FROM SWEEPER TO ENGINEER

ADRIENNE BIRD

Adrienne Bird
Comrade and Innovator

Adrienne Bird was a remarkable comrade, an innovator that lived a life of worth and service. Her father, Ken Bird, would have been as proud of what she achieved as she was of his achievements. It is a personal privilege and honour to have this opportunity to say something about her achievements and why they were of such an innovative and lasting nature. My thanks to merSETA and Adrienne's husband, Tony Vis.

In preparing for this, I needed to refresh an ageing memory, as to what happened when and how? I found documents from Adrienne. It turned out to be the draft of the Introduction and first chapter of her proposed thesis. The file was logged into my computer on the 15th April 2009 and I made some comments and suggestions on the 28th April 2009. In the manner of Adrienne, it was no small project she was embarking on, but I believe I was in fact looking at what will now be a book – the then introduction was titled From Sweeper to Engineer.

As always, with Adrienne the ideas and narrative were exhilarating – there were times when some tempering was needed, but only to hone them and not to curb them. What I read in 2009 was a serious political economist looking back at what had happened. When we started working together, many years before 2009, she would not have regarded herself as such - so in her intellectual life she lived out her fervent belief that all can learn and develop new capacities, if placed in the right supportive environment. She felt an obligation to provide that environment for all.

The draft Chapter 1 records that she first started working with the unions as an administrator for the FOSATU Labour Studies courses in 1983. At that time I was FOSATU Education Officer and thus began my work with Adrienne. The courses were two week residential courses held at St. Peters in Rosettenville – a safe haven in turmoil, closely associated with OR Tambo. FOSATU shop stewards and organisers from all over the country attended and studied with Phil Bonner, Duncan Innes and Eddie Webster – among others. The alumni of this course occupied, and occupy, many a position in the life of the union movement and all levels of the new democratic dispensation.

Adrienne soon graduated out of the administrative role, but for her teaching and administration were not distinct role models – administration is central to organisation and this was a constant theme in the Labour Studies course. We had seen the benefits of this link in our contact with the registered unions and union leadership such as Fred Sauls, Les Kettledas and the Secretary General of FOSATU, Joe Foster, had drummed this home. Bringing this varied experiential life into one place melded a new leadership and allowed learning from many inspirations.

This participative, yet theoretically rich, learning experience changed the views of both Adrienne and I – in my case a former university lecturer – and it also inculcated a love of the learning environment and the vitality of gaining knowledge. Adrienne was to shape this passion and translate it into systems, as I shall briefly recount.

It is not a common capacity to take ideas and have the persistence and patience to translate these into operational systems, let alone on an economy wide scale. Its probable that our wonderful learning experiences with an astrophysicist – Bernie Fanaroff – got us used to thinking on a mega scale. Adrienne sets out the path she walked, and the many involved in the process, in her book. I need not repeat that, so in what follows, I will highlight what I think are the three areas that Adrienne combined so effectively and importantly.

The first, is a stress on participative learning and research – in fact they should be the same process. We came to the realisation that learning occurs in a context and not only when you read your school primers – the more doing, combined with thinking, the better!

The second, is that the formalised education that we are so familiar with, indeed possibly trapped in, evolved in a time and placewithin the rise of manufacturing and industrialisation, which needed precise and replicable skills. However, as productive activity changes, we have to analyse and change. We needed to recognise learning beyond the certificate, or put another way to certificate the learning beyond the certificate – recognition of prior learning.

The third complexity we came to understand, is that wages, grades, skills and manufacturing/productive processes are an intricate and related ecosphere that has to be understood, in order to develop the human resources that must operate and occupy these notions and realities. It is not the skill that shapes the productive process, it is the human design of the productive process that will shape the skill requirements.

Adrienne was a passionate educator. By 1985 she had been pulled into MAWU as an education officer. By 1987 MAWU merged with the auto unions into NUMSA. NUMSA was therefore at the centre of the South African manufacturing sector. We had to start thinking about skills and the economic realities of wage bargaining. We had to think not only about the now, but about a possible democratic future for the working class. In 1987 I joined NUMSA as the National Education Officer and we began to plan a comprehensive study, learning and more innovatively a research programme.All the NUMSA regional education officers were actively involved, as were the negotiation leaders.

We established Research and Development Groups (RDG) in various key areas, including importantly skills and skill development. Many study tours took place and Adrienne, Jane Barrett and I spent time at the ILO looking at the various skill development programmes. It was the German system and a specific and novel approach taken by the Australian metal workers union that caught our eye and fitted with where our own thinking was going.

This research programme, led by Geoff Schreiner at the national level, provided an amazing platform for participative research and learning. Adrienne thrived in this environment. I recall that when we ran seminars shop stewards started as if they were sitting in a school and as we started they would pick up a pen ready to write down what they were going to be taught. Adrienne led the charge to change this – we changed the seating arrangements and seminars started with discussions of the nature of specific work places and what problems were prevalent. We started by recognising and learning from the participants knowledge. Then came the discussion on how we change the situation and what we would need to know if we wanted to do that. To this day this still seems to me to be the best way of setting about any serious policy making and its effective implementation – participative analysis and well administered collective implementation.

Adrienne set about systematising these methods and ideas – moving toward a new set of paths for skill development. From the experience of her father and her realisation that learning and skill development could take place very fast, if people were immersed in problem solving and had access to formalised knowledge, Adrienne became a firm advocate of recognition of prior learning. We gained confidence when we found such principles embodied in successful systems such as Germany. Adrienne started to build a team of home grown NUMSA experts around her – Sam Morotoba being her firm and very active emerging expert ally.

This work took us into the third and very crucial area. If one was going to recognise prior learning what skill set was to be accredited. There were the traditional artisanal skills, which clearly remained important. However, what would happen with more advanced industrialisation and the manifest drive toward mechanisation – digitisation and the role of ICT were just looming on the horizon. Here the Research and Development Groups and many study tours by national negotiators to see advance manufacturing in the USA, Japan, Germany, Italy, Sweden, Australia all made it clear that if South Africa opened its economy and wanted to industrialise, then it would have to revolutionise its approach to both skills and the organisation of work (including grading structures).

It was our experience in the auto assembly plants that illustrate this whole complex reorganisation process best. What was clear to the shop steward researchers was that a Japanese, German or American auto plant was massively mechanised. It was often hard to recognise the traditional artisan, as team work on production lines with digitally controlled machines predominated. We saw slightly differing responses to this and focussed on three. In Germany we found well organised sectoral and local training institutions and structures that could respond rapidly to new developments – the seed of the SETAs in our minds. In Japan we saw the average age of entrants into auto plants being quite high and with high levels of formal education (often tertiary). This allowed for rapid training on the job and multiskilling and tasking. The traditional rigid occupational divides – originating in the old guild system and the more recent artisanal streams – were breaking down.

In Australia we found what seemed ideally suited to our own distorted history of discrimination and undertraining in the workplace. Stated briefly they had reduced the number of grades in the auto assembly plants and introduced an incentive for training by adopting a concept of remuneration for skill acquired rather than skill applied – you moved up grades by the amount of training received and not by getting into a more skilled and therefore higher grade position. This is an oversimplification, as the designation of skill and grade is a pretty complex system and needs to be codified. Adrienne, the RDGs and Les Kettledas's team of OEM negotiators worked on this. The Australians kindly lent us Chris Lloyd for long periods. But the battle was won in the auto National Bargaining Forum (NBF).

This was an important breakthrough, as it is a vital platform to adapt to advanced manufacturing. What it does, is raise the general skill level and allow for rapid adaption to new skill needs. It facilitates team work and multi-skilling and tasking, but with fair remuneration. By the mid-nineties we learnt another advantage of such continuous training momentum. This we picked up in Germany. We were informed that most of the small and medium enterprises developed to supply the auto sector were formed by the highly trained workers that emerged from the assembly plants and tier one and two component suppliers. This is a positive skill supply path into the wider economy – it is essential for the assembly plants to have continuous skill development, if they are to be part of the global auto industry. So they must continuously train and losing skills to their supply chain is not a loss but an opportunity.

Adrienne and NUMSA had a comprehensive vision and clear understanding of the overall economic benefits of an effective skills development system, which was part of wider systems of grading and remuneration. However, it is also part of a wider drive for industrial development based on quality jobs.

A very important aspect of this whole story is how much international union solidarity helped it. The relatively short campaign in the NBF owes a great deal to this. Our shop steward leadership had extensive contact with metalworkers unions in the industrial economies – John Gomomo could engage in negotiations with a good knowledge of the VW plants in Germany, Daniel Dube was familiar with the Swedish systems – this undoubtedly strengthened our cause!

Adrienne would be the first to say that we have not fully realised the wider objective of the work she did in NUMSA and later in government. I share the view that this must be a priority area, especially if we are to talk of inclusive growth.It would be a fitting tribute to a worthy comrade if we address these challenges with the energy and determination of one Adrienne Bird.

- *Alec Erwin*

FROM SWEEPER TO ENGINEER

A history of apprentice and engineering qualifications in South Africa

ADRIENNE BIRD

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merSETA House
95 7th Ave
Melville
Johannesburg, South Africa
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93 Empire Road
Parktown
Johannesburg, South Africa
2193

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ADRIENNE BIRD

14 February 1955 - 15 June 2019

Photograph courtesy of Mickey von Maltitz

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Chapter contributors

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A list of all of the participants interviewed for research purposes, appears in Appendix II at the back of the book.

ACRONYMS AND ABBREVIATIONS

ABE	Adult Basic Education
ABET	Adult Basic Education and Training
ACTU	Australian Council of Trade Unions
AE	Adult Education
AECI	African Explosives and Chemical Industries
AMIC	A qualifications framework for motor industry (1995)
Akademie	Akademie vir Wetenskap en Kuns
ANC	African National Congress
APHEDA	Australian People's Health, Education and Development Agency
Armscor	Armaments Corporation of South Africa
AS&TS	Associated Scientific and Technical Societies
ASARET	Association of South African Registered Engineering Technicians
ASEE	Association of Supervisory Electrical Engineers
ASGISA	Accelerated and Shared Growth Initiative of South Africa
ASRET	Affiliation of Societies Representing Engineering Technicians
ATC I	Advanced Technical Certificate level 1
ATC II	Advanced Technical Certificate level 2
AUT	University and Technikons Advisory Council
BOC	Board of Control
BOC Reg. Cert. Eng.	Board of Control for Registered Certificated Engineers
BOCET	Board of Control for Engineering Technicians
BOCNOL	Board of Control for Professional Technologists (Engineering)
BSc	Bachelor of Science
CoC	Certificate of Competency
CATES	Colleges of Advanced Technical Education
CATES	Colleges of Advanced Technical Education
CCSATU	Coordinating Congress of South African Trade Unions
CEO	Chief Executive Officer
CEPD	Centre for Education Policy Development
CHE	Council on Higher Education
COSATU	Congress of South African Trade Unions
CTP	Committee of Technikon Principals
DET	Department of Education and Training
EAC	Education Advisory Committee
EASA	Engineering Association of South Africa
EATUSA	Electrical and Allied Trades Union of South Africa
ECSA	Engineering Council of South Africa
EGA	Engineering Graduates Association

EIC	Education Information Centre
EITB	Engineering Industry Training Board
EMP	Engineering and Manufacturing Processes
Eskom/ Escom/ ESCOM	Electricity Supply Commission
ET	Economic Trends
ETDPP	Education, Training and Development Practices Project
EU	European Union
FAK	Federasie van Afrikaanse Kultuurverenigingе
FOSATU	The Federation of South African Trade Unions
FSPE	Federation of Societies of Professional Engineers
GDP	Gross Domestic Product
GEAR	Growth, Employment and Redistribution: A Macroeconomic Strategy
GEC	General Electric Company
Gencor	Gencor Ltd was a South African based mining company
GPO	General Post Office
GTZ	German Technical Cooperation Agency
HE	Higher Education
HRD	Human Resources Development
IAS	Industrial Aid Society
ICMEESA	Institution of Certified Mechanical and Electrical Engineers, South Africa
ICRET	Interim Committee for the Registration of Engineering Technicians
ICRTE	Committee for the Registration of Technologists and Engineers
IMWG	Inter-Ministerial Task Team
IMF	International Metalworkers' Federation
Iscor / ISCOR	Iron and Steel Corporation (South Africa)
ISP	Industrial Strategy Project'
ITBs	Industry Training Boards
JET	Joint Educational Trust
MAWU	Metal and Allied Workers Union
MEIETB	Metal and Engineering Industries Education and Training Board
MICWU	Motor Industry Coloured Workers Union
MIEU	Motor Industry Employees Union
NAMB	National Artisan Moderation Body
NED	National Engineering Diploma
NEDLAC	National Economic Development and Labour Council
NEPI	National Education Policy Investigation Progress
NERSA	National Energy Regulator of South Africa
NICISEMI	National Industrial Council for Iron, Steel, Engineering and Metal Industries
NQF	National Qualification Framework

NSB	National Standards Body
NSDP	National Skills Development Plan
NTB	National Training Board
NTC I	National Technical Certificate level 1
NTC II	National Technical Certificate level 2
NTC III	National Technical Certificate level 3
NTC IV	National Technical Certificate level 4
NTC V	National Technical Certificate level 5
NTSI	National Training Strategy Initiative
NUMARWOSA	National Union of Motor Assembly and Rubber Workers of South Africa
NUMSA	National Union of Metalworkers of South Africa
NUSAS	National Union of South African Students
PAC	Pan Africanist Congress
PEJC	Professional Engineers Joint Council
POTWA	Post and Telecommunication Workers Association
PRISEC	Private Sector Education Council
PRISEC	Private Sector Education Council
PRP	Participatory Research Project
PSE	Post-Secondary Education
PTC	Preliminary Technical Certificate
RDG	Research and Development Groups
RDP	The Reconstruction and Development Programme
RPL	Recognition of Prior Learning
SAARET	South African association of Registerable Engineers and Technologists
SABC	South African Broadcasting……
SABRA	South African Bureau of Racial Affairs
SABS	South African Boilermakers Society
SABTACO	South African Black Technical and Allied Careers Organisation
SACHED	South Africa Council of Higher Education
SACP	South African Communist Party
SACPE	South African Council of Professional Engineers
SACTU	South Africa Congress of Trade Unions
SAEWA	South African Electrical Workers Association
SAFCERT	South African Certification Council (now Umalusi)
SAFTU	South African Federation of Trade Unions
SAICE	South African Institute of Certificated Engineers
SAIEE	South African Institute of Electrical Engineers
SAIERE	South African Institute of Electronic and Radio Engineers
SAIETE	South African Institute of Electrical Technician Engineers
SAIMENA	South African Institute for Marine Engineers and Naval Architects

SAIVCET	South African Institute of Vocation and Training
Samcor/ SAMCOR	South African Motor Corporation
SAPT	South African Posts and Telecommunications
SAQA	South African Qualifications Authority
SAR&H	South African Airways, Railways and Harbours
SATA	South African Telecommunications Association (of the Post Office)
SATTA	South African Telegraph and Telephone Employees Association
SATUC	South African Trade Union Council
SAVI	Die Suid-Afrikaanse Vereeniging van Ingenieurs
Std I - X	Schooling: Standards I-X, also Grades 1-12; also Form I-V
SEAWA	South African Electrical Workers Association
SEAWUSA	Steel, Engineering and Allied Workers Union of South Africa
SEIFSA	Steel and Engineering Industries Federation
SERTEC	Certification Council for Technikon Education
SETA	Sector Education Training Authority
SETO	Sector Education and Training Organisation
SIPs	Strategic Integrated Projects
SGB	Standards Generating Body
SOE	State Owned Enterprise
SPE	Society of Petroleum Engineers
TEB	Technical Education Board
TIME	Transvaal Institute of Mechanical Engineers
TUCSA	Trade Union Council of South Africa
UCGH	University of Cape of Good Hope
UCT	University of Cape Town
UDF	United Democratic Front
WEDCOM	Witwatersrand Education Committee
Wits	University of the Witwatersrand
WW 2	Second World War 1940-1944
WW I	First World War 1914-1918
4iR	Fourth Industrial Revolution

CHAPTER 1
INTRODUCTION

Men [and women] make their own [careers], but they do not make [them] as they please; they do not make [them] under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past'[1]

WHY THE TITLE "FROM SWEEPER TO ENGINEER" ?

> In the late eighties the National Union of Metalworkers of South Africa (NUMSA) envisioned a new order for workers historically consigned to the lowest rungs at work by both apartheid and capitalist dictates. 'From Sweeper to Engineer' was the slogan adopted to convey their aspirations to rise above their historically determined stations and to reach the highest pinnacles of human endeavour that only a handful of even the privileged attained. 'We can do it too!' was the message - 'just give us a chance and we'll show you'. "Oh *please*" was the chorus of the privileged that greeted them from outside, "are you saying my domestic worker could get a Ph.D.? Get *real*!" [2]

Adrienne Bird, the author of this book, was involved in the design of a new training model and chose to use the slogan, as the title of this book. The idea being to reflect on lessons learned regarding learning pathways, that actually existed, and that enabled poorly schooled engineering tradespeople to progress to become professional engineers. The questions she asked herself and sought answers for in the book include:

> Why were these pathways established, were they successful, how did they change and why were they ended? Should they be re-established and if so, what should their central features be and what is needed to re-establish them? [3]

Adrienne started writing the book in 2006, and after a break of many years, resumed the full-time task in 2018. Unfortunately, Adrienne passed away before completing Chapters 1 and 12. MerSETA and Wits Enterprise drove an initiative to complete the book. Tony Vis, her husband, and a number of her associates agreed to complete the missing chapters.

Adrienne did not have a passion – she lived a passion, to, in her own words, 'promote a system of learning that would enable those employed at humble levels in industry (and often poorly schooled) to advance to the maximum of their commitment and ability in a manner that served the interests of employers, workers and the country at large.' [4] This was to be achieved through the creation of progression learning pathways.

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[1] Author's adaptation of K. Marx and F. Engels, Collected Works, Volume 11 (London, 1985), p. 103 cited in P. Alexander, 2000, Workers, War and the Origins of Apartheid, p. 9.

[2] Author's Proposed Introduction for GTZ study. 2008. Unpublished.

[3] Author's funding proposal to MerSETA. 2018. Unpublished.

[4] DPME, 20 year review, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Chapter%204%20Economic%20Transformation.pdf – accessed 17 November 2019.

Underpinning Adrienne's commitment to progression learning pathways was the experience of her own father, Kenneth Bird. He came from a poor family and 'was forced to leave school early at the end of 1931 because it was the time of the Great Depression, his father was out of work and there were six mouths to feed at home'. He had completed Standard VII. In 1933, at the age of 18, Ken was lucky enough to be accepted as an apprentice with the Post Office and was able to take advantage of learning and training opportunities under very difficult economic circumstances. Over a lifetime he acquired new skills levels and expertise while working, finally qualifying as an engineer.

On the walls of Adrienne's home are Ken's framed certificates, acknowledging his journey from technician to finally become a professional engineer.

What was an important revelation to Adrienne, was that the learning/training in employment pathways had historically existed. The problem was that for some reason the pathway links, mentioned above, were broken and this created enormous gaps for individuals trying to gain learning recognition and progression opportunities in the South African education and training system.

CHASING A VISION

Adrienne's driving passion for this vision was contagious. Areas where Adrienne herself played a leading role with regards to the establishment of policies and mechanisms to enable progression pathways, is evident. Broadly in the storyline highlighted below, one can see in her involvement with the trade unions, the events leading to the National Training Strategy Initiative (NTSI) and her role in government, all of which are described within the context of this book.

According to Johnathan Jansen

> The origins of post-apartheid policy for education and training lie even further back in a popular labour studies course offered in the 1980's …….In May 1983, a young schoolteacher returning from the United Kingdom joined this course [actually she was brought back to run it according to Taffy Adler, FOSATU Ed Sec at the time] which involved officials from FOSATU. This teacher was Adrienne Bird, who was to become perhaps the single most important force in the redefinition of education and training in South Africa over the next decade.[5]

Her interest in learning pathways was sparked in the late 1980s when she was working for NUMSA. She was tasked to coordinate a Research and Development Group (RDG) with a number of union members and workers to develop training policy proposals.

The mandate of the RDG team was "…to move beyond being solely 'against Apartheid' and to formulate a vision of what training policy … should propose to the government-in-waiting at the dawn of a new democracy. At the time no policies, and career pathway models were in

[5] Jansen, J D & Sayed, Y (editors), 2001. Implementing Educational Policies: The South African Experience. University of Cape Town Press. p 14

place that could accommodate a new political environment. But emboldened by the climate of hope and change the RDG scoured the world, past and present, for models." [6]

Adrienne represented NUMSA on various Industry Education and Training Boards, taking the policy discussions of the RDG forward. She also represented the Congress of South African Trade Unions (COSATU) on the National Training Board (NTB), a tripartite institution, with representatives from business, labour and the public sector, responsible for amongst others, advising the Minister of Labour on training related issues. She and other union comrades also took the perspectives into the National Education Policy Investigation and subsequently into the processes to develop post-1994 Implementation Plans for Education and Training.

It was never easy in the early 1990s, remembers NUMSA colleague at the time, Jenny Grice:

> There had been deep mistrust between all parties – government, business and trade unions. It took special people to build that trust, to rebuild links between all the parties to find a common future.

The NTB appointed eight working committees to embark on a process to develop recommendations on a national training strategy for South Africa in 1993. Adrienne was part of Working Committee 2, responsible for developing a proposal on integrating vocational education and training; competencies and career paths; and certification.

In this working committee, Adrienne played a critical role, not only bringing to the table the policy discussions of the RDG, but also in bringing working group members together, especially organised labour and organised business. As Janet Lopez recalls:

> We were attending a four-day session of the NTB. Bryan [Phillips – representing employers] and Adrienne pushed off and sat out in the garden under the tree – I teased her over lunch. She said "the two of us were giving birth, birth to the South African NQF! A lot of the thinking has been through NUMSA and the trade union movement but unless we get employers on board, we are not going to have a South African NQF." [7]

Secretary to this working group, Santa van Niekerk recalls a specific day:

> After long discussions and elaborations, the representative of organised business (Bryan Phillips) thanked Adrienne (representative of organized labour) and referred to her as an "Angel of Peace". Coming from a business representative in those days really said something! Adrienne's passion for training and creating mechanisms to allow for learning pathways was such that she not only interacted with "like-minded" people, but actually created a community of "like-minded" people!

The National Training Strategy Initiative Report (NTSI) (commonly known as the "Blue Book") and the subsequent publication of *Ways of seeing the NQF* as well as various pilot projects set up within the spirit of the NTSI, such as the career pathing project at the Metal Engineering Industries Education and Training Board (MEIETB) and the Education, Training and Development Practices Project (ETDPP) were managed by Adrienne herself. These reports eventually informed the policy of the ANC led government when it came to power in 1994. It also informed the establishment of the South African National Qualifications Framework (NQF) with the objective to deal with legacies of job reservation and retrogressive and discriminatory training practices by creating ladders of opportunity or learning and career pathways.

[6] Author's funding proposal to Wits Enterprise, September 2018. Unpublished.

[7] Janet Lopez recollections, workshop 21 November 2019.

With regards to *Ways of seeing the NQF*, Adrienne played a crucial role in working together with the diverse and eclectic group, representing higher education, professional bodies, educators, assessment experts, adult basic education specialists, industry training boards and unions. Yet again Adrienne's infectious enthusiasm for processes to inform education and training and career pathing possibilities could not be missed, and is acknowledged in the following statement in *Ways of Seeing the NQF* "Adrienne Bird provided the inspiration at the workshops when everybody started flagging…"[8]

An Inter-Ministerial Working Group was appointed by the Ministers of Labour and Education to prepare legislation on the South African NQF. Adrienne was a member of this team and her hand, or should one rather say, heart, was obvious in the first *White Paper on Education and Training in a Democratic South Africa* (March 1995). The White Paper indicated that an integrated approach to education and training, linked to the NQF, would open doors of opportunity for people whose academic or career paths had been needlessly blocked because their prior knowledge (acquired informally or by work experience), had not been assessed and certified, or because their qualifications had not been recognised for admission to further learning, or employment purposes. The *White Paper on Education and Training* resulted in the establishment of the South African Qualifications Authority (SAQA) in 1995 to set up and implement the NQF.

Speakers at Adrienne's memorial service spoke of how her "driving passion for this vision was contagious". As Chris Vorwerk put it:

> She had the ability to get you excited about her vision only to find that in her gently persuasive way you had suddenly become one of her champions to achieve her vision.

Adrienne was one of the first employees appointed at the Department of Labour in 1995, after the elections of 1994. As Chief Director Employment and Skills Development Services (ESDS), she also had to fulfil the role of 'Registrar of Manpower' as per the Manpower Training Act of 1981. "Adrienne was always an avid defender and advocate of women's rights," remembers Jenny Grice, and Chris Vorwerk remembers how this archaic title occasioned some mirthful comments from her.

In government, Adrienne could finally articulate her vision more fully and drive processes to translate it into national policy (legislation). Her passion for this vision was contagious. Amongst others she was responsible for facilitating and driving policy development and stakeholder participation and consultation processes. Her style was to work with like-minded people, listen to their needs and opinions and try to develop policy and infrastructure to achieve this.

This included the Skills Development Act (1998) and Skills Development Levies Act (1999). She also managed, amongst others the establishment and support of 25 Sector Education and Training Authorities and the National Skills Fund. All this was to promote and enable workplace-based learning, through the implementation of skills programmes and learnerships, which were all firmly linked to the NQF to ensure learning pathways for workers.

Adrienne sought and obtained international aid (technical assistance) from the German Technical Co-operation Agency (GTZ) as well as the European Union (EU) for pilot projects

[8] Human Sciences Research Council. 1995. Ways of seeing the National Qualifications Framework. Pretoria: HSRC

and research to inform the policy proposals for the Skills Development Act and the SETA demarcation process.

“Her capacity for work – and her enthusiasm ‘to get things done’ – were remarkable”, says Mike Hanson, one of the team leaders in the EU-funded technical assistance programme that was managed by Werner Heitman of GTZ. “She worked day and night and receiving emails from her at 2 am in the morning was not unusual at all. She burned the midnight candle continuously to develop new policies, strategies and ideas to try and qualify the workforce,” confirms Adri Solomon one of the Deputy Directors in the ESDS branch.

Adrienne’s enthusiasm and selfless contribution in aligning all efforts to benefit workers and work-based learning was acknowledged by everybody and anybody who ever had the opportunity to work with her. Christoph Vorwerk can recall one such an incident during one of the pilot projects, the Engineering and Manufacturing Processes (EMP) project:

> A working group was refining unit standards for inclusion in the final report. In the absence of a formal NQF logo they selected a piece of clip art representing a phoenix rising from the ashes. But the real reason was a tip of the hat to Adrienne by the participants.

Whilst Adrienne and Lindsay Falkov (one of the Department of Labour (DoL) Directors) were trying to imagine and formulate appropriate policy proposals to fund skills development in the new landscape, there was considerable pushback from National Treasury, not wanting to introduce a ‘ring-fenced’ tax! Tony Vis recalls:

> Treasury was opposed to the Skills Levy because having ring-fenced taxes was frowned upon. Business was hostile to the levy too because, even though it was supposed to be their money set aside, they foresaw that the management of the fund would get bogged down in bureaucracy, besides which they did not want to be burdened with paying for training except for whatever workplace training they were already doing. With there being such inevitable pushback, Adrienne and her team were unlikely to get Treasury to accept the skills levy, regardless of the social significance. In the end Adrienne boldly took the conversation to Trevor Manual, seeking his approval.

All this work made her a national figure and she transformed what had been termed industrial training into skills development. Her influence in this space in such a short time was, and still is, quite remarkable.

The perception that the an integrated NQF was never really achieved resulted in the appointment of a study team to review the implementation of the NQF. The two world views of learning (that of formal education and that of non-formal and informal learning, mostly through social and on-the-job experience, one under the Department of Education and the other under the Department of Labour), seemed to irreconcilable and possibly the reason for not establishing the pathways that Adrienne so cherished. The study team published its report in 2002 and the two departments then conferred to find a solution. This was a tedious consultation process lasting seven years.

By this time, Adrienne held the position of Deputy Director General: Employment and Skills Development Services. Sebolelo Nomvete who worked with Adrienne at the DoL remembers Adrienne’s strong belief that her father’s work experience could serve as an example:

> There were hot debates that we had just after the NQF [review was started]. Adrienne brought her father’s certificates after he passed on. We were at Indlela, she put the certificates there

> and said, 'this is what happened with my father, this is what we want for everybody. How do we get this system to work for everybody?"[9]

It was an intense time as Sebolelo Nomvete remembers:

> [There were] very intense debates and intense issues at government level between ourselves [DoL] and DoE. Every time I sit at the MerSETA [now], I always think of one thing, Adrienne and I late on a Saturday at Indlela and she said to me "Sebo, we are trying to save the SETAs here and save our skills policy." That intensity!' …[10]

Adrienne was never deterred. According to Tony, 'inviting diverse groups of people into important discussions was part of how Adrienne chose to do things. At other times she would be at her desk or in her bedroom with her laptop dreaming up conceptual ideas to present to people 'out there'.

This consultation process (reaching an agreement on the way forward regarding the NQF review recommendations) eventually led to the revision of the NQF legislation, and amongst other things the establishment of an Occupational Qualifications Sub-framework (OQSF).

Adrienne had for some time been interested in the concept of occupation. "She was always thinking about innovative approaches", remembers Mike Hanson. In this case, by starting with occupations Adrienne was also able to conceptualise a revised architecture for developing work-related qualifications. Chris Vorwerk remembers: "At a meeting in her board room on 27 July 2004 she and her senior officials hammered out what became the architecture for the Occupational Qualifications Sub Framework (OQSF), one of the three sub-frameworks of the new interrelated NQF" – at that stage only a vision and dream!

Even though Adrienne was no longer employed by the Department of Labour between 2006 and 2009, her concept of using occupations as an organising framework, was an idea pursued by those who had worked closely alongside her and thus influenced by her vision. With proposals leading to the eventual establishment of the Quality Council for Trades and Occupations (QCTO), occupations became an organising principle.

IMPLEMENTING THE VISION

In short Adrienne's involvement after returning to government included acting as CEO of the QCTO, after it became operational in 2010 and the formulation of skills development strategy for the Strategic Integrated Projects as part of the National Infrastructure Plan (including the building of Centres of Specialisation, where education and training providers would focus on developing skills "as near as possible to the source of demand"[11]). Adrienne actively engaged in models for developing occupational qualifications and bringing role players together to ensure progression pathways, at least within the OQSF.

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[9] Sebolelo Nomvete recollections at Chapter 12 workshop, 21 November 2019.

[10] Sebolelo Nomvete recollections at Chapter 12 workshop, 21 November 2019

[11] Department of Higher Education and Training. 2015. Skills Through SIPS – Progress Report March 2015. Retrieved on 2019-11-24 from http://www.dhet.gov.za/Commissions%20Reports/SIPS%20March%2015%20close%20out%20report.pdf

At her DHET retirement function in 2018, after all the tributes to her, she said to Chris Vorwerk "It's all nonsense of course." And then after a pause, "There's still so much to be done."

According to Mickey von Maltitz,

> Adrienne was a modern-day hero of the South African post-school education system. As a unionist she was driven by a deep purpose to see equality and justice, as an educator she contributed to the social design of an education system that aimed to provide redress for millions of people so that they could be free of an oppressive apartheid system, and all the while she retained compassion and respect for her fellow colleagues who would walk her journey with her, even those who crossed her path for only a short while.

WHY THE BOOK?

Adrienne was inspired to write a book when she first researched and recorded her own father's story in 1995 as a birthday present for his 80th birthday as Tony elaborates:

> It however only started taking shape in 2006 when Adrienne obtained support from the Skills Development Programme of GIZ (then GTZ) and managed by Werner Heitmann, to undertake research into the history of career pathing in the engineering sector in South Africa since the 1920's. The aim was to describe how and why these pathways worked and to explore possible lessons that could be applied and to capture this in a book. This work was interrupted in 2009 and resumed in 2018 under contract of the MerSETA."

The questions she asked herself and sought answers for in the book include:

> Why were these pathways established, were they successful, how did they change and why were they ended? Should they be re-established and if so, what should their central features be and what is needed to re-establish them?[12]

According to Adrienne, the quest for learning pathways stems back to the late eighties and the National Union of Metalworkers of South Africa (NUMSA) processes.

> Workers were tired of being told to accept their lot and they were in no mood to make peace with this 'fact' or even 'the fact' that only their children might be able to rise. … The ideas drew on the dreams of other workers worldwide – ideas generously shared as others wanted to help workers shed the manacles of apartheid and rise. The Australian metalworkers were a particular inspiration – as they had set off on a similar path a short while earlier, but the lessons of those who had walked the path far longer, such as the German metalworkers, had shown that it could indeed be done. The plan they formulated was of a grading system expressed not in terms of fragmented tasks but in terms of a ladder of incremental education and training attainments, linked to a rising scale of payments to be awarded on the basis of 'skills acquired' not necessarily of skill used…"[13]

She queried why, after 30 years and despite policy interventions the following questions remain:

> Was the vision flawed? Some discussions on this question focus on the vision itself – was the thinking naïve? Others turn to the implementation path followed, was it to blame? Both? Can the vision be 'nuanced' and the system 'tweaked' and 'improved'? The loyal cite glimpses of successes and proclaim the future is bright if … but the sceptical say 'pack up and go home'. But what none have done, to my knowledge, is to look back to a time when stories abound of people who were poor and who, for financial reasons, were forced to begin their working lives in humble stations after they left school (many without completing it first) – but who

[12] Author's funding proposal to MerSETA. 2018.

[13] Author's funding proposal to MerSETA. 2018.

> subsequently rose up the ranks to become professionals. …. They were helped, they were inwardly driven, and they succeeded. I know this to have been the case, even though the memory of these routes is fading – because my own father's story is a case in point and the emphasised before he died that he was not alone. This account seeks to record these stories as well as to answer the question 'what made their success possible?' And then 'what happened to drive this route from the menu of possibilities available to the workforce of today? The hope is to learn lessons which can help to improve the prospects of the majority today." [14]

In her view the necessity for capturing these stories can be explained by the following quotes:

> "Forgetting is a crucial factor in the creation of a nation." (Ernest Renan).
> Remembering is crucial for awakening from nationalism.
> "The struggle of man against power is the struggle of memory over forgetting" (Milan Kundera)
> … the struggle to remember the stories that empower us against power. [15]

Adrienne interviewed many people with similar stories to that of her father in order to re-construct the education and training systems that underpinned the pathways each travelled. In her own words, "often these stories also embody the conflicts at the time and the social, economic and technological forces that drove their further evolution."

She also indicated that she wished to: "… reflect on the historical lessons, understand the challenges better and re-consider new possibilities."

Adrienne was confident that the

> … research will revive knowledge that has largely been lost regarding earlier systems of education and training, some features of which have important lessons for policy today. It will also bring to light the important roles played by different interest groups and remind policy makers of viewpoints expressed by those who 'lost' the debates at earlier times but whose perspectives could well assist to build an alternative system with fluid pathways that permit easy access at all levels.[16]

THE PEOPLE LENS AS A FRAMEWORK

In order to make her reflection manageable and not to trivialise the changes that have occurred, she devised a PEOPLE perspective lens to look at different phases of the training system as it evolved over time in South Africa. This lens uses the word as an acronym and posits a set of dimensions which need to be unpacked to understand the context within which a particular training and career path system took shape. The acronym must further be understood dynamically as changes were afoot within and between each one at every stage.

An outline of the framework is presented diagrammatically below:

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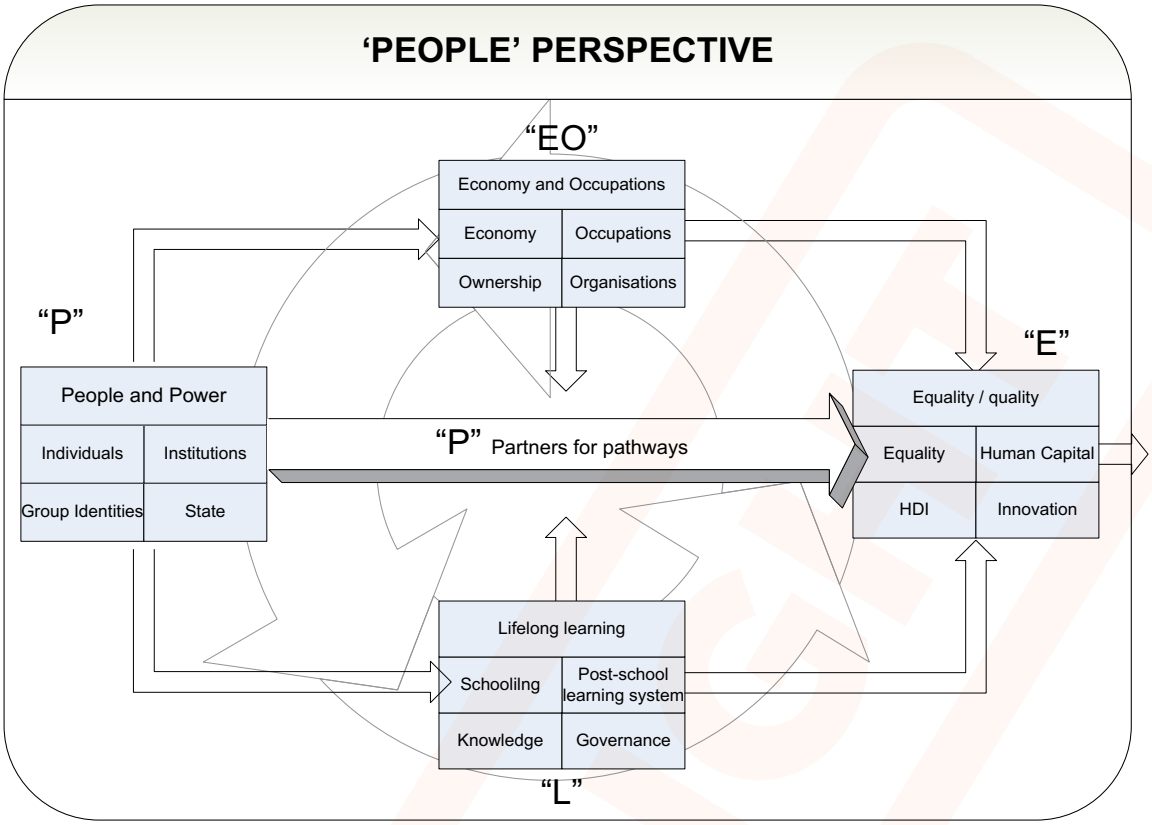
[14] Author's funding proposal to MerSETA. 2018.
[15] David R. Loy. 2010. The World is made of Stories. Wisdom Publications. Boston, p.59
[16] Author's funding proposal to MerSETA. 2018.



'P' – **People and places**

This is a storytelling lens. It aims to introduce the individual or group of individuals whose career paths and system engagements give insight in the possibilities that those times held.

'E' - Education and training landscape

This lens tells of the schooling system operational at the time and how it interfaced with the training system – meaning what entry and selection procedures applied, both formal and informal.

'O' - Occupational architecture and organisations

This lens describes the basic work organisation in operation at the time and that were encountered on entry to the workplace. These normally draw on the typical grading systems in operation.

'P' - Political economy

This is a wider lens. It explores the reasons why pathways were opening up or closing down in the broader society.

'L' - Ladders and levers

This lens focuses on the ladders themselves and looks at the ways in which the ladder itself was maintained or challenged by the various interest groups.

'E' - Evaluation and impact

The final lens seeks to evaluate the impact of the system at the time.

Interviews with those who were directly involved in achieving career pathways is the primary methodological tool used to gather information, and it is supported by the use of primary resources. A limited amount of secondary resource material is referenced where directly relevant.

She chose to focus on occupations and pathways rather than specific industrial sectors.

> Occupations by their very nature straddle industrial sectors. Even today an electrician can find work in up to seventeen economic sectors as too can an engineer. This work is focused primarily on occupations and pathways between them, but to give the issues texture and depth the metal and engineering, telecommunications, construction and mining sectors are variously explored.[17]

On the economic front special emphasis is given to two sectors – electronics and telecommunications. These sectors are not seen only as economic categories, they are also seen through the eyes of people whose careers journeyed through them. Adrienne chose the South African Post Office (SAPO), representing the telecommunications industry, principally because her father came up this route and she knew his story well, and also because it illustrates the enormous contribution made by parastatals to training in South Africa and the impact of privatisation (in Telkom's case in the early 1990s) on training. Electronics became a supply industry to SAPO after the Second World War and fell under the broad umbrella of the metal and engineering industry which NUMSA later organised – in this way the two 'story lines' are woven together.

This book follows a historical pathway in more or less chronological order.

Chapter 2: Sweepers with ideas beyond their station

This chapter recounts the period just as the clouds of apartheid were beginning to clear and people were asking what should be done when democracy dawned in South Africa. The chapter traces the evolution of the Training Research and Development Group (RDG) within NUMSA which led to a group of 26 unionists devoting themselves full-time to the question of training policy for the better part of three months. It spells out the debates that were held and the vision that the Training RDG developed, which was subsequently adopted by both NUMSA, and the federation to which it belonged, the Congress of South African Trade Unions (COSATU).

Chapter 3: From artisan to certificated engineer

As the South African economy became more defined by mining, particularly on the Witwatersrand, the men in charge were required to demonstrate a higher level of competency in their profession. This led to a campaign for the certification of mining engineers, and the unfolding of various legal processes, and subsequent need for competency certificates.

Chapter 4: From petrol pump attendant to assistant engineer

It is to the time between the two world wars that this chapter turns. It is also the period when Kenneth Bird and others rose from 'sweepers to engineers' by travelling the articulated qualifications route suggested by NUMSA in the previous chapter.

[17] Author's draft project proposal to Wits Enterprise. August 2018. Unpublished.

Chapter 5: From school to engineer

The pathway to becoming an engineer was varied and with the discovery of gold and diamonds, new engineering degrees for those with financial means, began to be offered at various at universities.

Chapter 6: War and post war occupational shifts

With the war efforts, the fundamental need for scientific knowledge increased, bringing with it a diversification of engineering roles. This chapter focuses on the enormous impact that World War II had on career progression possibilities for apprentices, and the shaping of the artisans in the post-war period.

Chapter 7: The apartheid years

This chapter traces events after World War II and then progresses through the decades when 'grand apartheid' flourished and then faltered in the early seventies. It follows two distinct trends, the racist policy of the Nationalist Party and its impact on achieving qualifications, and secondly, even though colleges were under state control, the boundaries between education systems that were becoming too difficult to bridge.

Chapter 8: The birth of technicians

In an environment of increasing mechanisation and automation, professionals were needed who had greater skills than an artisan, a kind of super artisan. They formed part of the engineering team but did not have the education or high-level skills of the engineers. This gave rise to a new occupation – the Engineering Technician.

Chapter 9: Professional engineers

Two major events occurred that were to have a lasting effect on qualifications within the engineering profession. The first was the appointment of the Straszacker Commission in December 1957, and the second was the Professional Engineers Act of 1968.

Chapter 10: The birth of technologists

It was 1973, at the Federation of Societies of Professional Engineers conference that a recommendation was made to government that a commission of enquiry into the status of Engineering Technicians be investigated. Its findings were to become the Goode Report. At a similar time two other Acts were to come under scrutiny, namely The Professional Engineers Act of 1968 was amended in 1979, and The Advanced Technical Act, No 42 of 1979. These events were to have a lasting impact on the engineering profession as a whole.

Chapter 11: Pre- and post- democracy

After the heady days of Mandela's release and the crescendo of the elections – implementation began and the vision, now embodied in political policy statements, was the light towards which South Africa strived. The only solution for South Africa would be to transition to a democracy with the liberation movements. This finally happened in 1994, amid enormous challenges, when the ANC entered as the ruling party, with its policy on Reconstruction and Development (RDP). This chapter follows the events that happened in the skills and training environment during the post democratic era.

Chapter 12: Foresight with hindsight: searching for the middle way

What is the way forward for the articulation of qualifications as was the case historically for engineers? Should it be the path forged by our ancestors, or a new path based along the lines of the NQF? Does articulation of qualifications currently exist and who is conducting those all-important RPLs? Many professions gathered to debate these issues to find solutions to the way forward. Adrienne herself raised many questions, some idealistic, others based on her beliefs and knowledge of the history described in this book. The solutions will always be based on matters highlighted in the PEOPLE lens and be biased by each individual's experience. In this final chapter, readers are encouraged to continue the debate to find the best middle way.

CHAPTER 2

SWEEPERS WITH IDEAS BEYOND THEIR STATION

"From each according to his[1] ability
To each according to his need"
Preamble to NUMSA Constitution, adopted 1987.[2]

PEOPLE AND PLACES

In 1989 a group of sweepers dreamt of escaping their dead-end jobs. These dreamers were products of their time and place but were also visionaries of a new time and place, where no-one would be trapped at the bottom of the pile but would be able to learn and work at increasingly higher levels of skill and responsibility over a lifetime.

They came from a spectrum of backgrounds and from all parts of the country, but they had three things in common. First, their opposition to apartheid: all had lived under apartheid since birth, so their identities and experiences had been tarnished by it, and all were committed

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[1] The voice of the women delegates at the launching NUMSA Congress was soft. The women delegates represented a small minority of the membership in a male-dominated industry. Nevertheless they replaced 'his' with 'her' in bold gold lettering on their bright red congress T-shirts.

[2] The full text of the preamble to NUMSA's constitution ran as follows:

Constitution of the National Union of Metalworkers of South Africa
1. Preamble
We, the members of the National Union of South Africa, firmly commit ourselves to a united South Africa, free of oppression and economic exploitation.
We believe that this can only be achieved under the leadership of an organised and united working class. Our experience has taught us that to achieve this goal we must:
(a) fight and oppose discrimination in all its forms within the union, the factories and in society;
(b) strive for maximum unity amongst organised metalworkers and organise every unorganised metalworker into our national industrial union;
(c) ensure that all levels of our union are democratically structured and controlled by the worker members themselves through elected worker committees;
(d) encourage democratic worker leadership and organisation in our factories and in all spheres of society;
(e) reinforce and encourage progressive international worker-to-worker contact so as to strengthen the world-wide society of metalworkers.
We call on all metalworkers who identify with these principles and aims to join us and the metalworkers we represent, as comrades in the struggle ahead. We call on all metalworkers to set aside any prejudices they may have and strive for unity under the guiding slogan of the international working class:
"From each according to his ability; to each according to his needs".

deeply to contributing to its demise. Second, they were roughly the same age, around 30, beyond the first flush of youth, but still young enough not to give in to the despair of 'being too late'. Third, they were all active members of the metalworkers' union.

The National Union of Metalworkers of South Africa (NUMSA), had been formed two years earlier, in 1987.[3] It was created by the merger of four unions, the Metal and Allied Workers Union (MAWU), a militant, industrial union of predominantly African workers doing jobs largely scheduled below that of an artisan;[4] the Motor Industry Coloured (later Combined) Workers Union (MICWU) with a traditional base of coloured artisans and a newer influx of African repair assistants and petrol pump attendants;[5] the National Union of Motor Assembly and Rubber Workers of South Africa (NUMARWOSA), representing coloured workers in the auto industry outside of the Western Cape – including some artisan assembly line workers; and the Western Province Motor Assemblers Workers Union (WPMAWU), which represented coloured auto assemblers in the Cape Town area.

NUMSA embodied both traditional craft traditions as well as militant industrial unionism in a single organisation.[6] In different times such varying organisational histories might have torn the young union apart. But there was a common enemy – apartheid – and the young army of African, Coloured, Indian workers, with a smattering of White comrades, united across these historical divides to fight against apartheid and for workers' rights.[7]

But having a common enemy was not enough. 'It's time to say what we're *for*; it's no longer enough simply to be *against* apartheid', said Alec Erwin, then the National Education Secretary of NUMSA, to his team of regional educators and national officials one hot, humid afternoon in Durban, early in 1988.[8]

The guiding principles for such a mobilisation had been set out in resolutions adopted at the union's inaugural congress in 1987. Little progress was made, however, as acknowledged at NUMSA's Second National Congress in 1989 when it adopted a further resolution which noted that:[9]

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[3] K. A. Forrest, 'Power, Independence and Worker Democracy in the Development of the National Union of Metalworkers of South Africa (NUMSA) and its predecessors: 1980-1995'. Unpublished Ph.D. thesis, University of the Witwatersrand, 2005, p. 42.

[4] Its 1981 registration certificate recognised it in the Iron, Steel, Engineering and Metallurgical Industry, in the Electrical Engineering Industry, in the Plastics Industry, and in the Tyre and Rubber manufacturing Industry (each in designated Magisterial Districts) BUT specifically excluded: '… journeymen, trainees, apprentices, probationers, foremen, supervisors, pupil engineers, technicians and monthly salaried staff'

[5] Forrest, 'Power, Independence and Worker Democracy', p. 130.

[6] National Union of Metalworkers of South Africa, Certificate of Registration, signed 22 January 1990, Department of Labour, Pretoria, South Africa.

[7] A full account of this union's history is provided by Forrest, 'Power, Independence and Worker Democracy'.

[8] Personal recollection of the author.

[9] NUMSA, 'Numsa Political policy', *South African Labour Bulletin,* 14(2), June 1989, p. 53.

RESOLUTIONS ADOPTED AT NUMSA'S SECOND CONGRESS IN 1989

i. The NUMSA launching congress in 1987 passed political policy resolutions entitled 'The Freedom Charter and the Struggle for Socialism' and 'the Principles of Working-Class Alliance';
ii. We have not taken our resolutions seriously and put them into practice;
iii. Our resolutions call for the discussion and a development of a working-class programme of action for unifying and strengthening the working class and showing the way forward. This has not been done.

…

NUMSA resolves:

1. To reaffirm the 1987 political policy resolution of NUMSA in respect of the Freedom Charter[10] as a programme of minimum demands, the urgency of a mass united front alliance of the working class in the struggle for democracy and socialism, the urgent need for a Working Class Political programme and its discussion at all levels of our organisation.

In passing it can be noted that the Freedom Charter specifically stated: 'All people shall have equal rights … to enter all trades, crafts and professions.'[11] It also stated 'Education shall be free, compulsory, universal and equal for all children; higher education and technical training shall be opened to all by means of state allowances and scholarships awarded on the basis of merit. Adult illiteracy shall be ended by a mass state education plan'.[12]

In order to make progress, the union leadership established Research and Development Groups (RDGs) to generate both bargaining demands and broader policy proposals in support of the working class and poor. Each was coordinated by a union official and members were drawn from the different sections of the union.

A range of RDGs was established: one on Health and Medical Aid Schemes; another on Housing; a third on the Electronic Sector and most significantly, the (Job) Training RDG, later called the Training RDG.

Training was treated as a priority because the union had been drawn into the Industry Training Board (ITB) structures.[13] A major concern for the union was to formulate demands for training that met the needs of all workers, not just artisans but operators and labourers as well.

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[10] The Freedom Charter was adopted on 26 June 1955 in Kliptown, Johannesburg at the Congress of the People. The Congress Alliance organised the congress which was made up of the African National Congress (ANC), the South African Indian Congress, the South African Coloured Peoples Organisation and the South African Congress of Democrats. https://www.sahistory.org.za/article/congress-people-and-freedom-charter (Accessed 5 February 2019).

[11] Freedom Charter, https://www.marxists.org/subject/africa/anc/1955/freedom-charter.htm (Accessed 28 October 2018).

[12] *Ibid.*

[13] Government had set up tripartite industry training boards (ITBs) in each industry in 1990. Composed of employers, trade unions and a government official, their job was to 'oversee apprenticeships, introduce modularised training, develop syllabuses, evaluate training and oversee its financing.' K. Forrest, *Metal that will not bend; National Union of Metalworkers of South Africa (NUMSA): 1980-1995.* Johannesburg: Wits University Press, 2011, p. 216.

The challenge was sharpest in the engineering sector. It started with a telephone call from Alan Grimble, the then General Manager of the Metal and Engineering Industries Education and Training Board (MEIETB). He phoned me to complain that NUMSA members on the East Rand were on strike against a literacy course that was being run 'for their benefit'. Grimble argued that the union should 'get its members back to work'.

I took the call as NUMSA's Education Officer for the Witwatersrand Education Committee (WEDCOM). I knew nothing about the MEIETB and its existence was also news to members of the Committee.[14]

Grimble made a presentation to WEDCOM in early 1988. He explained that as far back as 1975, in response to a shortage of artisans, all engineering companies had agreed to make a monthly contribution to a Metal and Engineering Industries Education and Training Fund to enable those who trained apprentices to get a grant to offset the costs of training.[15] The MEIETB was established to manage the Fund. The Board was made up of equal numbers of employers and registered (i.e. predominantly white) trade unions that were then parties to the National Industrial Council for the Iron, Steel, Engineering and Metal Industries (NICISEMI).

He further explained that in 1980, due to a world recession and the structural weaknesses of the South African economy,[16] a further agreement on 'Security of Employment' had been entered into[17] to 'establish training and retraining procedures'.[18] In furtherance of this objective, the *Metal and Engineering Industries Education and Training Fund – Supplementary Scheme* was established, which focused on all non-artisans.[19] Under this scheme company-specific training courses could be registered with the Board and grants paid to the companies that implemented them, based on a percentage of the wages of trainees and trainers. The scheme was funded by a 30c-per-worker-per-month levy on all employees (excluding artisans).[20] The Income Tax Amendment Act 30 of 1984 had provided further incentives for training.

Initially the grants paid under this scheme were for company-specific training only. However, Grimble went on to explain how in 1982, Jane Hlongwane, the General Secretary of the Steel,

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[14] [The objection to the training programme was an ideological one. The workers felt that the programme was biased in favour of capitalism, with little attention being given to other economic systems. The dispute was solved eventually.]

[15] Metal and Engineering Industries Education and Training Fund Agreement, *Government Gazette* No. 2809, 11 September 1970. Metal and Engineering Industries Education and Training Fund Agreement, Government Notice R.2000 of 24 October 1975, amended *Government Gazette* No. 7411, 20 February 1981.

[16] Forrest, 'Power, Independence and Worker Democracy', p. 82.

[17] Clause 35 Security of Employment, *Government Gazette* No. 7103, R. 1329, 27 June 1980.

[18] *Ibid*, clause 35(1)(iii) (ae). This was a year after the parties entered an agreement that abolished job reservation in the industry; see Forrest, 'Power, Independence and Worker Democracy', p. 38.

[19] *Ibid*, clause 35 (1)(iii) (aa). This agreement was now committed to 'provide equal employment opportunities for all groups of workers'.

[20] Supplementary Education and Training Fund Agreement signed 30 May 1980 and published in *Government Gazette* 7103, R1329, 27 June 1980. See clause 2(a).

Engineering and Allied Workers Union of South Africa (SEAWUSA) and the first black trade unionist to join its board after the legislative changes of 1979,[21] had challenged the Board to use the resources of the Supplementary Fund to fund literacy programmes as 'good workers had no chance of moving upward because of their illiteracy.'[22] However, Grimble modestly added that it was only after he had been appointed as General Manager to the Board in 1985, that there was progress on this proposal:

> A sum of R75 000 was allocated for the pilot project from the Supplementary Scheme. After an investigation of the services available for literacy training in industry a start to the programme was made at the beginning of 1987. The services of Mr Ken Baucom, a literacy consultant, were employed to train a trainer and provide resource material for a pilot project that ran from February 1987 to February 1988. Mr Edward French was then employed to evaluate the programme.[23]

Although the evaluator, Edward French, later slammed the programme – and indirectly justified the striking workers' scepticism about it[24] – at the time of his presentation to WEDCOM, neither Grimble nor his Board could understand why a group of metal workers on the East Rand were striking against it.

WEDCOM members had agreed in advance not to engage Grimble in debate but simply use the opportunity to gain information. So, they side-stepped his concerns about the literacy strike and proceeded to question him about his Board and its functions. He conceded, 'Yes, it is true, that the central focus is artisan training, but as the literacy programme illustrates, other types of training are considered too.' He then asked whether our members did not need training and why should they not benefit from the industry levy that companies paid for training.[25]

Worker educators then returned to their factories to find out more about training taking place in their own workplaces. Esion Mashego, the then Chairperson of WEDCOM, challenged his

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[21] *Industrial Conciliation Amendment Act, No. 94 of 1979*.

[22] University of the Witwatersrand, Historical Paper Research Archive, National Union of Metalworkers of South Africa (NUMSA) Records, 1987-2010, (hereafter Wits, Numsa Records), AH2555, Box 20, Education and Training 1989-1997, (written by Adrienne Bird although not cited), 'Internal NUMSA Report on Metal and Engineering Education and Training Fund', undated, p. 4.

[23] *Ibid.*

[24] *Ibid.* Edward French is reported on page 4 of this report to have found that there had been:

- An inadequate identification and satisfaction of learning needs
- A failure to take account of environmental factors and to utilise them creatively
- Outmoded, ineffectual methods and a lack of basic systematic procedures
- Unsatisfactory trainer training and back-up
- A lack of resourcefulness in handling problems arising partly from inadequacies in the programme design
- Perhaps the most serious failing was the diffuseness of aims. This was reflected in the lack of any reasoned specification of objectives or use of feedback on the attainment of objectives.

[25] Personal recollection of Grimble's words by Adrienne Bird.

management to test him and others for apprenticeship training.[26] Bruce Jonas, a shop steward at AE Components, managed to secure apprenticeship contracts for two NUMSA members.[27]

Concurrently I set out to find out more about the MEIETB and, in the process discovered surprisingly that the Supplementary Fund was about to be discontinued.[28] This led the union to apply for membership of the Board on 8 December 1988 in an attempt to save the fund for future negotiated training for its members.[29] NUMSA's application for membership was accepted. The other 13 members represented primarily artisan unions.

The first meeting of the MEIETB I attended was in January 1989 where the establishment of an Industry Artisan Training Board was the principal item for discussion. NUMSA opposed this on the grounds that training for all workers was required, not just artisans. But again, it was easy to be *'against'* and we continued to grapple with the question - what should the union argue *'for'*?

Whilst the bigger question of the objective remained unresolved and the union failed to keep the Supplementary Fund going, it did succeed in preventing its money being returned to employers. These funds were later to be put to good use as will be shown.

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[26] Wits, NUMSA records, AH2555, Box 20, Minutes of National and Regional Education Committee, 1988-1993, Education and Training 1989-1997. 'Minutes of WEDCOM meeting, 11-13 November 1988', item 4.9.

[27] Wits, NUMSA Records, AH 2555, Box 20, Minutes of National and Regional Education Committees 1988-1993, Education and Training 1989-1997. 'Minutes of WEDCOM meeting, 25-26 May 1989', item 4.6.

[28] Brian Angus, the spokesperson for the employer's organisation, the Steel and Engineering Industries Federation of South Africa (SEIFSA) replied on 24 November 1988:

> It was agreed at a meeting of the Education and Training Board early in 1988 that the Supplementary Scheme should be terminated. The reason for this decision was that employers felt that operator training is an extremely important, but generally company-specific activity. The Supplementary Scheme involved a cumbersome scheme of levy contributions by employers to a central fund and grants were paid to companies offering approved training courses. In fact, however, a very small number of companies claimed grants for training and so the objective of the scheme i.e. to stimulate operator training by means of a grant incentive, was not achieved.
>
> The Supplementary Scheme Agreement expired on 30 June 1988.
>
> It has been accepted that employers should assume responsibility for planning and financing training for workers below the artisan level in future – either on a company or sectoral basis. We believe that this will lead to a better focus on specific needs for operator training – needs which cover a wide spectrum of training requirements ranging from literacy and numeracy training to more advanced technical skills training.

[29] Wits, NUMSA records, AH2555, Box 20, MEIETB, letter dated 8 December 1988 from B. Fanaroff, NUMSA Engineering Secretary to The Acting Director, MEIETB.

Against this backdrop a 'NUMSA Job Training Research Group' was established by April 1989.[30] At first it consisted of six people but was later expanded to two members per sector (metal, automobile, motor, and tyre and rubber).[31] It began to moot a system of training ladders which workers could climb. Two international models, in Zimbabwe and Australia, were studied to design a system for South Africa.

Two members[32] of the group were invited to Zimbabwe and met with a range of Zimbabwean trade union officials, including Morgan Tsvangirai, then general secretary of the Zimbabwe Congress of Trade Unions.[33] We learnt that the Zimbabweans were working on developing a system of ladders to upgrade workers from 'semi-skilled' to 'skilled' positions.[34] They were motivated to do this by the exodus of white artisans following independence in 1980 and the consequent shortage of skills. They discovered that a large number of professional and skilled workers were in fact supervisory, with semi-skilled workers actually performing the skilled work, and this formed the basis of a new grading structure:

(a) Graded jobs – unskilled and semi-skilled (both metal and motor use the Paterson System for these graded jobs)
(b) Apprenticeship (traditional route to artisan – person indentured and partly trained by company and partly by the technical college)
(c) Skilled worker categories (across all industries):
    i. Skilled worker class 4 is lowest category
    ii. Skilled worker class 3 (higher)
    iii. Skilled worker class 2 (higher)
    iv. Skilled worker class 1 (equivalent to artisan)
(d) Skilled worker trainee categories (4 categories for each class). Clear training schedules for each class are being developed.

The industrial council main agreements define exact job descriptions for each skilled worker category and a minimum wage for each category of employment.

The Australian model came to our attention when Bernie Fanaroff, then Collective Bargaining National Secretary of NUMSA, a prolific reader of international trade union journals, handed me a copy of the Australian Metal and Engineering Workers Union's journal, saying, 'Look in the middle'. Across the centre spread was a diagram of progression from 'Sweeper to Engineer' – with neat blocks set out signalling both incremental courses and incremental wage rates.

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[30] Wits, NUMSA records, AH2555, Box 68, 'Report to NUMSA National Campaigns Coordinating Committee on the Progress and Workings of the Job Training Research Group, 8/9 April 1989', p. 11-25.

[31] Membership of the group at this stage was: Co-ordinators Adrienne Bird and Jerry Thibedi. Representatives from metal sector: Silas Adams (Siemens) and Andrew Stefaans (STC); auto sector: Les Kettledas (NUMSA official) and Toyah Lillah (VW); motor sector: Des East (NUMSA official); tyre and rubber: Andrew Blaauw (Goodyear Tyres).

[32] Des East, a member of the Motor Training Board and the Administrative Secretary of NUMSA, and Adrienne Bird from NUMSA and a member of the Metal Industry Artisan Training Board.

[33] He was later President of the Movement for Democratic Change and the second Prime Minister of Zimbabwe 15 February 2009 to 11 September 2013. https://en.wikipedia.org/wiki/Morgan_Tsvangirai (Viewed 12 October 2018).

[34] 'Numsa Report on the International Labour Organisation Workshop on Vocational Training, Zimbabwe, 16 – 17 August 1989', written by Adrienne Bird.

These two models gave the Training Research Group its much-sought-after direction. But these 'models' needed to be refined and contextualised and presented as practical bargaining demands. I made this point to Alec Erwin at one of our National Education meetings in Durban. After some thought he suggested: 'Why not take a block of time, say three months, to sit with a group of shop stewards and discuss the issues in greater depth?'

The journey from idea to plan took the better part of 1989 to travel. A detailed proposal was finally submitted to the union's Central Committee in February 1990:

> The broad aim of the Training Research and Development Group is to investigate strategies to facilitate the training of NUMSA members to higher levels of skill. This is partly to ensure that workers organised in conservative unions do not monopolise the highest skills – and therefore wield power to hold a future economy to ransom. And it is partly to ensure that a pool of politically progressive skilled workers will be available to assist with planning and organising a future economy.
>
> NUMSA believes that the task of overcoming the heritage of race discrimination in vocational training laid down by apartheid over decades will only be fully accomplished when organised workers take the initiative at plant and national level.[35]

A team was selected that included shop stewards, union representatives on Industry Training Boards and representatives from companies with a reputation for providing training. Once identified the challenge was to secure their release from their companies for the three-month period. Many companies agreed to the paid leave requested by the union because of the novelty of the demand and the broader climate of the times.

Funding for the operational costs of the first two months of the programme was secured from Australian People's Health, Education and Development Agency (APHEDA), the Australian Council of Trade Unions' (ACTU) humanitarian overseas aid agency[36] – an agency represented in the country by Helen McCue. The third leg of the programme, international visits, was supported by other metal unions through the International Metalworkers' Federation (IMF).[37]

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[35] Wits, NUMSA records, AH2555, Box 20, NUMSA Education and Training Proposals, 'NUMSA RDG, 6/7 February 1990: Proposal for Vocational Training Research and Training Project', p.1.

[36] Wits, NUMSA records, AH2555, Box 20, NUMSA Education Reports (NEC Mainly) 1988-1991, 'Training Research and Development Group Report to NUMSA NEDCOM 9-10 June 1990', p. 3. This report clarifies the relationship between APHEDA and the ACTU.

[37] Wits, NUMSA records, AH2555, Box 20, NUMSA Education Reports (NEC Mainly) 1988-1991, 'Report on the NUMSA Vocational Training and Grading Research Project', p.1. Submitted to APHEDA, faxed to Adrienne Bird on 18 October 1991.

NUMSA Training Research And Development Group, 1989

Photo credit: Cedric Nunn

Left to right:

- *Back row:* **Ike Abrahams**, Plater Boilermaker (artisan) John Thompson Africa in the Western Cape; 2. **Toyer Lilah,** Tool, Jig and Die Maker (artisan), Volkwagen, Port Elizabeth; 3. **Bheki Ntuli,** Operator, Alusaf, Northern Natal; 4. **James Jayiya,** Hella South Africa; 5. **Moredecai Moeng,** BMW; 6. **James Tom,** Operator, Aberdare Cables, in the Eastern Cape; 7. **Judy Favish,** SACHED Trust; 8. **July Khoza,** Clerk, Robert Bosch, Pretoria North; 9. **Herman Tshepe,** Motor Mechanic (artisan), Nissan, Pretoria
- *Second row from back*: 10. **Richard Cele,** Toyota S.A. (Southern Natal – Durban); 11. **Joshua Manana**, Armature Winder (artisan), GEC Alstrom, East Rand; 12. **Petros Mosehlana**, Operator, Iscor Vanderbijlpark; 13. **Welcome Mzili,** Splicer, Gentyre Industries, East London; 14. **Sam Morotoba,** Fitter and Turner (artisan), Samcor, Pretoria; 15. **Adrienne Bird,** National Training Organiser, 16. **Freedom Shuma** Iscor – Newcastle (Northern Natal); 17. **Elias Kubeka**, Armature Winder (artisan) from Siemens in the Witwatersrand: 18. **Andrew Blaauw**, Tyre maker (artisan), Good Year Tyres, Port Elizabeth; 19. **Les Nhlapo**, Fitter and Turner (artisan) from Highveld Steel;
- *Second row from front: 20.* **Kelvin Vilakazi,** Rezek Motor Group, Wits*; 21.* **Mophet Lekoba,** NUMSA organiser from Northern Transvaal region, artisan in a motor company before joining the union fulltime and he had been a member of the Training Research and Development Group from the beginning*; 22.* ***Derrick Williams,*** Operator, Delta Motor Corporation, Eastern Cape; *23.* **Belinah Khumalo,** Representative of NUMSA Women's structure and Welder, Dorbyl Automotive Products, East Rand; 24. **Johannes Mosia***,* Labourer/Operator, Dorbyl Heavy Engineering, in the Vaal; 25. **Temba Khumalo,** Toolmaker, August Laepple, Pretoria North, 26. **Amos Mashiane,** Fitter (trainee), Middleburg Steel & Alloys, Highveld;
- *Front row*: 27. **Moegamat Hoossen**, motor mechanic, Orbit Motors (Mercedes Benz Service Outlet, Cape Town: 28. **Gordon Sithole,** Carguard, Southern Natal.

[Not in the photograph: China Solani, Barrystone Garage, Border & Lennox Dwangu, Mercedes Benz, Eastern Cape.]

EDUCATION AND TRAINING LANDSCAPE

Education in 1989/1990, when the Training RDG did its work, was still the apartheid system. There were 15 different ministries and 19 organisational departments of education in South Africa, which were:

- Department of Education and Culture (House of Assembly) for whites and four provincial education departments;
- Department of Education and Training (DET) for Africans outside of homelands;
- Department of Education and Culture (House of Representatives) for Coloureds;
- Department of Education and Culture (House of Delegates) for Indians;
- Education departments in the four independent homelands of Transkei, Bophuthatswana, Ciskei and Venda; and
- Education departments in the six self-governing territories of Gazankulu, KaNgwane, KwaNdebele, KwaZulu, Lebowa and Qwa-Qwa.

In 1992 besides the schools, the Department of Education controlled 129 technical colleges and 103 colleges of education. The 15 technikons and 21 universities also fell under the education departments but had a greater degree of autonomy.[38]

The training system, however, was not racially divided.

- There was one Minister of Manpower and a single department.
- The National Training Board (NTB) was a policy advisory structure introduced under the Manpower Training Act No. 56 of 1981. It had 24 members: 7 employers, 7 trade unionists, 7 from state departments (including education), and 2 experts and a chairperson nominated by the Minister.
- There were 9 autonomous regional training centres with 62 satellite campuses and 65 mobile centres. Each centre had an independent governing body.
- Private training centres and training centres established by employers numbered some 1417. In terms of the Manpower Training Act Amendment, Act No. 39 of 1990, the Department of Manpower contracted with such organisations to provide certain training for the unemployed.
- There were separate labour departments in each of the independent homelands to deal with training for local authorities, the public sector and some parastatals.
- Industry Training Boards catered for some 26 of the identified industries. Legislation required the presence of business and trade union members on the Boards, but not in a specified numerical relationship.
- There was no single certification body for training.

No legal provision was made for linkages between education and training.[39]

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[38] National Training Board, *A national training strategy initiative,* Pretoria: Government Printer, 1994, pp. 37-39.
[39] *Ibid,* pp. 39-41.

When the Training RDG undertook its work, the education system was on fire. As the National Training Board's National Training Strategy Initiative (NTSI) report put it: '(there are) large scale stayaways, boycotting of classes, teacher and pupil strikes and damage to property'.[40]

Members of the Training RDG had direct experience of this militancy in schools. **Les Nhlapo,** for example, relates his experience:

> In 1976, we were some of the few students who took up the things from Soweto. We were imitating the things that were going on in Soweto. In fact, one of my closest friends was killed during that time because we were involved in riots with the police at Linden Hall. He was shot dead. He passed on. So, I was involved but [there] were never any formal student structures that one was involved in. But because of that eruption in Soweto, some of us began mobilising the people against the system. But we basically copied what was going on in Soweto.[41]

This activism brought them into contact with broader national youth organisations which in turn affiliated to the United Democratic Front (UDF) which was widely known to be 'sympathetic to' and allied to the still-banned African National Congress (ANC).

In spite of this militancy, some students managed to complete their schooling. They were part of a small but growing number of urban black South Africans with complete school-leaving-matriculation certificates. This was made possible by the gradual increase in the number of African high schools in the townships that was part of a strategy by the state to create 'a more stable, privileged, urban class of African workers'.[42]

Table 2.1. Education levels of 20 – 64-year olds in 1991

Education level	African	White	Coloured	Indian	Total
Standard 10	858,030 8%	1,181,042 40%	158,678 10%	136,964 26%	2,334,714 15%
Total population	28,4 million 75,2%	5,1 million 13,4%	3,3 million 8,7%	980 000 2,6%	37,7 million 100%

Source: NTB, *'National Training Strategy Initiative'*, p. 37 and 46, taken from Central Statistical Services, Table 13

Others had a different experience. **Belinah Khumalo,** for example, completed Junior Certificate (standard 8) and was unable to finish her schooling. Instead she went to a private business training school where she did a one-year secretarial course.

Joshua Manana financed his studies by doing odd jobs:[43]

> I was born in Brakpan in 1963. And we were living in Pretoria in a place called Winterveld. My father worked as a labourer at Iscor until he died in 1976. My mother was a domestic worker. My mother went to school Grade 1 and Grade 2. So I come from a totally illiterate family. I went to Zithulele Primary School, Zibuthe Higher Primary, Isidingo [Technical College on the East Rand] in Daveyton. I started at the [Technical] College in 1982. So, I was having breaks because of finance and so on … doing N1 – break – doing some practical at College … come back later and break like that. It was just break and on … as when you have money. I got as far as N3 in 1985.

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[40] National Training Board, *A national training strategy initiative,* pp. 49-50.

[41] Interview with Lesley Nhlapo, 4 April 2008.

[42] Forrest, 'Power, Independence and Worker Democracy', p. 87.

[43] Interview with Joshua Sephiwe Manana, NUMSA Head Office, 17 March 2008.

The training model that the team was seeking to design needed to be incremental and to combine learning with earning a wage. The model had to be based on the principle of 'earn and learn', since full-time study was beyond the means of most workers. This approach was based on their own experiences.

All needed to focus on securing an income after school to support their families. And, for some, whilst becoming an artisan had not been their first choice, it became the best option as it promised a decent wage in time and an income whilst getting there. It was also an option that was realistic and attainable. Companies came to their places of learning to recruit:

> **Elias Kubeka:** [T]he companies would come and make presentations to attract apprentices at the high schools. So, we filled in application forms and I was fortunate to be taken together with another group of students by Siemens. So, I started my apprenticeship in 1981.[44]

> **Joshua Manana**: I had N3. While I was at Isidingo, companies used to come to colleges and they … would do some aptitude tests, and some of the students were recommended by teachers to the companies. … So, I just made random applications – mines and works and everywhere. Until … we were told by one guy that there were forms [at General Electric Company]. We went there and picked up the forms and filled the form and then we sent them in. ... Then we were called by GEC to come and do the test, and I passed the test. … I started on January 7 1985.[45]

The opportunity to secure an apprenticeship contract was new, made possible by the passing of the Manpower Training Act No. 56 of 1981. This permitted black artisans for the first time to undertake this form of training. Companies embraced this new source of recruitment with alacrity. This shift in policy was made by the state as part of its 'Total Strategy' formulated to respond to what it viewed as a 'Total Onslaught' by opposition groups, of which more below.

Not all of the RDG members managed to access formal training and had to settle on direct employment. The sister of **James Jayiya,** Thandile Judith Jayiya, tells another tale of her brother's journey into employment.[46] He attended a series of schools, including Qhagqhiwa High School in the then Ciskei where he was elected onto the Student Representative Council (SRC). And whilst actively campaigning, was beaten up by soldiers. He passed Standard 8 but, due to his activism, was not permitted to return to school. So, he took up an operator position at Hella, a company that made car lamps and harnesses. He became a NUMSA shop steward and took up the fight for wages, conditions and trade union rights.

Belinah Khumalo was another who trod a non-apprenticeship path.[47] Her first job was with Murray and Roberts, a major construction firm, where she was given on-the-job training in personnel. She was refused entry to apprenticeship training 'because I didn't have matric and because I was a woman'. Eventually she moved to Dorbyl Automotive Products in Elandsfontein as the secretary to the General Manager. The company made

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[44] Interview with Elias Kubeka, 29 February 2008.

[45] Interview with Joshua Manana, 17 March 2008.

[46] Interview with sister of James Jayiya, Thandile Judith Jayiya, 10 May 2008, Uitenhage. James was dismissed in 1992, after a strike on wages and conditions and trade union rights. He was born on 13 Jan 1959 and died 14 July 2005.

[47] Interview with Belinah Khumalo, at Indlela, Olifantsfontein, 25 March 2008.

door handles and other small car parts. Belinah tired of her secretarial work and became involved in the union (NUMSA). She was fired for her work and then, with union help, reinstated. She asked to do welding work and after a spat was granted her wish. She was trained to do wire welding to an advanced level but never given formal artisan status. She did have to train others how to do her job as part of their broader training - an issue that rankled for years and fuelled later demands for Recognition of Prior Learning (RPL).

The coloured members of the team were legally in a better position and frequently had skilled parentage. Toyer Lilah for example said of his family:

> They were all like skilled artisans. My father could do building, carpentry, anything concerning building . ... My father used to take us when we were youngsters, you know, when he had contract work, he used to take us out there.[48]

However, they too faced challenges. Lilah finished an academic matriculation whilst also becoming politically active.

> I was preparing myself to go to varsity. … [M]y ambition was to be a lawyer, you see, and then there wasn't finances and I thought to myself my other option was to be a teacher. I said, no, I don't want to be a teacher… Then Volkswagen applied for trainees, you know… We started off as trainees first. There was no apprenticeships for us. … We had to force our way in. We forced the Germans. The Germans were the ones who were supporting us, you see. We said, if you subscribe to the Sullivan Code[49] … So at the end of the day we could go in as apprentices. …[W]e had to go to technical school at night, you see. Four days a week, from Monday to Thursday from six o'clock to nine o'clock.[50]

Moegamat Hoossen, of Malaysian, Indian and Dutch descent, had another tale to tell. His father had become a motor mechanic, through 'effluxion of time', his mother was a pioneering entrepreneur in the taxi industry in Cape Town, like others in the family.[51]

> I was born in Balmoral Street [District Six, Cape Town] [where] I grew up, I went to several different schools. I went to Chapel Street, I went to Walmer, I went to Zonnebloem, [then] I went to Johannesburg in Alexandra … where my grandmother's father's brother started the first mosque in the Transvaal – the Ahmat Kalliq mosque … . At that time District Six became gangster-infested and my mother was scared that they were influencing me in that direction. So, she sent me for religious instruction – hoping that I would then take the Imam's position. [The Alexander Institute was registered under Indian Affairs] … I went the other route. … I finished Eight [there, then] I came down from there, [but when] I came down to Cape Town I came again under Coloured Affairs – and it was then a problem to convert from Indian Affairs to Coloured Affairs … and they wouldn't accept the risk because of the different departments and acknowledgement of different certification at that point in time. [AB question: You couldn't get your Indian Affairs certificate recognised in a Coloured Affairs school?] Yes, so I had to re-do Standard Seven and Standard Eight again at Zonnebloem, because (they would) not accept that, and then I left there and went over to Windermere High to do nine and ten.
>
> I started [working] when I was six years old with my daddy, because he was paralysed on the left side, so I became his hands. When I was twelve and a half, he died. He was thirty-eight at that point in time. I was twelve-and-a-half at that time. So that is the story there. And then after that I went into a company as a driver. … And these Germans that were there, they

[48] Interview with Toyer Lillah, Uitenhage on 10 May 2008 at Mi Casä Guest House, Uitenhage.

[49] The Sullivan Code was a 14 point agreement signed by the South African trade union movement and the German government on behalf of German firms assuring South Africans that they would respect good international labour practices, thereby permitting them to remain in South Africa during the sanctions era.

[50] Interview with Toyer Lillah, Uitenhage on 10 May 2008 at Mi Casä Guest House, Uitenhage.

[51] Interview with Moegamat Hoossen, 27 March 2008, at Saudi Motors, Maitland, Cape Town.

were Austrians, and one guy that bought the company over was a German. He'd just got into the country – and he had no racist thing at that point in time. He offered me an apprenticeship. And the company at that point in time was called Aberg Pty (Ltd) … And the company's artisans were all Austrians at that time. They couldn't speak English properly. … I then attended Athlone Tech…. Even though you had matric at that point in time you still had to do N1, N2 and N3. Yes, it was segregated [for Coloureds]. I did the block courses there. I qualified at Olifantsfontein in petrol and diesel.

Such then is a snapshot of the vagaries of learning under apartheid at that time as experienced by some of the RDG members.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

The occupational architecture at the time can be inferred from the grading systems used by the national bargaining councils. True occupations, however, only existed at the artisan level where people where titled by the trade they had acquired after passing a trade test. Below the level of artisan, the work was fragmented, and described according to the processes used to make the product or deliver the specified service. The most elaborate system was to be found in the engineering bargaining council, where the grading system showed the strong influence of Taylorism and the fragmentation of skill that had taken place over decades. Rate A was the trained artisan rate, others were set as a percentage of that figure.

Table 1.2. Grades and hourly rates of pay in the Metal and Engineering Industries Bargaining Council Main Agreement, 1991

Existing grades	1991/2 Minimum hourly wage rates	Wages as a percentage of artisan in 1991/2
Rate A	R10,44	100
Rate AA	R9,13	93,5
Rate AB	R8,54	82
Rate B	R7,99	76,5
Rate C	R7,53	72
Rate D	R7,23	69
Rate DD	R6,55	63
Rate DDD	R6,13	59
Rate E	R5,74	55
Rate F	R5,37	51
Rate G	R5,02	48
Rate H	R4,70	45

Source: Report of NUMSA Engineering Grading Seminar held to discuss Training and Grading at St. Peters Lodge, 29/30 April 1992.

The Main Agreement also set wages for apprentices calculated as a percentage of the qualified artisan rate, for the first, second, third and fourth years. In 1986, the rates were:

Table 2.2. Rates of pay for apprentices in the engineering sector, 1986

First year	R2.32 per hour
Second year	R2.62 per hour
Third year	R3.20 per hour
Fourth year	R5.23 per hour

Source: *Government Gazette* No. 10392, R. 1744, 22 August 1986.

Against each of these wage levels were organisations seeking to represent the interests of their members. The artisans were represented by registered (white) craft unions, such as the South African Electrical Workers Association of which Ben Nicholson was the spokesperson. Yster and Staal Union also represented white artisans but, in addition, represented white workers more generally. The vast majority of Africans at lower levels were organised by NUMSA but there were some smaller black industrial unions such as Jane Hlongwane of the Steel, Engineering and Allied Workers Union of South Africa (SEAWUSA) to which reference has been made above. The divide between the artisan unions and the black industrial unions was, and had for decades been, adversarial and competitive as has been described in detail by Eddie Webster[52] and Jon Lewis[53], *inter alia*.

The young black artisans associated with the Training RDG chose to join NUMSA and not one of the other craft unions organising in their factories at the time.

Why did these young artisans decide to join a militant, industrial union rather than one of the registered craft unions which focused specifically on meeting artisan needs?

They were determined to develop a training system that encouraged progression. This was something that the traditional artisan unions would not support. To illustrate the point, Ben Nicholson from the South African Electrical Workers Association (SAEWA), the 'electricians' union, came to speak to the Training RDG to explain his perspective and said conspiratorially in the parking area before he left, 'this idea of incremental progression might work for welding but never for electricians of course!'[54] A number of other factors influenced these young people to join NUMSA.

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[52] E. Webster, *Cast in a Racial Mould: Labour Process and Trade Unionism in the Foundries,* Ravan Press, 1985.

[53] J. Lewis, *Industrialisation and Trade Union Organisation in South Africa, 1924 -55, the rise and fall of the South African Trades and Labour Council*, Cambridge University Press, 1984.

[54] Author: Personal recollection.

Family affinity

Joshua Manana, an apprentice when he joined the RDG, recalled that when he first qualified as an Armature Winder at General Electric Company (GEC) in Benoni on the East Rand it was assumed by the employers that he would join the predominantly artisan union, the South African Boilermakers Society (SABS). He insisted on joining MAWU and went on to encourage other artisans to do the same. When asked why, he said:

> No. I think you must bring the history of this country for people like that to understand. And maybe compare themselves with others in **their family**. Would **they** agree if it was **their** father, that one who gets so much little increase?[55]

The immediacy of this association is clear from the family backgrounds of the RDG members, apartheid had ensured that their parents could *only* have come from the labouring classes.

Many had themselves done labouring work before entering the trade

Some had worked as youngsters to help augment the family income. **Les Nhlapo**, for instance recounted that:

> But what I also did when I started growing up, one of my uncles was a plumber, but not qualified. He was working in the plumbing environment. So he used to do odd plumbing jobs in the township, and I used to work with him helping him on the weekends. And in that way, I would get money. … I [also] used to do garden work, what we used to call 'garden boy'. Saturdays and Sundays, I used to go and do garden work around Witbank.[56]

Elias Kubeka tells a similar story:

> At the age of six, seven, we used to just assist the Granny on her gardens. She had gardens. And we'd look after chickens … goats and other poultry. But then, as we grew, when they were tilling the land, we'd join in the tilling of the land, the hoeing of the wheat and so on. And got a little bit of money. But then I got street wise and started looking for other ways to supplement the income – and I'd do gardening in the suburbs – Irene, Kloofsig, Doringkloof and so on. And I interchanged that with being a caddie at Irene Country Club.[57]

Respect for their trainers

Unlike artisans of an earlier generation, once job fragmentation took hold in factories apprentices did not learn their skills from qualified men, but from operators on the shop floor doing an element of the trade. What made apprentices different from the operators was that they rotated from one such 'trainer' to the next until they had acquired the full range of skills required to undertake a trade test – trainers like Belinah Khumalo.

When I asked **Elias Kubeka**, then an Armature Winder from Siemens in Isando, why he had joined MAWU, he retorted:

> It wasn't an issue for me because even while I was an apprentice I was observing that the training, throughout, whether you went to any section, the training, the skills that you had to acquire, you are trained by semi-skilled or so-called unskilled people. So, it was not an issue.[58]

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[55] Interview with Joshua Manana, 17 March 2008.
[56] Interview with Les Nhlapo, 4 April 2008.
[57] Interview with Elias Kubeka, 29 Feb 2008.
[58] *Ibid.*

Sam Morotoba, a Fitter and Turner at SAMCOR, felt the same way:

> The other thing that also made me to look at life differently was that in the company itself, the people who were willing to train us on the machines were artisan aides, because they were running the machines for mass production. I mean [white - AB] artisans would come and do the machine setting and they would then go off to drink and they wouldn't work overtime … Now I learnt most of the tricks on the machines from those artisan aides.[59]

Ike Abrahams, who trained to be a boilermaker at John Thompson Africa, a Cape Town-based company, provided his own particularly graphic memory:

> The bulk of the operators were the blacks – and had been there for years. To give you an example, there was the guillotine operator in the plating shop. Whilst I was doing my apprenticeship, he allowed me then to operate the machine myself. So, you would go to the yard with your requisition and get your material. The crane will bring it in and put it on the pedestal on the rollers. You will mark it off and out and you will cut your own thing. I followed all that processes and then I cut the plate and he was throwing me with a wooden wedge. He was sitting some five metres away from me - and then was shouting out 'What is it that you are doing and why are you doing it? You must maar know that you cannot cut 6mm plate with my guillotine!' And then I said 'But it's written here 5 mm.' He said, 'No, it's 6.' On the thing, it's there, it's written, it's painted with white road-marking paint, it's a 5 mm plate. He argued and he argued. He got up, he got someone with a tape measure (he couldn't read or write properly that old man – so if he was measuring a thing, he will bring his finger here and he will just copy that). So, he got someone else to measure the thing and it was a six mm plate. His nickname was 'Pick-up'. And I asked him, 'Pick-up now how the hell did you do that?' It was a 6 mm plate, someone made a mistake in terms of putting that thingy there. When I asked him, 'How did that happen?' He said, 'My machine were *(sic)* labouring.' I said, 'What do you mean?' 'The machine were *(sic)* making another noise, another noise, and that only happens if it's a 6 mill plate that you were cutting.'[60]

Shared experience of apartheid's pass system

Kubeka, Manana and **Nhlapo** all had bad experiences of the hated 'dompas' system whereby all black people had to carry passes that regulated where someone could live and work. If the police stopped you and you failed to produce your pass, you could be arrested. Kubeka remembers: 'we used to get arrested for 'pass' – 'dompas'. I spent some days in the police cells – some weekends as well. Ja, that was the tough part of that life.'[61]

Manana's father, 'because of these pass laws, was suffering so much, so he moved to Pretoria and that's where he found a job [as a labourer] in 1971 at Iscor.' The family lived there until the time **Joshua** was supposed to 'take the pass'. 'I couldn't take a pass because I was roughly sixteen years in 1978 and then those guys in Home Affairs they told me I must go where I was born – and my place of birth was Brakpan. I came back to Brakpan to my uncle - the younger brother of my father. So, I was living there.'[62]

These were experiences they shared with all black urban residents and which pre-disposed them to forming alliances with others in the same boat.

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[59] Interview with Sam Morotoba, 24 November 2007.
[60] Interview with Ike Abrahams, 2 April 2008.
[61] Interview with Elias Kubeka, 29 February 2008.
[62] Interview with Joshua Manana, 17 March 2008.

Political mobilisation as students and workers

As students, many of them had been active in political organisations and continued to be when they were not at work. Sam Morotoba described how joining unions was the natural political progression for politically active students who were now workers.

> In 1982, the same year, I was elected the President of the Youth Movement. … the question then was, at work, how do you begin to relate your political activity with that of your work situation? … And that is where, as apprentices, we began to join the trade union.
>
> And [with] the right-wingers in the [other] union I earned a 'Terrorist' name. But you accept[ed] it, it didn't matter at that stage. We were amongst the first people who'd come with United Democratic Front (UDF)[63] T-shirts. And these guys would come in the company wearing army uniform. We had this problem in that the majority of them were in the commandos and they would be called up to do military duty when the townships were on fire. And we would come wearing [t-shirts] on the other side![64]

And yet, the choice of which trade union to join was not a simple matter. There was the view that those who *did* join the previously white unions were traitors as Nhlapo explained:

> But that was why it was very difficult for us to go back and join this Boilermakers' Union, because, well, very few blacks became members of this Boilermakers' Union. In fact one of us, who was an apprentice and who qualified with us, joined this Boilermakers' Union and I think it's very safe to say that he was part, or he understood and supported the past regime, because he was part of the information system of the past regime. … you could quickly find the connections that this guy at the factory, he's a member of Boilermakers and in the township, they've burned his car. Obviously, it's true, he *is* an *impimpi*. And that made us not to venture into joining that union because it was clear that that union was not popular amongst blacks and that is why we started having discussions with the union shop stewards to become members of NUMSA.[65]

Racism within the apprenticeship system

Before the passing of amendments to the Industrial Conciliation Amendment Act No. 94 in 1979, and to the Labour Relations Amendment Act No. 57 of 1981, Africans could not join registered trade unions. Apartheid laws simply excluded them from the legal definition of 'employee' and only unions representing 'employees' were permitted to register and to have representation on the Industrial Councils which set wages and conditions. Similarly before the passing of the Manpower Training Act No. 56 of 1981, Africans were effectively prevented from training as artisans; only registered unions were permitted to sit on the Apprenticeship Committees which oversaw the apprenticeship system and registered unions used their position to exclude African apprentices.

Des East, General Secretary of MICWU and later Administrative Secretary of NUMSA, told a similar tale of the National Motor Engineering Apprenticeship Committee, on which the registered Motor Industry Employees Union (MIEU) sat:

> The Act provided for Apprenticeship Committees - organised labour, organised employers and Department of Labour sat on these committees. MICWU never got a seat on these committees except in Natal…. But MIEU had a policy that none of its members were allowed

[63] The United Democratic Front (UDF) was an anti-apartheid body that incorporated many anti-apartheid organisations. It was launched in 1983, in Mitchells Plain.
https://www.sahistory.org.za/organisations/united-democratic-front-udf (Viewed 8 March 2019)

[64] Interview with Sam Morotoba, 24 November 2007.

[65] Interview with Les Nhlapo, 4 April 2008.

> to train black, coloured or Indian apprentices. If they did, that member would be expelled, and he would be excluded from getting any benefits etc.[66]

Ben Nicholson, the representative of the South African Electrical Workers Association (SAEWA) and a key craft union leader in the engineering industry for decades, sat on the National Apprenticeship Committee for the Engineering Industry and recalled how it worked:

> Nothing ever prevented anybody from being an apprentice[67] BUT, and this is a big BUT, apprenticeships had to be registered through an apprenticeship committee. And the apprenticeship committees met, discussed the applications to register an apprentice and said 'yea' or 'nay'. Now either the employer wasn't acceptable, couldn't train, didn't have the facilities to train or the person did not have the correct qualifications to be an apprentice. Now, on the apprenticeship committees were representatives of all the [registered] unions. And the union from the building side [the construction union] … and Yster and Staal were there. Anyway, it was a 'ware' [true] Afrikaner who was a secretary of that [building union], and he was a monster of the first degree. So, whenever a black name came up, forget it, they wouldn't agree. That was where it stopped.[68]

When asked if there was never a challenge, he responded with remarkable honesty:

> Yes, there was. But it had to be unanimous. And they [the other white unions] could always come up with something which prohibited them from being accepted. So, whenever a black name came up, the whole thing was researched, and it was found that he didn't have this, or he didn't have that or whatever. In many cases, they did, but you couldn't get it passed them. And of course, to our discredit, if we did fight them, they would pinch our members, we'd have to go back, and they would say to our members these guys want black artisans. We had that problem to deal with. Bit selfish perhaps, but it was the reality of the situation at the time.[69]

And on the ground, there was a widely held view that African apprentices were being set a higher educational entry standard than that for white apprentices. Certainly Morotoba, Nhlapo and Kubeka had passed their matriculation and Manana had completed his National Technical Certificate Level 3 (considered equivalent to matriculation) prior to embarking on their apprenticeships - whilst the legal minimum was only Standard Seven.

Manana reported that 'From amongst the blacks they would only take from those who had passed standard eight upwards, standard nine and matric. They wouldn't take standard sevens. But from whites they would take standard seven.'[70]

Kubeka recalled another illustrative incident:

> [Y]ou had some of the supervisors or foremen or chargehands who were not so much cooperative in training and checking your work – just leaving you there to do ordinary work – and when you look at your logbook you are supposed to be doing one, two, three and four and when you raise it with them they would be upset. Whereas the white apprentices would go through, you could see that they are going through a proper training.[71]

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[66] Interview with Des East done by Jenny Grice, 3 June 1997.

[67] Even before the legislative changes a registered union could represent the interests of black apprentices if they so choose. They did not so choose in the main, as Nicholson's account testifies.

[68] Interview with Ben Nicholson, 10 November 2006.

[69] Interview with Ben Nicholson, 10 November 2006.

[70] Interview with Joshua Manana, 17 March 2008.

[71] Interview with Elias Kubeka, NUMSA Head Office, Johannesburg, 29 February 2008.

There was also the fact that apprentices had to go to separate technical colleges to study their theory. And the reality was that technical colleges open to black learners were struggling to keep pace with the change in the law with college allocations. **Morotoba** recalled that:

> Now they used to have a rule that said you must not attend a college that is more than fifty kilometres from your residential area. But at the same time the colleges were still segregated and there was only one college where all the black students would go. That was Thuto Mathale (Learning Skills) Technical College in Mamelodi. That college still exists. It started somewhere as four classrooms and (w)e'd change and share classes – you know, some coming in the afternoon and some coming in the morning. Some would sit outside. We'd go in shifts.'[72]

It was also the case that the craft unions were marred with racially exclusive traditions.[73] Indian and coloured workers were legally wedged between African and white workers in the pre-1981 period. They were included under the definition of 'employee' in the Industrial Relations Act of 1956 – hence they could unionise and be represented on the Industrial Councils and the Apprenticeship Committees – but their hands were tied by the powerful white unions that dominated these structures.

Separated facilities undermined collective 'artisan identities'

Les Nhlapo recounted that at Highveld Steel where he was:

> you must remember at the time that we were apprentices we could not socialise with our white 'counterparts' as apprentices because there were separate facilities. So, at teatime I cannot take this work, the discussion of this work, to the tearoom because the whites are going to have their tea separately, so I must come back to the black environment where there are only labourers and artisan helpers.[74]

Militant industrial unions held the balance of power

There was also the simple fact that the balance of power had swung in favour of the militant industrial unions following the surge in their membership in the 1980s. Ian Macun has recorded that the number of unionised Africans increased from 259 582 to 956 969 between 1981 and 1988.[75] The number of registered unions with 'all races' or 'unspecified' membership (which usually meant the same thing), rose from zero in 1980 to 84 in 1988. On the other hand the number of whites-only unions had fallen from 80 to 29 over the same period, although, as Macun notes, given that the overall membership of these unions only fell from 468 029 to 439 679 it was more a re-alignment than a demise.

More telling was the closure of the Trade Union Council of South Africa (TUCSA) in 1986 following the disaffiliation of most of its key members.[76] This heralded the end of 'accommodation politics' – the question was increasingly 'which side are you on?'

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[72] Interview with Sam Morotoba, 24 November 2007.

[73] See Webster, *Cast in a racial mould*, and Lewis, *The rise and fall of the SATLC.*

[74] Interview with Les Nhlapo, 4 April 2008.

[75] I. Macun, 'The Dynamics of Trade Union Growth in South Africa: 1970 – 1996'*, Labour Studies Report Series*, No. 9, Sociology of Work Unit (SWOP), University of the Witwatersrand, Johannesburg, March 2002, Table 5, p. 18.

[76] *Ibid* p. 18.

Manana put it this way: 'we had to explain to the artisans, in a way they could understand it, 'NUMSA's strength.'[77]

Their wage levels were protected by the artisan unions anyway

There was also the least acknowledged fact that the artisan's wages were still *de facto* negotiated by the artisan unions – although it is worth noting that the differential between the artisan rate and the labourer's rate fell from its 5:1 'high' in 1961, to 2.8:1 in the early eighties[78], which for white workers represented a relative decline in living standards but for the young black artisans, a fabulous wage.

Morotoba recalls: 'I mean the high salary was not an individual thing. Whatever the craft union would negotiate and settle for, that's what we would get. But the across-the-board that NUMSA would get is what the other people would get.'[79]

And **Manana** noted: 'Getting increase, you were just given an increase - although it was more, better off from the lower grades.'[80]

Nhlapo, the 'honest one' chuckles when he recalls the time when he, as a member of the Numsa Negotiating Team and bound by the mandate of the union, sat in the NICISEMI negotiations listening to the artisan unions pushing for artisan wages and thinking silently to himself: 'Go for it!'[81]

Many 'white' unions focused on 'bread and butter' issues

Toyer Lilah held this view of the Yster and Staal Union at Volkswagen:

> They were just looking at bread and butter issues. You must look at the broader spectrum of things – if employers say, 'Okay, we'll give you 90c for your artisans.' They will accept it. Where we will say, 'No, no, no. We want R1,20 for our artisans.' You know what I mean? And at the end of the day they were also gaining out of us. Because it was through our sweat and fights that they achieved these things.[82]

POLITICAL ECONOMY

The context in which the Training RDG undertook its work was of course vital to its success and as the brief overview below showed, there were significant possibilities.

The starting point, Erwin believed, was to understand the economic crisis that the new government would inherit from its apartheid predecessor. To deepen this understanding, he and a number of progressive economists established an Economic Trends Research Group

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[77] Interview with Joshua Manana, 17 March 2008.
[78] SEIFSA, 2003, *Strength in Diversity, SEIFSA 60 years,* Johannesburg, p. 14.
[79] Interview with Sam Morotoba, 24 November 2007.
[80] Interview with Joshua Manana, 17 March 2008.
[81] Interview with Les Nhlapo, 4 April 2008.
[82] Interview with Toyer Lilah, 10 May 2008.

(ET) in 1986. Alan Hirsch, a member of the ET called Alec Erwin 'an influential thinker in the Congress of South African Trade Unions (COSATU)[83] beyond his formal status'.[84] Hirsch outlined the work of the ET group:

> Initially, the Economic Trends group was required to conduct research to advise COSATU on policy in relation to economic sanctions, but as the end of apartheid began to appear on the horizon, ET shifted to an analysis of the causes of the South African economic crisis … It was important to understand the economic crisis in order to develop suitable policies for a post-apartheid government. The analytical findings of the ET group were contained in a series of working papers and in a book edited by Gelb.[85]

The understanding they collectively reached was that the political changes were being fuelled by an underlying economic crisis that was the result of structural distortions in the economy.[86] These structural distortions were rooted in the developmental path the South African economy had followed and the changes in the international context within which it found itself in the 1980s. Mining was at the core of the issue: the early exploitation of the gold reserves in the country by international finance meant that whilst a slice of the profits was paid to the South African government in the form of tax, a large proportion of the profits were expatriated and not re-invested in new productive capacity locally thus limiting the employment dividend of the resource wealth of the country.

This problem was compounded by the system of labour controls used to supply the mining (and agricultural) industry with cheap workers – a system, based on low wages, both limited the consumer market for consumption goods, beyond basic items, and which cut off all entrepreneurial possibilities to the majority of the country's inhabitants, rendering them impoverished.

A manufacturing sector had developed and had grown strongly after the Second World War, but it was focused principally on the supply of consumable inputs to the mining industry and consumable goods for both white and black workers. There was no development of a viable capital goods sector – so machines had to be imported at prices that leeched finances from the country's national investment pool and which meant that growth was often choked off by balance of payment constraints.

The other constraint was that much of the manufacturing sector was protected by import tariffs which local producers persuaded the government to impose. The economy was not competitive internationally and the emphasis on 'cheap labour', rather than skills resulted in low levels of productivity. It followed that the cost and quality structure resulted in falling exports and a reliance on local markets which were constrained by the income levels of the majority.

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[83] 'COSATU was launched in December 1985 after four years of unity talks between unions opposed to apartheid and committed to a non-racial, non-sexist and democratic South Africa. At our launch we represented less than half a million workers organised in 33 unions.' http://mediadon.co.za/formation-of-cosatu/ Accessed 7 December 2019.

[84] Alan Hirsch, *Season of Hope, Economic Reform under Mandela and Mbeki*, University of KwaZulu-Natal Press, 2005, p. 45.

[85] *Ibid*, p. 45.

[86] A. Erwin, 'Towards a Socialist Economy: Economic reconstruction'*, The African Communist*, No. 129, 1992, pp.13-23.

The gaps between the productivity levels abroad and locally were widening. South African firms trailed behind world trade and production patterns which were rapidly moving towards commodities produced by skilled labour using flexible production methods capable of producing high quality products. This vicious cycle meant that low levels of human resource development, 'low levels of productivity, bad managerial practices and the wasteful use of the natural, including energy, resources of South Africa'[87] were the norm. So, in essence, there were no new markets for manufactured goods and so no new investment in manufacturing was taking place – so no new jobs in manufacturing were being created.

As a consequence of these factors the South African economy became increasingly controlled by a handful of very powerful conglomerates which grew by taking over existing capacity and using the high gold price and the general use of mineral exports to allow importation of machinery. By the end of the 1980s, five groups-controlled companies worth close to 90% of the stock market value of all publicly listed companies based in South Africa.[88]

In the engineering industry, naturally of concern to NUMSA, Erwin drew on the work done by Zavareh Rustomjee, an ET economist, who had found that

> [M]any firms … were profitable through boom and recession. Those few that were not were absorbed into conglomerate structures, closed. Case studies show that many engineering firms were able to achieve profitability and simultaneously remain internationally uncompetitive. Import parity pricing combined with conglomerate control across the production chain is a major reason for this. Thus, it is possible to make sufficient profit in the financial sector and in sectors protected by tariffs and import parity pricing to cover costs of running engineering industries at low capacity during periods without mega-projects. Overall conglomerate profitability is ultimately recovered from consumers through administered inflation.[89]

That this was possible acted as a break on greater competitiveness and new investment. Together these factors 'plunged South Africa into a recession marked by slow and, in both 1982 and 1983, negative growth in GDP'.[90]

Employers knew of the crisis and had been responding for some time – but the adequacy of their response, particularly judged from a union perspective, was what Erwin challenged:

> In short, the concern of capital is to cut costs in order to maintain profitability, and that of the state is to shed its obligations in order to solve its financial problems. There is no coherent thinking about the effects of such policies on the wider society. Such policies constitute a systematic attack on the working class in particular because they have a negative impact on wages and employment with no gains made elsewhere.[91]

In confirmation of this conclusion Hindson and Crankshaw have recorded: 'Unskilled jobs actually declined over the period [1965-1985] from about 300 000 to under 200 000' whilst

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[87] Erwin, 'Towards a Socialist Economy', p. 19.

[88] Hirsch, 'Season of Hope', p. 45.

[89] Wits, Numsa Records, AH 2555, B 68.4, Zavareh Rustomjee, 'The Engineering Sector in South Africa: A study prepared for the Industrial Strategy Project', Johannesburg, 1993, p. 1.

[90] Forrest, 'Power, Independence and Worker Democracy', p.69.

[91] A. Erwin, 'South Africa's post-apartheid economy: planning for prosperity', *South African Labour Bulletin*, 14(6), 1990, p. 42.

'semi-skilled jobs increased from about 400 000 to over 800 000'.[92] But it was not always the same workers that moved up.[93] They noted that 'the groups which lost out from this development were unskilled African workers, many of whom became permanently unemployed'.[94]

In the metal industry, Forrest reports that, 'From 1982 employers laid off tens of thousands of black workers in the sector. The trough came in 1986, even though output was still 8 per cent higher than in 1975. Output rose thereafter so that by 1989 the engineering industry was producing 20 per cent more than in 1977. Employment however had only increased by 3 per cent. Companies had used the recession to further mechanise and increase production using less workers.'[95] It was workers with skills that were spared the axe.

Bryan Phillips, employed from 1986 at Gencor, a major mining conglomerate, and later a leading negotiator on skills issues for business, confirmed this analysis:

> [T]here had been nothing but cost-cut, cost-cut, cost-cut for years in order to be able to compete. The big issue was less the political change as such and much more the impact of the re-integration into the global capitalist world. Eskom had access to coal at half the price from Colombia and Australia and other new producers. The productivity imperative in the mining industry was overwhelming.[96]

In discussion he gave the following example:

> In gold, we were able to reduce a 22-man team to an 8-man team with a rise in output simply by taking tasks away from the miner [the artisan] by using competency descriptions with a meteoric rise in productivity. To do that we had to take it away from the miner and give it to the team leader who then needed a different profile – and we needed a vehicle to do this. Well, while the miner was defined in the legislation, you had the team leader doing everything that was in the miner's role. The miner was simply signing it off. [97]

Phillips elaborated further:

> We got the production costs down to half what it had been five years previously and still we were told the costs had to reduce. We couldn't get the services we needed, and the costs of transport and portage rose per ton. So, the strategists in mining were saying we have to diversify our risk. Australian coalfields, Colombian coalfields, Venezuelan coalfields, Chinese coalfields – we have to diversify our risk. …And new mines? No, our new mines are in Australia.[98]

These employer strategies produced impressive profits at the time as highlighted by NUMSA's presentation to the 1987 NICISEMI wage round: large companies which dominated the metal industry and employed most of the workers such as Altron, Dorbyl, Robor and Amic were making excellent profits, well over the inflation rate (Dorbyl's profits had increased 264 per cent). These profits had been made 'through restructuring their operations – new machines,

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[92] D. Hindson and O. Crankshaw , 'New jobs, new skills, new divisions – the changing structure of SA's workforce', *South African Labour Bulletin*, 15(6), June 1990, p. 29.

[93] This was the central contention of the Training Group – that more workers should move up.

[94] Hindson and Crankshaw, 'New jobs, new skills, new divisions', p.29.

[95] Forrest quotes here from *Numsa Bulletin* `Retrenchments in the Metal Industry in South Africa`, No 1, September 1990.

[96] Interview with Bryan Phillips and Annamarie Rademayer, 26 August 2006, White River.

[97] *Ibid.*

[98] *Ibid.*

new ways of working, and retrenchment of workers'[99]. **Khumalo** illustrated this concretely from her Dorbyl base in Elandsfontein:

> [The manager] said, 'Everyone must set his own machine.' We were all trained to set our machines. Big or small, they trained everyone to set their machine. Then we set our machines. … Then the problem started, the [workers] said, 'We want setting money otherwise we don't set.' (Laughs) 'If I can set …, I want the money to set!' … So, they went, 'oh, oh no' and just left the idea of setting. We were not setting the machines anymore. But everyone now could set.[100]

Numerous smaller factories had been forced to close down which resulted in more than 110,000 jobs being lost in the metal industry between 1982 and 1990. Many of the smaller companies were bought out by larger metal firms together with their machinery and orders. Finally, the union asserted, the Household Subsistence Level wage (which the union rejected as inadequate for workers' needs) stood at R425.20 per month while the minimum wage in the metal industry was fixed at R399.90 per month.[101]

Whilst workers at the base were facing serious job losses, those with skills were enjoying the benefit of increasing demand. Rustomjee warned that:

> Severe skill shortages have been masked by a contracting engineering sector since the early 1980s. Skill constraints will cripple any nationwide expansion of the engineering industry as a whole and short-term solutions, such as selective skills imports might be necessary. Case studies show that skill constraints at supervisory, technician and artisan levels will act to prevent full equipment utilisation and might lead to wage-led inflation.[102]

This was confirmed in an employer survey[103] in which 39.9 per cent of employers interviewed cited the availability of skilled labour such as technicians as the biggest obstacle to greater capacity utilisation. In yet another study, Maller and Dwolatzky[104] argued that in some instances automation was accelerated to compensate for these skill shortages and had been slower at the lower levels where cheap labour was readily available. Indeed, it had been largely in response to this rising demand for more skilled workers that the state had introduced the Manpower Training Act No. 56 of 1981 to permit African apprenticeships for the first time. This was later amended to permit the 'outsourcing' of training to employers and unions through the voluntary establishment of Industry Training Boards (1990). Funded by voluntary levy schemes, these were key components of the state's own strategic plan. This strategy, devised in the face of the economic challenges, as well as rising resistance to apartheid in all its forms, was costly and led the state to commence a 'sale' of state-owned companies, such as the Iron and Steel Corporation (Iscor) and elements of the Post Office. This 'sale' included the commercialisation of the state's own training capacity, previously conducted by the state-owned companies.

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[99] Forrest, 'Power, Independence and Worker Democracy', p. 253.

[100] Interview with Belinah Khumalo at Indlela, Olifantsfontein, 25 March 2008.

[101] Forrest, 'Power, Independence and Worker Democracy', p. 253.

[102] Rustomjee, Zavareh. March 1993. The Engineering Sector in South Africa: A study prepared for the Industrial Strategy Project. Johannesburg. A copy was sourced in the NUMSA papers, Cullen Library, University of the Witwatersrand AH 2555, Box 68.4.

[103] Wits, Numsa Records, AH 2555, B 68.4, Rustomjee, 'The Engineering Sector in South Africa, p. 22.

[104] B. Dwolatzky and J. Maller, 'The Restructuring of Work in the South African Metal Industry', unpublished, Sociology of Work Programme, University of the Witwatersrand, August 1992.

The progressive economists and strategists were not passive in the face of these challenges. Under an ANC umbrella, extensive consultation and engagement took place. The outcome of which was the ANC's Reconstruction and Development Programme (RDP) which envisaged a new way to tackle the economic problems facing the country and redressing poverty, inequality and unemployment more broadly.

In this context, it is clear that the work of the Training RDG was a required and central component of the broader strategies of the progressive movement at the time.

LADDERS AND LEVERS

The 'miracle' of the Training RDG was that their employers, in the main, agreed to give paid time off to participants for three residential slots of three weeks each. Such was the naive nature of the request.

The final programme was divided into four phases: first, to establish what others were doing in the field in South Africa; secondly to collate our collective understanding of the problems that workers were then experiencing with training; thirdly to collect as much information as possible about pro-worker international initiatives from our union allies abroad, and finally to develop these into a new vision for training for our union to consider.

First phase

The first phase was a period of disclosure. The RDG found that a great deal was underway at micro, meso and macro levels in the country. At micro level companies were restructuring and training on quite a broad front, and at meso level about 33 industry training boards had been established. Private training companies and non-government organisations were also busy. And at a macro level, the RDG learnt of the National Training Board (NTB), a body established by the Manpower Training, Act No. 56 of 1981, to advise the Minister on training policy (a structure it knew nothing about as no black industrial union was represented on it at the time).

The RDG learnt of the NTB from Professor Alan Pittendrigh in person, who had by then chaired two major national training investigations and was in the process of completing a third. These were:

- Human Sciences Research Council (HSRC) / National Training Board (NTB) Investigation into the Training of Artisans in the RSA (1985);
- The HSRC/NTB Investigation into Skills Training in the RSA (1989); and
- The NTB/HSRC Investigation into a national training strategy for the RSA (1991).

He came to St. Peters Lodge, where the Training RDG was housed, dressed smartly in a suit and tie. He made a professional presentation to the shop stewards who sat casually in jeans and union slogan T-shirts - and who listened intently. He spoke of many ideas which resonated with us at the time, although of course he made no mention of grading or wages:

> Nationally recognised qualifications based on the completion of a series of accredited courses and modules should be developed. Such qualifications should be considered by the formal

education departments for accreditation so that holders of such qualifications can re-enter the formal education system with credits acquired in the non-formal sector.[105]

Second phase

The second phase was undertaken by the participants themselves when they returned to work between structured sessions. A long list of problems was collected which was later summarised in NUMSA's 1989 Congress Resolution on Training as follows:

> **Noting**
> That the present provision of adult education and training has resulted in a massive shortage of high-level skills at the same time as there is mass unemployment among people who are classified unskilled who have been denied every opportunity to improve their skills. The system has therefore totally failed.

Third phase

International study visits made up the third phase of the Training RDG, supported by international trade union partners. A group of ten participants went to Zimbabwe in a new van lent by Nissan, where they attended a three-day International Labour Organization (ILO) seminar on training models and the work of the ILO. Tripartism (government, business and labour) was needed for the formulation of training policy, we learnt from them together with a range of details on protection of the environment and health and safety.

Others visited the United Kingdom, Tanzania (where the still-banned ANC had its base), Italy (where again tripartism was emphasised along with paid training leave), Sweden (where the rights of women workers came across most loud) and Australia.

The Australian voice was loudest in the end. The group saw first-hand how they were planning a future metal industry grading scale based on skill and wage relativity all the way from 'sweeper to engineer'.[106]

Table 2.3. Australia's idea of a future metal industry grading scale

Classification	Classification Title	Wage relativity
C1 (b)	Professional Engineer Level IV Professional Scientist Level IV	210%
C1 (a)	Professional Engineer Level III Professional Scientist Level III	180%
C2 (b)	Experienced Engineer Level II Experienced Scientist Level II Principal Technical Officer	160%
C2 (a)	Leading Technical Officer Principal Supervisor / Trainer / Co-ordinator	150%

[105] Human Sciences Research Council, *HSRC/NTB Investigation in Skills Training in the RSA*, 1989, p. 281.

[106] *Award Restructuring Implementation Manual for the Metal and Engineering Industry,* jointly produced by Metal Trades Industry Association of Australia (MTIA), Australian Chamber of Manufactures and Metal Trades Federation of Union (MTFU), (undated but 1990), Section 5, p. 7.

C3	Engineering Associate Level II	145%
C4	Engineering Associate Level I	135%
C5	Engineering Technician Level V Advanced Engineering Tradesperson Level II Graduate Engineer Level I Graduate Scientist Level I	130%
C6	Engineering Technician Level IV Advanced Engineering Tradesperson Level I Graduate/Diplomate Scientist Level I (3-year course)	125%
C7	Engineering Technician Level III Engineering Tradesperson Special Class Level I	115%
C8	Engineering Technician Level II Engineering Tradesperson Level II	110%
C9	Engineering Technician Level I	105%
C10	Engineering Tradesperson Level I	100%
C11	Engineering Production Employee Level IV	92.4%
C12	Engineering Production Employee Level III	87.4%
C13	Engineering Production Employee Level II	82%
C14	Engineering Production Employee Level 1	78%

Source: *Award Restructuring Implementation Manual for the Metal and Engineering Industry, jointly produced by Metal Trades Industry Association of Australia (MTIA), Australian Chamber of Manufactures and Metal Trades Federation of Union (MTFU),* (undated but 1990), Section 5, p. 7.

This formed an integral part of a broader strategy to restructure Australian industry – then in a somewhat similar position to South Africa:

> The Australian economy was in serious crisis. It had an extremely large, and growing, foreign debt caused by a high dependence on the export of raw materials (71% of exports) and import of manufactured goods (82% of imports). Its manufacturing industry had been developed behind tariff barriers and was based on low investment, old technologies, old work methods and was therefore uncompetitive on the global market. Many analysts predicted that Australia would become increasingly like a third world economy unless a fundamental change took place.[107]

Their strategy to affect this turn-around was contained in a report, published in 1987, entitled *Australia Reconstructed*[108]. It addressed needed macro and micro reforms amongst which skills development was a central component. At its heart the strategy envisaged that 'Australia need(ed) to develop an internationally competitive export market in high value-added manufacturing products if it is to turn around its foreign debt and expand'[109].

Unlike NUMSA, the Australian Metal Workers' Union's (AMWU) membership was 60 per cent tradespersons and it was on the verge of merging with a union representing technicians, draftspeople and supervisors so they had a higher skills platform from which to launch. Australians also had a functioning schooling system, so they were not plagued by the need

[107] COSATU Participatory Research Project (PRP) Australian Study Visit Report, 1990, A. Bird, p. 10. (The PRP was COSATU's version of NUMSA's Training RDG with broad participation of various COSATU affiliates. A. Bird represented NUMSA on the COSATU PRP.

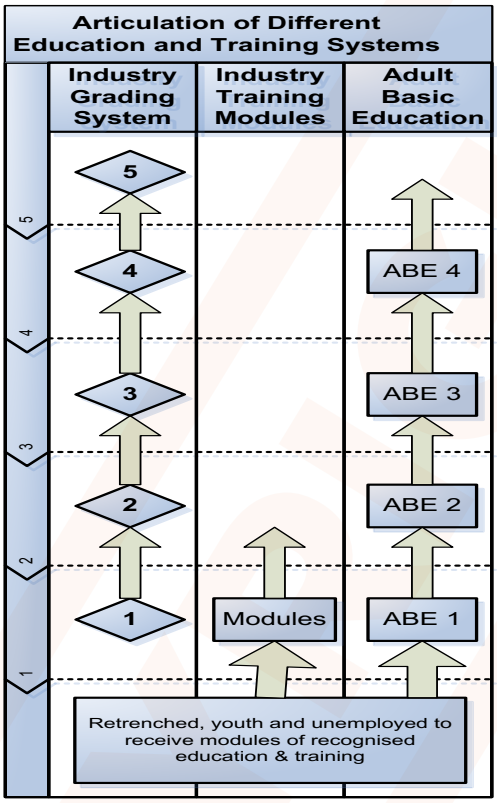
[108] ACTU-TDC, *Australia Reconstructed,* Canberra, AGPS, 1987.

[109] COSATU PRP Australian Study Visit Report, 1990, A. Bird, p. 11.

for adult basic education on a mass scale[110]. Australia was also a developed, democratic society, which South Africa was certainly not. So, a direct 'transplant' of policy was not on the cards.

Against all these inputs the Training RDG came up with a simple five-grade model – from sweeper to artisan.

Table 2.4. Numsa Training RDG 5 grade model – from sweeper to artisan



Source: Numsa Vocational Training Project. March 1991. OH 26.

The model did not extend beyond artisan level although the slogan 'sweeper to engineer' was widely used. This reflected the numerical dominance of the NUMSA membership on the lower rungs as well as the generosity of the artisans on the Training RDG. This should not, however, be interpreted to mean that the participating artisans did not aspire to climb. Of all the RDG members, only **Manana** reported that he was offered the opportunity to study at a Technikon, but he turned it down because: 'Ja, they did, but what they did was they put conditions. One of the conditions was for me to resign from the union and then sometimes they would say, "You can remain with the union but resign as a shop steward" … I would decline all these things.'[111]

[110] The NTB's NTSI estimated that the target group for Adult Basic Education in South Africa at the time was at least 6 million people, with more than 2 million at levels Standards 3-5. NTB, *NTSI*, p. 45.
[111] Interview with Joshua Manana, 17 March 2008.

Progression from artisan status was happening, but not to technicians. There appear to have been many 'stopping points' on the way. Some of these were junior supervisory positions which **Les Nhlapo** set out clearly:

> (T)here was progression, from Leading Hand you could apply to become a Charge Hand and from a Charge Hand you can apply to become a Foreman and that is where it would end unless you can perhaps become a Superintendent. But you can never become an Engineer because you needed to have sufficient qualification – N6 and so on. But some of the engineers would be made engineers with N4 – if they can show that they know sufficiently about the plant and they have sufficient experience, then they'll get made engineers. But they'd be engineers at a lower level. Because there'll be engineers at a higher level, those guys that come from Technikons and Universities. So that was sort-of the line of progression.[112]

More commonly it appears that artisans were sent on supplier-specific programmes for the installation, maintenance and operation of new machines. Moegamat Hoossen went on many of these – such as 'Mercedes Benz Passenger Cars Course 108 Automatic Transmission (Honda and Mercedes)' and 'Mercedes Benz Passenger Cars – Fuel Injection Systems'.[113] Sam Morotoba[114] was sent on programmes for 'Advanced CNC machining' and others. This meant they had detailed information on particular company-specifics but lacked a more generic understanding required at the higher levels. Ike Abrahams[115] and Sam Morotoba became so good at these specifics they became trainers of others, even of technicians and junior engineers, but they themselves were not sent for further formal study. Both tried to do night classes to gain their N4s, but it failed to give them the promotion they sought. Their careers were effectively blocked.

Ben Nicholson, from the South African Electrical Workers Association, was also of the view that technicians were a different breed and were opposed to siding with artisans:

> In a word, *elitism*! They considered themselves *better* than an artisan – which is foreign to the thinking of artisans by the way. A true artisan will say he's a fellow … we're all in the same industry together. But those people thought that getting technical qualifications put them in the engineer class. That they would now be the bosses. Well, this is my theory anyhow as to how it worked. Because when I spoke to any of these people, 'No we are above that – we don't work with our hands anymore, we're the brains people.' Which is elitism in its purest form. And they considered themselves better than most and they never appeared *ever* with us in any negotiations whatsoever. There was never any attempt by them to get involved and say, 'Look we could improve everybody if we did this, or that, or the next thing.' And they always went direct … I don't think they negotiated as a group – because my information was that they would meet their own employers. And generally, they were employed by the larger employers, of course, and they could afford to go and meet separately, and individually, with the employer and negotiate their own terms for them, but not as a group. In fact, there were no set salary scales for technicians.[116]

Morotoba was bitter about this. He reported that

> I had a group of young engineers and technicians under my supervision, and meanwhile I had apprentices and I had to work with all those people to show them what needs to be done. And yet in terms of salary level we were different. They were going to a Technikon and we were only confined to the College and they were being paid and they had a six-month kind of a break, block release. And I would say I'm working beyond an artisan and I've got aspirations

[112] Interview with Lesley Nhlapo, 4 April 2008.
[113] Interview with Moegamat Hoossen 27 March 2008.
[114] Interview with Sam Morotoba, 24 November 2007.
[115] Interview with Ike Abrahams, 2 April 2008.
[116] Interview with Ben Nicholson, 15 August 2008

> and these guys … I mean, we would teach them what to do. Even drawings and the reading of drawings, or some of the designs - because you used to get everything that was left-handed and because we are right-handed you had to do the modification. And some of the things you couldn't just machine, you had to do adaptations …[117]

After qualifying, he tried to progress further, but national recognition remained elusive as he illustrates, with much company-specific training which was not nationally recognised:

> Then I did up to N3 Electronics first of all, and then I continued with N4 Electronics – then I did N4. Then I carried on like that. I did subject, for subject, all like that. There were some blocks I didn't go and then … But there was no point at that point in time. After that I then worked at the companies, I was then sent up to Pretoria on all specialised Mercedes courses, which gave me all the technicians' courses of Mercedes. I did the technical technician courses of Mercedes.[118]

Morotoba, like Hoossen, was sent on a range of company courses, which for Morotoba were given by the suppliers of new technology to Samcor:

> … And that is when they decided to move me back into the Training Centre ... We were the first people to be exposed to all those CNCs and all those sophisticated sort or machines. And that's when I became an Instructor in the Training Centre and being moved to a Technician level. … You were promoted to that level because in terms of work …
>
> (Y)ou'd go and learn advanced CNC machining in a factory … we did this in Isando. There was a supplier, a supplying company and we spent three months there. And you would get the Japanese, for instance, coming in and you'd do another extended programme, accelerated programme with them. I mean most of the learning, and that is what is happening or used to happen in training centres, you used to get a lot of learning from the suppliers of the machinery because at the end of the day you had to maximize the operation of the machine. They just show you the basics and the capabilities of the machine and when you get a drawing you then have to combine the different manoeuvres and you'd set different cutting tools and all that to produce whatever you want.[119]

Abrahams was also promoted to the training section where he taught technicians amongst others.

Between 1988 and 1995 there was an explosion of students entering Technikons. The total student enrolment of the 14 contact Technikons and one distance Technikon almost tripled from 57 595 students in 1988 to more than 160 000 students seven years later. On paper increasing numbers of students were becoming technicians through 'the academic route'. However, a more careful examination of the numbers shows that internal progression routes were still common, even perhaps the majority: numbers increased most dramatically at the *distance* Technikon – from 10 557 in 1988 to more than 70 000 in 1995, an average annual growth of more than 36 per cent.[120] Distance learning was most common amongst those already in employment.

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[117] Interview with Sam Morotoba, 24 November 2007.

[118] *Ibid*

[119] Interview with Sam Morotoba, 24 November 2007.

[120] C.T. Verwey, *Trends in Higher Education Development, 1988-1995. Executive Summary.* Education and Training, Centre for Policy and Information, Development Banks of South Africa, 1995. Presentation to Strategic Planning Session 10 – 12 August 1995, Task Group; Future Needs and Priorities, National Commission on Higher Education (NCHE), item 7, Technikon Trends. The highest average annual growth rate of 27 per cent occurred from 1988 to 1991 - although the bulk of this growth was in the non-technical areas.

But, unlike the trend in apprenticeships and artisan numbers – which were showing a shift to Africans - technicians remained predominantly white and Indian, the result of policies instituted in the 1960s, and to which we shall return. The racial breakdown of technicians is shown in the table below.

Table 2.5. Racial and sexual division of labour across semi-professional occupations, 1990 (percentage distribution)

Occupation	Whites		Coloureds		Indians		Africans		Unspec. Race/sex	Total
	M	F	M	F	M	F	M	F		
Technician's assistants	37	27	8	3	4	1	19	1	0	100
Technicians	36	4	2	0	54	0	2	0	1	100
Technologists	82	8	3	0	3	1	2	1	0	100

Source: *Manpower Survey 1990: Occupational Information, Report No. 02-01-01,* Central Statistical Service, Pretoria, cited by O. Crankshaw, 1996, p. 645.

So, the vision of progression - all the way from sweeper to engineer - was still a mirage for most African and coloured workers. During the transition to democracy, one would have expected such forms of career progression to become a highway for the growing numbers of black artisans – along the lines of NUMSA's 'ladders' dream, but if the experiences of the RDG members are representative, it did not occur.

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From vision to policy

The vehicle for the translation of vision to policy was clear – a resolution needed to be formulated and tabled to a full congress – the union's highest decision-making body. It had initially been hoped that a resolution on training could be adopted in 1989 but the processes took more time than anticipated. So, it was only to the June 1991 National Congress that the Training RDG finally presented its resolution, where it was unanimously adopted. It was also tabled and adopted, more or less unchanged, to the Fourth COSATU National Congress held on 24-27 July the same year[121] and so almost immediately became federation policy as well.

The resolution, titled *NUMSA Resolution on Bargaining Strategy: Education and Training*[122] followed the formula of first ***noting*** the problems it sought to address; then expressing the broader outcome to which the proposed interventions sought to contribute, with the words ***believing that;*** and finally expressing as achieved goals (called 'principles') towards which the union would work, introduced by '***therefore resolve to fight for'.***

[121] University of Witwatersrand, Historical Paper Research Archive. Congress of South African Trade Unions (COSATU) Records, (hereafter COSTAU records), AH2373, B4.4, Resolutions, p.21ff. A consolidated resolution was finally recorded which added a clause (3.1) on the education system and a clause (4) on the Research and policy development capacity.

[122] NUMSA. 1991. Bargaining Strategy: Education and Training: Resolution On http://www.numsa.org.za/article.php?cat=res91&id=6 .

NUMSA RESOLUTION ON BARGAINING STRATEGY: EDUCATION AND TRAINING[123]

Noting

That the present provision of adult education and training has resulted in a massive shortage of high-level skills at the same time as there is mass unemployment among people who are classified unskilled who have been denied every opportunity to improve their skills. The system has therefore totally failed.

Believing that

1. A more highly skilled working class is needed to lay the base for a democratically planned socialist economy.
2. Skills will be needed if the working class is to gain and maintain control of production.

NUMSA therefore resolves to fight for*:*

1.A training programme based on the following principles:

i. Training must be linked to economic planning,

ii. Trade Unions must play a central role in planning, implementing and monitoring training. There must be agreed procedures for selection and testing.

iii. Trade unions must fight to end the effects of past class, race and sex discrimination in training.

iv. Employers and the State have a duty to train; both have a role to play in financing such training.

v. All workers have a right to paid education and training leave. Workers facing retrenchment or experiencing unemployment have a right to re-train as a steppingstone to secure employment.

vi. Education and training should continue throughout a worker's life to ensure that his or her skills keep pace with technological change, are needed by society and enable the person to develop his or her abilities.

vii. Formal education must be free and compulsory. There must be clear link between the formal schooling system, the adult education system, the industrial training system and other education and training systems e.g. for the youth and unemployed.

viii. Training must be linked to grading, and hence to pay. An increase in skill must lead to an increase in pay. The grading system must allow workers to advance up a career path from the lowest to the highest level through training.

ix. Training must be based on short courses that allow workers to progress form one course to the next. The courses must lead to national or industrial certificates.

x. There must be provision for recognition and pay for skills that workers already have.

xi. There must be career paths for trainers. Training trainers must be a central part of the system.

2. An adult education programme based on the following principles:

i. An adult education system should be nationally negotiated and be recognised by both management and the State. The system should be negotiated by COSATU, rather than individual affiliates where practical, in order to ensure that the courses are recognised across all industries.

ii. Courses must be recognised as providing sufficient education for entry into training courses. The course must also be recognised nationally as equal to formal education standards.

iii. All courses, including literacy and numeracy must be developed to allow clear steps to advance from one course to the next. The courses must lead to nationally recognised certificates.

iv. There must be paid time off for literacy and numeracy courses.

[123] NUMSA. 1991. Bargaining Strategy: Education And Training: Resolution On http://www.numsa.org.za/article.php?cat=res91&id=6 .

v.	Employers must provide facilities for literacy classes and negotiate with Unions both the paying and training of literacy and numeracy teachers as well as the development of suitable materials.
3.	**Measures to ensure that special problems that women workers face are adequately addressed, such as:**
i.	Equal wages for skills of equal value
ii.	Women's skills are recognised and paid
iii.	Encourage women to take up training opportunities in non-traditional areas of killed work
iv.	Full parental and childcare rights for all trainees
v.	Career paths for areas of traditional women's work – such as clerical work will have to be developed
vi.	All documentation to be non-sexist
vii.	All facilities to be equal for men and women.

After it was adopted by National Congress, the work intensified on three different paths. First, the different bargaining councils commenced negotiations on the proposed five grade system; second, the same resolution was taken to the COSATU National Congress in 1991, where it was again adopted unanimously. COSATU then initiated its own 'RDG' programme, known as the Participatory Research Project (PRP), with participants drawn from a more diverse group of COSATU trade union affiliates. The PRP managed 'training' and 'adult basic education' as separate groups. The third area of work took place at the National Training Board (NTB). The 'success' of each of these is considered below.

EVALUATION AND IMPACT

There are multiple criteria that might be used to evaluate these efforts and proposals. Here a simple set of two will be used.

1. Did workers benefit?
2. Did the propositions impact on the new government's training agenda?

Each will be briefly considered in turn below:

1. Did workers benefit?

The strategy was evaluated by the union itself in 2000 and the results were published in an article in the second *NUMSA Bulletin*[124]. In the article five criteria were used to evaluate progress:

1. *Negotiate a training system so that workers can climb up the ladder.*
    a. By June 30, 1995 Industry Training Boards (ITBs), in each sector must negotiate how workers can climb the ladder.
2. *Design modules (courses) which workers can do to climb up the ladder.*
    a. By June 30, 1995, courses/modules must be available for all workers.
3. *Assess all workers to see what skills they have. Pay them according to the skills that they have as well as the job that they do.*
    Recognition of prior learning (RPL) would assess each and every worker on the skills that they have learnt on the job. If their skills are more than the job they are doing, then they

[124] M. Samson, 'From Sweeper to Engineer? The Successes and Failures of Training in the Three Year Bargaining Strategy', *NUMSA Bulletin*, No 2, May 2000, pp. 24 – 30.

should be paid at their proper skill level. If their skills are less than the job they are doing, then they should be allowed to upgrade their skills.
Train workers so that they can move up the skills levels.
From July 1, 1995 all workers should be allowed to do two modules per year from the industry's education and training system.
Change the grading system to a skills-based grading system, not a task-based system.
By June 30, 1994, the ITBs in each sector must develop new skills-based definitions for each of the new grades as they will exist in January 1996. They must define what skills the worker needs to have on each level and what work responsibility the worker will do/have at each level.

The greatest gains were made in the automobile industry.

Table 2.6. Successes in the Automobile Industry – 1995-2000

Criterion 1: Negotiate a training system so that workers can climb up the ladder.	• The 1993 Auto Agreement included a new qualifications framework. • A qualifications framework called the AMIC was completed in 1995 for levels (grades) 2-4. • At each level workers must complete 8 credits in adult basic education (ABE) (6 at level 2), 8 core credits (which are non-technical skills like health and safety, employer-employee relations etc.) and 8 specialisation credits (technical skills).
Criterion 2: Design modules (courses) which workers can do to climb up the ladder.	• All modules have been completed except for technical, non-production and administration. • Most modules were imported from Australia. • Modules say what the assessor must look for and what the worker must be able to do – they are not teaching / learning modules. • Each company has developed its own training materials based on the modules, so workers in each company still receive different training. • According to the 1993 Agreement, modules for levels 5-7 were to be developed by June 30, 1995. This has not been done.
Criterion 3: Assess all workers to see what skills they have. Pay them according to the skills that they have as well as the job that they do.	• 1993 agreement gave all workers the right to a once off RPL on the technical part of their skills. • RPL exercise was conducted in 1996. • Each company used its own RPL process and assessment methodology.
Criterion 4: Train workers so that they can move up the skills levels.	• The 1993 agreement said that all workers participating in the skills development programme had the right to do a minimum of 2 modules before June 30, 1996. This was never implemented. • According to the 1993 Agreement, skills or on-the-job training will take place during company time, and knowledge training during employee's own time, half of which is to be paid at normal time rates.
Criterion 5: Change the grading system to a skills-based grading system, not a task-based system.	• The 1993 agreement established a new skills-based grading system for levels 1 – 7. • Workers who complete Auto Training Board certificates for levels 1-4, are automatically paid at the higher level, even if their job doesn't change. These workers must do any tasks at their level or below for which they have been trained. • Workers can only move beyond level 4 up to 7, if they have completed the certificate, and if there is a vacancy.

Source: M. Samson, 'From Sweeper to Engineer? The Successes and Failures of Training in the Three Year Bargaining Strategy', *NUMSA Bulletin*, May 2000, pp. 24-30.

These advances must surely be viewed as a great success, however on the factory floor a different picture emerged. The time it had taken to develop modules led to a falloff of focus by most workers. And when implementation began, it seems that workers were struggling to pass the ABE modules and became opposed to them – 'Our people are not educated … We thought our people would move because of their technical skills' but even there 'a lot of people failed the RPL, so no-one moved into higher grades'. Some believed that 'failure' was common because success would be a cost for employers.[125]

NUMSA had agreed that workers would have to do the training outside working hours and would only be paid for half the time they spent on it.

> Lots of workers claimed to be tired and all that jazz. Even those who were interested found that management says they must work overtime the same time as their classes. Certain individuals would compare going for money and going for classes and they would go for the money.[126]

There were however some concrete successes. Where workers were in jobs prioritised by management, they benefited from the system. For example, team leaders at Toyota received training and were promoted. In addition, workers with high levels of education who could teach themselves were able to move.

> (I)n plants like Delta you have people who were employed with matric. Those are the people for whom it was easy to make those modules at home and request assessment. And those people would move up the ladder. Now, in plants like Samcor where you find a majority of workers who have never been to school and are old and so forth, then they wouldn't do that. They have difficulty grappling with these requirements and therefore movement was not feasible in plants like those.'[127]

At the end of the day the general impression seems to have been that very few workers benefited.

In the auto industry there was also a productivity component to the three-year agreement, which spoke directly to the restructuring objectives of management:

- achieve production schedules, including the rescheduling and recovery of lost production
- introduce fair systems to reduce absenteeism, improve quality levels, reduce inventory levels, and eliminate waste
- develop human resources, including that of shop stewards
- introduce new shift patterns and new methods and 'approaches to work and work organisation to ensure competitiveness'.[128]

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[125] Samson, 'From Sweeper to Engineer?', p. 30.

[126] J. Grice, 'The 3-year auto agreement: long term – short changed?', *NUMSA Bulletin*, No 2, May 2000, pp. 18-23.

[127] Samson, 'From Sweeper to Engineer?', p.29.

[128] Grice, 'The 3-year auto agreement: long term – short changed?', p. 20.

The Tyre Sector of NUMSA achieved much the same outcomes as the Auto Industry although they attempted to work in greater harmony with the South African developments in the qualification arena, of which more later.

In the Motor Sector, there was no agreement on a skills-based grading system although some progress was made with regard to the development of new qualifications. NUMSA appears to have had limited involvement in these processes.

In the engineering industry, by far the largest and most diverse of all the sectors, the agreement reached was far more modest, but at the same time far-reaching as the table below indicates:

Table 2.7. Progress made in the Engineering Sector – 1995-2000

Criterion 1: Negotiate a training system so that workers can climb up the ladder.	• The Training Board has rewritten technical skills covered by the trades in unit standard format for levels 1-4 of the National Qualification Framework (NQF).[129] • No qualifications model has been developed as the fundamental and core have not been developed for each level.
Criterion 2: Design modules (courses) which workers can do to climb up the ladder.	• The ITB has drafted approximately 500-unit standards for the trades for the NQF. Parallel to this, collective bargaining processes have clustered tasks into the 5-grade system. The two processes are not related. • No training modules have been developed.
Criterion 3: Assess all workers to see what skills they have. Pay them according to the skills that they have as well as the job that they do.	• No industry wide RPL exercise has been conducted. • The Bargaining Council has adopted 'Implementation Guidelines' developed by the Training Board. • These guidelines say that there must be education and training committees, with equal numbers of employer and union representatives, in each plant. • The committees will oversee all aspects of education and training, including RPL, but there are no specific RPL guidelines.
Criterion 4: Train workers so that they can move up the skills levels.	• There is no agreement on the right of workers to a certain amount of training per year.
Criterion 5: Change the grading system to a skills-based grading	• The bargaining council has negotiated a voluntary 5 grade system, that sets out skill definitions for each grade. • The unit standards drafted by the training board do not map directly onto the 5-grade system, as an artisan is pegged at level 4.

[129] The National Qualifications Framework (NQF) created a single integrated national framework that aimed to 'facilitate access to, and mobility and progression within, education, training and career paths'. For more details see: http://www.saqa.org.za/list.php?e=NQF, accessed 26 August 2019.

system, not a task-based system.	

Source: Samson, M. 'From Sweeper to Engineer? The Successes and Failures of Training in the Three Year Bargaining Strategy', *NUMSA Bulletin*, No 2, May 2000, pp. 24-30.

The work with regard to the unit standards produced was initially undertaken by the MEIETB, under a project funded from reserves saved from the Supplementary Fund mentioned above. Adrienne Bird was employed by the MEIETB in 1994 to translate broad propositions into implementable schemes and whilst a start was made, real progress was only achieved when the National Training Board's Engineering and Manufacturing Process Pilot Project took off in 1995 (see NTB below).

However, the bottom line for workers (and management) was time. Getting paid time off for study was a challenge and it took enormous commitment to stay on course. The other real constraint appears to have been poor schooling. Without a foundation on which to build, the training agenda floundered.

2. Did the propositions impact on the new government's training agenda?

When the Training RDG was set up its primary aim was to formulate worker-friendly policy proposals that could inform the new government's training agenda. Did it do this? Yes, it did.

The Training RDG began its work in 1989. In 1990 Mandela was released from prison. The world changed dramatically – the apartheid state accepted that an altogether new path lay ahead. In this space a wide range of negotiating fora were set up or restructured and a more legitimate set of representatives were drawn in even whilst the negotiations pertaining to the hand-over of national power and the scheduling of the first democratic elections were underway.

National Training Board

One of these fora was the National Training Board. In 1991, soon after both NUMSA and its federation COSATU had adopted the resolutions on training, COSATU received an invitation from the last apartheid Minister of Manpower to nominate first one and later two representatives to the National Training Board.

At the time COSATU was aware that the different interest groups were positioning to influence the policy trajectories of the new government. For example, business decided to set up a trust fund, the Joint Education Trust (JET). They approached the big players in the Johannesburg Stock Exchange - Anglo-American, Gencor, etc. - who together contributed R500 million. They then set up a board of influential people and began to negotiate with incoming leaders on policy questions. For them schooling and trade training were key.[130]

Even the education department of the apartheid state was accepting that fundamental change was afoot. It developed its own strategy, the Education Renewal Strategy. This proposed an

[130] Interview with Bryan Phillips and Annamarie Rademayer, 26 August 2006.

amendment to the Manpower Training Act No. 56 of 1981, which effectively handed over the control of training to voluntary Industry Training Boards and absolved the state of its responsibilities for training, except in the area of training of the unemployed.[131]

In this context, and armed with policy proposals of their own, COSATU accepted the invitation and Adrienne Bird and Sam Morotoba were nominated.

The NTB established eight working groups, each with union, business, government and civil society representation. The groups were (1) Environmental Scan; (2) Integration of Education and Training, Competencies, Career Paths and Certification; (3) Training of Trainers; (4) Adult Basic Education and Access to Training; (5) Supporting Infrastructures, facilities and infrastructures, incentives and finance; (6) Labour Market Training Strategies; (7) International Comparators; (8) Legislation.[132] This structure enabled many more NUMSA and COSATU people to get involved in the process. The views of business, largely led by Brian Phillips from Gencor and Andre Diepenaar from the Chamber of Mines, and the then government officials, Deon Haasbroek from Manpower and Gustav Niebuhr from Education were joined by those of COSATU.

Whilst many propositions were won, inevitably compromises were made. Most notably, given later developments, agreements were reached on the need to establish a National Qualifications Framework, independent of grading which, it was argued, was a collective bargaining issue. In April 1993 the National Training Strategy Initiative (NTSI)[133] was completed. The first democratic Minister of Labour (the Ministry and Department had a name change), Tito Mboweni, agreed to adopt the NTSI as his own on the basis that it had been endorsed by a tripartite group.

Once the NTSI was finalised and before the new government settled in, it was agreed that pilot projects should commence to explore the practical implementation of the ideas developed. Two NTB projects were particularly important: the 'Education and Training Development Practitioners Project: An indigenous model for progression paths, qualifications and standards within the National Qualifications Framework'[134] (financially supported by German Technical Cooperation) and the 'National Qualifications Framework: Engineering and Manufacturing Processes Pilot Project'.[135] The latter was co-convened by Christoph Vorwerk (then seconded from the Plastics Federation where he was the Training Director), Gustav Hoffman of the Aerospace Industries' Education and Training Board and Lesley Nhlapo, a NUMSA shop steward from Highveld Steel and Vanadium (Pty) Ltd and previously a member of the Training RDG.

The engineering pilot project was a widely participative project in which other members of the Training RDG also participated, such as Ike Abrahams and Sam Morotoba. It produced the

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[131] Wits, NUMSA records, AH2555, Box 20.9, Vocational Training Project, Proposals to Numsa Polecon 28-29 November 1990.

[132] National Training Board, 'A Discussion Document on a National Training Strategy Initiative: A Preliminary Report by the National Training Board', April 1994, p. 12.

[133] *Ibid,* 'A Discussion Document on a National Training Strategy Initiative'.

[134] NTB, Final Report, October 1998.

[135] NTB, April 1997.

first set of unit standards for the engineering industry. Both projects undertook pioneering work that later influenced national discussion. The work was done between June and November of 1996 whilst more formal legislative frameworks were being put into place.

Another significant piece of work done under the auspices of the National Training Board was on the financing of training, made possible by a grant from the Japanese government. Lindsay Falkov undertook a study of international grant/levy systems. The chapter titled *Partnership for the reform of technical, vocational and training: the South African experience*, published in 1996[136], was to outline the foundation for the Skills Development Levies Act No. 9 of 1999.

African National Congress Reconstruction and Development Programme

The Reconstruction and Development Programme, which set out the broad policy parameters of the new government had the following to say about training:

> **3.3.1.5 Restructuring training within an integrated education and training system**
>
> 3.3.15.1 The RDP proposes a substantially restructured and expanded training system, integrated with Adult Basic Education, post Standard 7 formal schooling and higher education.
>
> 3.3.15.2 The national qualifications framework must be the mechanism by means of which this integration is given effect.
>
> 3.3.15.3 The national ministry and provincial departments of education and training must consult with the restructured bodies of civil society on policy issues.
>
> 3.3.15.4 Education and training for skills development must be modular and outcome-based; must recognise prior learning and experience; must develop transferable and portable skills; must have common standards and must be integrated within the national qualifications and accreditation system. Training programmes and schooling after Standard 7 should form part of an integrated system. Training for self-employment is essential and must be offered.[137]

There was an emerging consensus between the unions and government on the way forward for education and training.

African National Congress Education and Training policy

The African National Congress set up its own education policy process. Again a series of working groups were established in which COSATU representatives participated, including those involved in the Training RDG. It was managed by John Samuels and linked to the Centre for Education Policy Development. In the light of their experience at the NTB, the COSATU team argued that it would be best to include the voices of business in the discussions and this was agreed.

The final document, *A Policy Framework for Education and Training,* colloquially referred to as the Yellow Book, had a far wider scope than the NTSI, however the publication itself acknowledged the work done: 'The National Training Board Task Team on a National Training Strategy Initiative is another important example of participatory, consensus-building policy

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[136] UNESCO. 1996. The financing and management of vocational education and training in Eastern and Southern Africa: report of a sub-regional workshop. Partnership for the reform of technical, vocational and training: the South African experience. Chapter 3. p28-36.

[137] ANC, *The Reconstruction and Development Programme: A policy framework*, Umanyano publications, 1994, p. 68.

development from which we have learned much.'[138] It did however also mention other processes, such as the ANC Policy Conference in May 1992 and the National Education and Training Forum as consensus-seeking mechanisms to address the crisis in education and for creating stable conditions for the restructuring of education and training into a single national system.'[139]

The principles on which the ANC's policies were based are reproduced in full below as they signal strongly the recognition of worker rights in the broader system:

- The state has the central responsibility in the provision of education and training
- The provision of education and training shall be planned as part of a coherent and comprehensive national social and economic reconstruction and development programme, including a national strategy for the development of human resources, and the democratisation of our society.
- A nationally determined framework of policy and incentives shall ensure that employers observe their fundamental obligation for the education and training of their workers.
- Education and training policy and practice shall be governed by the principle of democracy, ensuring the active participation of various interest groups, in particular teachers, parents, workers, students, employers, and the broader community.
- In the process of ensuring education and training for all, there shall be special emphasis on the redress of educational inequalities among historically disadvantaged groups such as youth, the disabled, adults, women, the unemployed and rural communities.
- There shall be mechanisms to ensure horizontal and vertical mobility and flexibility of access between general formative, technical, industrial and adult education and training in the formal and non-formal sectors.
- There shall be nationally determined standards for accreditation and certification for formal and non-formal education and training, with due recognition of prior learning and experience.
- The education process shall aim at the development of a national democratic culture, with respect for the value of our people's diverse cultural and linguistic traditions, and shall encourage peace, justice, tolerance and stability in our communities and nation.
- Education shall be based upon the principles of co-operation, critical thinking and civic responsibility, and shall equip individuals for participation in all aspects of society.

It goes beyond the scope of this study to analyse the ANC's Policy Framework in any depth. However, it can be noted that full support was given to the establishment of a National Qualifications Framework. It can also be noted that it was envisaged at the time that the ANC would establish a 'single national ministry for education and training'.[140]

[138] ANC Education Department, 'A Policy Framework for Education and Training, Draft for Discussion', January 1994, p.5.
[139] *Ibid*, p.5.
[140] ANC, 'A policy framework for education and training', January 1994, p.9.

CHAPTER THREE

FROM ARTISAN TO CERTIFICATED ENGINEER

'Hats off to the truly practical engineer'
The Certificated Engineer, October 1972, Vol. 45, No 10, p.221

There are two people whose voices will be heard most loudly in this chapter, those of Arthur C. Whittome and Abraham Burger Jacobus (A.B.J.) Tinderholm. Their stories are decades apart but the work of Whittome laid the foundation for the pathway along which Tinderholm subsequently trod. The chapter will recount their working lives – from 1891 to 1938 for Whittome and from 1932 to the 1960s for Tinderholm. However, in the end the evolution of this pathway was not only the work of individuals. The strong and well-coordinated Association (later Institution) of Certificated Mechanical and Electrical Engineers of South Africa – was ultimately the agency that collaborated with government to forge the path. The story of the birth and maturation of the organisation is also described.

The period 1890s to 1938

PEOPLE AND PLACES

Arthur C. Whittome

A.C. Whittome led the campaign for the certification of resident mining engineers. His success in this venture resulted in the creation of a second progression pathway for artisans – different from that in the government service, but widely available and, in the end, more durable..
There are few details of his early life but he came to South Africa from Britain in 1891.[1] For a time he sold patented dust collectors, dust samplers, water blasts, atomisers and humidifiers to the mining industry.[2] He joined the Transvaal Institute of Mechanical Engineers (TIME) in 1898[3] and was elected its President in 1904-5.[4] He was one of only four men to have passed the Certificate of Competency examination with honours by December 1936.[5] Once he had succeeded in his certification campaign, he himself was appointed to the Commission of Examiners that set the exam. When he died on 24 May 1938 he was remembered by his peers 'in connection with the valuable work he did in the coaching of entrants to the examinations for Government Certificates of engineering competency'[6] – work which he did under the

[1] The Journal of the Transvaal Institute of Mechanical Engineers (TIME), Vol. IV, August 1905-July 1906, p. 17.
[2] As shown by an advertisement placed by Arthur C. Whittome, in 'Mines and Works Act of the Union (No. 12 of 1911)' and The Mines Works and Machinery Regulations, 1911 as amended by *Government Notice* No. 1675, 30 October 1913 and by *Government Notice* No. 746, 13 July 1915, and by *Government Notice* No. 728, 30 May 1917, published by W.E. Hortor & Company, Ltd, 1917.
[3] *The Journal of the South African Institution of Engineers*, July 1938, p. 250.
[4] *The Journal of TIME*, Vol. III, July 1904 – June 1905, p.12.
[5] A.C. Whittome, in discussion on M. Udwin's paper on 'Examinations with particular reference to Certificates of Competency for Electrical and Mechanical Engineers', *The Journal of the Institution of Certificated Engineers,* South Africa, April 1937, p. 70.
[6] *The Journal of the South African Institution of Engineers*, July 1938, p. 250.

umbrella of the private college he established in London: A.C. Whittome's Engineering College.[7] The College offered correspondence courses for would-be coal engineers in Britain as well as 'mines and works' resident engineers in South Africa.[8]

One of Whittome's College's many students, years later, was A.B.J. Tinderholm whose experience of the system will be drawn upon to explore how it developed.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

The creation of an occupation

The story goes back to 1886 soon after gold was discovered on the Witwatersrand. In *The World the Mine Owners Made*, van Onselen recounts that:

> The initial discoveries of gold on the Rand were made along the length of the reef outcrop as it stretched from east to west in the series of rocky ridges which gave the region its name. Both the fact that the reef protruded at the surface along this line, and that the gold itself was held within the matrix of a more friable and weathered conglomerate in its upper reaches facilitated the first – and easiest – phase of the production process. Hundreds of small-scale, under-capitalised 'diggers' simply excavated rows of trenches from which the gold-bearing reef was relatively easily removed by pick and shovel.[9]

The problem was not at first the digging; it was the subsequent crushing of the ore and extraction of the gold that was difficult. And so, 'within eighteen months of the fields being opened the infant industry made the first of its many demands for more substantial capital investment for equipment to undertake these processes'.[10]

This demand led to the inflow of finance and a boom in 1888-9 during which the broad Diggers' Committee transformed itself into the Chamber of Mines, which represented a much smaller group of considerably wealthier mine owners. But even they were initially stumped when they found that below about 120 feet, the gold extraction process then in use was no longer effective. This halted progress and precipitated a depression, but this was reversed when the mining houses learnt of the MacArthur-Forrest extraction process which had been developed and patented in Glasgow.[11] The process proved very successful, and James Jennings, a Harvard trained engineer, was recruited to come to the Witwatersrand in 1889 to introduce its application across the reef.[12]

It was in response to the boom that followed that skilled men like Whittome came to the Rand. The new process technically enabled mines to go to ever deeper levels with the use of a rising quota of machinery: In June 1894, machinery in use generated an estimated 29,000 horse-power and was valued at £3.5 million, by 1904, 211,000 horse-power was being generated by

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[7] This college, that was part of the British Institute of Engineering Technology (BIET), was referred to by A.B.J. Tinderholm in an interview with him on 22 July 2007.
[8] Interview with A.B.J. Tinderholm, 22 July 2007.
[9] C. van Onselen, 'The world the mine owners made', *Studies in the Social and Economic History of the Witwatersrand 1886 – 1914: 1 New Babylon,* Johannesburg: Ravan Press, 1982, p.2.
[10] Van Onselen, 'The world the mine owners made', p. 3.
[11] Van Onselen, 'The world the mine owners made', p.11.
[12] B. Bozzoli, *Forging Ahead: South Africa's Pioneering Engineers,* Johannesburg: Witwatersrand University Press, 1997, p. 64.

machines valued at £15.75 million.[13] This investment proved to be highly profitable as can be gauged from the rising market share that the mine owners began to enjoy: in 1886 the Witwatersrand goldfields produced 0.16 per cent of the world's gold output, by 1898 it produced 27 per cent and by 1913 it produced a whopping 40 per cent.[14]

But all was not plain sailing. As the shafts tunnelled deeper into the bowels of the earth, new challenges had to be overcome: for example men had to lay and ignite the explosives at ever more dangerous depths and these men, together with those whose task it was to gather and bring the ore to the surface, had to be hoisted down and up again each day. To reduce the incidence of life-threatening mistakes, the men who performed this work were required to demonstrate to a team of assessors that they were competent – success signalled by the earning of a 'certificate of competency', commonly called a 'government ticket'. Only those with such a 'ticket' were allowed to do the work:

> Records in the library of the Government Mining Engineer show that certificates of competency were instituted for the first time in South Africa in the Transvaal Republic in 1897 under Law 12 of 1896. Provision was made for the issue of certificates of competency to chief overseers, mine overseers and engine drivers (being drivers of hoists conveying persons).
> During 1897 the following certificates of competency were granted: 155 to chief overseers, 199 to mine overseers and 720 to engine drivers. These were confined to 'Service Certificates' which were granted without formal examination to persons who were considered sufficiently experienced in the posts they were occupying to remain in charge without endangering the safety of persons. …
> The Mine Manager's Certificate of Competency came into being in 1903, to take the place of the Chief Overseer's Certificate of the old Republic and an additional certificate of competency-that for 'Miners entitled to blast' was introduced at the same time. (The Certificated Engineer, February 1961, p 81). The 1903 ordinance did include a reference to 'engineers' but it did not define the word nor did it prescribe any required qualification.[15]

Whittome tells of the world he found when he first arrived in the country:

> When I first came to these fields, in 1891, there were practically no resident engineers. There were men who were nominally in charge of the machinery on the individual mines, but there was no desire to give the holders of these positions any proper standing. … As time went on it was found that it was necessary (and the mining men I feel assured thought it *unfortunately* necessary) to appoint a man on each mine who would simply supervise the work and perform little or no manual labour himself.[16]

But the situation changed gradually and in 1905 an engineer was able to raise a laugh from his fellow engineers with the remark that 'when some of them came into the Transvaal, they did not have mechanical engineers then as they were their own engineers, and they were all experts'.[17]

Whittome believed this was inadequate and began to campaign for a certificate of competency to be required for men doing this work too. He put forward the following four reasons to motivate his case.

The first was that appointments to such posts took place on the basis of 'nepotism' or, as Orr later quaintly put it: "I am credibly informed that a man need not look for work on certain mining

[13] *The Journal of TIME*, Vol III, July 1904 to June 1905, p. 274.
[14] Van Onselen, 'The world the mine owners made', p. 1.
[15] *The Journal of the South African Institution of Mechanical Engineers*, 1993, p. 17.
[16] *The Journal of TIME*, Vol. IV, August 1905 – July 1906, p. 17.
[17] *The Journal of TIME*, Vol. III, July 1904 to June 1905, p. 275.

properties on the Rand unless he wears a kilt" (Orr, 1908a, 26). The shear randomness of this process irked men like Whittome and John Orr. Orr as the President of TIME in 1908-9, argued this point most strongly:

> It has been a fact, which I need not attempt to blink at, that many men have in the past, with serious injustice to competent men, and detriment to the industry, been pitchforked into responsible positions which they were not justified in holding either by education, training, ability or experience.[18]

The second was a consequence of the first and pertained to a concern over the health and safety of miners and, concomitantly, the cost of accidents to mine owners. This was brought into sharp focus when, in April 1904, one of the well-known members of the Mechanical Engineers' Association of the Witwatersrand, Freeman, was indicted for culpable homicide[19] after a rope accident on the Robinson Deep mine in which a cage-load of men died when a flat winding rope broke.[20] In the subsequent investigation the authorities asked whether Freeman had used the correct method of inspection and whether he had inspected the rope himself – suggesting he was personally responsible. The case clearly concerned other engineers greatly and prompted Whittome, then President of TIME, to ask 'how many lives have been sacrificed during the "weeding out" process by the fact that incompetent men were in charge of the machinery'. He also asked what the cost to shareholders had been.[21] He pondered then:

> When a man sets in to 'break' a horse to harness he does not commence by spanning him in to a new carriage … Why, then, should it have been deemed advisable to take a mechanic (who is the raw or 'unbroken' material from which an engineer is eventually built) and place him in charge of valuable machinery, in the running of much of which human life is dependent, without first proving that he was competent to fulfil his duties.[22]

However, he was careful not to suggest that 'mechanics' were incapable of becoming qualified over time – a point with which others agreed at the trial:

> The advocate for the defence was unwise enough to ask one of the Government Machinery Inspectors if it was not a fact that he had worked as a fitter. The inference being that he could not be a fully qualified engineer. Nearly all the consulting mechanical engineers for the big houses on the Rand gave evidence for the defence, Mr Behr, of the Consolidated Goldfields, and Mr Robeson of the Corner House were amongst them. Each technical witness for the defence was asked, by the Crown Prosecutor, whether he had 'worked as a fitter', and all, including the consulting engineers, stated that they had done so, and one of the most prominent said that he was very glad he had so, otherwise, he would be unsuited for the position he then held.[23]

The third factor was more pecuniary. Some engineers believed that the reason why experienced artisans as opposed to graduated engineers were appointed to these posts was because 'he can be obtained at a few pounds a month less than a trained and tried engineer would accept'.[24] Whittome argued that 'if one is desirous of showing a low salary sheet, this policy will attain it, but at the sacrifice of probably a hundred times the salary of a competent and skilled man.' But here too was an important caveat: he conceded that the work of a

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[18] *The Journal of TIME*, Vol. VII, August to July 1908-9, p. 26.
[19] *The Journal of TIME*, Vol. III, July 1904 to June 1905, p. 12.
[20] J.R. Draper, *The Engineer's Contribution: A history of the South African Institution of Mechanical Engineers 1892 – 1967,* Kelvin House, 2 Hollard Street, Johannesburg, 1967, p. 208.
[21] *The Journal of TIME*, Vol IV, August 1905 – July 1906, p. 17.
[22] *The Journal of TIME*, Vol IV, August 1905 – July 1906, p. 17.
[23] Journal of the Institution of Certificated Engineers, South Africa, April 1937, pp. 71-2.
[24] *The Journal of TIME*, Vol IV, August 1905 – July 1906, p. 17.

resident engineer was not as difficult as that undertaken by the 'brilliant … head-office engineers'.[25] The work of a resident engineer was more routine; he had to 'plod on and keep the plant running with low working and maintenance costs and with safety to life and limb'.[26] Still he believed it was undervalued and he put forward the case for higher reward:

> One of our members told me that an Australian contractor defined 'useful expenditure' as the spending of money so that profits were thereby increased or working expenses reduced. The mining companies should take the same view and, providing the desired results seemed probable of attainment, incur a little more 'useful expenditure' as far as the mechanical engineering section is concerned.[27]

Finally, he argued that the 'status' of resident engineers needed to be raised and he undertook, in the closing statement to his Inaugural Presidential Address to 'do all in my power to advance the status, not only of our Association, but also of our profession.'[28] This was no idle promise. He used every opportunity to advance the case of resident engineers – one notable example being on the occasion of the Fifth Annual Dinner of Transvaal Institute of Mechanical Engineers (TIME), at which the new Governor General, Lord Selborne, and Chaplin, President of the Transvaal Chamber of Mines were present. There he argued that:

> The work of the old engineers was very varied, and in fact the predecessor of the modern mechanical engineer, the millwright, was a man who undertook and carried out all kinds of work. … To my mind the engineers of one section of the profession, the resident engineers, do not receive the recognition which is their due. (Applause.) …The resident engineer is the nearest approach to the old general engineer imaginable! But with far more extended responsibilities than the latter had.[29]

The solution was clear to Whittome: examine the men first and, if they are found competent, certificate them – a model already in operation in the navy:

> I hold that no engineer should be allowed to assume the responsibility of a plant unless he has proved to the satisfaction of a board of competent examiners that he has the experience necessary to enable him to perform his work. No engineer is allowed to take control of the machinery of a steamship unless he has passed a qualifying examination and has worked his way up, this is in some sense due to the fact that the lives of all on board are at nearly all times in his hands. The lives of the workers on the mines are more or less in the hands of the resident engineer, why, then, should he not be certificated![30]

By 1905 he had enough support to put a formal proposal to TIME:

> In the opinion of the members of the Transvaal Institute of Mechanical Engineers it is advisable that no engineer shall be permitted to fill the position of resident mechanical engineer unless he is in possession of a certificate, and that no certificate should be granted to anyone who is not now holding an appointment as resident engineer in the Transvaal until he has passed a qualifying examination. [31]

Not everyone rallied to his call. Even TIME's then President was doubtful:

> Personally I do not see what the resident engineer has to gain by this change in his status. I will not call it raising his status – he [Whittome] is asking you to lower your status to that of hauling engine drivers and men with blasting certificates. I think it is rather a libel on the resident engineers of the past to say that they contributed to the filling of the cemeteries. (But) If it be

[25] *Journal of TIME*, Vol IV, August 1905 – July 1906, p. 17.
[26] *Journal of TIME,* Vol IV, August 1905 – July 1906, p. 17.
[27] *Journal of TIME* , Vol IV, August 1905 – July 1906, p. 17.
[28] *Journal of TIME* , Vol III, July 1904 – June 1905, p. 14.
[29] *Journal of TIME* , Vol. III, July 1904 - June 1905, p. 275.
[30] *Journal of TIME* , Vol IV, August 1905 – July 1906, p. 17.
[31] *Journal of TIME* , Vol IV, August 1905 – July 1906, p. 17.

> the wish of the members to have a ballot taken on this matter, the Council will engage to have a ballot paper sent out.[32]

It *was* the wish of members, and so ballot papers *were* sent out. However Whittome, when later recounting these events, stressed that he left nothing to chance:

> I will not weary you with details of the fight for the certificate which I had to wage against a great number of the elderly members of the TIME, this fight being carried on behind the scenes instead of in public. Mr. Kenneth Austin, who has assisted me wholeheartedly during the years 1903-1904, was in England at this time, and until about 1907 or 1908, so that the fight was almost on my own.[33]

His efforts won him allies and together they went knocking on government's door:

> A little later in the year 1905, a deputation from the Council, consisting of Messrs. E. Farrar, H.H. Johnson, J.A. Mills, and myself waited upon Mr H. Weldon, who then was Government Mining Engineer, to urge upon the Mines Department the advisability of certificating engineers. The members of the deputation spoke in the order given above, and urged every possible point in favour of certification, but Mr. Weldon was dead against the proposal until I had a brain-wave and stated that the Governor-General (Lord Selborne) had offered me every encouragement and said that he would help in every way possible to attain our object. After that the sailing was a little easier, and eventually we obtained our desire, during the year 1906.

In January 1907, the then President, H.H. Johnson, reported that 'as a result of the ballot taken some time ago to find out the feeling of the members of the Institute, it was ascertained that they were almost unanimously in favour of certificates being granted.'[34] And with this support and government's approval, the legal process unfolded:

> The necessary amendments to legislation to provide for this class of certificate were promulgated under the Mining Certificates Amendment Ordinance No. 11 of 1906 and Government Notice No. 1232 which came into force on 7 December, 1906. The Commission of Examiners for the Mechanical Engineers' Certificate of Competency, as it was then called, was constituted in January, 1907 and, up to the end of June of that year, it had recommended the issue of 134 'Service Certificates' from a total of 137 candidates considered.[35]

Whittome recounted with pride that the first certificates for resident engineers were issued during the year 1907.[36] By 1911, when new legislation was introduced, 212 'Service Certificates' (for those already employed as resident engineers and deemed competent) and 94 Certificates by full examination had already been issued in the Transvaal.[37]

> The initial issue of Certificates of Competency covered the granting of Service Certificates, without examination, to all resident engineers on mines of the Witwatersrand and for a great many subsequent years such service certificates were awarded to applicants who provided evidence of their previous control, as engineers, of mines other than the many small properties operating 'on tribute' on the outskirts of 'the main reef', or in the North Eastern Transvaal. Such applicants were given an oral opportunity of satisfying the examination Board concerning their qualifications. Sound practical engineers who lacked fluency with the pen, but who had many years of practical experience behind them as maintenance foremen on mines and such like, were occasionally granted 'the Certificate' after a satisfactory examination. Quite a few of these distinguished themselves as resident engineers and, in debate at monthly meetings, their opinions were highly valued by colleagues having higher educational but lesser practical

[32] *Journal of TIME*, Vol IV, August 1905 – July 1906, p. 18.
[33] ICMEESA, April 1937, p. 67.
[34] *Journal of TIME*, Vol. V, August 1906 – July 1907, p. 140.
[35] *The Certificated Engineer*, February 1961, pp. 81-2.
[36] *Journal of ICMEESA*, April 1937, p. 67.
[37] *The Certificated Engineer*, February 1961, pp. 81-2.

> experience in the profession. Their diction garnished upon occasion by redundant adjectives, invariably afforded clarity of understanding amongst their audience. …[38]

In this way the occupation of Certificated Engineer was created.

Organisation of Certificated Engineers

Talk of an organisation for Certificated Engineers began as early as 1908, a year after the first certificates were issued.

> About 1908 our late Secretary, for many years, Mr. Kenneth Austin, conceived the idea of forming the Association of Certificated Engineers, with a view to helping each other to keep a watchful eye on our professional status, to see that it did not suffer, and at all times to watch the Mines Department, who were then busy experimenting with Mining Regulations and gaining experience at our expense – it sometimes costing an Engineer £50 because it was the Mines Department's lucky day, and they were able to impress the gentleman on the Bench that they, and they only, were to be believed.[39]

The idea took off in 1910. The following account was prepared by W.S. Carr, a Foundation Member and Past President of the Association:

> One Thursday evening in November, 1910, about a dozen engineers in possession of the Government Certificate of Competency attended a meeting convened by the late Mr Kenneth Austin at the old Masonic Hall in Jeppe Street, to consider his proposed formation of an Association of Certificated Engineers under the aegis of which engineers – and particularly Mine Resident Engineers – might meet for monthly discussions of problems and difficulties arising from the execution of their manifold duties and responsibilities. …[40]

Carr then usefully copied an unreferenced newspaper report recording the inaugural meeting of the 'Association of Certificated (S.A.) Mechanical Engineers', held in December, 1910, in which its central debates are recorded:

> The Chairman said that up to the present the resident engineers of the Rand and district had been single units and had worked against each other instead of with each other. The electrical engineers had shown them a good example, and that body was now being consulted by the Government in the framing of regulations which would affect resident engineers. The necessity of representing their interests was one important reason why they should continue. The Association would be nothing in the shape of a trades union. It would be a professional association banded together for professional assistance. It would watch the interests of its members and provide legal and technical assistance when necessity arose. They would not conflict with technical societies. …
>
> In future all questions of public and professional importance as affecting mechanical and electrical work (which is already covered by the Mine Regulations) will be dealt with by this Association, much in the same manner as is now done by the Association of Mine Managers. The last-named Association has been of great public service, and it is anticipated that similar results will be obtained from the operations of the Association of Certificated Mechanical Engineers. The greatest interest was taken in the proceedings on Saturday, the first and last keynote being co-operation and efficiency.[41]

At first the Association only included Mechanical Engineers as members but Certificated Electrical Engineers were added to the list of members of the Association once regulations were passed in December 1911.[42]

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[38] *The Certificated Engineer*, February 1961, p. 76.
[39] *Journal of the Association of Certificated (South African) Mechanical and Electrical Engineers*, August 1927, p. 5.
[40] *The Certificated Engineer*, February 1961, p. 76.
[41] *The Certificated Engineer*, February 1961, p. 76.
[42] *The Certificated Engineer*, February 1961, pp. 81-2.

Membership

The first members of the committee established to carry on the work of the association were mainly resident engineers drawn from the mining houses on the Reef: for instance there were men from Crown Mines, Ferreira Deep, City Deep, West Rand Consolidated, Randfontein, Aurora West, Randfontein Deep, Rand Collieries, Brakpan, East Rand, Knights Deep and Cinderella Consolidated, but amongst the men nominated was Whittome.[43] That these were 'rough diamonds' can be inferred from W.S. Carr, whose delicate reference to them as 'not … unduly articulate in reporting cause and remedy' speaks volumes. He went further in his jubilee tribute:

> The resident engineer – always the most important man on the mine in times of accident or breakdown whether on the surface or underground – was not, in those early days, unduly articulate in reporting 'cause and remedy' and none but his manager and the few mining men and fitters who worked with him during these emergencies were able to assess his true worth. Debate at meetings of the Association overcame this diffidence and bestowed a self-assurance affording clarity of expression and engendering further prominence in the eyes of consulting engineers. He thus became more frequently drawn into discussions about plant and equipment 'prior to its installation' rather than subsequent to decisions relating to suitability, with ultimate advantage to all concerned in its efficient operation. This instance a major endowment bestowed by all Scientific and Technical Institutions up all respective members.
>
> The engineers of the dense cluster of mines on the Near-East Rand in the period under review, were a very enthusiastic bunch of men. Some wag dubbed them 'The Germiston Gang'. They took prominence in discussions upon every theme – explosions in air compressors or pipe-lines, failure of winding ropes, everything which concerned the safety of life and limb while maintaining maximum output of plant – and were often so fiery in debate that argument continued in the home-bound train to the frequent amusement and occasional annoyance of fellow travellers in the same coach. … It is surprising how many of this 'gang' rose to join the ranks of Consulting Mechanical and Electrical Engineers; or attained like distinction in industry or commerce.[44]

In 1927 the Association had a membership of 280, which increased during the year by 51 to 331, and during 1928 there was a further increase of 36, bringing the total membership in 1929 to 367.[45]

The initial membership architecture of the Association of Certificated (S.A.) Mechanical and Electrical Engineers of South Africa was as follows, with its members attaining the following 'letters of designation' after their names once they met the necessary requirements:

Honorary Member:	Hon. M.I.Cert.E.
Member:	M.I.Cert.E.
Associate Member:	A.M.I.Cert.E.
Graduate:	Graduate I.Cert.E.[46]

Conditions for membership

Initially only men who already held Certificates of Competency were permitted to join. However on its own this was insufficient, the applicant also had to have passed a specified age and should have references to confirm they were of good conduct and sobriety:

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[43] *The Certificated Engineer*, February 1961, p. 76.
[44] *The Certificated Engineer*, February 1961, p. 77.
[45] *Journal of the Association of Certificated (S.A) Mechanical and Electrical Engineers*, January 1929, p. 156.
[46] *Journal of the Institution of Certificated Engineers*, South Africa, March 1955, p. 82.

1. Age

Whilst there was a maximum age limit for apprenticeship, there was a minimum age restriction for those wishing to sit the engineers' examination. The requirement was that a candidate for the examination had to be at least 25 years old. This was based on the belief that maturity was required if the level of responsibility that the work demanded was to be fully appreciated. Certainly this was the norm for candidates:

> I can prove that all but a very moderate percentage of those who are candidates for, and obtain, these certificates have started as fitters, or in like trades, and have had sufficient ambition and energy to obtain the necessary additional technical training when they were men and not as youths.[47]

This was similar to other professional engineering societies which also restricted membership by age as Draper has recorded for the mechanical engineers

> In April 1915, a special general meeting was held to consider the equally important question of amendments to the Constitution and By-Laws of the Institution. One of its results was that the minimum age for admission as a Member was set at 25 and that for an Associate member at 23. In later years these age limits were to be raised gradually to ensure the high standards set by the Institution.[48]

2. 'Sobriety and general good conduct'

Evidence of sobriety and general good conduct generally took the form of letters of reference, usually from employers. Whittome, in 1937, spoke of mine managers encouraging promising young mechanics to study further, making the practice sound routine.[49] This appears to have been the common practice.

3. Student membership?

In 1928 the Chairman of the Association recommended that a Students' Section be formed. He suggested that it should be open to engineering students who were studying for the Government Certificate of Competency. The matter proved to be very contentious as certain members believed that only qualified members should be admitted and that their debates and standing would be compromised if unqualified people i.e. students, were permitted to attend. After discussion in May, June and July of that year the matter was postponed for a further three months. Over time however the matter was resolved. In the 2015 Constitution of ICMEESA a Student Member is one who:[50]

> **Student Membership Grade**
>
> 2.8.1. A candidate for election to the grade of Student who, in the opinion of the Council is a fit and a proper person whose election would conduce to the interests of the Institution shall satisfy the Council that he:
>
> 2.8.2. Is not less than 18 years of age; and
>
> 2.8.3. Is in possession of the National Technical Certificate (Engineering) Part III, or of a matriculation certificate or exemption and is a bona fide student for a National Engineering Diploma or equivalent qualification or is engaged in bona fide studies for an Engineer's Certificate of Competency; and
>
> 2.8.4. Is desirous of becoming a Corporate Member on attainment of an Engineer's Certificate of Competency.

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[47] *Journal of ICMEESA*, April 1937, p. 72.
[48] Draper, *The Engineers' contribution*, p. 29.
[49] *Journal of ICMEESA*, April 1937, p. 71.
[50] https://www.icmeesa.org.za/images/Constitution_2015.04.pdf, viewed 12 December 2018.

Over time other categories of membership were added: Life Members, Retired Members, and Senior Members, but the fundamental focus on the Certificate of Competency has not been compromised.

4. Functions of the Association

The Association, like other professional associations, sought to protect the interests of its members and provide a platform to update members on professional issues.. In relation to the latter they arranged for the presentation and discussion of technical and relevant papers, visits to mines and plants and provided an active employment exchange. Like the SAIEE, they were invited to nominate members onto the Commission of Examiners - a function which for them took centre stage.[51]

Over and above these general functions, establishing a network with major sector players was key. This meant maintaining contact with employers (particularly the Chamber of Mines), key state officials and apprentice policy makers. These are briefly explored below:

- **Relationship to employers**

Their relationship to the mining employers can be inferred from the fact that:

> For the last twelve years the Chamber of Mines has provided the Association with a home and I am glad to say that this link is not really to be severed as the Chamber of Mines has made Kelvin House possible – the Chamber in many ways has been a friend to the Association and those on the Council do know how well we have been cared for in the matter of Council and Committee Meetings and the general body of members know that the tea interval has brightened our Thursday nights and we shall miss the ready attentions of Mr. Duckhan.[52]

This close association did not mean that the Association and employers agreed on every issue – as shall be seen under the discussion on the Mines and Works Act below. However their relationship was not as adversarial as it might have been: their disagreements were on policy matters which, whilst they had implications for incomes and employment security, also dealt with health and safety and productivity more generally – including new technologies and work organisation.

- **Relationship to the State**

As indicated above, one of the founding purposes of the Association was to inform 'all questions of public and professional importance as affecting mechanical and electrical work (which is already covered by the Mine Regulations) will be dealt with by this Association'[53].

As the engagement on the Mines and Works Amendment Act (1926) will show, this took a great deal of the Association's time and attention and, whilst sharp at times, was clearly a 'gentlemanly' affair.

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[51] *Report of the Select Committee on the Professional Engineers Bill*, S.C. 4 – 1968, House of Assembly, Paragraph 104 and 105, page 35.
[52] *Journal of the Association of Certificated [S.A.] Mechanical and Electrical Engineers*, February, 1934, p. 97.
[53] *The Certificated Engineer*, February 1961, p. 76.

- **Relationship to apprentices and artisans**

The Association also took up issues on behalf of apprentices, although there is no record of close engagement with the relevant trade unions as appears to have been the case between SATTA and SAIEE in the early years.

One example of their engagement on apprenticeship issues was in March 1934. The Secretary, Mr. Wilson, wrote to the Secretary of Labour informing him of a resolution adopted at a General Meeting 'that this Association take such steps as are necessary to secure for apprentices, matriculated at their 18th birthday, one year's remission of the period of apprenticeship'. And their voice was heard as the Secretary of Labour replied two weeks later informing the Association 'that the resolution passed by your Association is being brought to the notice of all Engineering Apprenticeship Committees in the Union for their recommendation.'[54] The reason for this intervention was suggested by Tredre, President of the Association in 1934:

> It is not right that a matriculated lad should be forced to serve his pupillage overseas in order that the matriculation certificate he is holding should be of advantage to him. It is unreasonable that any young man who, by diligent study, qualifies for his matriculation should be driven from a profession to which he is impelled through heredity and environment, because his knowledge of mathematics and science is not recognised as it should be in his own country.[55]

This loyalty to the apprentice, *inter alia,* warrants emphasis as it continued to be a central principle for at least five decades as is evidenced by their submission to the Select Committee on the Professional Engineers Bill in 1968:

> Perhaps this is one of the points which I personally and our Institution are concerned about, that this certificate permits a way for people with relatively low school education to progress, and by dint of hard part-time study to gain a qualification which will enable them to go a long way in engineering. [56]

POLITICAL ECONOMY

The Mines and Works Act, No. 12 of 1911

Engineers supported the exclusion of Africans from the new South African Constitution, as the applause they gave to Chaplin, the President of the Transvaal Chamber of Mines who proposed the toast at the Transvaal Institute of Mechanical Engineers' fifth Annual Dinner on 3 June 1905, indicates:

> (South Africa) had got a new Constitution (Applause.) It was a Constitution which gave equal voting powers to all white British subjects, and did not give voting powers to black men, and that, he said, was something in its favour. (Applause.) He hoped they were all going to show their fitness for Responsible Government by making the best of what the Imperial Government had given them, by doing their best to make it success. And the first thing to do would be, as soon as the booths were open, to get themselves registered as voters.[57]

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[54] This exchange of letters was published in the *Journal of the Association of Certificated [S.A.] Mechanical and Electrical Engineers*, March 1934, p. 117.
[55] *Journal of the Association of Certificated [SA] Mechanical and Electrical Engineers*, October 1934, p. 73.
[56] *Report of the Select Committee on the Professional Engineers Bill*, S.C. 4 – 1968, House of Assembly, Paragraph 86, pp. 30-1.
[57] *Journal of TIME*, Vol III, July, 1904 to June, 1905, p. 271.

That there was no objection when the Mines and Works Act No.12 of 1911 was passed so soon after Union, comes as little surprise. This Act, and its subsequent amendments did two things – first, it restricted access to certification to Europeans and some coloured and Indian folk, Africans were clearly excluded; secondly, it expanded the 'horizontal' reach of certification across a wider range of engineering occupations and sites. Each of these dimensions is considered in turn below:

1. Prohibiting African access to certification

The reservation of certain jobs for whites only was by no means new in 1911. Job reservation for whites had first been legally sanctioned in 1883 when, according to Krikler,[58] a German immigrant became the state mining engineer in Kruger's Boer republic and restricted the work of blasting to whites because he believed only whites could be trusted to handle explosives. However the advantages of such restrictions became rapidly apparent to white workers and, as Davies[59] has recorded, they persuaded the Transvaal government to pass further laws in 1897 and 1898 reserving the operating of winding and other machinery to whites only. In 1904 even more occupations were added to the 'whites-only' list, apparently in an attempt to gain the support of white workers for the importation of Chinese labourers when African labour was scarce. In regard to Coloured and Indian workers, Regulation 285 was passed in 1917 which stated:

> Certificates shall not be granted to any coloured person in the Transvaal and Orange Free State and certificates granted to any coloured person in any other Province shall not be available outside such Province.[60]

The cumulative effect of these restrictions before the First World War was that:

> the State had already constructed a racial wall around the most skilled jobs on the mines. That wall gathered within its confines 'about two-thirds of the white mine workers' then employed – that is, men in three dozen or so occupations. On the other side of that wall were the one in three of the white mineworkers employed in around a score of semi-skilled functions. Here, a 'customary colour bar' operated to prevent black people from moving into their stations.[61]

Johnstone[62] has referred to these measures as the *job colour bar* – which demarcated white from black jobs the central purpose being keeping black labour cheap. However he has also shown that the owners had other vehicles for the continued containment of black wage costs on which the profitability of the mines fundamentally depended – measures which he called the *wage colour bar:*

> These colour bars of the mine owners were basically threefold: the *maximum average system* (a collective agreement of the mining companies not to permit the average wages of African workers to exceed a very low maximum rate); the *recruiting monopsony* (a buyer's monopoly over the recruitment of African labour, to prevent the competitive determination of African wage

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[58] J. Krikler, *The Rand Revolt: The 1922 insurrection and racial killing in South Africa,* Jonathan Ball Publications, Johannesburg & Cape Town, 2005, p. 33.
[59] R. Davies, *Capital, State and White Labour in South Africa, 1900 – 1960: An Historical Materialist Analysis of Class Formation and Class Relations*, Humanities Press, United States, 1979, p. 113.
[60] *Mines and Works Act of the Union No. 12 of 1911, The Mines Works and Machinery Regulations 1911,* as amended by Government Notice No. 1675, 30 October, 1913; No 746, 13 July, 1915 and No. 728, 30 May, 1917*,* W.E. Hortor & Company, Limited, 1917, p. 172.
[61] Krikler, *The Rand Revolt*, p. 35.
[62] F.A. Johnstone, 'Class conflict and colour bars in the South African gold mining industry, 1910 – 26', in E. Webster, L. Alfred, L. Bethlehem, A. Joffee, T. Selikow, *Work and Industrialisation in South Africa: An Introductory Reader,* Ravan Press, Randburg, South Africa, 1994, p. 120.

> rates through a freer relationship between supply and demand);[63] and *servile labour measures* (such as the closed compound system, breach of contract provisions, etc). Since the essential aim of these discriminatory measures was to secure the cheapness of African labour, they can be referred to as the *wage colour bar* (as opposed to the job colour bar of the white workers), which constituted the class colour bar of the mining capitalists.[64]

The employers favoured this wage colour bar as it kept all African labour cheap, but they were less enthusiastic about the job colour bar which protected the high wage levels of white workers. This concern was expressed by one Edward J. Way, in his Presidential address to TIME in 1914. He argued that such discrimination added considerably to the costs of wage bill of mines and should be abolished.65 Admittedly, Way did not argue that black workers should be put on an equal footing with whites, he simply argued that occupations should not be closed to them (i.e. the work should be able to be done at a cheaper rate). He criticised the fact that 'the native, who does a good day's work, has little or no hope of advancement'66 and quoted H.M. Taberer, General Superintendent, Native Recruiting Corporation, in support of his view:

> It can assuredly be assumed that many natives have become efficient in the various classes of mine work at which they have laboured, yet not only are employers debarred under severe penalties from monetarily recognising any individual effort of a native, but a strong sentimental and legal colour bar militates against advancing any native so that he may be classified as superior to his ordinary unskilled countrymen.[67]

These views were opposed by the protected white miners. Major strikes were fought on these issues in 1913, 1914 and 1922.68 But the law remained unaltered until, in 1923 the legality of the racial colour bar regulations were challenged in court and found to be ultra vires due to poor drafting.69 The new Pact Government, elected in 1924, was quick to remedy the situation by passing an Amendment in 1926 (Act No. 25 of 1926) which clarified the matter beyond doubt:

> 1.(i) The regulations under paragraph (n) may provide that in such provinces, areas or places as may be specified in the regulations, certificates of competency in any occupation referred to in that paragraph shall be granted only to the following classes of persons, namely –
> (a) Europeans;
> (b) persons born in the Union and ordinarily resident in the Province of the Cape of Good Hope who are members of the class or race known as 'Cape Coloureds' or of the class or race known as 'Cape Malays';
> (c) persons born in the Union and ordinarily resident in the Union elsewhere than in the Province of the Cape of Good Hope who would if resident in that Province, be regarded as members of either of the classes or races known as 'Cape Coloured' or 'Cape Malays'; and

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[63] Earlier, Johnstone explains that by the early 1890s the ownership of the gold mines had become concentrated in the hands of a few groups of capitalist entrepreneurs. This centralisation of control was further consolidated by the formation of the Chamber of Mines (as early as 1887), which came to represent and co-ordinate the interests of the Groups, and of two African labour recruiting agencies – the Witwatersrand Native Labour Association (1896, under another name) and the Native Recruiting Corporation (1912). Johnstone, 'Class conflict and colour bars in the South African gold mining industry', p. 117.

[64] Johnstone, 'Class conflict and colour bars in the South African gold mining industry', p. 120.

[65] E.J. Way, 'The Economic Use of Workmen on the Witwatersrand'*, The Journal of The South African Institution of Engineers*, Vol. XIII, August 1914, p. 16.

[66] Way, 'The Economic Use of Workmen on the Witwatersrand', p. 5.

[67] Way, 'The Economic Use of Workmen on the Witwatersrand', p. 7.

[68] Krikler, *The Rand Revolt*.

[69] D. Yudelman, *The emergence of modern South Africa: State, Capital, and the incorporation of organized labour on the South African Gold Fields, 1902 – 1939,* Cape Town, Johannesburg: David Philip, 1983, p. 89.

(d) the people known as Mauritius Creoles or St. Helena persons or their descendants born in the Union.

(ii) The regulations under any other paragraph of this sub-section may restrict particular work to, and, in connection therewith, impose duties and responsibilities upon the classes of persons mentioned in (a), (b) (c) and (d) of part (i) of this sub-section; may apportion particular work as between those classes and other persons; and may require such proof of efficiency as may be prescribed.

The Certificated Engineers were certainly an influential voice in the drafting of these sections as the following comments recorded in their Journal a few years later testify:

> The revision of the mining regulations, in collaboration with the other institutions concerned and the Chamber of Mines Committee, was the cause of a considerable amount of discussion, and formed the principal part of the agenda at ordinary Council meetings for a considerable time, but, in addition to these, we had to have special meetings to get through the work, which culminated in a very satisfactory meeting with the Government Mining Engineer and his staff, at which matters were freely and amicably discussed; also several concessions were made when the other point of view was put forward by members of your Council. We have to thank Dr. Pirow for according us the opportunity of discussion … I may say that throughout all our discussions with him the very excellent relations between ourselves and his Department have continued uninterruptedly with that spirit of mutual confidence which, I trust, will influence all our future relations with him and the staff of his Department in both the mining and machinery sections.[70]

The application of this Act, and the racist practices that embellished it, made access to certification impossible for black South Africans. The scale of this exclusion can be illustrated from the position in 1932 when, of the 32 221 whites on the mines, 24 408 were employed in the more skilled and better paying occupations (5 580 as, inter alia, engineers and foremen on the staff and 18 828 as daily-paid artisans) with only 7 813 on less skilled (but still racially exclusive) work, whilst 277 838 black workers were locked into labouring and limited semi-skilled work.[71]

Many studies of this period [72] focus on the battles that played out between artisans and the growing numbers of semi-skilled workers (both black and white) on the one hand and between these groups and the mine and factory owners on the other. However, given the purpose of this study, to unwrap the ways in which progression was achieved , it is necessary to enter this 'whites only' world.

2. The widening reach of certification

As can be seen from the following extract of the Mines and Works Act No. 12 of 1911, certification for engineers was initially restricted to mechanical engineers on the mines:

> 4 (1) The Governor-General may make regulations, not inconsistent with this Act, in respect of or in connection with all or any of the following matters or things, namely - …
> (n) The grant, cancellation, and suspension of certificates of competency to-
> (1) Mine managers,
> (2) Mine overseers,
> (3) Mine surveyors,
> (4) Mechanical engineers,
> (5) Engine-drivers,
> (6) Miners entitled to blast,

[70] J.Q. Braidwood, 'Valedictory Address, 1929', *Journal of the Association of Certificated (S.A.) Mechanical and Electrical Engineers*, January 1929, p. 156.

[71] 'Annual Report', Government Mining Engineer, December 1933, *UG* No. 21 – 1934, p. 11.

[72] Lewis, *The rise and fall of the SATLC*; Webster, *Cast in a racial mould*; Davies, Capital, State and White Labour in South Africa; Krikler, *The Rand Revolt,* and many others.

(7) Such other classes of persons employed in, at, or about mines, works, and machinery as the Governor-General may from time to time deem it expedient to require, to be in possession of certificates of competency;
(o) the fees to be payable by persons apply for any of the certificates mentioned in paragraph (n), or on their admission to an examination for any such certificate. [Emphasis added][73]

But it did not take long for the electrical engineers to be added – indeed regulations were passed in December 1911 to this end.[74] This extension of the scope of certification reflected the advance of the electricity revolution then underway. Electrification of the mines had begun in earnest after the South African war but prior to 1906 there were only two small generating stations. However the thirst for power grew so rapidly that the Victoria Falls and Transvaal Power Company (VFP) was appointed to accelerate generation – an endeavour led by a British trained engineer named Bernard Price.[75] By 1908 almost every machine used electric power – hence becoming 'the necessary part of the engineering equipment of every mechanical engineer'.[76] So rapid was this change that John Orr, from his TIME presidential platform, noted that 'very few of our members, through no fault of theirs, have had the opportunity of a technical training in electrical work'[77] so he organised special courses to remedy this. Electricity generation continued to expand in 1911, 1912 and 1916 and reached an important milestone with the passing of the Electricity Act No. 42 of 1922 and the establishment of the Electricity Supply Commission (Escom) which oversaw further developments in this area.[78]

But the regulation which introduced the electrical engineers' certificate of competency was not identical to that of the mechanical engineers. It provided for men with experience to attain certification without examination, which the mechanical engineers' did not. This displeased the mechanical engineers as Whittome's circumspect account testifies:

> When the electrical engineer's certificate was inaugurated a different (and unfortunate) qualification for candidature for examination was laid down. The would-be mechanical engineer compulsorily had to have served a satisfactorily apprenticeship or pupillage. For the electrical engineer (and entirely at the wish of the electrical engineers themselves) there was tacked on to this 'or had practical experience equivalent thereto'. Mr. Perrow informs me that this procedure was in direct opposition to the expressed desire of the Institute of Electrical Engineers. I accept this statement without question but, undoubtedly, the regulation was drafted to enable men working as electricians on the mines to write the examination in spite of the fact that they had had no electrical training.79

Perrow was in the audience when these words were spoken and elaborated:

> I was a member of the Council of the SAIEE in 1911, and in December of that year a deputation from the Council waited on the Acting Government Mining Engineer and the Chief Inspector of Machinery and urged the deletion of the words 'or had practical experience equivalent thereto' from the regulation, and it was only on the definite understanding given them that this proviso was only to be considered as a temporary measure and would be deleted, and both classes of engineers placed on a similar footing that the deputation withdrew its opposition to this clause.[80]

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[73] *Mines and Works Act of the Union No. 12 of 1911,* W.E. Hortor & Company, Limited, 1917, p. 172.
[74] *The Certificated Engineer*, February 1961, pp. 81-2.
[75] G.R. Bozzoli, *Forging Ahead: South Africa's Pioneering Engineers,* Witwatersrand University Press, Johannesburg, 1997, p. 188.
[76] J. Orr, 'The Education and Training of Engineers'*, The Journal of the Transvaal Institute of Mechanical Engineers*, Vol. VII, August to July, 1908-9, Johannesburg, Transvaal Leader, Printers, 1909, p. 6.
[77] *Journal of TIME*, Vol VII, August to July, 1908-9, p. 7.
[78] Bozzoli, *Forging ahead*, p. 189.
[79] *Journal of ICMEESA*, April 1937, p. 67.
[80] *Journal of ICMEESA*, April 1937, p. 76.

This suggests that there was a difference of view between the employers (who wanted flexibility) and the engineers (who wanted clarity) – and the state, in this instance 'persuaded' to support the employers' view.

3. The work of a Certificated Man

> It is the ambition of the majority of apprentices in the mechanical and electrical engineering industries to qualify for the Union Government Certificates of Competency as mechanical and electrical engineers without which certificate no engineer can take charge of a plant exceeding a total of 250 horse-power, or having any one unit above 75 horse-power, unless a special certificate of exemption is granted.[81]

A second spat occurred around the requirement to employ a Certificated Engineer: what conditions made the oversight of a Certified Engineer necessary.
The employers wanted a higher threshold before they would be required to employ a man with a Certificate of Competency (for them a cost issue). The matter came to a head in 1917 over Regulation 16, Mines and Works Act No. 12 of 1911. Regulation 165 was of particular importance to the certificated engineers because it effectively restricted categories of work to men with certificates only:

> 165 (1) At every mine or works having plant developing more than 250 horse-power or on which any unit of the plant is developing more than 75 horse-power, all boilers, engines, and other machinery shall be under the general charge of a competent engineer, who shall be appointed in writing.
>
> (2) No such engineer shall be appointed at a mine unless he is the holder of a mechanical or electrical engineer's certificate qualifying him to take charge of mining machinery and issued in accordance with Part IV of these Regulations or any amendments thereof or issued under any law heretofore in force and in the case of works the Inspector of Mines may require that such mechanical or electrical engineer shall be certificated. [82]

The certificated engineers were not happy with sub-clause (2) because of the discretion it gave to the Inspector of Mines with regards to 'works'. The spat festered for a number of years until Kenneth Austin, in his capacity as the Honorary Secretary of the Association of South African Mechanical and Electrical Certificated Engineers, wrote to the Minister of Mines and Industries requesting the inclusion of 'works' alongside 'mines' in the first clause – which would make the holding of a certificate compulsory in these workplaces as well. This request was turned down by the Minister. In a letter written by his Secretary for Mines and Industries written on 5 December 1921, it was stated:

> The Minister has given most careful consideration to the proposal of your Association but has come to the conclusion that it will be a mistake at the present time in the history of the Union to rob that section of the Regulations of the elasticity which is desirable in a country which is developing along industrial lines. The proposals of your Association would result in hard and fast conditions which he thinks would not tend to encourage the expansion of industry. He regrets, therefore, that he is unable at present to approve of the alteration proposed.[83]

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[81] J. Orr, 'Technical Education and Training', in *The Transactions of the South African Institute of Electrical Engineers*, Vol. XXIII, April 1932, p. 144.
[82] *Mines and Works Act of the Union No. 12 of 1911* and *The Mines Works and Machinery Regulations 1911,* as amended by Government Notice No. 1675, 30 October, 1913; No 746, 13 July, 1915 and No. 728, 30 May, 1917, p. 124.
[83] National Archive, SAB, Source MNW, Vol. 602, Ref. 3185/21 and 3249/21, File No: 3233.

This decision was more sympathetic to employers than to engineers, but it failed to please employers. They had lobbied to have the limits raised from 75 to 500 for a single unit and from 250 to 1000 for a plant – which of course the engineers opposed, fearing that this would undo 'the good work of many years past'.[84]

This argument took place in the context of the mushrooming of enterprises outside the mining industry. The 1911 Act's definition included 'chemical works, metallurgical works, reduction works, ore-dressing works, petroleum works, salt works, brickmaking works, lime works, pottery works, sugar mills, flour mills, saw mills, and any places where machinery is erected or used … and all dams, reservoirs, and other appliances for conserving water, or for producing or transmitting energy …'[85]

The engineers believed that the same issues that had inspired their initial campaign for certification applied equally to all these concerns. But it was only after 'many years of hard work' and the passing of the Mines and Works (Amendment) Act No. 22 of 1931 that the discretion that had previously fallen to the local Inspector of Machinery fell away and employing a certificated man became compulsory if there was one 75 horse-power engineer or the plant totalled 250 horse-power or more in any 'works'.[86] The compulsory *registration* of certificated engineers was also introduced which resulted 'in the formation of a register of legally qualified members of the engineering profession … (which) has placed the South African engineering profession in a more favourable position than engineers as a class in many other older countries'.[87]

The Mines and Works Act by definition did not cover smaller enterprises which had also begun to grow apace during World War I. In the main these factories only used small, more primitive machinery88 and so the case for certification was weaker. These enterprises fell under the Factories Act No. 28 of 1918 which permitted, under Section 42(1)(d), the passing of regulations dealing with 'the prevention of accidents and the circumstances which shall necessitate reports of accidents being made and the persons by and to whom reports shall be made'. However, with the growing sophistication of equipment in use, more specific reference was made to the requirement for certification when this Act was amended in 1931 (Act No. 26 of 1931), Section 11 stating that factory inspectors had to hold certificates of competency issued under the provisions of the Mines and Works Act No. 12 of 1911, and Section 12(1)(i) giving to the Governor-General the right to pass regulations on 'the classes of persons employed in connection with machinery who shall be in position of certificates of competency issued under the provisions of the Mines and Works Act, 1911'. This provision was broadened after the boom years of the thirties with the passing of the 1941 Factories, Machinery and Building Act No. 22 of 1941. The regulations passed under this Act made it compulsory for any engineer taking responsibility for plant and machinery above regulated limits to be

[84] *Journal of ICMEESA, April 1937*, p. 70.
[85] In consolidated publication printed by W.E. Hortor & Company, Limited, 1917: *Mines and Works Act of the Union (No. 12 of 1911* and *The Mines Works and Machinery Regulations 1911,* as amended by Government Notice No. 1675, 30 October, 1913; No 746, 13 July, 1915 and No. 728, 30 May, 1917*,* p. xxxiii.
[86] *Journal of ICMEESA*, April 1937, p. 70.
[87] *Journal of ICMEESA*, April 1937, p. 83.
[88] Wits, NUMSA records, AH 255, B68.2 Papers, A. Black and J. Stanwix, 'Crisis and Restructuring the South African manufacturing Sector', Paper presented at the Workshop on Macroeconomic Policy and Poverty in South Africa, Cape Town, 29-30 August 1986, unpublished.

certificated.89 However, even whilst the obligation on engineers to become certificated when working in smaller industrial workplaces was not prescribed, it was still a 'bow in their bonnets' if they were:

> A very large number is engaged in commercial work, where the certificate enhances their standing but is not necessary for their work.[90]

Certification was anyway a requirement if they ever wished to progress from a small to a larger concern.[91]

But for all that the range of sites requiring or benefiting from certification expanded over the years, what did not change much before WWII was the nature of the work that certificated engineers had to perform. This was principally due to the fact that the machinery needed by the mines, works and factories was mainly imported from abroad, so mechanical and electrical engineers' work was principally related to its lay-out, installation, maintenance and repair.92 As shall be seen, radical change only came with the expansion of engineering manufacturing during and after WWII.

EDUCATION AND TRAINING LANDSCAPE

The attainment of a Certificate of Competency depended on being at least 25 years old and on the passing of the examination set by the Commission of Examiners, appointed by the Minister of Mines. Permission to write the examination was granted by the Commission based on two considerations: first, the completion of a 'satisfactory' pupillage or apprenticeship and secondly, the ability to demonstrate 'sufficient knowledge of the construction, maintenance and operation of machinery'. Once passed, the person was immediately able to be appointed as a Resident Engineer on a mine or the equivalent in other workplaces. There was no further requirement after passing the examination.

Even university graduates had to sit the Certificate of Competency (CoC) exam if they wished to apply for senior positions on the mines, but they constituted a small minority before WWII. For example, in 1937, 'shop trained engineers' outnumbered university graduates 2-to-1.[93] In later years the proportion dropped but in 1961, 56 per cent had no degree or diploma.[94]
As there was no formal requirement for an apprentice to PASS any theoretical examination, as shown in the last chapter, there was likewise no specified standard of technical college or ordinary school required prior to sitting the CoC Examination. By 1968, when views were being heard by the Select Committee on Professional Engineers, it was stated that the number of years of practical experience a person should have prior to sitting the examination was nine years where he has neither a degree or an apprenticeship; two years where he has a degree; two years additional to his apprenticeship where he is an electrician, etc., and a longer period

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89 Select Committee 4, 1968: para 52, p. 19.
90 *Journal of ICMEESA*, April 1937, p. 71.
91 *Journal of ICMEESA*, April 1937, p. 77.
92 *Commission of Enquiry into the method of training for university degrees in engineering,* Report: Part I and II, (The Straszacker Report), Department of Education, Arts and Science, 1964, para 122.
93 *Journal of ICMEESA*, April 1937, p. 82).
94 *Report of the Select Committee on the Professional Engineers Bill*, S.C. 4 – 1968, House of Assembly, Paragraph 56.

for other apprenticeships.[95] However earlier it seems even these experience specifications were not yet in place.

In 1926, Mines and Works Amendments Act, No. 25,Regulation 305 stated the following:

> **F.- MECHANICAL OR ELECTRICAL ENGINEER'S CERTIFICATE**
> (Qualification of Candidate and Subjects). Regulation 305:
>
> (2) Every candidate for examination for a mechanical engineer's certificate shall satisfy the Commission that he has attained the age of 25 years, and that he has served a satisfactory apprenticeship or pupillage in mechanical engineering; that he possesses a sufficient knowledge of the construction, maintenance and operation of machinery: and that he possesses a thorough knowledge of such portions of the mining and machinery laws of the Union as may be prescribed by the Government Mining Engineer.
>
> (3) Every candidate for examination for an electrical engineer's certificate shall satisfy the Commission that he has attained the age of 25 years, and that he has served a satisfactory apprenticeship or pupillage in electrical engineering or had practical experience equivalent thereto; that he possesses a sufficient knowledge of the construction, maintenance and operation of electrical machinery and of the mechanical appliances associated therewith in the generation and distribution of power; and that he possesses a thorough knowledge of such portions of the mining and machinery laws of the union as may be prescribed by the Government Mining Engineer.
>
> (4) Every candidate who desires to obtain a certificate qualifying him to take charge of the machinery on a mine shall, in addition, satisfy the Commission that he possesses a sufficient knowledge of mining machinery, and such qualifications shall be endorsed on his certificate.
>
> (5) Every candidate shall produce satisfactory evidence of his experience, qualifications, ability, sobriety and general good conduct.[96]

The right apprenticeship or pupillage

As seen above the rules said that a candidate for the examination had to have completed a 'satisfactory' apprenticeship or pupillage in mechanical or electrical engineering. In practice however, the former was by far the more common. A 'pupillage' was originally a 'premium apprenticeship' with its roots in nineteenth century Britain:

> [t]he traditional English road to a professional career did not lie through a university but through apprenticeship: 'learning by doing'. For the solicitor, that meant an articled clerkship; for the doctor, 'walking the wards'; for the civil engineer, pupillage in the drawing office and on the site; for the mechanical engineer, 'going through the mill'. 'Premium apprentices', heading for a professional career, were marked off from apprentices on the way to becoming skilled tradesmen by the fees which their parents paid and by the expectation that they would study in their spare time.[97]

In South Africa a 'pupillage' appears to have referred to that 'twilight zone' between completion of one qualification and preparation for an engineering qualification. John Orr, in 1932, spoke of 'a pupillage' as a necessary compliment to academic learning.[98] In 1945 the Industrial Council for the Electrical Engineering Industry referred to 'pupil engineers' as:

> any individual who is in possession of educational qualifications approved by the Council and obtained through an educational institution likewise approved by the Council',[99] who became

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[95] *Report of the Select Committee on the Professional Engineers Bill*, S.C. 4 – 1968, House of Assembly, Paragraph 86, pp. 30-1.
[96] *Journal of the Association of Certificated (S.A.) Mechanical and Electrical Engineers*, August 1927, p. 18.
[97] W.J. Reader, *A History of The Institution of Electrical Engineers 1871 – 1971,* London, Peter Peregrinus Ltd., 1987, p. 12.
[98] Orr, 'Technical Education and Training', p. 106.
[99] Industrial Council for the Electrical Engineering Industry, Transvaal, *Government Gazette* No. 1524, 24 August 1945.

> engaged in workplace learning for whom they set weekly wage rates for each of three years of a 'pupillage': first year pupillage - £2 10s 0d; second year of pupillage - £3 10s 0d; third year of pupillage - £4 10s 0d and thereafter 4£ 10s 0d.[100]

In 1966, a 'pupil engineers or junior engineer' was described by F.A. Cotton, a Past President of the Certificated Engineers (in 1959) as having the following qualifications:

1. Either a university degree, or
2. A technician diploma [a later development]
3. A completed apprenticeship in an approved trade together with the A.T.C. II

And in relation to the last of the three, he said:

> Their experience has been confined to one trade. During pupillage their training must be broadened by giving them experience in trades other than their own. Those who have served an apprenticeship elsewhere must be given ample opportunity to acquaint themselves with the peculiarities of the plant where they are now working. They should spend some time acting as foremen because this gives them confidence and provides valuable experience in the art of getting work done.[101]

Before the Second World War by far the greater number of candidates for the certification examination was qualified artisans.[102]

After the passing of the Apprenticeship Act in 1922, these apprentices would have undergone training similar in outline to that which Ken Bird underwent in the Post Office. Their training was however overseen by different Apprenticeship Committees. On the mines, the Apprenticeship Committee for the Building, Mechanical Engineering and Electrical Engineering Industries (Mines), Transvaal would have been responsible[103] In 'private workshops', including 'works', the Transvaal Mechanical and Electrical Engineering Apprenticeship Committee would have held sway.[104]

The mines' apprenticeship committee consisted of representatives of the Chamber of Mines, the Amalgamated Engineers' Union, Iron Moulders Society and the South African Boilermakers.[105] Engineers did not sit on the committee in their own capacity; a number of resident engineers sat there as representatives of the Chamber of Mines[106] and were drawn onto committees dealing with the question of apprenticeship.[107]

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[100] [In the same year Journeymen rates were 3s. 3d. per hour.]
[101] F.A. Cotton, 'Some thoughts on Engineering Training', *The Certificated Engineer*, September 1966, pp. 345-347.
[102] Orr, 'Technical Education and Training', p. 113.
[103]
[104] *Department of Labour Annual Report*, 1933, UG No. 43, Union government printer, 1934, p. 46.
[105] National Archive, SAB, ARB, 1032, File L.C. 1001/29-1, Witwatersrand Gold Mines Apprenticeship Committee: 'Report of Sub-Committee on Training of Apprentices, Electrical and Mechanical', 19 September 1916.
[106] The membership of the first Mines Apprenticeship Committee was gazetted in GG. No 2184 of 29 November 1926, and included W. Carr and F.G.A. Roberts. W. S. Carr was President of the South African Institution of Engineers in 1929 – 30 (Draper, *The Engineer's Contribution*, p. 245) and of the Institution of Certificated Mechanical and Electrical Engineers, South Africa, in 1915 and 1916 (*The Certificated Engineers*, October 1972, p.ii). F.G.A. Roberts was a President of the Institution of Engineers in 1927-28 (Draper, *The Engineer's Contribution*, p. 245). E. Farrar (President of Mechanical Engineers' Association of the Witwatersrand / Transvaal Institute of Mechanical Engineers in 1905-6 (Draper, *The Engineer's Contribution*, p. 245) and F.G.A. Roberts were members.
[107] E. Farrar (President of Mechanical Engineers' Association of the Witwatersrand / Transvaal Institute of Mechanical Engineers in 1905-6 (Draper, *The Engineer's Contribution*, p. 245)) and F.G.A. Roberts

The range and numbers of apprenticeships on the mines in 1932 can be seen from the table below:

Table 3.1. Number of indentured apprentices, Witwatersrand and Union of SA, 1932

Trade	No. of Indentured Apprentices, Witwatersrand Area.			No. of Indentured Apprentices in Union of S.A. (April, 1932)
	On Mines (April, 1909)	On Mines (April, 1932)	Total including Private Workshops (April, 1932)	
Fitters and Turners	143	345	670	1,191
Electricians	2	173	300	681
Blacksmiths	32	70	106	125
Boilermakers	15	116	149	271
Moulders	-	10	99	191
Welders	-	2	20	112
Carpenters	21	123	390	1,054*
Totals	**243**	**839**	**1,734**	**3,625**

* *Including other Woodworkers*.

Source: J. Orr, 'Technical Education and Training', *Transactions of the South African Institute of Electrical Engineers*, Vol. XXIII, April 1932, p. 113.

1. 'Satisfactory apprenticeship'

The regulations spoke of 'a satisfactory apprenticeship' and initially, it seems, men from a wide range of trades were permitted to apply – but later, and certainly by 1937, some trades were excluded. Whittome strongly objected to this:

> During nearly the whole of the past 30 years, men who were apprenticed as fitters and turners, or as pattern makers, or as boilermakers or blacksmiths have been considered as serving a 'satisfactory apprenticeship to mechanical engineering'. This is no longer so. Men apprenticed as boilermakers and blacksmiths now are held not to satisfy the requirements of the regulations, in spite of the fact that necessity for the safe operation of boilers was one of the factors which caused the certificate to be instituted.[108]

Others agreed with him, such as Nimmo, who was Vice-President of the Institution of Certificated Engineers, South Africa at the time. He felt that

> the employer should be allowed to select from his apprentices, no matter in what trade they have commenced their apprenticeship, boys who have shown outstanding diligence and intelligence. These boys should then have their indentures altered to that of apprentice or pupil-engineers, and be given a training in every branch of engineering, from foundry to drawing office.[109]

(see above) were members of a Chamber of Mines Sub-Committee on the Training of Apprentices in 1916. National Archive, SAB, ARB, 1032, File L.C. 1001/29-1, Witwatersrand Gold Mines Apprenticeship Committee: 'Report of Sub-Committee on Training of Apprentices, Electrical and Mechanical', 19 September 1916.

[108] *Journal of the Institution of Certificated Engineers*, SA, April 1937, pp. 74-75.

[109] *Journal of ICMEESA*, April 1937, p. 80.

2. Certificated engineers and apprenticeships

The matter of apprenticeship was close to the hearts of the certificated engineers at the time. Their Association had made a formal submission to the Select Committee on Apprenticeship Act in 1921[110] and frequently discussed the issue as is evident from the many references taken from their journal in this account. They complained forcefully about not being consulted on the question of trade school training for apprentices, claiming at the time to control all engineering apprentices on the mines.[111] This oversight of, and engagement, with the apprenticeship system by the engineers reflected their view that apprenticeship was the first rung on the ladder to becoming engineers - after all it was the route that nearly all of them had travelled. Indeed they were more mindful of progression questions than the unions, because, unlike SATTA in the Post Office which represented workers across all grades, the unions on these apprenticeship committees were craft unions, whose priority was the protection of their trades rather than securing a passage into and beyond them. The engineers differed with the unions on these matters and Mr. Udwin went so far, in December 1936, as to criticise them for their perpetual use of 'time-honoured arguments of the inability of some employers to give the full and proper training necessary, and of the exploitation of cheap labour by the introduction of a large number of apprentices' to limit the number of apprenticeships on offer. He argued that this was a 'pernicious' practice prompted by the 'fear of over-crowding' and should be challenged: 'To me it seems far better for the welfare of the country that a high proportion of the individuals should be, at worst, three-quarter trained rather than not trained at all'.[112]

3. Sufficient knowledge of the construction, maintenance and operation of machinery

Candidates for the mechanical engineers examination had to convince the examiners that they had 'sufficient knowledge of the construction, maintenance and operation of machinery' and electrical engineers had to do the same in relation to 'electrical machinery and appliances associated with the generation and distribution of power'. The emphasis was on practical competency, as Whittome explained:

> There was no intention, for instance, that a candidate should be able to design a steam turbine, though he should know how to operate it safely and efficiently when it was installed and put under his charge. The point which should be kept in view is that an engineer need not be certificated before he designs a turbine, he need hold no certificate to authorise him to erect it, but he must hold one before he is permitted to undertake its operative charge.[113]

But a candidate's experience had to be more than artisan's work only:

> there is one provision which requires that a man must not have gained that experience purely by working at the bench. He must have had the experience in a supervisory capacity. If the man says he worked at the bench for 20 years, that by itself is not accepted,[114]

[110] U.G. Select Committee 9-1921.
[111] Orr, 'Technical Education and Training', p. 115.
[112] *Journal of the Institution of Certificated Engineers*, Dec 1936, p. 341.
[113] *Journal of ICMEESA*, April 1937, p. 68.
[114] U.G. Select Committee, SC 4 – 1968, paragraph 67, p. 26.

As to the quantity of experience required, initially the examiners used their collective judgement, but later they had a guideline which stated that they required nine years for a man who had no theoretical qualification and two years for graduate – with others falling on the spectrum between these two extremes. However in all cases it had to be years of 'approved experience':

> That means that if he [the graduate] goes and locks himself up in a drawing-office, he must expect to be rejected. And the commission often tell them when they get the applications and the man says he wants to write this or that examination, that they need one or two years, or whatever it is, in these specific subjects before they can write.[115]

- **The Commission of Examiners**

The first Commission of Examiners comprised: J.A. Vaughan, chairman; R.W. Parry, vice-chairman; H.H. Johnson, J.A. Yule and A.C. Whittome himself.[116] Except for the Chairperson of the Commission, who was a state official, the other members were practicing engineers appointed by the State Mining Engineer.[117] Their appointment was based on the recommendation of the various engineering institutions – and so, as Perrow put it 'one can only presume that they are carrying out the wishes of those institutions in the manner in which they are conducting the examinations'[118] and 'if we lacked faith in them we have the remedy largely in our own hands'.[119]

- **The examination – and the 1937 debate**

Initially the Commission of Examiners conducted an examination when a sufficient number of applications had been received and approved. However, as the years passed an examination timetable was set two or three times a year and candidates had to simply sit the exam on the next scheduled date. The dates of the exams were published in the government gazette – of which the following in 1923 is a typical example:

[115] U.G. Select Committee, SC 4 – 1968, paragraph 66, p. 26.
[116] *Journal of ICMEESA*, April 1937, 67
[117] U.G. Select Committee, SC 4 – 1968.
[118] *Journal of ICMEESA*, April 1937, p. 77.
[119] *Journal of ICMEESA*, April 1937, p. 78.

MECHANICAL AND ELECTRICAL ENGINEERS' EXAMINATION[120]

It is notified that the Commission of Examiners for Mechanical and Electrical Engineers' Certificates of Competency will hold the next examination on Wednesday, Thursday, and Friday, the 13th, 14th and 15th February, 1924, at 9 a.m. at the Y.M.C.A. Building, corner of Joubert and Bree Streets, Johannesburg, and also at Dundee, Kimberley, and Bloemfontein if there are sufficient applicants.
The prescribed form of application is obtainable, without payment, by applying to the Secretary to the Commissions of Examiners, … Johannesburg. …
The following syllabus of examination is published for information, and a detailed copy thereof will be supplied on application to the Secretary:-

Mechanical Engineers

Legal Knowledge
Strength of Materials and Design of Structures
Power Plant
Driven Machinery and Mechanical Appliances
Electro-Technics (Elementary)

Electrical Engineers

Legal Knowledge
Strength of Materials
Power Plant
Driven Machinery and Mechanical Appliances
Electro-Technics (Advanced)

Candidates for examination as mechanical or electrical engineers to take charge of machinery on mines will, in addition to the foregoing subjects, be examined in *"Mining Plant".*

The syllabus was geared to serve the objects of the exam and the spread of subjects was designed to cover 'the diverse responsibilities which may fall to the lot of the certificated engineer'.[121]

The Legal Knowledge paper required an intimate (memorised) knowledge of the relevant provisions of the Act as the following example questions taken from the Legal Knowledge paper in 1932 shows:

[120] *GG* 1358, Notice No. 2135, 28 December 1923, p. 664.
[121] *Journal of ICMEESA*, April 1937, p. 82.

MECHANICAL AND ELECTRICAL ENGINEERS' EXAMINATION[122]

Wednesday 8th June 1932
Time allowed 1 ½ hours
Legal Knowledge (Works)

1. Specify the respective minimum factors of safety which are compulsory in the case of:-
   a. Passenger and goods elevator supporting ropes;
   b. The supports of overhead electrical lines;
   c. Electrical overhead line conductors;
   d. Steam boilers

2. State what occurrences must be reported to the Inspector of Mines classed as accidents. What occurrences fall within the category of reportable accidents whether personal injury is caused or not? In this connection, define the term "serious injury".

The 'Plant' and other papers consisted mainly of practical problems that occurred in the workplace which the candidates had to solve using calculations to motivate their answers.[123] There was remarkable consistency in the subject headings used, indeed they barely changed from 1918 to 1939.[124] But this did not mean that the content remained the same, as was emphasised when the Association of Certificated Engineers made its submissions to a Select Committee in 1968:

> Soos u weet, is daar 'n Kommission van Eksaminatore wat dooroor sit, en alle industriee, soos die Kamer van Mynwese en SEIFSA, word gedurig gesirkuleer en gevra om saam te werk in die hersiening van sillabusse, ens. Die sillabusse word dus voortdurent hersien.[125]
>
> *[As you know, there is a Commission of Examiners that sits and oversees this, and all industries, such as the Chamber of Mines and SEIFSA are regularly circulated and asked to work together on the review of the syllabus etc. The syllabus is therefore continuously updated.]*

The revisions that were brought about were however not always supported by the community of certificated engineers. For example, in 1936 the pass rate for both the Electrical and the Mechanical papers dropped to an all-time low (12 and 14 per cent respectively)[126] and many believed this was due to an excessive emphasis on 'rote learning' that had been introduced. In 1937 there was a major discussion on the subject triggered by a paper presented by Udwin to the Association of Certificated Engineers entitled 'Examinations with particular reference to Certificates of Competency for Electrical and Mechanical Engineers'.[127] In his paper Udwin argued that the exam was too heavily memory-based and should become an 'open-book' exam and he also argued that the students should not automatically be failed if they failed one subject, which was then the case.

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[122] National Archive, SAB, ARB, Vol. CF 35/3, 134, File: Queries under Mines and Works Regulation 165(1).
[123] Interview, H. Hanrahan, 18 October 2006.
[124] See *GG*. No. 1263, No. 1263, 17 September 1918; *GG* 1358, Notice No 2135, 28 December 1923 and Notice No. 1284, 25 August 1939.
[125] *UG* Select Committee, SC 4 – 1968, para. 61.
[126] *Annual Report of the Government Mining Engineer for respective years.*
[127] *Journal of Association of Certificated (SA) Mechanical and Electrical Engineers*, December 1936, p. 339.

The paper opened a floodgate of discussion which spilled over four meetings of the Association: December 1936, April, July and September 1937. Whittome himself participated in the debate in April. His view was that the examination was becoming too theoretical and not one for testing an engineer's ability to take charge of plant. [128] He drew two conclusions from this: first, that this was resulting in too many theoretically trained engineers being trained in comparison to the number of positions available for them; and secondly that:

> It seems to me that the change in the type of paper is due to a mixture of the desire to reduce the number of men passing the examination, i.e. to prevent undue competition for positions as engineer, and to make it easy for the 'degree' engineer and difficult for the practical man to obtain a certificate. The net result being covered by the expression 'improve the status of the engineer'. To my mind, this is utterly wrong.[129]

Clearly the notion of 'status', which he had so vociferously fought for at the beginning, had taken a turn he could not support. He tried to remedy this by proposing a series of practical remedies along the lines put forward by Udwin.[130] But this time he was not supported.[131] In the debate there were a number of speakers who felt that the changes reflected a changed world:

> Since the examination was first instituted, engineering science has certainly not stood still. The plant in use today requires far more technical skill to operate it efficiently than the plant of only 20 years ago. If our engineers in charge of plant are to be more than mere machine-minders, they must equip themselves accordingly, and if certificated engineers are to remain in the forefront of the profession the standard of the examination must be maintained and perhaps raised even higher.[132]

But still, underpinning this debate, as Nimmo, then the Vice-President, observed was 'a concern for the future of the shop-trained engineer' who had been too poor to go to university in his youth.[133] This foreshadowed, albeit in a muted form, the post-WWII contests which will be outlined in a later chapter. But the Certificated Engineers remained concerned about the shop-trained engineer and rose to become his chief protagonist when others set out to close this entry route.

- **Preparation for the Exam**

There was no formally set minimum education requirement for would-be candidates of the Certificated Engineers exam, so the opportunity for advancement was wide open to all who had completed a 'suitable' apprenticeship and who had the requisite practical experience (the latter being potentially all that might be required for electrical engineers initially).
The completion of such a 'suitable' apprenticeship did not require that any particular educational standard had been attained. A few artisans would have completed a National

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[128] *Journal of ICMEESA*, April 1937, pp. 68-69.
[129] *Journal of ICMEESA*, April 1937, p. 69.
[130] *Journal of ICMEESA*, April 1937, p. 75.
[131] It took several decades for this change to be tried as evidenced by A.B.J. Tinderholm's Presidential Address in 1965:

> The most recent change was the introduction of the 'OPEN-BOOK' examination as applicable to PLANT ENGINEERING for both Mining and Factories. The method of examining the student in LEGAL KNOWLEDGE obviously remained unchanged. The new 'open-book' concept has also produced disappointing results, especially for the November 1984 sitting when a success rate of only 15.6% was obtained.
> A.B.J. Tinderholm, 1965, 'Engineering Potpourri during the 20th Century', *Certificated Engineer*, Volume 58 No. 4. April 1985, p. 59.

[132] *Journal of ICMEESA*, April 1937, p. 79.
[133] *Journal of ICMEESA*, April 1937, p. 80.

Technical Certificate I or II, however this would have been the exception not the rule if the official figures that Aspinall, in 1956, gave of the actual levels attained by mining apprentices in 1954 are anything to go by:

Table 3.2. Levels attained by mining apprentices in 1954[134]

Number of apprentices	2,697	
Number who wrote examination	2,392 or	88.8 per cent
Number of subjects [exams] written	9,005	
Number of subjects [exams] passed	2,219	24.63 per cent.
Number of N.T.C. 1 certificates obtained	121	4.4 per cent.
Number of N.T.C. 2 certificates obtained	57	2.1 per cent.
Number of N.T.C. 3 certificates obtained	20	0.7 per cent.
Number of A.T.C 1 certificates obtained	9	0.33 per cent.
Number of A.T.C 2 certificates obtained	2	0.074 per cent

So preparation for the examination was fully dependant on becoming familiar with the required content of the examination. Local entrepreneurs were the first to see an opportunity, when, in 1924, they established Veasey's Engineering College in Johannesburg to help prepare engineers for the Certificate of Competency exam.[135] Its advertisements were common in both the Journal of Institution of the Certificated Mechanical and Electrical Engineers, South Africa, as well as in the journals of the leading trade unions of the day such as that of the South African Electrical Workers Association, POWER.[136]

VEASEY'S ENGINEERING COLLEGE[137]

Preparation for the
Union Government Examinations for Mechanical and Electrical Engineers' Certificates.
Particulars of Complete Correspondence and Personal Tuition Course of Instruction
on Request.
26/33, Cullinan Buildings, Main Street. P.O. Box 35. Johannesburg. Phone 33/2432.

[134] H.T. Aspinall, 'Technical College Educational Systems in Britain and South Africa – a Brief Comparison', Journal of the Institution of Certificated Engineers, South Africa, April 1956, p. 124.
[135] 'Veasey's Engineering College was established in 1924 with the aim of providing study material and assistance to students who have been accepted, by the Commission of Examiners, as candidates to write the two examinations; Plant Engineering and Legal Knowledge, and to continually review this material to ensure it aligns with the syllabi as laid out by the Department of Labour (Factories) and the Department of Mineral Resources (Mines).' https://www.veaseys.co.za/ viewed 9 December 2018.
[136] Interview Ben Nicholson, 15 August 2008, reference to his Association's POWER magazine.
[137] Advertisement placed in *Journal of ICMEESA*, August 1933, p. 2.

However the commercially-minded Whittome also saw an opportunity and in 1927 linked up with the British Institute of Engineering Technology[138] to establish A.C. Whittome's Engineering College in London. The College offered correspondence courses for would-be coal engineers in Britain as well as 'mines and works' resident engineers in South Africa.[139] These private providers did not monopolise the market as once the Witwatersrand Technical College was up and running after 1925,[140] it also provided courses for those wishing to sit for the Union's Certificate of Competency examinations[141] – two-thirds of the costs being met by government (an effective subsidy from the government to the mines) and the remaining third by the Transvaal Chamber of Mines.[142]

It offered three-year, part-time courses, not only in mechanical and electrical engineering but also in mining, surveying and assaying - all in close co-operation with the mining industry. The College and the chamber of Mines also developed courses for mine managers, mine overseers, mine surveyors, mine assayers, and those wanting to qualify for Blasting Certificates.[143] The part-time or correspondence opportunities for study that these courses provided is worth underlining – they were all designed to assist those *at work* to study for advancement – many of whom would have come from homes who had been unable to afford full-time university study.[144]

For most youngsters, the best time to undertake the further learning required was during the apprenticeship itself – and as in the public service, apprentices were widely encouraged to study beyond the minimum level while they were indentured. This had been the case from the earliest days as John Orr noted in 1908:

> In some cases employers pay the fees of the apprentices on condition of regular attendance and satisfactory progress. In other cases prizes are given to those who meet with success in the various examinations. One of the most general methods is to hold out prospects of increase of pay and promotion.[145]

Certainly on the mines youngsters were encouraged 'to attend evening classes at the University of the Witwatersrand'.146 Forty years later Aspinall147 found that such inducements were still widespread: 'Some companies such as the African Explosives Ltd. pay bonuses and certain mines and firms award prizes to apprentices who have made satisfactory progress in their technical studies and in the workshops.'

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[138] The British Institute of Engineering Technology (BIET) was established in 1927 and was an educational institute that provided home-study courses on engineering and engineering related subjects. The BIET offered over a hundred courses covering a wide range of subjects such as civil and mechanical engineering, electrician, automobile and aeronautical engineering, radio engineering, building, etc. as well as examinations that led to recognised qualifications. BIET were based at Shakespeare House at 29 Oxford Street, London, W1.'
https://www.flickr.com/photos/23885771@N03/9533177380 viewed 9 December 2018.
[139] Interview with A.B.J. Tinderholm, 22 July 2007.
[140] Orr, 'Technical Education and Training', p. 131.
[141] *Journal of ICMEESA*, August 1933, p. 2.
[142] De Villiers Report, UG 65/1948: para 1098.
[143] Orr, 'Technical Education and Training', p. 135.
[144] *Journal of ICMEESA*, April 1937, p. 80.
[145] Orr, 'The Education and Training of Engineers', p. 16.
[146] National Archive, SAB / ARB / 1032 – 1001/29/1, Pamphlet on the Government Miners' Training Schools.
[147] Aspinall, 'Presidential Address', in *The Transactions of the South African Institute of Electrical Engineers*, Vol 39, Part I, January 1948, p. 18.

Such inducements were no doubt prompted by the 'acute shortage of mining graduates from the University of the Witwatersrand'[148] at the time. Certainly it is true that the majority of candidates for the exam had a trade background – as Whittome himself observed in 1937.[149] And, perhaps not surprisingly, given that many had travelled the course themselves. Many certificated engineers held the view that this was the better course to follow, blending as it did theory and practice at every stage – and given that the NTC courses gave 'a thorough grounding in the technical knowledge necessary for them to proceed further and obtain all that is essential for a resident engineer to know'.[150]

One such Certificated Engineer who believed in encouraging youngsters to pursue their studies, was Archibald Alistair Rae, Inspector of Factories (Engineering) and Machinery and President of the Association in 1931 and 1932:

> (T)he importance of the technical education of the apprentice who must be encouraged and provided with the educational facilities necessary to allow him to achieve the full status of a professional engineer. The Certificated Engineer was admirably fitted to promote this cause.151

Rae's commitment to this cause was not academic. He had himself travelled this path and had previously been actively involved in helping other, inevitably young, white boys, to do the same as he had done, as is recorded in his obituary published in *The Certificated Engineer* in 1972:[152]

ARCHIBALD ALISTAIR RAE

The demise of ARCHIBALD ALISTAIR RAE, Life Member and first Chairman of the Natal Branch of the Institution, ends an exemplary engineering career.

As a boy, during the South African War (1899 – 1902), he unfortunately lost his father cutting short his schooling in Std. IV. And this compelled him to embark upon a self-educating career.

Young Archie found a job as a messenger with the Drivers and Firemen's Union, and followed this up by apprenticing himself with the Wolhuter G.M. Co. Ltd., concurrently attending the evening classes held by the Transvaal Technical College, housed in what was known as the 'Tin Temple', Eloff Street.

In 1908, he was awarded a gold medal by the Mine Managers' Association, for being the best engineering apprentice in the Gold Mining Industry.

Evening class students of that period were encouraged by annual awards of Abe Bailey Scholarships, totalling thirty per annum. Three of them were awarded to Archibald Rae.

On completion of his apprenticeship, his journeymanship started with the Victoria Falls and Transvaal Power Company (now Escom). He eventually accepted the post of Resident Engineer, Piggs Peak G.M. Co. Ltd., Swaziland, where he surrendered his bachelorship to marry Miss Gwendoline Lloyd, enjoying a long period of married life, and being blessed with one son and two daughters.

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[148] *The Social and Industrial Review*, June 1928, p. 473.
[149] *Journal of ICMEESA*, April 1937, p. 72.
[150] *Journal of the Institution of Certificated Engineers*, South Africa, April 1937, p. 72.
[151] Rae, Inspector of Factories (Engineering) and Machinery and President of the Association in 1931 and 1932 recalled by W.C. Lindemann (Past Chairman) in his historical review of the Natal Branch of the Association in 1961 in *The Certificated Engineer*, February 1961, p. 80.
[152] *The Certificated Engineer*, Volume 45, Number 10, October 1972, p. 233.

At the outbreak of World War I, Archie served as a trooper with the Imperial Light Horse, rising to the rank of Lieutenant.

Archie's chief characteristic was to be 'thorough in all things'. He studied for his Government Certificate of Competency with the late A.C. Whittome's Engineering College, a course which qualified him to join the Mines Department staff at Krugersdorp as Assistant Inspector of Machinery. …

The depression of 1931 gave him further scope for his talents. At the request of the late Colonel Creswell, Minister of Labour, Archie was commissioned to exercise his influence in the Sugar and Associated Industries, for the main purpose of finding jobs for young people and helping them to carve out a useful career. In this he was very successful. …

LADDERS AND LEVERS

In summary, during the period 1890-1938, the route to a Certificated Engineer can very simply be shown as follows:

Schooling	No specified level
Apprenticeship in 'suitable' trade	No formal technical education level to be attained
Experience at the appropriate level	Recognised by the Commission of Examiners – beyond that of artisan only i.e. at some supervisory level across a range of work areas.
Age – 25 years	Deemed to be a maturity indicator
Certificate of Competency Examination	Set by Commission of Examiners

The biggest hurdle was passing the examination which required in-depth knowledge and understanding of the practical working of machinery in a mine or factory. However, the helping hands along the way – both those from the education and training institutions as well as from individual members of the Association – need to be recognised.

The period 1930s to 1960s

Another example is provided to illustrate the endurance of the pathway developed in the earlier years, as well as the benefit it brought those who grasped the opportunities it offered. Built into the example is also evidence of the value that the engineering community, and by extension the economy and society enjoyed as a consequence of the learning these men acquired. The Political Economy of these later times is not however focused on here – it will be explored in later chapters.

PEOPLE AND PLACES

Abraham Burger Jacobus (ABJ) Tinderholm[153]

1932	Born
1948	Completed Standard 8
1949 - 1954	Telephone and Telegraph Electrician, Post Office
1955 – 1960 …	Power Electrician, Anglo Alpha West Driefontein Gold Mines, …
Age	Over the required 25 years, 28 and 30 respectively
1960	Electrical Certificate of Competency, Electrical Works
1962	Mechanical Certificate of Competency, Mechanical Works

'Tindy' as he was called by his friends, was born in 1932 in Vryburg. He was a sixth generation Afrikaans-speaking South African. The first Tinderholm on South African soil had been of Swedish origin and had come to Cape Town as a Quarter Master with the old Dutch East India Company. Tindy's own grandfather had first farmed with his father in the Cape and later worked for a while transporting groceries by wagon from Malgas to Kimberley after diamonds were discovered there. On one of these trips he joined the Railways and became a Plate Layer for a while before returning to farming. Tindy's father also joined the Railways for some years and considered himself lucky to be able to do so because back in the twenties 'the Afrikaner had no place'. A year or two later he was taken off the 'footplate' and transferred to Vryburg as a Power Station Attendant and it was whilst he was there that Tindy was born. Tindy's father was later transferred to Kimberley where young Tindy went to school. He left school after completing Standard Eight at Diamantveld Hoërskool (ten years of schooling) – 'and that was money again. I stayed at Ritchie and stayed in the hostel there at school, and my dad found it difficult to afford the hostel fees'. Years later, in 1985, he was elected the President of the Institute of Certificated Mechanical and Electrical Engineers of South Africa (ICMEESA). His journey from the 'platteland' (rural) school to this prestigious office will be woven into the account that follows.

EDUCATION AND TRAINING LANDSCAPE

Apprenticeship

Tindi did his initial apprenticeship as a Telephone and Telegraph Electrician with the Post Office, just as Ken Bird had done. However, unlike Ken, once he completed his apprenticeship he decided to leave the Post Office and take up a posting at Anglo Alpha Cement near Kimberley:

> I decided when they told me that the remuneration that I would be getting at the end of five years would be £37 10s. I said, Anglo Alpha has offered me exactly double, something like £65 or something like that, and I decided to rather abandon the idea of carrying on in the Post Office.[154]

[153] Interview A.B.J. Tinderholm, 22 June 2007 and 15 October 2007.
[154] Interview A.B.J. Tinderholm, 22 June 2007.

In passing it can be noted that whilst he was in the Post Office he did his ATC II. He did 'Strength of Materials' and 'Advanced Electrical Engineering'. These subjects gave him credit towards his CoC.

> Leaving the Post Office there was this perception in my mind that I will not become an engineer anymore, … I'm going to be a just a power electrician at Anglo Alpha which is just the other side of Kimberley, a cement and lime factory. I'm going to work there and I'll be happy, I'll just be making money and the idea of a career path was put by the wayside. …
> And then about two years after I joined Anglo Alpha Cement, one day I was erecting an open wire new telephone line for them, (when) one morning this engineer Heine Brussouw climbed up onto the pole where I was working and said to me 'Mr. Tinderholm…'. and put the following question to me: 'Mr. Tinderholm, wouldn't you like to be an engineer one day?' I said, 'Mr. Brussouw, let me tell you the truth, I had been aspiring to be an engineer in the Post Office, but now I'll never be an engineer because I have broken my career path at the Post Office.' He said, 'No, no, no, wait a minute. I don't have time to talk to you now, but tonight, after five o'clock, my house is number 42.' …
>
> And low and behold, that night, I was on my bicycle … so I went up to his house and presented myself and he said to me, 'I've been watching you. You've been here six months and … I think you should think about a career path to become an engineer one day. And this really lit the flame in me again.
>
> He was a certificated engineer, but he of course had an advantage, he also had a degree. In those days it was a legal requirement that you had to have a CoC – that means a Certificate of Competency. The CoC was a prerequisite for taking charge of machinery – it didn't matter whether you had an MSc or a BSc, you had to obtain a CoC. Because the engineers that came out of university those days were lacking practical experience and couldn't take responsibility for machinery, they had to get the CoC. Heine Brussouw was electrical engineer and he had his CoC. He was appointed as the responsible engineer for that operation. He introduced me to one of his other subordinate engineers who had recently passed the exams and qualified, and he put me in touch with Whittome's Engineering College in London. That was part of the BIET, the British Institute of Engineering Technology. I enrolled myself in London for the course for engineering students and I started doing the electrical and mechanical subjects. I would work through the papers and then send in answers to them for marking. They also sent me the model answers. This went on for about three years. Because I was rather busy at Anglo-Alpha, working long hours every day, working overtime almost every weekend, really trying to make some money. I married at the time and had to pay off the furniture and a motor car. So I got stuck in making work priority number one. Studying was number two.
>
> But then I realised after two to three years that I needed more experience on the mines on different types of machinery that we didn't have at Anglo Alpha and not only that, I realised that I am in a rut as far as overtime was concerned. So I realised that if I really wanted to swot and pass then I'll have to get away from Anglo-Alpha Cement. So I went to West Driefontein goldmine. Where luckily there was very little overtime, so I was able to devote most of my free time to studying.
>
> I joined Anglo-Alpha in 1954 and I stayed with them five years. I resigned and two years later in 1960 I got my engineers Electrical Certificate of Competency whilst in the employ of West Driefontein Gold Mines.155

Tindy was initially unaware that there was a local alternative at Veasey's or the Witwatersrand Technical College. He was later to say that

> this colleague of mine who referred me to Whittome's really did not do me such a big favour. He should have referred me in the first place to Veasey's which was concentrating on the needs of the South African exam. The other one was nice, a lot of extra knowledge I gained, I mean how

[155] Interview Tinderholm, 22 June 2007.

> to run a coal mine and how to do blasting. I could have applied for a blaster's certificate after that. I knew all about blasting and all about dynamite.[156]

Another drawback of Whittome's was that it taught British legal prescriptions, which Tindy had to augment with South African research. But in spite of these drawbacks, Tindy persevered and passed his mechanical examination in 1960.

Those, like Tindy, who had completed their Advanced Technical Certificates I and II during or soon after their apprenticeships were given credits, on a subject for subject basis, for certain of the Government's Certificate of Competency exams[157] – which meant for Tindy that he gained exemption for his Advanced Electrotechnics and Strength of Materials ATC II courses. Those who had completed a full college diploma were exempted from three of the usual five years of apprenticeship required before writing the examination.[158] Anyway such a candidate was unlikely to experience great difficulty in Orr's view.[159]

> In 1968, the educational qualification base of this membership was given as follows: University graduates or holders of the equivalent diploma, but not members of the London Institutes, 12,8%; graduates who are also members of the London Institutions, 6,1%; total 18,9%. Non-graduates who are members of South African institutions only, 16%, and holders of certificates of competency only, 56,4%.[160]

'Experience' criteria for acceptance to write the exam

Tindy's experience is illustrative here:

> After I had talked to Brussouw and Engelbrecht and had enrolled at Whittome's, I also needed to know how long I had to wait before I could write … because they had to evaluate the candidates' experience. So I wrote to the Commission of Examiners and Mr. Shields (Secretary for the Commission of Examiners) …wrote back to me at Anglo-Alpha Cement saying that the Commission had ruled that I could sit the Electrical Works exam after I had a further eighteen and a half months experience in my present employment. Eighteen and a half months – listen to this! To this day, I could never work out in my head as to how they arrived at eighteen and a half months (laughs).
>
> You know I had written that I had spent so many hours, or days on the cement mills, and so many on conveyors and in the power station and all this, then they had to come back and said I needed eighteen and a half more months. So in the eighteen and a half months I started looking out for another job because I also wanted to be near Jo'burg where I could write. You know, I could have written there in the Northern Cape, Kimberley, but it used to be quite complicated. You had to go to one of the ministers, it used to be the pastor of the Baptist Church - do you know Pierre Spies, the rugby player? Well his grandfather was a reverend in the Baptist Church and he used to oversee the exams. Anyway, I wanted to leave Anglo-Alpha, as I had also developed hay fever from the lime and the cement, so I decided it was better for my education and career path and my health, to get away from there and resettle in Carletonville. So I did another six months at Anglo-Alpha and then I did another twelve or thirteen months at a gold mine, where the experience was rather different. Then I wrote to the Commission of Examiners again and said, okay, I've changed jobs but now I've even got broader experience - now I'm also working on surface machinery and underground equipment.' They said it was acceptable.

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[156] Interview Tinderholm, 22 June 2007.
[157] Aspinall, 'Presidential Address', p. 15.
[158] Orr, 'Technical Education and Training', p. 109.
[159] Orr, 'Technical Education and Training', p. 144.
[160] *Report of the Select Committee on the Professional Engineers Bill*, S.C. 4 – 1968, Printed by Order of the House of Assembly, Paragraph 56, page 23.

So the seniority as well as the quantum and range of experience were judged by the examiners. The reason was simple: the day after attaining a Certificate of Competency, a successful candidate could be appointed to a responsible position so, *before sitting the examination,* the candidates had to convince the examiners that they were ready to take charge. Whittome stressed this point in 1937:

> a certificated resident engineer should be thoroughly acquainted with the safe operation of plant, especially of boilers, steam engines, winding engines, elevators, etc., on which safety of life depended, and, in general, of all machinery and general construction work. For the sake of his employer he also should be able to operate any plant entrusted to his care in as economical a manner as possible, and in particular avoid break-downs and know the quickest and safest methods of executing repairs after a break-down.[161]

Those who wished to be certificated as *both* electrical *and* mechanical engineers (a popular choice given the indivisibility of machines and electricity and the preference of employers for more flexible men) initially presentation of the first Certificate automatically entitled the person to sit for the second, but in 1936 this was changed and mechanical engineers wanting to sit for their electrical ticket were asked to show proof of practical electrical engineering experience equivalent to an apprenticeship.[162] But by 1968 the additional experience required was reduced to two years.[163] Getting this range of experience was a challenge in smaller workplaces but in large workplaces it was relatively simple – as Tindy discovered after he had attained his electrical 'ticket'. He approached his employers at the mine and said:

> 'Ok, gentlemen, now I want to go for my "mechanical" and I believe that the only way I can qualify to sit for the exam I must run, or supervise or take charge of one of the mechanical sections.' So they said, 'Fine, we've got a mechanical maintenance section with fitters and turners and boilermakers and riggers, you go and take charge of that, like a foreman.' So I did that for the next twelve months or so and then two years later I wrote my mechanical, and I passed.164

This illustration also shows the advantage that foreman's experience gave to applicants – experience that about one in fifteen artisans were getting in 1932.[165]

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

This is how Tindy Tinderholm elaborated the beginning of his career-long relationship with the Association of Certificated Mechanical and Electrical Engineers of South Africa:

> Now I joined as a student member. And we were paid very little, probably 30 or 40 or even 10 percent of what a full member would pay. So, the lowest rank was a student, or as we would say, engineer in training - because it had to relate to somebody who wants to be an engineer. So, it can't just be a student, it had to be something else as well. You had to be an engineer-in-training; in other words, you must already have applied to the government to be accepted as an eligible candidate. You pay this low fee and you didn't really need any qualifications – if the government accepted you as an eligible candidate, they would accept you. And then when you get your government ticket in those days, they would make you immediately an Associate Member, and then if you qualify and you have had a number of senior posts or you have been in certain jobs long enough, you can apply to be a full member. And then again towards the end of your life you become a Retired Member or Life Member.[166]

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[161] *Journal of ICMEESA*, April 1937, p. 68.
[162] *Journal of ICMEESA*, April 1937, p. 74.
[163] Select Committee SC 4-1968, para 65, p. 26.
[164] Interview Tinderholm, 22 June 2007.
[165] *Annual Report*, Government Mining Engineer, December 1933, UG No. 21 – 1934, p. 11.
[166] Interview Tinderholm, 22 June 2007.

When he wrote his Certificate of Competency examination in 1960 he met the age criteria of at least 25 (28 and 30 years old respectively). He recalled that a number of others were a fair bit older:

> When I wrote my exam in the red brick building, there I saw them, 50 or even 60 years of age, writing their exam, right down to about 25. The whole spectrum! Many were pupil engineers but the majority were guys who were then were still on the bench as artisans – a fitter and turner, an electrician or whatever – and he aspired to be an engineer.[167]

He rose to become the President of his institution – in 1985.[168] He also served on multiple committees for many years. Below is the introduction that the Journal published on his election:

FROM CERTIFICATED ENGINEER / GEDIPLOMEERDE INGENIEUR, VOLUME 58 NO. 4 APRIL 1985

Our New President A B J Tinderholm

Tindy, as he is known to his friends was born near Vryburg, RSA, on 1 June 1932, and did his early schooling in Kimberley. He is married to Edith and they have three children and also three grandchildren.

He was trained as a Post Office Communications Technician in Johannesburg and Kimberley and specialised on multi-channel systems as well as automatic exchanges. After completing an Engineering Diploma course in 1954, he worked as a Junior Engineer at West Driefontein Gold Mines and obtained the Certificate of Competency (electrical) in 1960. Later, in 1962, he also obtained the Mechanical Certificate.

After a spell with Langeberg Koöperasie, he joined AMCOR as Electrical Engineer in 1962, and served successively as Assistant Resident Engineer and Engineering Manager.

He joined J.C.I. in 1975 to take up the position of Engineering Manager at their ferro-chrome plant in Lydenburg. He was subsequently transferred to the Head Office in Johannesburg as Assistant Consulting Mechanical and Electrical Engineer.

During 1982 Mr Tinderholm decided to join the ranks of the Rand Water Board as Deputy Resident Engineer. He was also Chairman – Vaal Triangle Branch during 1975/76 and has served on Council since 1980. He trained in Organization and Methods Study and is a full member of the Institute of Organization and Methods since 1961. Also the holder of a Gold Medal in First Aid as issued by the South African Red Cross Society. His hobbies include electronics and genealogy and he is a keen hiker. Amongst many short trails he has also completed the Otter Trail in the Cape, Fanie Botha and Morgenzen in the Eastern Transvaal and the Cederberg near Clanwilliam.

[167] Interview Tinderholm, 15 October 2007
[168] Tinderholm, 'Engineering Potpourri during the 20th Century', *The Certificated Engineer*, Volume 58, No. 4 April 1985, p. 56.

EVALUATION AND IMPACT

Orr believed that 'many of our best engineers have risen from the ranks of the artisan'.[169] This route did indeed provide a progression route for many who would otherwise have been trapped at lower points on the occupational ladder.

The table below gives an overall picture of the numbers who passed their Certificate of Competency examinations over the first three decades of the last century:

Table 3.3. The Certificate of Competency Examination for the Mechanical and Electrical Engineers, 1912 - 1940

Year	Applied		Examined		Successful*		Failed		% Pass Rate	
M = Mechanical E = Electrical	M	E	M	E	M	E	M	E	M	E
1912	128	85	95	30	80	39	44	12	84	130
1914	41	19	36	21	22	10	19	13	61	48
1916	46	15	46	14	18	11	28	3	39	79
1918	83	27	78	25	48	21	30	6	62	84
1920	98	28	93	24	45	23	52	5	48	96
1922	85	25	76	24	32	13	44	11	42	54
1924	82	40	70	38	22	14	48	24	31	37
1926	75	33	67	27	30	16	39	14	45	59
1928	84	38	87	38	36	20	52	18	41	53
1930	177	78	158	69	79	52	80	19	50	75
1932	248	90	244	91	101	53	143	38	41	58
1934	248	110	245	112	80	59	165	53	33	53
1936	299	86	269	86	37	10	232	76	14	12
1938	330	144	317	135	94	54	223	81	30	40
1940	284	119	280	119	69	44	211	75	25	37

** Service certificates were given to people who were already resident engineers at the time the regulation was gazetted. These men did not have to write the examination.*

Source: *Annual Report of the Government Mining Engineer for respective years.*

No doubt the low pass rates in 1936 precipitated the debate recounted above.

An evaluation of these numbers is difficult. What one must assume is that as a result of the qualification of these men there were fewer accidents, fewer injuries and deaths, greater productivity and fewer expensive delays and errors on the mines and in the works where they were employed or as a result of their oversight in the government service. These would stand as the final measure of the impact of all this work – albeit difficult to recount and measure.

It is also clear that over the three decades recorded above the numbers are modest. This pathway, from artisan to Certificated Engineers, was not a mass highway, but a steady route for the committed and supported. As indicated above, no Africans were allowed to even apply to sit for the Exam in this period, so this no doubt moderated the numbers considerably.

[169] Orr, 'Technical Education and Training', p. 113.

But one may still ask why so few artisans applied to sit the examination? The most widely held view amongst the engineers was that the fault lay with the apprentices themselves because they failed to take advantage of the opportunities on offer.[170] Clearly it took effort and time, and many were ill-prepared with a weak schooling and technical education base – but there was much encouragement and systems were in place supported by attractive incentives. Ben Nicholson, who later became the General Secretary of the South African Electrical Workers Association, surmised that it was because there were only a limited number of promotion posts available.[171] The figures bear him out: in 1932/3 there was approximately 1 engineering post for every 3.3 'foreman' posts and 22.2 artisan posts – as calculated from the following table:

Table 3.4. The principal classes of men on the staff of large mines and of daily-paid men on large mines in June, 1933, compared with June, 1932

Classification		**June 1933**	**June 1932**
Staff	Chief Mechanical Engineers	86	79
	Assistant Mechanical Engineers	65	63
	Chief Electrical Engineers	29	30
	Assistant Electrical Engineers	7	7
	Foremen: Underground Surface	141 453	134 460
Daily paid	Apprentices, Improvers and Learners	2069	1957
	Skilled Mechanics*	4226	3912

* *Including blacksmiths, boilermakers, carpenters, drill-sharpeners, electricians, fitters, masons and bricklayers, millwrights, moulders, painters, patternmakers, plumbers, pump-fitters, sawyers, turners, and welders.*

Source: *Annual Report of the Government Mining Engineer, Dec. 1933, UG No. 21 – 1934, 12-3*

So the odds were challenging but not insurmountable and in fact the prospects of post-qualification placement were even less bleak than these numbers might suggest, because several workplaces, such as Johannesburg City Council, reserved positions for certificated men even though they were not legally required to do so.[172] Furthermore, it was also the case that:

> Practically all, if not all, of the consulting mechanical engineers appointed during recent years by the mining houses have risen from the ranks and do not hold engineering degrees.[173]

The principal reason for the modest numbers seems to rest on the fact that this route was very difficult. Orr himself called it an 'arduous path' which required 'sheer ability, force of character and hard work'.[174] But whilst hard, it bridged what would otherwise have been an insurmountable barrier as W. A. Woeber, an Associate Member of the Institution of Certificated Engineers, South Africa observed:

> (t)he Union Government examination not only defines the minimum qualification for an engineer, but it also fills a gap that would otherwise exist between engineering graduates and

[170] *Journal of Institution of Certificated Engineers*, South Africa, April 1937, p. 65.
[171] Interview Ben Nicholson, 15 August 2008.
[172] *Journal of ICMEESA*, April 1937, p. 70.
[173] *Journal of the Institution of Certificated Engineers*, South Africa, April 1937, p. 72.
[174] Orr, 'Technical Education and Training', p. 113.

> those whose circumstances do not permit them to discontinue the earning of wages in order to enter upon a regular University course.'[175]

It was also believed to be true that certification brought status to these engineers (behind which nomenclature stands increased reward):

> Mr. Whittome, rightly, I think, infers that the necessity for the certificate in the early days was to improve the status of the engineer and raise him on a pedestal above the licensed winding or stationary engine driver, etc. … I am convinced that all engineers will agree that certification has definitely raised the status of the engineer.[176]

But one seemingly unimportant and slight fact needs to be highlighted: these certificates were all issued to mechanical and electrical engineering men. The certification system was never adopted by the civil engineers or by any of the newer branches of engineers – a fact which may well have contributed to the different positions they later took in the debates that erupted after the war.

As regards numbers, it is interesting to note that the presenters to the Select Committee in 1968 claimed that the Institute of Certificated Mechanical and Electrical Engineers had over 1,400 members and constituted about 40 per cent of all practising mechanical and electrical engineers in the country. It had therefore a powerful base,[177] from which it was able to engage on the post-WWII debates on what should constitute a professional engineer.

[175] *Journal of the Institution of Certificated Engineers*, South Africa, April 1937, p. 62.
[176] *Journal of ICMEESA*, April 1937, p. 76.
[177] Report of the Select Committee on the Professional Engineers Bill, S.C. 4 – 1968, Printed by Order of the House of Assembly, Paragraph 52, page 20.

CHAPTER 4
PREFIX

THE EXCLUSION OF AFRICANS FROM APPRENTICESHIPS IN THIS PERIOD

'Apprenticeship' suggests the notion of complex skills and understandings, in a particular practical field, being conveyed from one generation to the next by a skilled practitioner to a novice, usually framed by cultural norms around the process. Hunter gatherers in South Africa used a system akin to this to train youngsters in the art of arrow design, poison acquisition and shaft construction, as well as plant identification for medication and nutrition. Similarly, other societies in the country trained apprentices in ironmaking, agriculture, pottery and beading. European societies formalised this practice in the Middle Ages through Guilds which sought to draw sharp lines between qualified people, those on the inside, untrained outsiders, and those in training. These different forms of apprenticeship persisted in their cultural settings, with little or no cross fertilization, for hundreds of years.

Colonialism changed that. New bastardised forms of 'apprenticeship' were introduced to control the labour of the colonized. Most glaring was the British Slavery Abolition Act 1833 (3 & 4 Will. IV c. 73)[1] which not only abolished slavery throughout the British Empire (of which South Africa was then a part), but also introduced the notion of an 'apprenticeship' for freed slaves to train them to be wage labourers. Worden, tracing the story from the perspective of the Cape Colony, had the following to say:

> On 1 December 1834, the day that Cape slaves stopped being slaves, they did not become free. As elsewhere in the British colonies, the Abolition Act tied them to their owners as 'apprentices' for a further four years, a period designed to prepare them for a future as wage labourers and to permit the colonists to adjust to the new type of work force.[2]

The development of skilled labour, able to earn wages and be independent was not the policy objective, however. Rather it was to teach freed slaves the 'discipline of labouring' through a system of indenture that maintained a continuous labour supply. As was pointed out in the parliamentary debates of 1838 over the ending of slave apprenticeship, the Abolition Act had,

> … but sunk the name of slavery in the hypocritical base, deceptive name of apprenticeship – a term intended to deceive the people of Great Britain ... they would learn that they had got apprenticeship for slavery – not apprenticeship as it was understood by the term in this country, but a vile system that exacted labour and fear of the lash.[3]

The Dutch/Afrikaner settlers in South Africa had their own particular brand of 'apprenticeship', where the 'apprentices' were called 'inboekelinge'. This system involved the so-called 'gift' [read 'theft'] of young black children to Afrikaner households for their labour until they were in

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[1] United Kingdom Parliament, https://resources.saylor.org/wwwresources/archived/site/wp-content/uploads/2011/05/Slavery-Abolition-Act-1833.pdf - Accessed 19 November 2018.
[2] N. Worden, 'Between Slavery and Freedom: The Apprenticeship Period, 1934 – 1838', p. 117, in N. Worden and C. Crais, *Breaking the Chains: Slavery and its Legacy in the Nineteenth-Century Cape Colony*, Witwatersrand University Press, 1994.
[3] C.H. Wesley, 'The Abolition of Negro Apprenticeship in the British Empire', *Journal of Negro History*, 23, 1938, p. 163, quotation cited in Worden, ibid, p. 121.

their mid-twenties. When the British abolished slavery in 1834, farmers in the Cape feared that this would end this practice too, a fear which contributed to their decision to 'trek' north away from British control and establish what later became the Boer Republics in the Transvaal and the Free State where these barbaric practices were continued.

However, even the Afrikaner leaders realised that this system was being abused so the Transvaal Volksraad passed the Apprentice Act, 1851. The first Article of which stated:

> It was decided and determined that without exception, if anyone has obtained from either a Kaffir captain or a free Kaffir, Bushman or anyone else, irrespective of where he might live, a child, orphan or orphans, either as gifts or in any other legal or voluntary way, this person will be obliged within eight days after receipt or arrival home, personally or in writing, to inform the Landdrost or Veldcornet in the district where he lives or is presently residing that he has received one or more above-mentioned children, and he will be obliged to state from whom he received the children and in what manner he received them.
>
> **Penalty.** He will also have to state their approximate age, and if he neglects to do this, he will be fined Rd. 5 the first time and double each time thereafter, with the proceeds to the general kitty (exchequer).[4]

The horror of this practice is well illustrated by the following:

> In the Soutpansberg area, commandos frequently abducted African children and women and indentured the children. In some cases, they were sold to other burghers. This was called the trade in 'black ivory', which followed the trade in white ivory after the elephant herds had been decimated. …
> When in 1858 a Free State commando kidnapped 115 children, a chief, Mahura, wrote to Boshoff, the OFS president, telling him that if they were not returned there was no prospect for peace, adding 'you are surely familiar with the tenderness of a parent towards his children.'[5]

These practices, and the laws which effectively justified them, persisted for a long time. The provisions of the Transvaal Law were partially amended by Articles 19, 40-45, 54, 56-58 of Field Cornet's Instructions of 1858. These instructions were then replaced by Law No. 2, 1885, and by the provisions of Law No. 13, 1880, regulating the rights and duties of masters, servants and apprentices.[6]

These laws transmuted over time into iterations of the Masters' and Servants' Act. The first such act was passed in Britain in 1823, even before the official termination of slavery. This provided harsh penalties for desertion, absenteeism, and breaches of discipline.[7] Similar legislation was later mimicked in the Cape, in 1841, after the freeing of slaves, in the form of Masters' and Servants' Ordinances. Similar laws were passed in Natal in 1850, in the Transvaal in 1880 and in the Orange Free State in 1904. Lodge concludes a study of these laws with the comment that 'the controls and discipline which the farmer had hitherto exercised haphazardly, on a private and individual basis, the court-based administrative machinery could now exercise systematically, publicly, and on a large scale'.[8]

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[4] Volksraad, 9 May 1951, in *Lokale Wetten*, 1849-85, VRR 16/3/66, pp. 423-431.
[5] H. Giliomee, *The Afrikaners: Biography of a People,,* Cape Town: Tafelberg, 2003, p. 184.
[6] See also: Proclamation, 24 March 1858, *Government Notice* 77, 23 July 1866.
[7] Giliomee, *The Afrikaners*, p. 122.
[8] C. Lodge, 'The Abolition of the Masters and Servants Act', *South African Labour Bulletin*, Vol. 2 No. 1, May – June 1975, p. 39.

Even after the passing of the Apprenticeship Act, 1922, trades that were not 'designated' continued to be managed under the Masters and Servants Act.[9] Even during the public hearings on the Apprenticeship Act held in 1921, the Select Committee was informed by Thomas Searle, representing the Leather and Boot Making Industry in the rural Great Brak River area, that 'One of the objections to the Bill is that the people from whom we draw our labour supply are not used to being bound down, as it were, and they object to binding their children to the employers. They feel that to do so is to some extent making slaves of them.'[10] Fundamental change to this pre-dominantly agricultural regime came with the discovery of diamonds (1860s) and later gold (1880s). Although Africans had been trading gold since at least the 11th century,[11] from the time that it was 'discovered' in 1881 'South African history became the history of gold'.[12] The British-controlled provinces at the time, the Cape and Natal, had tolerated the Boer republics, but after the discovery of gold their desire to own the proceeds of this lucrative metal set the scene for war. The South African War, 1899 – 1902, (known previously as the Anglo-Boer War) was about who governed the rules of its extraction and controlled its ownership. The British won that war and their victory framed the course the country followed thereafter – which included the unification of the previously four independent states into the Union of South Africa in 1910 – a Union that however included an 'inclusive deal' with the Afrikaners and the denial of citizenship to all African people.

The exclusion of African people took ever-deeper forms with the passing of legislation, by successive governments, which systematically restricted their freedom of movement, residence and employment during the period under review, for example:

- 1911, Mines and Woks Act, No. 12 (which introduced job reservation on the mines)
- 1913, Natives Land Act, No. 27 (which gave Europeans 87% of the land and 13% to all Africans)
- 1920, Native Affairs Act, No. 23
- 1923, Native (Urban Areas) Act, No. 21 (which restricted African access to urban areas other than to provide services to the Europeans)
- 1926, Mines and Works Amendment Act, No. 25 (further entrenched job reservation)
- 1927, Immorality Act No. 5, Native Administration Act, No 38
- 1932, Native Service Contract Act No. 24
- 1936, Representation of Natives Act No. 12, Native Trust and Land Act No. 18
- 1945, Native (Urban Areas) Consolidation Act No. 25. (Kruger, p. xv)

These and other laws in the industrial relations field, together with the devious practices of the qualified 'insiders', served directly or indirectly to exclude Africans from quality apprenticeship training. This only began to change after the Second World War and was finally ended with the passing of the Manpower Training Act, No. 56 of 1981. These will be considered in later chapters.

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[9] Department of Labour Annual Report 1933, *UG No. 43*, p. 48.
[10] Apprenticeship Bill Select Committee, 1921, p. 116.
[11] W. Watson, *Brick by Brick: An informal guide to the history of South Africa,* Claremont: New Africa Books, 2007, p. 7.
[12] C. De Kiewiet, *History of South Africa,* p. 114*,* cited in D. Yudelman, *The emergence of modern South Africa: State, Capital, and the incorporation of organized labour on the South African Gold Fields, 1902 – 1939,* Cape Town, Johannesburg: David Philip, 1983, p. 19.

CHAPTER 4

FROM PETROL PUMP ATTENDANT TO ASSISTANT ENGINEER

'The apprentice of today is the journeyman, the engineer, and the employer of to-morrow, and no one should grudge him all the assistance that can be rendered … to make his arduous path as smooth as possible.'[13]

This chapter sets out to explore what made it possible for Kenneth Burgess (Ken) Bird to progress from Petrol Pump Attendant to Assistant Engineer in the South African Post Office over the 1920s, 1930s and early 1940s. It does not seek to aggrandize the individual, although success entailed considerable effort and commitment, but rather to explore the systemic and contextual conditions that made this possible. These contextual factors changed over time and Bird's career straddled a number of decades. This chapter focuses on three historic periods, up to and including the Second World War:

Chapter sections:	Significant dates:	Significant dates of Ken Bird's career path:
The first period: 1910 - 1923	1915	Born
	1918	Emigrated to South Africa
The second period: 1924 - 1931	1931	Concluded Schooling (Std. VII)
The third period: 1932 - 1945	1932	Petrol pump attendant
	1933	Commenced apprenticeship in SA Post Office
	1935	Student Member South African Institute of Electrical Engineers (SAIEE)
	1938	Artisan
	1942	Assistant Engineer, Grade III Associate Member SAIEE

The **PEOPLE** organising principle will be applied, as appropriate to Bird's career, across the different decades, and in each case the political economic section will include developments in the South African Post Office, as this was where he worked.

The first period: 1910 - 1923

PEOPLE AND PLACES

Kenneth Burgess Bird was the second son of an English barber, called Henry John Bird. He, his London-born wife, Emily Ada (neé Burgess) and two sons, Hugh (born in 1910) and Ken (1915) lived in Leytonstone in Essex, England. When the 1914-1918 war broke out, Henry joined the Merchant Navy, following in his father's and grandfather's footsteps. He became a Chief Steward and travelled the route from Britain to India via South Africa and back many

[13] Professor John Orr, 'Technical Education and Training', in *The Transactions of the South African Institute of Electrical Engineers*, Vol. XXIII, April 1932, p. 130.

times. He was about to leave South Africa for Britain on a routine leg of his journey in 1919 when his ship left without him. He had contracted meningitis and was seriously ill for three months. But as he began to recover, he found South Africa 'very pleasant' and the South African government, led by General Smuts of the South African Party (SAP), was making Britons feel welcome. Henry decided to invite his young wife and their two boys to join him. His family set sail on the Queen Mary and arrived in Cape Town in December 1919, with their hopes and fears and portmanteaux.

The Bird family decided to move to Durban soon after arrival as it was rumoured that work was to be found there. Henry tried his hand at hotel management but found the owners tiresome, and for a time set up his own barber shop. He did not have a head for business, any more than for employment compliance, so vacillated between work and unemployment. Emily Ada kept the family fed by buying goods at antique markets and selling them again in a small second-hand furniture and clothing shop she and a friend opened in Point Road. In 1920 a third son, Norman, was born and in 1922, a daughter, Mavis. Times were hard, and they like many others[14] were poor and vulnerable.

EDUCATION AND TRAINING LANDSCAPE

Although Henry Bird was certainly not looking for training it is worth noting that in addition to the 'contracts' that were available under various Master and Servant ordinances and the Regulation of Wages, Apprentices and Improvers Act, Act No. 29 passed in 1918 (whose history is captured in the prefix above), prior to 1922 there were different kinds of 'apprenticeship contracts' in operation, as Johnson explains:

> (F)or some years before the promulgation of the (Apprenticeship) Act, the Post Office had what were known as 'Engineers Learners', the equivalent of apprentices in all respects except that there was no formal contract regarding their employment and the period of training was shorter. Engineers Learners were trained by attachment to skilled men, either singly or in groups, and later by training courses consisting chiefly of demonstrations of correct methods conducted one afternoon in each week. Their training followed a definite curriculum, and much the same arrangements continued for some years after the introduction of the system of apprenticeship.[15]

Matthews later confirmed this and further elaborated stating that 'the period of training was 2.5 years until 1918 and then 3 years for the period 1918 to 1922. A curriculum of field training was prescribed for these learners although it was not always rigidly adhered to.' [16]

Other workplaces also had their own system of private contracts:

> The first organized system of apprenticeship in South Africa, involving compulsory attendance at technical classes, was introduced by de Beers Company in 1898. The system was adopted by the Transvaal Chamber of Mines and certain private engineering firms on the Witwatersrand in 1906, the position being governed by the provisions under various Masters' and Servants' Ordinances. In the 'Regulation of Wages, Apprentices and Improvers Act' passed in 1918

[14] E.G. Malherbe, *Part III Education Report: Education and the poor White*, Part III of The Poor White Problem in South Africa, The Report of the Carnegie Commission, Pro Ecclesia Printers, Stellenbosch, South Africa, 1932.
[15] B.A. Johnson, B.A., 1940, 'Training in the Engineering Branch of the Post Office', *Transactions of the S.A. Institute of Electrical Engineers*, October 1940, p. 268.
[16] H.A. Matthews, 'Technical training in the South African Post Office', *The Transactions of the SA Institute of Electrical Engineers,* July 1975, p. 139.

power was vested in Wage Boards to determine the ratio of apprentices to skilled workers or journeymen.[17]

The Apprenticeship Act, Act No. 26 of 1922

The call for a more structured, local apprenticeship delivery system was based on the fact that most artisans were then trained abroad and came as immigrants. Local people felt disadvantaged. This view was expressed most strongly by the then Juvenile Affairs Boards and supported by the craft union movement.[18] These Boards had been voluntarily established during WW I (1915), in Durban to address the difficulty which young boys experienced finding decent work after leaving school – too often finding 'undesirable' or 'blind alley occupations'. Similar boards were established in the Cape Peninsula (1916), Johannesburg (1917), Bloemfontein (1918) and Pretoria (1918). Smaller centres followed suit 'during the latter part of the year 1920 … at Port Elizabeth, Germiston, Benoni and Krugersdorp, and for coloured juveniles a special Board was formed to operate in the Cape Peninsula.'[19] However, these voluntary committees found it difficult to compel schools and employers to co-operate, and so in 1921 the Juveniles Act was passed (Act No. 33 of 1921) to put them on a legal footing.

In terms of the Juveniles Act, principals of schools were required to supply information to the Boards about youngsters about to leave school and employers, as per Sections 3 and 4, of Act 33 of 1921, were required to supply to them 'information … as to the nature of the occupation at which such juvenile is employed, as to his educational attainments and as to any continuing educational course he is pursuing'. This legislation was accompanied by strong advocacy for vocational guidance to be given at schools.[20] The Boards were administered by the Department of Mines and Industries at the time and consisted of a number of persons nominated by the various employers and workers' organisations, together with people of educational standing, all appointed by the Minister.

Lobbyists for apprenticeship legislation also argued that the Masters and Servants Act – introduced after the abolition of slavery to control 'free workers' - was 'far too infrequently resorted to'.[21] (Furthermore, in their view, the Regulation of Wages, Apprentices and

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[17] H.T. Aspinall, 'Presidential Address', in *The Transactions of the South African Institute of Electrical Engineers*, Vol 39, Part I, January 1948, p. 8.

[18] See for example the submission of Robert Stuart, Secretary of the Cape Town Federation of Labour Unions, May 3 1921, Apprenticeship Select Committee, p. 49.

[19] Information in this paragraph has largely been taken from the input of Herbert Warington Smyth, Secretary for Mines and Industries, to the Union of South Africa Select Committee on Subject-Matter of Apprenticeship Bill and Regulation of Wages Bill, to which was also referred the 'Juvenile Affairs Bill', Printed by Order of the House of Assembly, Cape Town, Government Printers, June 1921, paragraph 1.

[20] L. Chisholm, 'Reformatories and Industrial Schools in South Africa: A Study in Class, Colour and Gender, 1882 – 1939', Unpublished PhD thesis, Johannesburg: University of the Witwatersrand, 1989, p. 253. Chisholm cites the following in support of her argument: the *Report of the Transvaal Indigency Commission of 1906-8* (and later also the *Report of the Industrial Education Committee of 1916* and the *Report of the Relief and Grants-in-Aid Commission* of 1917) had stressed the necessity to provide vocational education alongside the institution of a Juvenile Labour Exchange and provision of apprenticeships for boys to the 'skilled trades'.

[21] *The Social and Industrial Review*, June 1928, p. 440. As the campaign for 'free labour' mounted in Britain, even before the official termination of slavery, a system of labour control was introduced in Britain in 1823 – the Masters' and Servants' Act. This provided harsh penalties for desertion, absenteeism, and breaches of discipline (Giliomee, *The Afrikaners*, p. 122). This legislation was mimicked in the Cape, in 1841, after the freeing of slaves, in the form of Masters' and Servants'

Improvers Act, Act 29 of 1918, which had been passed to curtail the abuses that were then current, was insufficient as it focused primarily on the setting of minimum wages in various localities for vulnerable young and women workers – not on training. This was done by means of Wage Boards, which also set penalties for infringements. Training was not the focus.

To advance their cause the Juvenile Affairs Boards convened a number of conferences in Pretoria, Johannesburg, Cape Town, Durban, and Bloemfontein.[22] These conferences led to the appointment of a national committee which drafted the Apprenticeship Bill.[23] In drawing up the Bill they emphasised the need for technical education to be included in the apprenticeships alongside workshop training. It was believed that such technical education would offset the fragmentation of trades which the industrial revolution had begun.[24] They were successful in this, as Bird's own contract later verified:

> That the Apprentice … does of his own free will … agree …(e) to attend, in accordance with the requirements of the Minister, in terms of Section 13 of the Apprenticeship Act, 1922, as amended by Act 22 of 1930, such classes or take such correspondence courses or portions thereof as may be decided upon by him for the purpose of receiving technical or other instruction.

It was not plain sailing for these protagonists as evidenced by the submissions made to the public hearings convened by the Select Committee on the Apprenticeship Bill in 1921. Powerful voices, such as that of Bernard Price, then representing the Victoria Falls and Transvaal Power Company Ltd (which later became the Electricity Supply Commission or ESCOM) opposed the Bill. He argued that the Bill, if enacted, would make the employer less disposed to take that personal interest in the progress and development of individual apprentices; would promote sharper delimitation between trades and occupations and would

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Ordinances. Similar laws were passed in Natal in 1850, in the Transvaal in 1880 and in the Orange Free State in 1904. Lodge, ('The Abolition of the Masters and Servants Act', p. 39) concludes a study of these laws with the comment that 'the controls and discipline which the farmer had hitherto exercised haphazardly, on a private and individual basis, the court-based administrative machinery could now exercise systematically, publicly, and on a large scale'.

[22] *Union of SA Official Year Book*, No. 14, 1931-2, p. 180.

[23] Apprenticeship Select Committee, 19 April 1921, p. 9.

[24] Liepman recounts this as part of her overall three phase summary of British apprenticeships: "(i) Guild Apprenticeship, from the 12th century to 1563; (ii) Statutory Apprenticeship, set up by the Statute of Artificers, … 1563, and ended by its repeal in 1814; (iii) Voluntary Apprenticeship, since 1814." She further reproduces an analysis which divided the last phase, from 1814 to the 1920s, into a further three periods:

(a) the hundred years from 1814 to 1914 (during which period apprenticeships declined because of industrialisation and technological changes which caused 'the sub-division and specialisation of processes and the greater use of machinery [which] rendered it unnecessary for many workmen to become acquainted with a complete trade or even a complete branch of trade'. This was compounded by 'the speeding up of the processes and increasing use of payment by results [which] made it difficult and even unprofitable for the journeyman to give the time and care necessary for the proper instruction of the apprentice'; (b) the war years 1914-18 (during which the earlier trends accelerated and 'were reinforced by .. the liability of boys to be called up for military service. At the end of the war period, therefore, the future supply of skilled men appeared to be seriously menaced…'); and (c) the decade after the First World War (during which the fragmentation of the trades continued, but the decline of apprenticeships were partially allayed by the introduction 'where practical and desirable, for instruction in technical institutions'. However 'important as this contribution was, however, it only affected a temporary phase of the problems of apprenticeship. The sub-division of processes and specialisation in products which had spread to such an extent during the war continued and indeed increased.' (K. Liepmann, *Apprenticeship: An Enquiry into its Adequacy under modern Conditions,* London: Routledge & Kegan Paul, 1960, p. 9.)

create more red tape.[25] The Transvaal Chamber of Mines also opposed it on the grounds that 'the conditions of apprenticeship are but conditions of employment, and should be left to the organised industries for themselves to settle.'[26]

But the case 'for' won the day and the Apprenticeship Act No. 26 of 1922 was passed. It was an enabling piece of legislation, setting the parameters and guidelines for those responsible for the detailed implementation of apprenticeships. For example, it provided for the establishment of Apprenticeship Committees whose principal task was to advise the Minister. These committees were made up of an equal number of employer and union representatives and were chaired by an independent person of high standing appointed by the Minister. The scope of each Committee was set by the Minister for 'any scheduled industry within (any) given area'.[27] The scheduled industries were listed in the First Schedule to the Act. They were boot-making, building, clothing, carriage building, electrical engineering, food, furniture, leather working, mechanical engineering and printing.

A Government Apprenticeship Committee (GAC) was established on 26 October 1923 'to advise the Minister on all matters connected with the conditions governing apprenticeship in all Government Departments within the Union of South Africa other than the Railway and Harbours Administration and the Government Printing Works'.[28] Other such Apprenticeship Committees were established in other industries and areas and by 1933 the following Committees in operation were:

- Printing: The Union (one Committee)
- Government (Building and Engineering): The Union (one Committee)
- Railways (Building, Engineering and Carriage Building): The Union (one Committee)
- Mines (Building and Engineering): The Transvaal (one Committee)
- Building: Nine areas
- Mechanical, Electrical and Motor Engineering: Nine areas
- Baking and Confectionary: Two areas
- Leather Working: Three areas
- Carriage Building: Two areas
- Hairdressing: Two areas
- Dental Mechanician: Three areas
- Furniture Industry: Five areas[29]

The GAC had four representatives from the Post Office, two from the 'official side' and two representatives drawn from its union, the South African Telegraph and Telephone Employees Association (SATTA).[30] A further two representatives were drawn from the Department of Public Works – one employer and one trade unionist – which, with the chairperson made it a committee of seven people (and seven alternates).[31] The members of the first committee were M. Buxton Foreman, T. Montgomery, J.W. Thompson, J.J. van Meerton, F.C. Stephens, E.

[25] Apprenticeship Select Committee, 11 May 1921, pp. 92-3.
[26] Select Committee, 9 May 1921, p. 65.
[27] Section 11 (1), Act 26 of 1922.
[28] Government Notice No. 1738, 19 October 1923, reproduced in *Government Gazette Extraordinary*, No. 1283, 19 November 1965.
[29] Department of Labour Annual Report, 1933, *UG* No. 43, 1934, p. 46.
[30] See for example Minutes of 215 meeting of the Central Executive Committee of SATTA, Johannesburg, 16 January 1939, p. 89. item 3177, Government Apprenticeship Committee. Resolved that the following be appointed to membership of the Government Apprenticeship Committee: T.H. Woods, alternate W.H. Dymond, and S.A. Cole, alternate R.J. Bunce.
[31] GAC Report for the year 1926, ARB, Volume No. 325, Reference G5/3.

Cloete and Captain E. Murray. (Presumably T. Montgomery, who later signed Bird's apprenticeship contract in 1933 was the same person who had been party to the GAC's inauguration).[32]

The Chairman of Apprenticeship Committees was appointed by the Minister in terms of Clause 11(2)(e) which stated: 'The chairman shall be an independent person appointed by the Minister and in the case of equality of votes on any subject he shall have a casting vote on that matter but he shall have no deliberative vote.'[33] The first chairman of the GAC was Percy Coleman, MA who had previously been the Advisor on Technical Education in the Union Department of Education.[34] This was a common pattern – namely that the Chairperson of the Apprenticeship Committees was someone drawn from the education community. For example two leading education figures, of whom much more will be heard, were similarly so appointed: Professor John Orr, the Director of the Witwatersrand Technical College, was the chairperson of the Transvaal Mechanical and Electrical Engineering Apprenticeship Committee, from its inception in 1925,[35] for fifteen years[36] and Harry Aspinall, Head of the Electrical Engineering Faculty of the same institution, followed him in that capacity.[37] The De Villiers Commission, which sat in 1948 also noted this trend, cited other instances, and commended the practice.[38] However, this was not a fixed rule. In other cases the chairperson was simply someone who was acceptable to both sides – as presumably was Colin Griffith, Chief Engineer of the Department of Posts and Telegraphs who, despite being from 'the official side' was greatly admired by those he managed.[39] He was initially an alternate member on the GAC[40] but later became its Chairman[41]. The seniority of the men on the Committees is worth noting – this was clearly perceived as an important structure.

The Act outlined the work of these committees in the following manner:

a. Recommend to the Minister the designation of trades or branches of trades in the area for which they were appointed;
b. Recommend to the Minister the qualifications upon which an apprenticeship may commence in any designated trade, provided that the age and standard of education shall not be lower than the minimum set;
c. Recommend to the Minister the number of apprentices who may be employed in any workshop or industrial establishment, provided that the number shall not be restricted with the object of limiting the future number of journeymen;

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[32] A copy of this contract was kindly retrieved by Ms Cecilia Carsons of the Department of Labour. Registration Number MG 557 on 2/9/2004.
[33] See *The Social and Industrial Review*, June 1928, p. 440 in which it is stated that 'The chairman of a Committee is required to be an independent person appointed by the Minister, who in practice endeavours to ascertain whether the person it is proposed to appoint will be acceptable to both employees' and employers' representatives before making the appointment.'
[34] Orr, 'Technical Education and Training', p. 130.
[35] *Transactions of the SAIEE*, April 1932, p. 123.
[36] Jos Lurie, *Technikon Witwatersrand, A History 1925 – 2000,* Fishwicks, South Africa, 2000, p. 59 and 'Obituary of Professor John Orr', in the *Journal of the South African Institution of Mechanical Engineers*, July 1954, p. 392.
[37] 'H.T. Aspinall profile', *Journal of Certificated Engineers*, South Africa, April 1956, p. 112.
[38] De Villiers Report, UG65/1948, paragraphs 698-9.
[39] 'A Great Legacy: Following the Griffith Tradition', *The Live Wire*, the Official Organ of the South African Telephone and Telegraph Association, Vol. XXV, January 1943, No. 289, pp. 1, 2, 4.
[40] Notice No. 1738 of 19 October 1923 republished, *Government Gazette Extraordinary*, No. 1283, 19 November 1965, p. 13.
[41] Notice no. 1798, *GG,* No. 2974, 19 December 1941, p. 798.

d. Recommend to the Minister the rates of wages of apprentices (except in the case of those employed on the railways and harbours administration or in any government department;
e. Investigate any matter of dispute arising out of a contract of apprenticeship and endeavour to settle it amicably;
f. After consultation with the educational authorities, recommend to the Minister the nature and number of educational classes to be attended by an apprentice;
g. Report on any matter concerning apprenticeship referred to it by the Minister (summary of section 14 of Act No. 26 of 1922)

The first list of trades to be recommended by the GAC was forwarded to the Minister on 16 November 1923[42] and gazetted by the Minister on 22 February 1924.[43] They were:

1. Telegraph and Telephone Electrician.
2. Telegraph and Telephone Mechanician.
3. Electrician.
4. Fitter and Turner.

The first designated trade – that of Telegraph and Telephone Electrician – was the one Bird and others referred to in this account were indentured for (like Allen Bennett, Bob Round, Malcolm Gow and Rod Harker) – of which more later.

The same gazette also set out the minimum age of admission (not less than 15 years), the minimum qualification for entry (Standard VI), the period of the apprenticeship (5 years unless the apprentice had certain relevant technical qualifications which could entitle him to a year's remission) and the number of apprentices to be employed (to be determined by the Committee and the custom of the trades).

Whilst the minimum age for entering an apprenticeship was set at 15, in those provinces where 16 had been set as the compulsory school leaving age, this became the minimum.[44] But the Act did not only set a minimum age, it also set a 'maximum'. It stated in section 8(2), that 'a minor shall not so bind himself if before the termination of the contract he would be over the age of twenty-six years' – although the Minister could issue exemptions if the circumstances warranted it. Such circumstances applied in 1945 when the maximum age for a government apprentices for entry was raised from 18 to 19 to allow returning soldiers to qualify for training.[45] This proved to be an obstacle for the rural youth 'who through lack of opportunity failed to make an early enough start'.[46] Adult immigrants into towns from the countryside were similarly disadvantaged. [47]

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[42] National Archive, ARB, Volume No. 325, FILE g 5/5, Government Apprenticeship Committee, Recommendations: Designation of Trades, Letter signed by the Secretary of GAC.
[43] *Union Government Gazette* No. 1370, No. 304, 22 February 1924.
[44] Aspinall, 'Presidential Address', p. 9.
[45] Telkom Archives, Minutes of Forty-sixth Meeting of the Central Executive Committee of the SAT&T Association, held at Groote Kerk Gebou, Cape Town, on Wednesday, 13 June 1945, Paragraph 5104: 'Apprentices (Age of Entry). Letter 30 May from Acting Chief Engineer that Public Service Commission had agreed that maximum age be raised from 18 to 19 years in the case of matriculated youths who are candidates for appointment as Apprentices.'
[46] E.G. Malherbe, *Part III Education Report: Education and the poor White, Part III of The Poor White Problem in South Africa,* The Report of the Carnegie Commission, Stellenbosch: Pro Ecclesia Printers, 1932, pp. III-59.
[47] *Ibid,* para. 79, xxii-xxiii.

The Act allowed the respective apprenticeship committees to recommend to the Minister 'the qualifications upon which apprenticeship may commence' (section 14(b), Act 26 of 1922) – which advice the Minister was to consider and, if accepted, then gazette. The norm set was Standard VI, although the Government Apprenticeship Committee recommended, in 1934, that Standard VII be set as the minimum for the trade in which Bird was indentured.[48] Standard VI was the minimum for other trades.[49] Johnson[50] reported that in the Post Office some 10% of apprentices had a full matriculation certificate. Of course, this was a major obstacle for the majority who were denied compulsory schooling in the white political supremacy and economic prosperity regime of the day.[51] Those who, like Bird, had passed the Preliminary Technical Certificates at school (the equivalent of a Standard VII or Junior Certificate at the time) had a slight advantage too. They were not alone in this. The National Printing Apprenticeship Committee, the Witwatersrand Building Apprenticeship Committee, the Cape Town Engineering Apprenticeship Committee and the Bloemfontein (Building, Furniture and Engineering) Apprenticeship Committee also set the minimum entry educational level at Standard VII.[52]

Where there were more applications than apprenticeships available, a selection process had to be instituted. Johnson, when describing the Post Office system noted in this regard:

> It is important to note that the Post Office has no right or power of selection whatever … Selection was undertaken through a process managed by the Public Service Commission, Public Service Examination 'C' – this competitive examination is in four subjects: English, Afrikaans, Accuracy, and General Knowledge and it serves to recruit Post and Telegraph Assistants as well as apprentices.[53]

Presumably this rule applied to the public service in general. The reference to 'competitive' here signals that the pass rate was directly set by the number of apprenticeship places available – a system also used for engineers as shall be seen shortly. Although having said this, Bob Round, an apprentice at around the same time as Bird, noted:

> The Post Office took on more youngsters than they needed so that they could shed those that they considered unsuitable, during the first three months. The arrangement was that during this period you could give them a month's notice and they could give you a month's notice. The latter was the far more likely scenario in that jobs were difficult to come by and you considered yourself lucky to have been allowed to start down the path. After the three months those still in the system were indentured as apprentices for five years. This agreement had to be signed by your father or guardian. [54]

The third function of the apprenticeship committees was an issue of sharp contention between employers and the craft unions – and the way it was formulated in the Act constituted a compromise between them as the Department of Labour itself reported:

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[48] *Government Gazette,* Notice No. 832, 22 June 1934, Apprenticeship Act, No. 26 of 1922, as amended by Act No. 22 of 1930.
[49] B.A. Johnson, 'Training in the Engineering Branch of the Post Office', *Transactions of the S.A. Institute of Electrical Engineers*, October 1940, p. 294.
[50] *Ibid,* p. 267.
[51] D. Posel, *The Making of Apartheid, Conflict and Compromise,* Oxford: Clarendon Press, 1991, p. 8.
[52] J. Orr, 'Technical Education and Training'*,* in *The Transactions of the South African Institute of Electrical Engineers*, Vol. XXIII, April 1932, p. 121.
[53] B.A. Johnson, 'Training in the Engineering Branch of the Post Office', *Transactions of the S.A. Institute of Electrical Engineers*, October 1940, p. 267.
[54] Correspondence between A. Bird and Bob Round, 1 January 2007.

> The Act has also exercised a moderating influence on the trade union practice previously in operation, of stipulating for a ratio of minors to journeymen who might be employed in certain skilled trades. The Act deprived the unions of this assumed right and gave them in exchange the statutory right to control the number through the Apprenticeship Committee system under which the registration of a contract is dependent on the ability of the employer to provide adequate training over an extended period. It is true that even before the passing of the Act minors were employed in skilled trades, but there was no proper course of training and no security of employment; now the course of training is prescribed, it includes compulsory attendance at classes, and the retention of the apprentice in employment is safeguarded by his contract.[55]

Many believed this craft union practice was used by the artisans to reduce the number of artisans on the labour market and hence to protect the wages of those that remained. Their motivation was more likely to preserve and improve the quality of training.

The fourth function listed above did not apply to the government as wage rates were set by the Public Service Commission. However, the approach adopted by the Commission was similar to that of apprenticeship committees and in this regard the rates set out in Bird's contract was typical:

> For the remaining 5 months and 15 days of the 1st year of apprenticeship at the rate of 3/6d per day (313 days per annum)
> For the 2nd year of apprenticeship at the rate of 4/6d per day
> For the 3rd year of apprenticeship at the rate of 5/6d per day
> For the 4th year of apprenticeship at the rate of 7/6d per day
> Such allowances as may be authorised from time to time will be additional to the rates of pay specified above.[56]

The fifth function occupied a great deal of the time of the committees and in this the GAC was no exception. From the trade union perspective there was one particularly common thread to the disputes raised, namely the use of apprentices as cheap labour.

Once a trade had been designated by the Minister, companies were free to apply to the relevant apprenticeship committee for specific apprenticeship contracts to be registered.

Contracts of apprenticeship had to be registered by the Inspector of Apprenticeship on the recommendation of Apprenticeship Committees. In exercising this duty the Committees took account of such matters as 'the financial stability of the firm, the length of time it has been established, the number and qualifications of the journeymen and the proficiency of apprentices already trained'[57] – which on paper seems fair but in practice was believed to be used by the craft unionists on the Committees to protect their own and exclude others (as shall be seen in later chapters).

There was a great deal of pride associated with the Apprenticeship Act. Dr. Richard Smyth conducted a global investigation of technical training systems around 1930 and concluded: 'I've travelled in South America and the West Indies and Germany since I left Johannesburg, and I realise that your technical schools are the best I've ever seen.'[58] Orr himself said: 'South Africa has nothing to learn from Great Britain with regard to the technical education of

[55] 'Review of the first ten years of the Apprenticeship Act', *Department of Labour Annual Report 1933*, *UG* No. 43, printed 1934, p.45.
[56] K. Bird's apprenticeship contract.
[57] 'Annual Report of Department of Labour', *UG* No. 43, December 1933, printed 1934, p. 46.
[58] Orr, 'Technical Education and Training', 1932, p. 145.

apprentices – in fact, it is a long way ahead of Britain'.[59] Aspinall shared this view.[60] These assessments may be viewed as hyperbole but they certainly stand in contrast to the evaluation Andy Green gives of the British system just a few years earlier:

> The long record of neglect left an enduring legacy. Technical education had been cast in a mould that subsequent legislation would find hard to break. Growing up as an extension of the apprenticeship system and reliant on employer initiatives, it developed in a fragmented and improvised manner: perennially low in status, conservatively rooted in workshop practice, and hostile to theoretical knowledge, publicly funded technical education became normatively part time and institutionally marooned between the workplace and mainstream education. A century later we have still not overcome the deep divisions between theory and practice and between academic and vocational learning which were first entrenched in these nineteenth-century institutional structures. Nor, it would seem, have we quite outgrown the voluntarist reflex which gave rise to them.[61]

Whether South Africa avoided all of these problems is a moot point but the multiple layers of interconnections between the theory and practice that will be outlined in the 1930s period, suggest that technical education in South Africa was far from 'marooned' between the workplace and mainstream education, it was proudly located there to the benefit of the apprentice, the employer and the country.

POLITICAL ECONOMY

The welcome Henry Bird and his family received was a policy matter. The Manifesto of the South African Party (SAP), then in power, as enunciated by its leader General Louis Botha, put the matter bluntly: 'The encouragement of European … immigration into South Africa'.[62]

The SAP led the first South Africa-wide government following the British victory of the South African War (Anglo-Boer War) and the establishment of a Union of the four previous independently run provincial governments in 1910.

Considerable numbers of British citizens emigrated and reached a new peak in 1920, having declined after the Great War from an annual 10,000 to 1,500.[63] The wave of which the Birds were a part commenced in 1918 but this wave was 'checked by the economic downturn which began in the following year'.[64]

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[59] *Ibid,* p. 104.
[60] Aspinall, 'Presidential Address', p. 8.
[61] A. Green, *Technical Education and State Formation in Nineteenth-Century England and France,* in McCulloch, G. (ed), 2005, The RoutledgeFalmer Reader in History of Education, Routledge, Oxon, USA and Canada.
2005, pp. 114-5.
[62] General Louis Botha, *The South African National Party: General Louis Botha's Manifesto*, The Star, 3 June 1910, as cited in D.W. Kruger, *South African Parties and Policies, 1910 – 1960, a select source book,* Human & Rousseau publishers, Cape Town, 1960, p. 49.
[63] D. Yudelman, *The emergence of modern South Africa: State, Capital, and the incorporation of organized labour on the South African Gold Fields, 1902 – 1939,* Cape Town, Johannesburg: David Philip, 1983, p. 127.
[64] John Stone, *Colonist or Uitlander? A Study of the British Immigrant in South Africa*, Oxford: Clarendon Press, 1973, p. 122.

In 1911 the overall skill profile of the white population can be gleaned from the first census of the Union of South Africa, conducted in 1911:[65]

Table 4.1. Skill profile of the white population, 1911

		White Males	White Females
I	**Professional**	**43 967**	**15 754**
II	Domestic	9 004	281 556
III	Commercial	75 098	6 529
IV	Agricultural	168 252	24 172
V	**Industrial**	**131 293**	**11 962**
VI	Indefinite	4 644	6 101
VII	Dependants	269 664	243 295
VIII	Unspecified	3 242	1 709

Source: *Official Yearbook of the Union of South Africa No 1*, p. 176, from the Table: White and Coloured population of the Union at Census of 1911

The highlighted occupations were given the following definitions in the Census (noting at this time the majority of the white population were agriculturalists):

> **Professional** – 'Embracing all persons not otherwise classed, engaged in the general and local government, and in the defence of the country, and in ministering to religion, charity, law, health, art, literature, science, and amusement of the people.'
> **Industrial** – 'Embracing all persons engaged in connection with the manufacture, construction, modification, or alternation of materials, so as to render them more available for the various uses of man, in the construction and repair of buildings, railways, roads, … and in mining.'[66]

Those who came with skills were an elite. They organised to protect their privileges. Attempts to de-skill them led to civil unrest in 1922, a story well told by Krikler.[67]

South Africa was drawn into the 'Great War', 1914 -1918, under the British flag. This made all forms of international trade difficult, so import substitution of consumer goods in particular began. The SAP strengthened this with tariffs barriers in order to grow and diversify the local economy. The SAP also passed the Electricity Act, No. 42 of 1922, which provided for the establishment of the Electricity Supply Commission (Escom) – providing a major energy boost to the mines as well as to secondary industry and private households. However, for the country as a whole the period was characterised by a depression, the immediate cause of which was post-war inflation and the fixed price of gold.[68]
During these difficult years the mining industry was focused on optimising their profits in a context where the gold price was fixed. The 'variable' cost they targeted was workers' wages, particularly those of skilled miners. To maintain production the mine owners and craft unions entered a Status Quo agreement in 1918 which effectively said 'so far and no further'.[69] The agreement had held during the war, but thereafter the mine owners, prompted by post-war

[65] Cousins, C.W. (Director of Census). *Official Yearbook of the Union of South Africa No 1,* Union Office of Census and Statistics, Pretoria, 1917, p. 176.
[66] Cousins, C.W. (Director of Census). *Official Yearbook of the Union of South Africa No 1*, Union Office of Census and Statistics, Pretoria, 1917, page unknown.
[67] J. Krikler, *The Rand Revolt: The 1922 insurrection and racial killing in South Africa,* Jonathan Ball Publications, Johannesburg & Cape Town, 2005.
[68] Yudelman, *The emergence of modern South Africa*, p. 134.
[69] Krikler, *The Rand Revolt*, p. 39.

inflationary pressures, again began to fragment jobs and reduce the ratio of skilled to semi-skilled jobs.[70]

> (T)he Witwatersrand was cruel to the skills of the white miner. It snatches these up, ripped them into their constituent parts and very rapidly made the white miners supervisors. With the organisation of production putting the power of their skills under threat, and with the presence about them of workers who could be employed at far lower wages than themselves, the white workers' impulse was to racial protection.[71]

These events precipitated the 1922 strike which boiled over into civil unrest. The uprising was suppressed by the army, but tensions persisted as the SAP Party. General Smuts became its leader in 1919 and it was seen to be 'dominated by big business interests'.[72] So in the 1924 general election a Pact Government was voted in – the Pact having been entered into by unlikely bedfellows: the Afrikaner National Party of J.M.B. Hertzog (who led the pact in power until 1933), and the South African Labour Party formed in 1910 under the leadership of F.H.P. Creswell. Their alliance was built on their shared opposition to the SAP, their fear of fighting the South African Party (SAP) separately and splitting the vote and their desire to qualm the fears of those voters that suspected each of radical views (that the Nationalist Party would secede from Britain which the English speakers would have opposed and that the Labour Party was a Bolshevik group opposed to all owners of capital that powerful farm owners would have feared).

There was a second issue which also precipitated a government change in 1924. As Abedian and Standish have noted '(i)n 1916 it was estimated that there were 39 000 indigents and 67 500 other poor whites in the Union. … In 1920 an unprecedented increase in unemployment occurred "… due in varying degrees to the closing down of a number of the low-grade mines, the restriction of diamond mining, the inability of returned soldiers and others to find work, and the financial depression which manifested itself towards the end of the year"'.[73] The problem was also compounded by the failure of a number of Afrikaner Boers (farmers). They were ill-equipped to rise to the food challenges of the growing towns and mining compounds because of poor farming practices and an inheritance system that required a sub-division of land for all inheritors. With the added 'push' of drought and cattle diseases, many of these farmers and their families began drifting to the towns. They lacked the skills needed by the mines or railways (the big employers of the time) and yet wished to have a 'European' standard of living. The mining bosses found them to be more expensive than black labourers, so these folks struggled to find work. Unemployed and desolate, their numbers contributed to the 'poor white saga'. However, whilst economically weak they were a voting constituency whose support the political groups sought to secure, and so a solution had to be found.[74]

The SAP began solution-seeking by passing three pieces of legislation, which sought to ameliorate the plight of the young and most vulnerable in particular: the Regulation of Wages,

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[70] *Ibid,* p. 47.
[71] *Ibid,* p. 32.
[72] Creswell, as cited in D.W. Krüger, *South African Parties and Policies 1910 – 1960: A select source book,* Cape Town: Cape Times Limited, 1960, p. 77.
[73] *Official Year Book of South Africa, SA 1910 – 1921*, No. 5, p. 293, as cited in I. Abedian and B. Standish, *An Economic Inquiry into the poor White Saga*, Saldru, Working Paper No. 64, November 1985, p. 35.
[74] By 1932 this group constituted 16.6 per cent of the European population – or 300 000 out of 1.8 million people. Malherbe, *Part III Education Report.*

Apprentices and Improvers Act, 1918 (Act 29 of 1918), the Juveniles Act, 1921 (Act 33 of 1921) and the Apprenticeship Act, 1922 (Act 26 of 1922). The Apprenticeship Act is discussed in detail in the 1930s section below, when Bird's own apprenticeship is considered.

The South African Post Office

Colonial postal services in South Africa dated back to the beginning of the 17th century 'when boulders on the shores of Table Bay were used by passing vessels as the repository of letters intended for collection and conveyance to their destinations by vessels proceeding in the opposite direction'.[75] But more sophisticated services had to wait for Samuel Morse to invent his magnetic telegraph in 1832 and for his famous Morse Code in 1837. The first telegraph line was installed in the United States in 1843 and in South Africa in 1860 'using a single iron wire supported on insulators mounted on iron poles, the current returning through the earth'.[76] 1860 was also the year that Alexander Graham Bell invented the telephone which, on the 10 March 1876, he evolved into a practical voice instrument.[77] By 1880 telephones were in use between Cape Town and Simon's Town, using a single wire between the two places, like the telegraph. As the use of telephones spread between many pairs of callers, some system of interconnecting callers became necessary and South Africa installed its first exchange in 1887, four years after the world's first in the United States. The single wire with earth returns suffered from interference from the telegraph and so the far superior two wire method of linking callers was introduced.[78]

When the Union of South Africa was formed in 1910 there were 90 telephone systems in operation, all of which became the responsibility of the Central Post Office when Act No. 10 of 1911 was passed and the Ministry of Posts and Telegraphs was created.[79] The new administration was charged with the responsibility of expanding the reach and efficiency of the system.

From its inception the South African Post Office (SAPO) maintained 'close links … with the British Post Office (BPO) which provided all the advice and expertise.[80] Indeed, it was not only the advice and expertise that came from the BPO, so too did the list of equipment suppliers. Most of the equipment used was imported from the same companies that supplied the BPO.[81] For example, Standard Telephone & Cable (STC) supplied many single and three channel long distance systems to SAPO and for the purpose established a small office in Johannesburg which operated until 1946.[82] This close partnership brought with it the

[75] Cousins, C.W. (Director of Census). *Official Yearbook of the Union of South Africa No 1,* Union Office of Census and Statistics, Pretoria, 1917, p. 749.
[76] G.R. Bozzoli, *Forging Ahead: South Africa's Pioneering Engineers,* Johannesburg: Witwatersrand University Press, 1997, p. 149.
[77] O. Lodge, 'The history and development of the telephone' in *The Journal of the Institution of Electrical Engineers*, London, November 1926, Vol. 64, No. 359, p. 1100.
[78] Bozzoli, *Forging Ahead: South Africa's Pioneering Engineers*, p. 150.
[79] Union of South Africa Year Book, 1927, p. 749.
[80] Bozzoli, *Forging Ahead: South Africa's Pioneering Engineers*, p. 150.
[81] D. Kaplan, *The crossed line: The South African telecommunications industry in transition*, Witwatersrand University Press, 1990, p. 28.
[82] M.A. Crouch, (ed), *Sparkling Achievements: Highlights of Electrical Engineering in South Africa*, Chris van Rensburg Publications (Pty) Ltd., Johannesburg, 2001, p. 48.

consequence that the SAPO, like the other state departments and many businesses at the time, were dominated by English speakers and their traditions.[83]

The South African Post Office (SAPO) had also imported, alongside many British men and much equipment, the tradition of creating internal progression routes which, as Sidney and Beatrice Webb described in their seminal work on *Industrial Democracy*, were commonplace in the BPO at the turn of the century:

> The Postmaster-General, who is by far the largest employer of labour in the country [Britain], never dismisses a man for lack of business, and fills practically all the higher grades of his service by promotion from the lower as vacancies occur.[84]

The second period: 1924 - 1931

EDUCATION AND TRAINING LANDSCAPE

"Unless the white men put education in the foreground, how can they hope to permanently maintain their supremacy?"[85]

Schooling

Bird's first school was in a tin shanty in Umzimkhulu (Durban), with about six benches, each row being for a different standard. He completed primary school at Addington, and then did two years at Mansfield Road where he was given a choice of joining the technical or the commercial stream. This was the first career choice he remembered making. He chose the former and completed his Preliminary Technical Certificate I and II (PTC) courses at school[86] - which gave him a National Trades School Certificate (at Standard VII level).[87] That was as far as he got, first time round – and he was no exception: even in 1944 only 17 per cent of those who began school matriculated.[88]

General education for white children varied according to the province in which they studied. However, an overview of the situation was given some years later by the engineer, Badham, in a discussion on the subject at the SAIEE:

> Education is compulsory for European children between the ages of 7 and 15 in Natal and 7 and 16 in other provinces, but exemption from further attendance may be granted to pupils who have passed Standard VI in Natal, Orange Free State and Cape Province and Standard VIII in the Transvaal, provided in the last case that the pupils are 15 years of age. Primary education is free

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[83] E.G. Malherbe, 'Education and the Poor White'*, South African Journal of Science*, Vol. XXVI, pp. 888-903, 1929, republished by the South African Association for the Advancement of Science, Johannesburg, 1929.
[84] S. and B. Webb, *Industrial Democracy,* Longmans, Green and Co., 39 Paternoster Row, London, New York and Bombay, 1902, p. 492.
[85] John Orr, 'The Education and Training of Engineers'*, The Journal of the Transvaal Institute of Mechanical Engineers*, Vol. VII, August to July, 1908-9, Johannesburg, Transvaal Leader, Printers, 1909, p. 27.
[86] A. Bird, 'On his 80th Birthday: Kenneth Burgess Bird', unpublished, p. 15.
[87] Orr, 'Technical Education and Training', p. 117.
[88] L.H.L. Badham, 'The Education and Training of Engineers for Industry', seconding the vote of thanks to A.P.M. Fleming, *Transactions of the SAIEE*, October 1946, p. 237.

in all provinces, except for a few primary schools or primary departments of high schools in the Cape, Natal and Orange Free State.[89]

The meaning of Standard VI at this time varied by province but it was everywhere very basic: An example is given below of what was written on Eric Dickson's Standard VI Certificate (he was the man that Bird's sister, Mavis, later married):

EDUCATION DEPARTMENT, NATAL

Standard VI Certificate

This is to Certify that **Eric James Dickson**
Completed satisfactorily at the end of 1937, the Primary School Course up to and including Standard SIX, and gained this Continuation Certificate, which allows a pupil to be admitted to a secondary or continuation course in a Natal Government School.
The candidate was successful in the following subjects: -
(1) English as Main Language.
(2) Arithmetic.
(3) Afrikaans as Second Language

Signed by an Examiner, Superintendent of Education and Head Teacher.
Dated 7th Feb 1938 for the Bellair Government School.

Aspinall, a leading authority on engineering training was to state in 1954 that such statements were 'meaningless'.[90] They did however, open doors for those who attained them. And there were a rising number who did. In the 1930s the number of white youngsters who attended school increased dramatically on the back of a rising government subsidy – a trend which had been evident since Union, as Malherbe has noted:

> …the expenditure on education in 1911-12 was 14% and by 1930 it had grown to over 20% of the national expenditure. During the same time the number of Whites receiving education grew from 165 000 to 370 000. … By that time most of the White children of school-going age had been drawn into the school net by gradually extending the limits of free and compulsory education. This process was facilitated also by the increased urbanization from about one-half to two-thirds of the population during that period.[91]

Preliminary Technical Certificate

The Preliminary Technical Certificate (PTC) which Bird studied had been on offer since 1919 after a spat between the education authorities on the one hand and the employers, engineers and trade unions on the other, had been resolved. The spat arose after the government proposed that trade school programmes replace 'workshop apprenticeships' which the later groups strongly opposed. The opposing parties argued that these courses should be preparatory only – an argument that eventually won the day.[92] The extensive involvement of the engineering societies, especially the S.A. Institution of Engineers (SAIE) (the mechanical

[89] Badham, 'The Education and Training of Engineers for Industry', p. 237.
[90] H.T. Aspinall, as cited in J. Ettershank, 'Presidential Address: Some Reflections on the Apprenticeship Act and its Implications' in *Journal of the South African Institution of Mechanical Engineers,* July 1954, p. 379.
[91] E.G. Malherbe, *Education in South Africa, Volume II: 1923-75*, Juta & Co. Ltd. Cape Town, Wynberg, Johannesburg, 1977, p. 156.
[92] Orr, 'Technical Education and Training', pp. 114-5.

engineers) and the Association of Certificated Engineers in this debate is itself worth noting – apprenticeships being their feeder channels at the time.[93]

The examinations for the PTC I and II were set by the Examinations Section of the Union Department of Education which was itself only set up in 1919.[94] They consisted of the following subjects in the early 1930s (Orr, 1932, 138-9):

Certificate	**Preliminary Technical Certificate I**	**Preliminary Technical Certificate II**
Compulsory subjects	Official language Mathematics A (Workshop Arithmetic)	Official Language B Drawing B
Select from given menu	*At least two subjects from:* Drawing A Second Official Language Civics Trade theory A (for specific trade)	*Three subjects from:* Science B Mathematics B Second Official Language B Civics B Trade theory B (for specific trade)

For observers today the inclusion of Civics in these programmes is worthy of note. Sadly, no record appears to exist of their content.

Those that completed these programmes had an advantage when it came to securing an apprenticeship, and once secured, were technically entitled to remission of one year off their apprenticeship[95] although this was not always given, as Bird's own experience shows.

Mansfield Road, where Bird did his PTC, appears to have been a trade school. There were however also Industrial Schools (Malherbe: M. III – 55). In his Educational Report to the first Carnegie Commission of Investigation on the Poor White Question in South Africa published in 1932, E. G. Malherbe noted that[96]

> 18. Although there were a few Africander artisans in the country districts in the early days, and although many farmers in the older self-sufficing economic system performed their own artisan work, we find that a suggestion of poverty and inferiority was always associated with industrial education and systematic vocational training. As early as 1854 the Cape Government established industrial schools for coloured and native pupils. But it took forty years before church and school authorities realized that a considerable section of the white population was falling into economic decline because it was practically excluded from industrial activities. Attempts were then made to introduce industrial training specifically as a remedy for the poor white problem. But even at a later stage the application of the Children's Protection Act associated these more practical forms of education with mental deficiency and criminal tendencies, as well as with poverty.

Beyond Standard Six

Beyond Standard Six a few options for white pupils became available:

> In the latter provinces [Cape, Natal and Orange Free State], pupils who are promoted after passing Standard VI, proceed (a) to provincial, secondary, or high schools where two-year and four-year courses are provided, leading to the Junior and Senior Certificates respectively, or (b) to day classes conducted by the technical colleges where courses of a predominant commercial or technical nature are provided. In the provincial secondary and high schools,

[93] Ibid, p. 115.
[94] Ibid, p. 138.
[95] Ibid, p. 119.
[96] Malherbe, *Part III Educational Report : Education and the Poor White*, paragraph 18, p. ix.

> pupils may follow different courses of study which are commonly term[ed] a) academic, (b) commercial, (c) technical, (d) domestic, (e) agricultural and f) general. The number and nature of the courses offered at any high school depends upon the environment, enrolment and consequent staffing.[97]

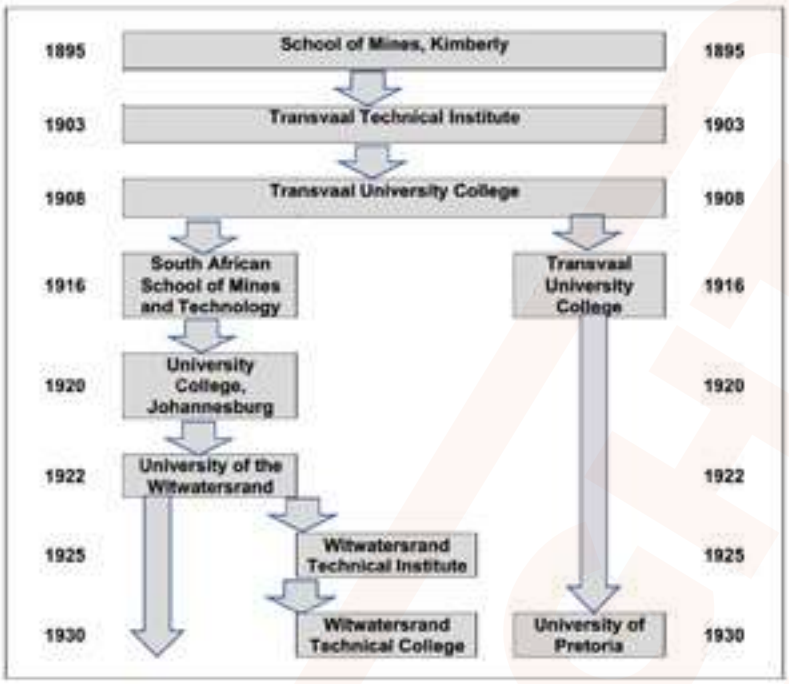
The technical colleges to which Badham refers '…owe(d) their origin to part-time technical classes conducted for railway apprentices. The first classes of this kind to be established in the Union were held in the workshops of the Natal Government Railways in Durban in 1884 with an initial enrolment of sixteen voluntary students.'[98] By 1948 there were nine such colleges in the country – Witwatersrand, Pretoria, Cape, Natal, Port Elizabeth, Free State (Bloemfontein), East London, Pietermaritzburg and Northern Cape (Kimberley)[99] with three of the largest, namely, Cape Town, Witwatersrand and Bloemfontein, having branches in other urban centres.[100] As Malherbe was later to observe, these institutions and the technical education they provided was born out of 'a frank recognition of the increasing industrialization and commercialization of South Africa, and out of the effort to meet these needs by means of training that was respectable and carried no stigma with it'.[101]

Colleges established a forum where they could exchange ideas: the Association of Technical Colleges of the Union of South Africa, following the declaration of a number of technical colleges in the mid-twenties. This became an interest group in its own right and frequently lobbied the Department of Education on policy and implementation matters.[102]

Bird was later to attend the Witwatersrand Technical College which had its roots in the mining, not the railway industry, as the following diagram shows.[103]

Figure 4.1. Th relationship with the School of Mines, Kimberley

[97] Badham, 'The Education and Training of Engineers for Industry', p. 237.
[98] H.T. Aspinall, 'Presidential Address', in *The Transactions of the South African Institute of Electrical Engineers*, Vol 39, Part I, January 1948, p. 8.
[99] Ibid, p. 7.
[100] De Villiers Report, para 519.
[101] Malherbe, *Part III Education Report*, p. 55.
[102] Jos Lurie, *Technikon Witwatersrand, A History 1925 – 2000,* Printed by Fishwicks, South Africa, 2000, p. 34; A. Pittendrich, *Technikons in South Africa*, The Building Industries Federation (South Africa), Halfway House, South Africa, 1988, p. 130.
[103] Lurie, *Technikon Witwatersrand*, p. 10.



Source: Jos Lurie, *Technikon Witwatersrand, A History 1925 – 2000, p. 34.*

In the case of this institution it was the passing of the Apprenticeship Act that prompted the split between university and college – because a large increase in student numbers was anticipated. Prior to this, since 1905, all courses had been conducted at the Transvaal Technical Institute and by its successors in the Transvaal.[104] An equivalent arrangement had existed in the Cape.[105] Indeed it was only after both the Apprenticeship Act and the Higher Education Act (Act 30 of 1923) had been passed that a more formal division became possible.

The Higher Education Act had legislatively enabled the declaration of 'higher education institutions' other than universities, which generally had their own legislation. In 1924 the University of the Witwatersrand established a Technical Education Board (TEB) to oversee the provision of all courses other than those the university claimed as its own, namely those leading to a degree and university diploma.

John Orr, then holding the De Beers Professorship of Mechanical Engineering at the university (but having previously himself completed an apprenticeship) assumed the Chair of this body from March 1924.[106] Under his chairpersonship the TEB launched a comprehensive scheme of technical training for apprentices on the Witwatersrand[107] which is outlined later. Orr then resigned his professorship and became first the President and then the Director of the newly created Witwatersrand Technical College.[108] The division was formalised when the Witwatersrand Technical Institute (which became a Technical College on 7 March 1930[109] was declared on 15 May 1925. Following its declaration, the anticipated increase in student

[104] Lurie, *Technikon Witwatersrand*, p. 14.
[105] L. Chisholm, *South African Technical Colleges: Policy Options,* Johannesburg, University of the Witwatersrand, Education Policy Unit, 1992, p. 7.
[106] Lurie, *Technikon Witwatersrand*, p. 14.
[107] Lurie, *Technikon Witwatersrand*, p. 88.
[108] 'Obituary, Professor John Orr', *Journal of the South African Institution of Mechanical Engineers*, July 1954, p. 392.
[109] Orr, 'Technical Education and Training', p. 131.

numbers did materialise, with student numbers rising from a total of 1 600 students in 1925 to 11 207 in 1932 – of which 4 962 were part-time and 3 748 were correspondence students – correspondence courses being made available to those where suitable technical facilities were not available, such as in the outlying rural areas.[110] Part of this growth was due to the transfer of general education correspondence courses, previously offered by the Department of Posts and Telegraphs, to the Witwatersrand Technical Institute in 1928.[111]

The Government Apprenticeship Committee (GAC) built up their work slowly - in 1927 it had registered 29 contracts, terminated 21 and cancelled 3.[112] Nationally, in 1932, a total of 20,618 apprentices had been indentured of whom 18,779 had either already completed their training or were well on their way to becoming 'well trained artisans'.[113]

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

Bird as petrol pump attendant

Bird was forced to leave school early at the end of 1931 because it was the time of the Great Depression, his father was out of work and there were six mouths to feed at home. Finding work was not easy. For six long months at the beginning of 1932 he trudged up and down the streets of Durban hoping against hope that something, anything, would turn up. Eventually he was taken on as a petrol pump attendant at Club Garage in Smith Street, where he also washed and polished cars. He was paid £4 per month – a wage comparable to that being earned by African mineworkers[114] and to the starting wage of inexperienced white labourers at ISCOR.[115] At the time he was grateful – it was ploughed directly into supporting his family.

There were other 'employment' opportunities available for unskilled and unschooled or incompletely schooled young white men as part of an intensive set of measures to address the then growing problem of 'poor whites'. These included:

- The newly established (1929) Iron and Steel Corporation (ISCOR) where strong preference was being given to white labourers.
- Government departments or entities on a permanent or temporary basis. The Railways were the primary driver in this regard, employing 5 045 white labourers in 1920 and 15 722 in 1930.[116]
- Government relief programmes which Abedian and Standish have described at some length– with the numbers on subsidized schemes rising from 1 400 in 1920 to 7 943 in 1931. These numbers doubled and then trebled in the period up to 1936[117] after which the schemes began to fall away as the 'poor white saga' was abating.

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[110] Lurie, *Technikon Witwatersrand*, p. 21.
[111] Lurie, *Technikon Witwatersrand*, p. 24.
[112] National Archive, GAC Report for 1927 SOURCE: ARB, VOLUME. No. 325, REFERENCE G5/3
[113] DoL Annual Report 1933, UG. No 43, 1934, p. 45.
[114] *The Social and Industrial Review*, 30 June 1928, pp. 428-9, as cited in Jon Lewis, *Industrialisation and Trade Union Organisation in South Africa, 1924 – 55: The rise and fall of the South African Trades and Labour Council,* Cambridge University Press, 1984, p. 53.
[115] The S.A. Worker, April 1952, p. 1, as cited in J. Lewis, *The rise and fall of the South African Trades and Labour Council*, p.82.
[116] Abedian and Standish, *An Economic Inquiry into the Poor White Saga,* p. 48.
[117] *Ibid,* 1985, pp. 41 – 47.

- Learnerships, which were structured training programmes registered with an industrial council, were provided under the Industrial Conciliation Act, No. 11 of 1924 – and several Industrial Council Agreements provided for them.[118] In later years, Learnerships became little more than probationary periods during which lower wages could be paid. For example, the Iron and Steel Manufacturing and Engineering Industry, Transvaal, in a 1939 agreement, made wide-ranging provision for Learnerships – expressed only as the number of shifts to be completed by a learner prior to qualifying for the full 'rate for the job' – a Keeper in the Blast Furnace Division, for instance, had to complete 1,450 shifts before becoming eligible for 21s per shift, the 'qualified' rate.[119]

POLITICAL ECONOMY

As indicated above the Pact Government came into power in 1924 under the leadership of General Hertzog of the National Party (until 1933). For the bulk of his tenure, South Africa was a poor country, which deteriorated further during the Great Depression.[120] By 1925 South Africa had a gross domestic product (GDP) of only R537 million, agriculture contributing 21 per cent, mining 16.2 per cent, and secondary industry only 7.8 per cent. Industry was starved of capital; more than half the profits of the mines (were) sent abroad as dividends. The government levied a tax of only 5 per cent on the value added by the gold mines, which still sold gold at a fixed price.[121]

The Pact Government inherited a number of problems. The first of which was the aftermath of the 1922 uprising. In an effort to secure industrial peace, it passed, in 1924, the Industrial Conciliation Act (No. 11), which established industrial councils for organised white (and some coloured and Indian) workers for the bargaining of wages and conditions on an industry-by-industry basis. The craft unions were the most organised group of white workers and became a 'labour aristocracy'. They came to dominate both the industrial councils and, later, the apprenticeship committees, and were able to use this position to advance their wages at the

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[118] Learnerships frequently covered training of shorter duration than an apprenticeship, as is illustrated by the Industrial Council of the Furniture Industry, which, in 1932, decided to do away with apprenticeships completely because training of longer than three years could no longer be justified 'owing to the present-day methods of production'. Initially they were almost as carefully structured as apprenticeships, as can be seen from the furniture industry example:

> Strict control over the number of learners employed is exercised by provisions in the Agreement that no person may be engaged as a learner unless four journeymen are first employed and unless he is in possession of a certificate from the Council authorizing his employment in that capacity. Furthermore, in order to ensure that learners receive a general training, it is laid down that they may not be retained on any one of a large number of specified operations for a longer period than three months. The enforcement of the latter condition is a matter that engages the special attention of the agents of the Council in the course of their inspections of factories. (Department of Labour Annual Report, 1933, U.G. No 43, p. 46)

Learnerships were also provided in the Post Office to post and telegraph assistants. This persisted until 1937 when an alternative system was provided. (*The Live Wire*, Journal of the SATTA, April 1940, p. 14).

[119] *Government Gazette* Number 1492, 29 September 1939, p. 29.

[120] Giliomee, *The Afrikaners,* referencing S.P. Viljoen, 'The Industrial Achievement of South Africa', *South African Journal of Economics,* 51, 1 (1983), p. 31.

[121] Giliomee, *The Afrikaners*, p. 340.

expense of the low skilled.[122] The Act excluded all 'pass carrying natives'. It also excluded public servants whose wages were set by the Public Service Commission.

For those white workers in the private sector who were not organised, it introduced the Wage Act in 1925 which enabled a statutory Wage Board under Ministerial authority to set minimum wages to protect the most vulnerable non-Africans. These measures were intended to dampen the militancy of workers – and largely succeeded in doing so.[123] They also set these workers apart from African workers, minimising the prospect of their forming an alliance for their mutual benefit.

For the unemployed 'poor whites' – a constituency of growing concern, given that the Pact Government believed it's success at the polls was due in no small measure to it – the Government adopted what was euphemistically called a 'Civilised Labour Policy', which was described in the country's Official Year Book of 1927 as follows:

Civilised Labour Policy:

> (i) The Prime Minister desires it to be understood by all Departments of State that it has decided as a matter of definite policy that, wherever practicable, civilized labour shall be substituted in all employment by the Government for that which may be classified as uncivilized. Civilized labour is to be considered as the labour rendered by persons; whose standard of living conforms to the standard generally recognized as tolerable from the usual European standpoint. Uncivilized labour is to be regarded as the labour rendered by persons whose aim is restricted to the bare requirements of the necessities of life as understood among barbarous and undeveloped peoples. (iv) Juvenile white labour should be employed wherever possible, and the Department of Labour will welcome any suggestion as to the development of a reasonably permanent career to this class of employee, and the avoidance of ultimate and unmerited stagnation.[124]

The policy not only promoted the replacement of black with white labour, it also accelerated the creation of temporary positions in government departments – which the railways in particular were able to provide.[125] It also expanded the number of public works projects such as 'afforestation, irrigation works, road and railway construction and repair".[126] And to oversee this plethora of new programmes and laws, in 1925 the Pact government established a new government department, the Department of Labour.[127]

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[122] R. Davies, 'The Political Economy of White Labour in South Africa: Some preliminary notes', in Adler, T. (ed.), 1977, *Perspectives on South Africa: A collection of working papers,* African Studies Institute, University of the Witwatersrand, 1977, Johannesburg, South Africa, pp. 163-4.

[123] Davies, 'The Political Economy of White Labour in South Africa', p. 167.

[124] Union of South Africa Official Year Book, 1927, Chapter V., p. 201.

[125] Many of the new jobs for whites on the railways were either themselves in casual positions, or else, if 'regular', replaced jobs previously performed by Africans on a casual basis. And many of the new positions created for 'civilised labourers' in Government service were in gangs, organised by the Department of Labour, to carry out some unskilled, and probably unnecessary, task on some public works. (Davies, 'The Political Economy of White Labour in South Africa', p. 165)

[126] Abedian & Standish, *An Economic Inquiry into the Poor White Saga*, p. 37.

[127] Functions of the Labour Department spelt out in *Government Gazette* 1410, Notice No. 1305, 8 August 1924 as follows: (1) Employment generally, including Government and Relief Works; (2) Conciliation Boards, Industrial Councils, Registration of Trade Unions and Employers' Organizations, Private Registry Offices, etc.; (3) Juvenile affairs; (4) Apprenticeship; (5) Wages Boards; (6) International Labour Office affairs; (7) Factories.

In the education field, also in response to the 'poor white saga', the new government introduced the Vocational Education and Special Schools Act, 1928 (Act No. 29 of 1928).[128] The institutions which were established were badly equipped and definitely not stigma-free as shown by the amendment to this Act passed in 1937 (Act 43 of 1937) which focused on the relocation of students 'with some physical, mental or behaviour aberration or disability' from ordinary to special schools. (section 2). The Government was also forced to cut back on subsidies for technical colleges. For example, whilst the technical colleges received a significant proportion of their running costs from learner fees (often paid by employers), they relied on Government to make up the difference between fee income and actual costs. This difference normally hovered around two thirds but during 1934 this fell to 53.6 per cent for the Witwatersrand Technical College, which naturally put strain on the operation of the College.[129] However even in this resource-constrained environment the government maintained the tariff protection and import substitution policies of the previous government to promote local industry. In 1929, the Government established the Iron and Steel Corporation (Iscor) – mandated to implement the 'civilised labour policy' rigorously.[130] This initiative was driven by Dr. H.J. van der Bijl who had previously led the establishment of ESCOM. Dr van der Bijl had been persuaded by General Smuts to return to the Union in 1920, after studying abroad, to undertake the position of Technical Advisor on Industrial Development to the Department of Mines and Industries.[131] He was later to play a key role during the Second World War.
Abedian and Standish[132] describe the period between 1924 and1931, as a period of industrial planning and labour market regulation – but with only modest progress on the ground due to the effects of the Depression.

The South African Post Office

Another investment driver came through the Post Office, which formulated plans to introduce automatic exchanges in the urban centres to improve the communications network just before the 1929 Depression set in. The Chief Engineer, C. Griffith, was later to say that 'it was fortunate for the Department and the public that contracts had actually been placed and the work initiated before expenditure generally was curtailed, as delay in commencement of the work of conversion would have intensified the difficulties experienced by the Department, particularly on the Witwatersrand, when the depression ended.'[133]

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS IN THE POST OFFICE

[128] E.G. Malherbe, *Education in South Africa, Volume II: 1923-75*, Juta & Co. Ltd. Cape Town, Wynberg, Johannesburg, 1977, p. 178.
[129] Lurie, *Technikon Witwatersrand, A History 1925 – 2000*, p. 32.
[130] M.L. Morris and D. Kaplan, 'Labour Policy in a State Corporation: A Case Study of the South African Iron and Steel Corporation', *South African Labour Bulletin, Vol. 2 Number 6, 1976,* p. 21.
[131] ESCOM, *Twenty-Five Years: A Record of the Origin, Progress and Achievements of the Electricity Supply Commission, Union of South Africa, 1923 – 1948,* Cape Town: Cape Times Limited, 1948, p. 17.
[132] Abedian & Standish, *An Economic Inquiry into the Poor White Saga*, pp. 32-3.
[133] C. Griffith, 'Presidential Address to the South African Institute of Electrical Engineers', in SAIEE Transactions, Vol. 30, Part 2, February 1939, p. 32.

Before World War II there was little manufacture of parts in South Africa, and, as Johnson elaborated in his paper to SAIEE in 1940 '(t)he workshops are not equipped for mass production and most components required are imported, but unanticipated demands arise which have to be met at short notice and the mechanician is required to produce what is needed by hand. He is, in fact, required to be an instrument maker.'[134] The electrician primarily installed, maintained and repaired the telephone equipment.

Johnson listed the occupational categories in operation over this period:

Ranks:
1. Casual Labourer
2. Temporary Workman
3. Permanent Construction Workman
4. Apprentice Telegraph and Telephone (T & T) Electrician
5. Apprentice T & T Mechanician
6. T & T Electrician, Grade II
7. T & T Mechanician, Grade II
8. T & T Electrician, Grade I
9. T & T Mechanician, Grade I
10. Supervising Electrician
11. Supervising Mechanician
12. Assistant Engineer[135]

These twelve ranks could be clustered into four bands: casual/temporary workmen; permanent construction, or sometimes called telephone, workmen; artisans and engineers. Bob Round, another Post Office man, described their work as follows:[136]

1. **Casual Workmen** – they were the beasts of burden. They were taken on when there was manual work to be done, such as digging trenches, pole holes, etc. They were paid off when the task was complete. These people were, in many instances, abused in that sometimes they were employed for years without … a pension, medical aid, sick leave or vocational leave.
2. **Permanent Telephone (or Construction) Workmen** – they were chaps who had acquired good practical knowledge of a narrow phase of the job.
3. **Telephone Electrician** – these were hands-on workers who managed to keep the wheels turning. They were in many instances the driving force, brawn and brains, of the Engineering Branch. They had completed a five-year apprenticeship.
4. **Engineers** – Officers and Gentlemen (who did the lay out of the carrier systems at head office).

Malcolm Gow confirmed this breakdown using a slightly different language:

> Your electrician would do most of the surveying and also the control of the installation. The holes were all built to certain standards, he had to check that all those holes were correct and at the right depth. The actual labour was done by the labouring force. Where possible they would employ local people, a lot of them were what we called Casual Telephone Workmen, or CTWs. So, the actual workers were mainly CTWs or TWs, Telephone Workmen, if they became permanent. But there were naturally smaller numbers of them because they would be with the Post Office and go where there is work to be done. Head Office would do all the basic planning. It was essentially engineers.[137]

With the exception of the engineers, with whom a close link was maintained, all of these workers were organised in a single trade union.

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[134] B.A. Johnson, 'Training in the Engineering Branch of the Post Office', *Transactions of the S.A. Institute of Electrical Engineers*, October 1940, pp. 281-2.
[135] Johnson, 'Training in the Engineering Branch of the Post Office', p. 266.
[136] Personal correspondence, A. Bird and B. Round, 1 January 2007.
[137] Interview with Gow, 22 January 2007.

The South African Telegraph and Telephone Employees Association (SATTA)

The South African Telegraph and Telephone Employees Association (SATTA) was formed on February 27 1918 following a meeting of 32 people in the Cable Room of von Brandis Square offices in Johannesburg.[138] On 14 March 1918, 110 members adopted the constitution and rules of the Association, which consisted of five rules:

Rule 1:	That the name of the Association be: The Telegraph and Telephone Employees Association
Rule 2:	That the Headquarters shall be in Johannesburg.
Rule 3:	That membership of the Association shall be open to all employees of the Telegraph and Telephone Department, and to any others of the Postal Service who may desire admission.
Rule 4:	The object of the Association shall be the protection of the interests of its members.
Rule 5:	The affairs of the Association shall be conducted by an Executive Committee consisting of President, Vice President, Secretary, Treasurer and five executive members.

Rule 3 was important – the union recruited across the range, including engineers, and so it was well placed to see 'progression' as being in the interests of its members.[139] This alliance persisted until 1956 when the engineers broke away.

The range of members included the apprentices, although when the Apprenticeship Act, 1922, (Act 26 of 1922) was first passed, each apprentice was compelled to sign a contract which forbad trade union membership.[140] It was under the more union-sensitive Pact Government that the clause was softened in 1924 to read 'may not absent himself from his employment without the sanction of the Inspector'.[141] The main Act was also amended to read 'Any person who brings pressure to bear on an apprentice to break the conditions of his contract under any circumstances shall be guilty of an offence',[142] but membership of a union was no longer prohibited. SATTA took advantage of this space and organised apprentices.

The union adopted a shop-by-shop representation model and on 15 April 1918 at a Committee meeting held in the Cable Office, von Brandis Square, it selected its first group of shop stewards:

> The following members were picked to act as Stewards, subject to their acceptance:
> For A.E. Central - Fault Staff, Stores, Mechanician, Boksburg East Rand, Clerical, labourers (Mr. D.W. Sinclair); for Night Operators (Mr. Green).

By August of its first year it had 500 (white) members of whom about 100 were women.[143]

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[138] Taken from SATTA Executive Committee records housed in TELKOM archive, 1918, p.1.
[139] Abridged history of the Society of Telkom Engineers, a copy of which was kindly emailed to me by Neil Jooste, the 2008 President, Society of Telkom Engineers, on 8 January 2009.
[140] Second Schedule of Act No. 26 of 1922, clause 1(d).
[141] Amendment Act No. 15 of 1924, clause 3.
[142] *Ibid*, clause 2.
[143] 'Ordinary quarterly meeting of members (of SATTA) held in the Transvaal Arms August 2 1918 at 8 p.m'. 'The Secretary states that the membership has just topped the 500 mark including about 100 ladies. … He further stated that now we had organized the bigger centres, we were extending our activities towards country relations and he hoped that within a not too distant period we would have the whole of the Transvaal solidly organised.'

On 6 February 1919 the union launched its journal, *Live Wire*[144] having already decided, in November 1918, to subscribe to the South African Institute of Engineer's (IEE) monthly journal, no doubt in order to stay abreast of matters of interest to its engineer members.[145] This relationship with the SAIEE greatly assisted the career path model.

It set about representing its members with alacrity: for example, it sent a 'wire' to Colonel Creswell of the Labour Party asking him to extend the provisions of the Factories and Wages Bill to Casual and Temporary employees of all government departments,[146] to which Creswell replied, by 'wire' the next day informing them that 'Bill passed Assembly. Providing closing of factories, public holidays, does not touch payment'. On 21 May 1918 it convened a special general meeting at which the 'unprecedented rise in the cost of living' was discussed. It was resolved 'that the Government be approached by means of a petition to the Prime Minister which all members of the telephone department will be invited to sign' calling for a general wage rise.

Another example of SATTA fighting for temporary workers was reported in their journal in 1943: they argued that after a maximum of seven years temporary workers should be made permanent.[147] They also compared the relative benefits of Post Office casuals to the Railway workers and found the Post Office to be sorely wanting – 'railworkers' (previously called 'white labourers') had a non-contributory pension scheme, sick leave, vacation privileges, travel concessions, rent rebates and were even eligible for the home ownership scheme if they could meet the repayments. They also had a feeding scheme as a result of which 'there has been a general improvement in stamina and general health'. By comparison all the Post Office casuals had was the right to contribute to the pension scheme, with the Temporary Workmen having only a little more.[148]

The focus of the union's work was not only on temporary workers. However, their work in relation to the curriculum matters of the apprenticeship will be discussed in the next time period, 1932 to 1945. Here an anecdote must suffice to show their concern with apprentice training: in 1933 SATTA wrote to the GAC complaining that apprentices in Bloemfontein had been continuously employed, for six months, installing rural and party lines under the supervision of a Temporary Workman. In this instance the matter was settled when the Department justified its actions 'in the light of the …adverse economic conditions which resulted in a considerable reduction of the amount of work' and with the comment that 'generally … some practical experience at digging holes and planting poles would stand the apprentices in good stead as these lads might later be required to supervise this class of work' but then proceeded to apologize stating that 'The Department of Posts and Telegraphs has,

[144] At a SATTA Executive meeting held in the Lounge, 6 February 1919.
[145] SATTA Executive meeting held in the Lounge on November 29 1918 at 8pm: 'That the account of £1.8.0 Modern Press and 2/- for a copy of the monthly S.A. Institute of Engineers be sanctioned. Carried.'
[146] SATTA Committee meeting held in the Cable Office von Brandis Square at 5pm 1 May 1918.
[147] *The Live Wire*, May 1943, p. 13.
[148] *Live Wire*, February 1943.

however, promised that in future a recurrence of the action taken by the Divisional Engineer at Bloemfontein will be avoided.'[149]

This dual concern, for both lesser skilled workers and apprentices, set them apart from other unions at the time where conflict between skilled and lesser skilled was intensifying with the expanding introduction of machines.

The South African Institute of Electrical Engineers (SAIEE)

The SAIEE, a 'partner' institution of SATTA, had a history that went back even earlier to May 1897 when its pre-cursor, the South African Society of Electrical Engineers (SASEE), was formed. SASEE's first President, Sir James Sivewright, had become a Telegraph Engineer under Sir William Preece, the Chief Engineer of the British Post Office,[150], twice President of the UK Institute of Electrical Engineers (IEE), in 1880 and1893, underlining the strong British influence at the time. Interestingly, it was later suggested that:

> As a member of the Cape House of Assembly Sivewright was based in Cape Town and could not attend SASEE meetings in Johannesburg. The committee were, none the less, glad to have such a distinguished practitioner at the top as 'his name undoubtedly helped to remove any slight misunderstanding which had arisen through the small suspicion of trade unionism which had at one time threatened the society's career'.[151]

This was an issue that remained sensitive for some time.[152] However the SASEE did not survive the South African war:

> Most of its members were dispersed elsewhere and in spite of efforts made to re-assemble the society after the war no further meetings were held.[153] … In June 1909 three pioneer electrical engineers convened the first General Meeting of the South African Institute of Electrical Engineers. At first they considered starting a branch of the London Institute of Electrical Engineers but finally decided that an independent local institute would be preferable. The first Ordinary General Meeting of the SAIEE took place at 8.15 pm on 13 January 1910 in the Lecture Theatre of the Transvaal University College in Eloff Street, Johannesburg and was attended by 70 members and 40 visitors.[154]

After the SA War a new society was formed – the South African Institute of Electrical Engineers – albeit still strongly associated with the British IEE.[155] The first Constitution of SAIEE, adopted in 1909, essentially set the Institute up exclusively as a 'Learned Society', deleting wording used by the earlier society which referred to advancing the material interests of members[156] - 'objects' which were left unchanged when the Constitution was amended in 1921. These read:

> 3(a) To promote the general advancement of Electrical Science and its applications; to facilitate the exchange of information and ideas on these subjects among all Members of the Institute;

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[149] Exchange of letters contained in National Archive, ARB, Volume 325, Reference G8, Government Apprenticeship Committee, Training of Apprentices. Letters dated 14 January 1933, 30 January 1933.
[150] Crouch, *Sparkling Achievements*, p. 4.
[151] Crouch, *Sparkling Achievements*, p.4.
[152] The objects of the initial Society of Electrical Engineers differed from those of the British IEE in that they added to their 'learned society' functions the promotion of 'the material interests of members' - which the Charter in the UK had forbidden: "To hold meetings for studying electrical science and its commercial applications, to promote intercourse amongst those engaged in electrical pursuits, and the general and material interests of members." Emphasis added. Crouch, *Sparkling Achievements*, p.4.
[153] Crouch, *Sparkling Achievements*, p. 5.
[154] Crouch, *Sparkling Achievements*, p. 6.
[155] SAIEE Trans., Nov 1919, p. 167.
[156] Crouch, *Sparkling Achievements,* p.4.

to place on record the results of experience elicited in the discussions thereon, and to do all such things as are incidental or conducive to those attainments.

(b) To hold meetings for reading and discussing communications, works or treatises bearing on Electrical Science and its applications or on subjects connected therewith.

(c) The formation of a technical library and modern laboratory for the purpose of promoting research in Electrical Science, to be open to all Members of the Institute.

Its work was coordinated from Kelvin House, a facility it shared with the other engineering and scientific societies from 1920.[157]

Amongst the meetings convened by the SAIEE were those with government departments engaged in electrical engineering. The Post Office was central amongst these – as was confirmed by C. Griffith when a paper on the topic of *Training in the Engineering Branch of the Post Office* was presented and debated at a meeting in 1940. Griffith himself both worked at the Post Office and was a President of the SAIEE in 1939:

> President (of SAIEE): 'We have for the last few years had a Post Office meeting of this kind, and I should like to say what a great source of encouragement it is to have it so well supported. It has become quite one of the outstanding meetings that we have had each year over the past three or four years, and I am sure we owe a great deal of its success to Mr Griffith.'[158]

Other functions of the SAIEE can be inferred from the sub-committees it established to undertake its work, one amongst which was the 'Status Committee'.[159] This Committee no doubt acted as a 'think tank' for the SAIEE's contribution to an external structure convened across the engineering societies at the time, called the 'Status of the Engineer' Committee.[160] The existence of both internal and external committees is worth noting here as it signals that this matter was of considerable importance even though the notion of 'trade unionism' was not explicitly prescribed by the objects of the SAIEE at this time. It was later to undermine the relationship which the SAIEE had enjoyed with the SATTA.

Membership categories of the SAIEE at its inception are shown below, no category specifying a particular educational level at this time:[161]

Figure 4.2. The 1909 SAIEE Constitutional provision[162]

Membership categories	Age	Formal education requirement	Practical requirement	Acceptance

[157] D.J. Vermeulen, *Living amongst the Stars at the Johannesburg Observatory,* Johannesburg: Chris van Rensburg Publications (Pty) Ltd., March 2006, p. 107 tells of the history of Kelvin House in central Johannesburg where the SAIEE was based together with the other engineering institutions and scientific societies until the 1960s.

[158] *SAIEE Trans*., Oct. 1940, p. 293.

[159] *SAIEE Trans*., Jan 1939, p. vi.

[160] *SAIEE Trans*., Jan 1939, p. vi.

[161] As the years passed additional educational qualification requirements were added but sadly records of these changes are scarce. However, Ronald Wedderburn, member of SAIEE in later years, recalls that before 1968:

'The SAIEE accepted NED [National Education Diploma] graduates provided they had completed Advanced Mathematics, had at least two electrical subjects at ATC 2 level, Matric English or Afrikaans and had written and passed one of the 5 examinations set by the institute. The institute examinations stopped somewhere about 1967, I think. After that you could only become an associate member I think.' (Electronic information received via email from Ronald Wedderburn via Viv Nel on 26 August 2008.

[162] Copy of first SAIEE Constitution kindly given to me by Dirk Vermeulen.

Student member (Clause 9)	18	Furnish evidence of training in the principles or practice of Electrical Engineering.	Must be serving an apprenticeship or approved pupillage.	He must, if he desires to remain connected with the Institute, apply for admission as an Associate Member on attaining the age of 25 years.
Associate (Clause 8)	21	Who from his scientific attainments or position OR formal education	Engaged in such work connected with the science and practice of Electrical Engineering	Shall satisfy the Council that he is a suitable person for admission as an Associate
Member (Clause 10)		Shall be proposed by a Member and seconded by another Member, both from personal knowledge, the proposal to be made on the form provided. The proposal form shall be submitted to the Council at its next meeting, and if approved, the candidate shall stand for election at the next following Ordinary General Meeting. Due notice of all such proposals shall be given in the circular convening the meeting, and the election shall be by ballot. The candidate shall be declared elected providing that not more than ten per cent of the votes cast are unfavourable, Members and Associate Members only being entitled to vote.		
Associate member (Clause 11)		Every candidate for election as an Associate Member shall be proposed by a Member, or an Associate Member, and seconded by another Member or Associate Member, both from personal knowledge, the proposal to be made on the form provided. (See form "A"). The proposal form shall be submitted to the Council at its next meeting, and if approved, the candidate shall stand for election at the next following Ordinary General Meeting. Due notice of all such proposals shall be given in the circular convening the meeting, and the election shall be by ballot. The candidate shall be declared elected providing that not more than ten per cent of the votes cast are unfavourable, Members and Associate Members only being entitled to vote.		
Honorary member (Clause 5)		Honorary Members may be chosen from among those persons who have rendered acknowledged service to science and shall be elected by the Council.		

On 20 January 1921, there was a more thorough going revision of the constitution, partly in response to the expansion of the telecommunications industry. As evidence of these two additional membership categories were added: Technical Associates and Telegraph Associates, and a third that of Student was also added:

9. Every candidate for admission or transfer to the class of Technical Associates shall be at least 21 years of age and be employed in an engineering or scientific capacity in the applications of electricity and be a person whose admission as a Technical Associate would conduce to the interests of the Institute.
10. The class of Telegraph Associates is intended for any member of the technical branches of the Post and Telegraph Department who has attained the age of 21 years.
11. Every candidate for admission as a Student must be at least 16 years of age and be serving an apprenticeship or attending some college as a student in electrical engineering. He must, if he desires to remain connected with the Institute, apply for admission to a higher grade on attaining the age of 25 years. Any member of the technical branches of the Post and Telegraph Department between the ages of 16 and 21 shall be eligible for admission as a Student of the Institute.[163]

[163] SAIEE 1921 Constitution.

The 1921 Constitution also specified experience requirements for membership more explicitly than had earlier been the case:

6. Every candidate for election as a Member, or for transfer into that class must be at least 30 years of age, and must either
    a. Have served an apprenticeship or approved pupillage in electrical engineering and have subsequently occupied during a period of at least three years a position of superior responsibility in electrical engineering. (Graduation at an approved engineering college shall be regarded as equivalent to an apprenticeship): or
    b. Have been engaged in the profession of an electrical engineer for at least five years in practice on his own account, or otherwise in a position of superior responsibility; and have acquired eminence in his profession; or
    c. Have such knowledge of electrical science or experience in the applications of electricity that his admission as Member would conduce to the interests of the Institute.[164]

For others their achievement of the Advanced Technical Certificate (Part II) – ATC II – was their route to corporate memberships – which was permitted as the following excerpt from a 1948 SAIEE Transaction shows:

> The Advanced Technical Certificate (Part II) with an approved course of study, or the Engineering Diploma, each including Electrotechnics V as a subject, is accepted by this Institute as technical qualifications for corporate membership.[165]

It is interesting to note that later the successful passing of the Post Office's Competitive Examination gave entry to SAIEE member status, as the following 1935 SAIEE minute verifies – which no doubt assisted Bird:

> The President: I would like to take this opportunity of announcing that the Council has decided to accept the G.P.O. Assistant Engineers examination as one of the qualifying examinations for Associate Membership of the Institute, and it is hoped that this step will lead to much closer co-operation between the communication engineer and the power engineer than hitherto.[166]

Once accepted into a particular membership category, a person was permitted to append to his name 'authorised letters of designation' to signal his status to the outside world (and to his colleagues) which, in the 1921 Constitution were:

> 26. ...For a Member, M.(S.A.) I.E.E; and for an Associate Member, A.M.(S.A.) I.E.E. … No Member or Associate Member shall adopt or describe himself by any other abbreviation to indicate the class to which he belongs than that provided in this Rule for such class.

This mixture of entry routes led those who later favoured university entry only, to disparagingly call the 'unspeakable tail' of the SAIEE.[167] But this 'tail' certainly persisted over time as in 1968 it was assessed that '(i)n the electrical engineering (institute) … (a) comparatively small number … (of) members of that institution could possibly claim university degrees'.[168] However, the SAIEE was to defend its right to set its own entry requirements and resist state legislated minima. It reiterated in defence of this position the right of artisans to advance.

The following table gives a snapshot of the SAIEE membership trends over the period under review. The slow but steady rise, especially after 1909, was at least partly as a result of A. M.

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[164] *SAIEE Trans.,* January 1921.
[165] *SAIEE Trans*., Jan 1948, p. 15.
[166] *SAIEE Trans*., May, 1935, p. 13.
[167] 'Report of the Select Committee on the Professional Engineers Bill', S.C. 4 – 1968, Printed by Order of the House of Assembly, Paragraph 137, p. 43.
[168] 'Report of the Select Committee on the Professional Engineers Bill', S.C. 4 – '68, Printed by Order of the House of Assembly, Paragraph 137, p. 43.

Robeson, a Consulting Mechanical Engineer, successfully advising the Rand Mines Group to electrify all of the mines in that year – a lead which the other mines quickly followed.[169] However the expansion of the telecommunication network clearly also played its role, particularly after 1930 – leading to the increases of Associate members and students.

Table 4.2. State of the Membership of the South African Institute of Electrical Engineers

	Honorary Members	Members	Associate Members	Associates	Technical Associates	Telegraph Associates	Students	Corres-ponding	TOTAL
Inception		71	65	14			8		158
1910		88	79	22			16		205
1915		104	104	22	9		33		272
1920		158	152	9	32	55	83		489
1925	2*	145	153	22	69	5**	39		435
1930	3	135	181	10	105***		51		485
1935	2	147	219	171			90	1	630
1940	4	146	297	243			162		852

* First Honorary Member was in 1921. It was the first President of SAIEE, Mr. Campbell.
** Last Telegraph Associate was in 1927 – when there were 3. Discontinued.
*** Last Technical Associates registered in 1932 – when there were 131. Discontinued

Source: SAIEE Transactions, Jan – Dec 1949, p. 38.

The SAIEE was run by a Council, initially consisting of 'a President, two Vice-Presidents, and twelve Members, and all these shall be elected from the Members, with the exception that not more than three ordinary Members of Council may be elected from the Associate Members. Past Presidents of the Institute shall be permanent Vice Presidents and ex officio Members of Council.'[170] In 1921 the same basic structure was kept, but only the last three Past Presidents remained Council members.[171]

There was also a Students' Section, where student members met and exchanged papers amongst themselves.[172] This helped induct students into the practices of the Institute and gave them learning opportunities in support of their future careers. It seems this was a function which the craft unions tried to emulate, as Aspinall noted in 1948:

> In South Africa … in the case of the Witwatersrand, the Student Section of this Institute enables students from the university and technical college to conduct their own meetings for the reading of technical papers and to arrange social functions and visits to works. The South African Electrical Workers' Association has established a section for apprentices with a somewhat similar object in view.[173]

[169] Vermeulen, *Sparkling Achievements*, p. 5; Yudelman, *The emergence of modern South Africa*, p. 56.
[170] SAIEE Constitution, 1909, clause 22.
[171] SAIEE Constitution, 1921, clause 27.
[172] see for example *SAIEE Trans.*, May 1939, p. 109.
[173] *SAIEE Trans.*, Jan 1948, p. 26.

Initially all activity was focused around the Johannesburg centre, but slowly local centres were established, at Cape Town to serve the Cape Province, and at Durban to serve Natal.[174]

The above activities are recounted in the Transactions of the Institute and stand therefore on firm ground. There was another activity that Ben Nicholson, General Secretary of the South African Electrical Workers' Association (SAEWA) raised:

> Well, we used to meet with representatives of the Institute quite regularly to discuss how the industry was going, what's happening, and do we need to do something. And this is where, I believe, the actual requirements of an artisan came from. What are the standards that are required of an artisan with respect of an engineer? They are the senior representatives of the industry. And they determine therefore what would be best to be of assistance to them with regards to the engineering innovation and new requirements. Because they were the ones with the professional academic knowledge who can in fact determine the requirements of a new system or new installation or whatever. And that is their profession.[175]

These exchanges would surely have helped to secure 'the unspeakable tail' to the body of the professionals and consolidated progression possibilities through the exchange of information about opportunities.

The SAIEE was also approached by the Government Mining Engineer to nominate people to sit on the Commission of Examiners setting examinations for electrical engineers – the group that conducted the Certificate of Competency examinations – of which more in the next chapter.[176] Furthermore the Electrical Wireman's Act (Act No. 20 of 1939), which established the Electrical Wireman's Registration Board to issue people undertaking wiring work in person with certificates (later licences) to operate, stipulated in clause 3(a) that 'one member shall be a municipal electrical engineer and a member of the South African Institute of Electrical Engineers.' So, for all that they were not a statutory body, they were recognised by the state, provided expert assistance on non-statutory functions and were invited onto a number of their statutory bodies.

The third period: 1932 - 1945

EDUCATION AND TRAINING LANDSCAPE

The Post Office Apprenticeship System, 1930s

*The account that follows draws extensively from a paper entitled **Training in the Engineering Branch of the Post Office** by B.A. Johnson to the South African Institute of Electrical Engineers (SAIEE) in 1940. He was Head of Training at the Post Office at the time.[177] That he presented this paper to the SAIEE signals the close relationship of these two organisations at the time, which it shall later be argued was central to the career path on offer*.

[174] SAIEE, 1959, p. 14.
[175] Interview with Ben Nicholson, 10 November 2006.
[176] For example, SAIEE General Purposes Committee, 6 June 1969, Item 6, p. 2.
[177] Johnson, 'Training in the Engineering Branch of the Post Office'.

Bird applied to the Post Office when he heard from his brother, who was already apprenticed there, that 13 new apprenticeship opportunities had been advertised. 'I applied. I was one of 250 applicants. I got in because my brother Bill (neé Hugh) was already apprenticed there and he was well liked. Also, my dad "knew some people".'[178] Knowing someone on the inside was clearly a major advantage, provided of course that the other criteria were also met. Bird was also given a letter of reference by his employer, the Club Garage and Service Station, which surely added to his advantage:

> **TO WHOM IT MAY CONCERN**
> ***Dated: January 11 1933.***
>
> This is to certify that the bearer Kenneth Bird has been in our employ as garage assistant during the past 18 months, during which time we have found him honest, punctual, civil and attentive to his duties. He is leaving us to better his position and carries with him our best wishes for his future life.

This practice, it seems, was widespread, not only in the government service:

> (I)n the case of some engineering firms and mining companies generally, preference is given to sons of employees in the engagement of apprentices. In some cases, particularly with the smaller firms, employers may be influenced by a desire to meet the wishes of their important customers.[179]

Johnson in his account stated that recruits had to be 'Europeans of good character'.[180] Notions of 'good character' carried then, as now, the meaning 'like us' – suggesting that for an indenture in the Post Office being English speaking was an added advantage. Indeed, the Carnegie Commission noted[181] that language was a significant obstacle for rural Afrikaans speakers: 'Most people speak English in the city'. And beyond language was culture. The English were seen to have 'an artisan rather than a farming tradition' whilst Afrikaners were the reverse.[182] This issue is further explored in the next Chapter, however it can be noted that on the railways, where the English preference was not nearly as strong, *half* of all apprentices were engaged 'from lads already employed in the service as messengers, junior rail workers, etc'.[183] Either way then, European insiders were given preference.

Some joined the Post Office as a 'second-best' option. Allan Bennett had opted to go straight to university but was unable to do so, as explained below:

> My parents couldn't afford to send me to university. In those days you didn't get a bursary for just being 'you'. You got a bursary under very special circumstances. My parents couldn't afford it, so they got me into the Post Office because my father was very keen on that. He was the chap who wanted me in the Post Office as an *engineer*, not as a workman, not as a technician, as an engineer. That's what my father's ambition was. And of course, that was realised.[184]

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[178] A.P. Bird, 'On his 80th Birthday: Kenneth Burgess Bird', unpublished, p. 15.
[179] Aspinall, 'Presidential Address', p. 10.
[180] Johnson, 'Training in the Engineering Branch of the Post Office', p. 267.
[181] Malherbe, *Part III Education Report*, p. 19.
[182] Malherbe, *Part III Education Report* , p. 21.
[183] Memorandum on the Establishment of Centralised Control of Technical Training after the War, JMC/AJ 12/4/43, signed by Division Inspector J. Aspelino. National Archive, ARB, Volume 325, G5/3, Government Apprenticeship Committee: Recommendation. Circular. Correspondence etc.
[184] Interview with Alan Bennett, 13 November 2007.

He was not alone, as Aspinall stated in 1948 said, 'full-time attendance at a university for a period of four years is almost invariably out of the question owing to the lack of financial resources, even though the student is prepared to work as a journeyman during the university vacations.'[185] The problem for these youngsters and their parents was not only insufficient resources to cover the fees, but also the absence of any income for the duration.

In passing it can be noted that white women were not legally excluded, but because they were required by the Public Service Commission to resign when they married,[186] the Post Office like other government bodies did not recruit them as apprentices. Their hope for employment and training was restricted to home-making courses (such as that which Bird's sister Mavis pursued) and trades such as hairdressing which were seen as their preserve. Unemployment amongst women, including young women, ran high.[187] The conservatism of the times can be read off the fact that even white women only won the vote in South Africa in May 1930.[188]

Naturally all this took place in the context of the Civilised Labour Policy which was still operational and required youngsters to conform to the age, qualification and gender requirements discussed further below. It would also have required Bird to sit the Public Service Competitive Examination 'C' as discussed earlier.

Travel and accommodation

When Bird's apprenticeship was confirmed, he was informed that he had to report in Johannesburg. And so, his first financial challenge was to find the money to pay for his train ticket to get there – money which his family had to borrow. He signed on in Johannesburg in January 1933, and this proved to be a big mistake. The Chief Administrative Officer told him he would have been entitled to an extra shilling-a-day 'away from home allowance' had he signed on in Durban before he left, and at the time of telling this tale he still felt they owed him that money!

The next problem was accommodation. Bird rented a room from a family friend's sister in Kensington. Johnson in his 1940 account says that there was a Post Office hostel in Johannesburg, although not in other centres, and the one there was 'almost entirely filled with Post and Telegraph Assistants'[189] – although there must have been some space for some apprentices as a broad contemporary of Bird's, Bob Round, reported staying there a little later.[190] Here is how the problem was managed for those unable to make their own arrangements:

> In the absence of a hostel under official control, senior engineering officers recommend other suitable accommodation. There is no doubt that this is a matter of some consequence, as is another allied to it – that of meeting strangers at the station upon arrival. Arrangements are made to meet

[185] Aspinall, 'Presidential Address', p. 18.
[186] This requirement was only lifted with the scrapping of article 14(7) of the Public Service Act, No. 54 of 1957 with effect from 1 August 1976. See notice Ref. No. 4/2/8 of the Office of the Public Service Commission, dated 21 January 1977, copy from the Telkom Archives.
[187] 'What to do with our Boys? Employment for Only one half.' Memorandum by Juvenile Affairs Board, Reprinted (as a pamphlet) from Cape Times, 12 May 1924.
[188] See journal 'Speak', August 1993, http://www.disa.ukzn.ac.za:8080/DC/SpAug93.1684.5161.000.052.Aug1993.5/SpAug93.1684.5161.000.052.Aug1993.5.pdf, viewed on 9 July 2009.
[189] Johnson, 'Training in the Engineering Branch of the Post Office', p. 283.
[190] Interview or correspondence with Bob Round, 1 January 2007.

all youth who wish it and notify the Divisional Engineer of the date and time of their coming. Such boys are escorted to lodgings which are known to be satisfactory and given directions as to how to find their way to their place of work.[191]

Probation and Contract

Bird's apprenticeship contract was signed *six months and 16 days* after he joined the Post Office. This was in fact a breach of the Apprenticeship Act: as whilst the *1922* Act (Act No. 26 of 1922) had permitted a six month probation before the signing of an apprenticeship contract (section 4(2)), the Act had been amended in 1930 (Act No. 22 of 1930) and the probation period had been reduced to four months (section 2(a)). Nevertheless, signed it was on the 'First day of August, 1933', by both Bird and his father (as his legal guardian) on the one hand and by the Inspector of Apprenticeship, T. Montgomery on behalf of the Postmaster-General on the other. The nature of the contract was set out in the Second Schedule of the Apprenticeship Act in 1922 (Act No. 26 of 1922).

Records show that the Department of Posts and Telegraphs favoured accepting only the number of apprentices for which 'there (was) a reasonable prospect of placing on the establishment within two years of their indentures'[192] – so careful selection was done. But this point should not be over-stated, as Bob Round, a man a few years younger than Bird, who followed the same path pointed out:

> The Post Office took on more youngsters than they needed so that they could shed those that they considered unsuitable, during the first three months. The arrangement was that during this period you could give them a month's notice and they could give you a month's notice. The latter was the far more likely scenario in that jobs were difficult to come by and you considered yourself lucky to have been allowed to start down the path. After the three months those still in the system were indentured as apprentices for five years. This agreement had to be signed by your father or guardian. [193]

Practical training

Practical training was divided into two clear components: one provided by the Post Office directly and that undertaken at the technical college – a division that was typical of apprenticeship training since the latter years of the previous century.[194] The training conducted by the Post Office was itself divided between 'in the field' and workshop training in its own schools. By 1930 twelve weeks of uninterrupted school courses were conducted before apprentices were sent out into the field.[195] Until 1935 the Post Office had schools in each of its five divisional centres (Johannesburg, Cape Town, Port Elizabeth, Bloemfontein and Pietermaritzburg). The last three were under-equipped so the bulk of apprentices were trained in the first two centres for at least intensive two year stints.[196]

Bob Round recalled this twelve-week training slot:

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[191] Johnson, 1940, p. 284.
[192] National Archive, ARB, Volume 325, G5/5. 'Government Apprenticeship Committee: Recommendation'. Circular. Correspondence etc. Note in a letter to the Secretary for Mines and Industries on 16 November 1923 from the Secretary of the GAC, dated 16 November 1923.
[193] Correspondence with Bob Round, 1 January 2007.
[194] Gamble, 2004, p. 179.
[195] Johnson, 1940, pp. 268-9.
[196] Johnson, 1940, p. 268.

> You were given introductory courses, which included generalised things such as Clerical procedures, First Aid (part of this was to be taken down to the emergency section of the Baragwanath Hospital, on a Friday evening where the gore flowed in copious quantities), Safety-first, etc. There were also courses on how to use hand tools, underground cables, overhead lines, switchboard maintenance, and how the telephone worked.[197]

Johnson gives the following outline of the practical programme that Telegraph and Telephone Electrician apprentices followed. The table also shows how the learning time doubled between 1913 and 1935 as more complex technology, such as the automatic exchanges ordered by Griffith before the Depression, were introduced (see rise from 4 to 14 months for switchboards for instance).

Table 4.3. Learning time for Telegraph and Telephone Electrician apprentices, 1913 – 1935.

Subject	Time in months				
	1913	1918	1923	1930	1935
Aerial Line Construction (Town)	6	6	12	8	6
Aerial Cable Construction	2	3	14	16	-
Underground Cables	2	3			6
Fitting	4	4	4	4	4
Mechanician Shop	4	4	8	8	6
Faults	4	7	10	6	6
Switchboard Construction and Maintenance	4	4	6	10	14
Telegraph Maintenance (From 1926 incl. Secondary Cells)	3	3	4	4	3
	1	2	2	2	2
Records and Clerical Work	-	-	4	4	3
Test Clerks	-	-	6	6	6
Aerial Line Construction (Country	-	-	-	2	3
Outstation Experience	-	-	-	-	1
Motor Transport					
	30	36	60	60	60

Source: *Table II, Johnson, 'Training in the Engineering Branch of the Post Office', p. 268.*

This is how Bob Round recalled these courses:

a. **Cables** – responsible for the underground network. Hard dirty work in difficult circumstances – possibly explains why they were generally a hard-drinking crew.
b. **Aerial lines** – the erection and maintenance of the network of lines above ground.
c. **Faults** – they went out and repaired the faulty telephones and switchboards. The major bonus was that you got to meet those wondrous and nubile creatures that operated the switchboards. The admonishment, from the lecturer, not to try any hanky-panky with the switchboard operators fell on deaf ears.
d. **Autos** – the maintenance of the equipment, which automatically switches you through to the number which you have dialled. This was considered to be the leading edge of technology and the auto chaps considered themselves to be a cut above ordinary mortals.
e. **Carriers** – this was a technique that, by electronic means, put a number of conversations on the same pair of wires. Carriers were just being introduced into this country and were considered a Black Art by the old-timers. This really was the leading edge and only the smartest and prettiest apprentices were put on this phase. No prize if you guess what I was on!![198]

Of the lecturers, who were all officers in the Post Office,[199] Bob Round had this to say:

[197] Correspondence with Bob Round, 1 January 2007.
[198] Correspondence with Bob Round, 1 January 2007.
[199] Johnson, 'Training in the Engineering Branch of the Post Office', p. 288.

> The lectures were given by people who had many years of practical experience and who knew their area of expertise intimately. Some of them were excellent lecturers and some of them less so.[200]

In some cases, the apprentices were themselves drawn into teaching. Bird was still studying himself (in his fourth year) when he was called on by the Head of Department to teach Radio I. Some of his students were his peers, but he was paid for it and grew to enjoy it so much that he continued doing part-time teaching for some 12 years, and was even, some years later, temporarily seconded to run the Baragwanath Training Centre when the engineer in charge died suddenly. The practice persisted for decades as Malcolm Gow, who began his apprenticeship years later in 1948, shows:

> At the end of my third year I was invited to give lectures on Introductory Carrier / Carrier System courses for two months. I then spent the rest of that year at the Carrier Room at Jeppe Street Post Office in Johannesburg. At the end of that year I was again sent to the Training Centre as a Resident Demonstrator to give practical training to apprentices in their Introductory, Basic and Advanced courses on Carrier Systems. I stayed there for four years. At the beginning of 1953 I completed my apprenticeship, but I was there at the training centre until the end of 1955.[201]

Bob Round concluded his recollection of these courses with the following comment:

> After each course you were put out into the real world and did a spell of field training with an electrician (those who had served an apprenticeship were proud to call themselves 'electricians').[202]

Johnson put it this way:

> The man in charge must be reliable in character and efficient in his work… every opportunity is taken to employ apprentices on construction work of a nature bearing on their training. When a new exchange, or repeater or carrier equipment, is being installed, apprentices are used to the fullest extent possible, even if they have not all had the appropriate school course.[203]

Bob Round finally mentioned that:

> … You had a written and practical exam after each course and hidden in the fine print of your indenture papers was a clause, which said that if you did not attain the required standard they could terminate the agreement.[204]

Internal streaming of apprentices in the Post Office

Exit was not the only option for the less able. Johnson explained that there was 'streaming' that took place, between 'urban' and 'rural' boys in the ratio of 3 to 2 – with the former, being the more able and willing, being given, more extensive training.[205]

This elaborate system was the result of the concerted effort of officials in the Department – some of whom clearly stood out as the following trade union obituary to Mr. Griffith testifies:

> We think that one of the many acts of service to the country by which Mr. Griffith will be remembered will be his outstanding efforts in regulating the training of apprentices in the Engineering Division. The elaborate curricula for the two sections of the Engineering Division and the whole and difficult process of laying down adequate practical training for the future engineers and engineering officers will be a monument to him.[206]

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[200] Correspondence with Bob Round, 1 January 2007.
[201] Interview with Malcolm Gow, 22 January 2007.
[202] Correspondence with Bob Round, 1 January 2007.
[203] Johnson, 1940, p. 279.
[204] Correspondence with Bob Round, 1 January 2007.
[205] Johnson, 'Training in the Engineering Branch of the Post Office', p. 273.
[206] *The Live Wire*, January 1943, p. 2.

So successful was this system of practical training and testing in the Post Office that the Government Apprenticeship Committee advised the Secretary for Labour and Social Welfare, in 1937, that the system be applied to all trades.[207] This thinking was only taken forward during the WW II.. In the interim, the only other sector where such training occurred was the Railways.[208]

College training

The technical colleges primarily grew out of the railways and the mines but they were drawn under the Department of Education umbrella when it was established after Union. The Department set the first national technical examinations after establishing an Examinations Section in 1919.[209] However, with the establishment of the Technical Education Board (TEB) of the then University of the Witwatersrand in 1924, and the enormous growth in student numbers as a result of the passing of the Apprenticeship Act No. of , the Transvaal Education Department largely handed the work over to the TEB (Orr, 1932, 130). The Department of Education adopted the qualification architecture which the TEB had developed (outlined below), and issued certificates to successful candidates, but much of the actual work was outsourced to the Technical Colleges themselves (Orr, 1932, 138). The work of the TEB gained national influence after vocational education was transferred from the provinces to Union control in 1925.[210] They also managed the correspondence courses which were widely used by rurally based apprentices.[211]

The qualification architecture developed by the Technical Education Board (TEB) consisted of a graduated set of certificates extending over a period of seven years (one a year): ranging from Preliminary Technical Certificates (PTC) I and II, National Technical Certificates (NTC) I, II and III and then the Advanced Technical Certificates (ATC) I and II – all, except the PTC, designed to be provided on a part-time or correspondence basis. This architecture remained in place for more than 40 years, until the early sixties.[212] Under this framework courses were designed and delivered to all apprentices - fitters and turners, electricians, pattern makers, motor mechanics, blacksmiths, boiler makers, acetylene and electric welders and so on – as well as to commercial students. As Aspinall was to note in 1948:

> … The national system of examination … results in the maintenance of a Uniform standard throughout the Union, and the certificates are in the process of having a recognized value as to the extent of the technical studies and ability of the successful student. The work of the technical institutions and staff is simplified by the provision of standard courses and syllabuses although wide variations in the courses are permitted.[213]

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[207] National Archive, ARB, G. 5/5, Letter from GAC to the Secretary for Labour and Social Welfare, Union Buildings.
[208] Aspinall, 'Presidential Address', p. 25.
[209] Orr, 'Technical Education and Training', p. 138.
[210] Union of South Africa Official Year Book of the Union, No. 14, 1931-1932, Pretoria Government Printers, 1933, item 12, p. 126. The Union Department of Education administered *technical colleges* under the Higher Education Act, No. 30 of 1923; *industrial schools* under the Children's Protection Act, No. 25 of 1913; and *trades, housecraft and agricultural schools* under the Vocational Education and Special Schools Act, No. 29 of 1928.
[211] Orr, 'Technical Education and Training', 1932, p. 135.
[212] Lurie, *Technikon Witwatersrand, A History 1925 – 2000*, 2000, p. 88.
[213] Aspinall, 'Presidential Address', p. 14.

It seems that the curriculum for such courses were originally derived from Britain although localisation of content took place through the intervention of South African actors:

> It was natural that the first courses held in this country should be founded on those existing in Britain and I have in my possession some old copies of the prospectuses of the City and Guilds of London with annotations in the later Professor Orr's handwriting. In the course of years the syllabuses have been considerably altered as a result of suggestions made by industries and by college staffs, but basically the South African colleges are still working on the same lines as those in Britain.[214]

That there was cross-fertilization of ideas between the two governments is not surprising – indeed, a senior Post Office man, Keith Prins, informed me that much of the substance of the programmes in South Africa were informed by those used in the British Post Office.[215]

The Post Office worked within this framework of qualifications, and worked closely with the Union Department of Education and the Technical College staff to finalise the curricula and examinations for the programmes required by their apprentices, as Johnson[216] explained.[217] This was an ongoing task as the curricula had to be consistently revised to keep pace with technological changes – something which applied to both the Post Office's own courses as well as those given at the College.[218] In 1940 when Johnson wrote his paper, this was the position:

> The curriculum which apprentices are required to follow is shown (below). The department decides what subjects the boys should be taught, the curriculum and syllabuses are framed in collaboration between the Post Office and the Union Department of Education.
>
N.T.C. 1.	Mathematics 1
	Physics 1
	Engineering Drawing 1 or
	Telephone and Telegraph Drawing
N.T.C. 2	Mathematics 2
	Telephony and Telegraphy 1
	Lines 1
	Electrotechnics 1
N.T.C. 3	Mathematics 3
	Telephony 2
	Telegraphy 2
	Radio-Communication 1
A.T.C. 1	Mathematics 4
	Telephony 3
	Transmission 1
	Telegraphy 3 or Radio-communication 2
A.T.C. 2	Mathematics 5
	Telephony 4
	Transmission 2
	Lines 2 or Radio-Communication 3

[214] Ettershank discussing Aspinall's 1956 paper, in *Journal of the Institution of Certificated Engineers*, South Africa, p. 128.
[215] Interview, 24 October 2007.
[216] Johnson, 'Training in the Engineering Branch of the Post Office', p. 287.
[217] The De Villiers Report, UG 65/1948 para 705 states that 'there are several Government departments (for example the SA Railways and Harbours, the General Post Office) and other organisations undertaking vocational training independently, with little or no co-ordination. Nor is there always the necessary consultation with the education authorities' which suggests that the collaboration that characterised the 1930s did not continue a decade later.
[218] Johnson, 'Training in the Engineering Branch of the Post Office', p. 269; p. 285.

No theory pass level prescribed

In spite of this elaborate qualification system it was not compulsory for an apprentice to *pass* any of their theoretical examinations, even though, following the Amendment to the Apprenticeship Act in 1930 (Act 22 of 1930), *attendance* became compulsory, as Johnson explained:

> At present there is no means of insisting upon an apprentice's passing any examination, and the Post Office cannot demand any such qualification before appointing to the grade of electrician. …It may not be a *sine qua non,* because there will always be men who are incapable of passing examinations and yet make excellent electricians.[219]

But the biggest problem all acknowledged was time. The Apprenticeship Amendment Act also addressed this. The amendment provided for compulsory paid time-off work for a minimum of four hours a week for the first two years of the apprenticeship (Section 8(1)(f), Act No. 22 of 1930) – a system which most apprenticeship committees adopted.[220]

This did not mean that apprentices were completely free to disregard their studies. Section 3(c) of Schedule Two of the Apprenticeship Act (Act 26 of 1922) made provision for suspension of apprenticeship contracts if the apprentice conducted himself 'contrary to good discipline'. It seems that this practice was widely spread as the Transvaal Industrial Council for the Engineering Industry made a similar provision for all apprentices under its mantle:

> Should an apprentice fail to show satisfactory diligence at his studies, and immediately upon receipt of a report to that effect by the Committee from the authority controlling the technical educational institute concerned, the employer shall be notified. Such failure on the part of the apprentice shall be regarded as a breach of his contract, and shall be dealt with in terms of clause 3(c) of the Second Schedule to the Act. [221]

College training costs and rotation practices in the Post Office

For the apprentice, workplace-based training costs were carried by the employer in full, but he had to pay his own technical college class and examination fees and then to re-claim them. This 'pay back' policy was conditional on the apprentice attending at least 75 per cent of the classes and displaying 'satisfactory diligence as certified by the Principal'.[222]

Where suitable technical facilities were not available, such as in the outlying rural areas, special arrangements were made for apprentices to study by correspondence. The Post Office permitted youngsters undertaking such courses to also have time off for study, with some supervision[223] and their answer papers were sent in 'post free'.[224] The Post Office also subsidised such peripheral costs as those for textbooks and drawing instruments which the apprentices needed.[225]

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[219] Johnson, 'Training in the Engineering Branch of the Post Office', 1940 p. 289.
[220] Orr, 'Technical Education and Training', p. 121.
[221] Transvaal Industrial Council for the Engineering Industry, GG No. 1617, 7 January 1927, Notice 32, p. 48.
[222] Johnson, 'Training in the Engineering Branch of the Post Office', p. 289.
[223] De Villiers Report, UG 65/1948, paragraph 1455.
[224] Johnson, 'Training in the Engineering Branch of the Post Office', p. 290.
[225] *Ibid,* p. 289.

The 1930 legal change did not reverse the fact that there was little incentive to attend or pay attention and some Apprenticeship Committees resorted to prosecuting apprentices for poor attendance. In 1932, for example, 221 were prosecuted of whom 203 were convicted.[226] But this was the exception, and in the Post Office every effort was made to facilitate this learning.

Before the passing of this Amendment Act (Act 22 of 1930) the Post Office released its apprentices during the afternoons for attendance at part-time day classes but following the legal change apprentices attended in the early morning instead.[227] In 1937 a decision was taken to release apprentices for one full day a week which had beneficial effects on both attendance and pass rates.[228] The technical colleges had to change their timetables with each shift – but apparently did so helpfully as providing programmes for apprentices was their *raison d'être.*[229] As Orr himself stated in 1932[230] 'in all cases, the technical colleges have been developed from part-time classes formed for apprentices and commercial employees' and this remained their core function.[231] This persisted for decades: in 1946, of a total of 43 000 college students, nearly 33 000 were part-time.[232]

Keeping curricula up-to-date and relevant

Keeping the curricula up to date required a deep network of connections between the college and the employer, in this case, the Post Office, the trade union (in this case SATTA) and the Education Department. Below is a summary of how this was done:

1. The Post Office supplied the College with copies of all its technical instructions, and such other descriptive literature as is available. It also lent apparatus for demonstration purposes where practicable.[233]
2. The trade union, SATTA, made inputs into the curricula, as evidenced by reports in their journal, *Live Wire*, in 1941:

1. Mechanician Apprentices. Further reference was again made to letter 6 February from Chief Engineer replying to our proposals that amendments be made to apprentices' training curriculum and explaining why this cannot be done. After the matter was fully considered it was decided to again write the Chief Engineer asking … that Metallography be added to curriculum of mechanician apprentices and be added to Technical College list of subjects, and Department assist such apprentices to obtain practical knowledge.[234]

2. Mechanician Apprentices. Letter 17th March from Chief Engineer referring to our correspondence and proposals to revise the curricula stating … that the Department is

[226] Department of Labour 1933 Annual Report, UG 43, p. 46, p. 48.
[227] Orr, 'Technical Education and Training', 1932, p. 129.
[228] Aspinall, 'Presidential Address', 1948, p. 17.
[229] Johnson, 'Training in the Engineering Branch of the Post Office', p. 288; Aspinall, 'Presidential Address', p. 8.
[230] Orr, 'Technical Education and Training', p. 130.
[231] De Villiers Report, UG 65/1948, para 520/1.
[232] De Villiers Report, UG 65/1948, para. 1410/11.
[233] Johnson, 'Training in the Engineering Branch of the Post Office', p. 288.
[234] Minute number 3913, 260 meeting of CEC of SATTA, Johannesburg, 3 March 1941. Other references include: 1940, item no. 3577, 19 February 1940;1941, item no. 3913, 3 March 1941;1941, item no. 3937, 7 April 1941;1941, item no. 4005, 16 June 1941;1941, item no. 4134, 15 September 1941;1941, item no 4150, 7 October 1941;1941, item no 4238, 1 December 1941.

prepared to amend NTC II and NTC III curricula so as to include Industrial Metallurgy I and II as alternate subjects for Mechanician Apprentices to Lines I and Radio Communication I from 1942. … The Chief Engineer's letter was noted with considerable satisfaction, and it was felt that the Mechanician apprentices should be given an opportunity of giving their views regarding the alternation of the curricula.[235]

3. Mechanician Apprentices. Regarding the proposed change in the curriculum for mechanician apprentices, the Transvaal Branch delegates said the Branch would draw up a paper outlining the points which would be handed to Mr. de Ridder for circulation to the Mechanician apprentices. This procedure would enable the apprentices to express their agreement with the proposed changes and would obviate the necessity for a special meeting.[236]

4. Mechanician Apprentices. Letter 30th November from Chief Engineer referring our representations, stating curriculum for Mechanician Apprentices will be amended to include Industrial Metallurgy I and II as alternate subjects to Lines I and Radio Communication I respectively, as from 1942. Industrial Metallurgy II will be included as an optional subject.[237]

So pleased was the union at this development that they proposed an exchange on curricula matters be institutionalised. To this end they proposed:

> That a Committee be formed consisting of 2 Apprentices' Representatives, 2 Association representatives, the lecturers conducting the classes and representatives of the Official Side, appointed by the Chief Engineer, to discuss any modification or extension of the syllabuses of the classes and also the problems arising from these classes... After discussion it was unanimously resolved that the resolution of the branch be accepted and given effect to.[238]

It appears that this particular resolution was not successful, however this did not detract from the attention the union paid to these matters. One particular intervention was to assist Bird and others like him, enormously: the union had, in 1939, approached the Department of Education to recognise the Post Office specific NTC qualifications for credit towards the National Senior Certificate. Their success enabled Bird to have Telephony II and Radio Communication I as credit bearing subjects when he finally set out to attain his matriculation. The union celebrated the letter received from the Department of Education by publishing it in their journal, *The Live Wire*:

> Sir [The General Secretary of South African Telephone and Telegraph Association],
> National Senior Certificate (Matriculation Exemption).
>
> With reference to your letter of the 18th January, 1939, in which the Department is requested to make representations to the Joint Matriculation Board in order to have the subjects Telephony II, Telegraphy II and Radio Communication I included as alternate subjects in the conditions under which the National Senior Certificate is accepted by the Joint Matriculation Board for purposes of exemption from the Matriculation Examination, I have to advise you that at the recent meeting of the Joint Matriculation Board, it was resolved that these three subjects be added to the subjects under Group V, Page-86 of the accompanying handbook containing the courses of the National Senior Certificate (Matriculation Exemption) …

[235] Minute number 3937, 262nd meeting of CEC of SATTA, Johannesburg, 7 April 1941.
[236] Minute number 4005, 266th meeting of CEC of SATTA, Johannesburg, 16 June 1941.
[237] Minute number 4238, 278th meeting of CEC of SATTA, Johannesburg, 1 December 1941.
Minute number 3913, 260 meeting of CEC of SATTA, Johannesburg, 3 March 1941. Other references include: 1940, item no. 3577, 19 February 1940;1941, item no. 3913, 3 March 1941;1941, item no. 3937, 7 April 1941;1941, item no. 4005, 16 June 1941;1941, item no. 4134, 15 September 1941;1941, item no 4150, 7 October 1941;1941, item no 4238, 1 December 1941[238] Minute number 3577, 237 meeting of the CEC of SATTA, Johannesburg, 19 February 1940, p. 211.

I have the honour to be, Sir, Your obedient servant, AA Rowan, Secretary for Education (Examinations).[239]

Keeping up-to-date was largely ensured by senior staff of the Engineering Division, who set and moderated the Post Office-specific examinations.[240] This was confirmed by a set of Telegraphy II examination papers found amongst Bird's papers.[241] They showed that Johnson himself was an examiner in both 1940 and 1941, and C. Griffith was the moderator across the decade. The seniority of these people is itself worthy of note.

UNION DEPARTMENT OF EDUCATION
TELEGRAPHY II – National Technical Certificate (PART III)

Nov. 1930+5: Examiner: Mr. J.A.F. Mitchell, B.Sc.(Eng.), M.(S.A.)I.E.E.
Moderator: Mr. C. Griffith, M.(S.A.)I.E.E.
Nov. 1940+1: Examiner: Mr. H.A Johnson, B.A. (Hons), A.M.I.E.E
Moderator: Mr. C. Griffith, M.I.E.E., M.(S.A.)I.E.E.

Bird was himself drawn into doing some of this work in later years:

UNION DEPARTMENT OF EDUCATION

National Examinations, November, 1948
National Technical Certificate (Part II) **LINES I.**
Nov. 15, 1948 Examiner: Mr. K.B. Bird, A.M.(S.A.)I.E.E
Moderator: Mr. H. Collins, Assoc. I.E.E.

Significantly each examiner and moderator above highlighted their membership of the South African Institute of Electrical Engineers (SAIEE) or the British Institution of Electrical Engineers (IEE) - with 'member' signalled by M(SA)IEE and 'Associate Member' of the SAIEE or IEE being AM(SA)IEE or AMIEE respectively. The high status and visibility afforded to the professional body in this exercise is interesting and reminiscent of similar practices underway in Britain at the time when its Ministry of Education worked in cooperation with professional engineering institutions to develop the various National Certificates (the Ordinary National Certificate and the Higher National Certificate) and the certificates were jointly granted by both the Ministry and the professional body concerned.[242] These linkages would have helped inform new developments and maintain professional ethics in the process.

In addition to the active involvement of educationalists on apprenticeship councils, including serving as Chairs, there were other arrangements to secure cross representation, for example:

a. ***There were apprenticeship committee members on college councils*:**

[239] *The Live Wire*, March 1940, p. 9.
[240] Johnson, 'Training in the Engineering Branch of the Post Office', p. 288.
[241] Union Government, Department of Education, National Technical Examinations, November 1930, ref. 5136-16/6/30-150.
[242] Liepmann, *Apprenticeship: An Enquiry into its Adequacy under modern Conditions*, pp. 38-9.

For example, under the Council at the Witwatersrand Technical College was a Board of Studies that consisted of the heads of each of the departments of the Institute and two elected Council members. The Board was chaired by the Director. Its powers included the following:

> (c) to consider and formulate new courses of instruction and to report its recommendation to Council;
> (d) to determine, subject to the approval of the Council, the conditions necessary for the obtaining of diplomas or certificates, and to decide what persons have satisfied the said conditions;
> (e) to superintend and control all examinations held by the Institute, in accordance with such regulations as may be framed by the Board of Studies for the purpose and approved by the Council;
> (f) to make recommendations to the Council as to what examiners shall be appointed for the Institute's examinations;[243]

These functions were clearly of great interest to the apprenticeship committees and so membership of the nominating Council was valued. The first Council of the Witwatersrand College (then Institute) had no fewer than five apprenticeship committee representatives (out of a total of 26 members), including one each from the GAC and the Transvaal Mechanical and Electrical Engineering Apprenticeship Committee.244 So prized were these places that in 1928 there was a spat led by the Witwatersrand Master Builders' Association which threatened to start their own institution if they did not get representation. It feared that there was a real danger of the courses being too 'theoretical' and lacking practical aspects.245 The GAC faced a similar problem when the constitutions of the Witwatersrand & Pretoria Technical Colleges were reorganised in 1934 and the GAC's representation on the councils of these two colleges was terminated. The GAC was most unhappy about this and made formal representations to the Union Education Department. It was thought that the large number of Government apprentices attending classes at these centres entitled the Committee to representation.[246] But it transpired that it was not a life or death issue as collaboration between the apprenticeship committees and the Department of Education was the accepted norm when it came to the setting of syllabuses for courses of technical education which apprentices under contract were required to attend.[247]

b. There were college representatives on apprenticeship committees:

Clause 14(f) of the 1922 Apprenticeship Act (No. 26 of 1922) required the apprenticeship committees to 'recommend to the Minister the nature and number of educational classes to be attended by an apprentice in terms of his contract of apprenticeship', only 'after consultation with the educational authority'. The Educational Authority was defined in a government gazette published in 1923 as being 'the controlling authority of the local technical courses acting in conjunction with the Advisor on Technical Education to the Union Department of Education, or such other person as the Minister may appoint.[248] This put the onus onto the apprenticeship committees to establish these relationships. This arrangement was tightened in 1944 when the wholly revised Apprenticeship Act (No. 37 of 1944) obliged apprenticeship committees,

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[243] Lurie, *Technikon Witwatersrand, A History 1925 – 2000*, p.18.
[244] *Ibid,* p. 16.
[245] *Ibid,* p. 17.
[246] National Archive, ARB, Volume: No 325, Reference G7 GAC Reports, GAC Report for Year Ended December 1934.
[247] South African Official Year Book No. 8, 1925, 1910-1925, published under the Authority of the Minister of the Interior, Pretoria, Government Printer 1927 p. 221.
[248] Regulation in Union of South Africa Government Gazette 1307, 21 March 1923, p. 497 - 9, cl. 9.

(clause 13(1)(a)), to consult with 'designated' institutions in relation to four areas of advice to be given by them to the Minister: in relation to:
(d) required attendance part-time classes;
(e) the nature and number of correspondence courses to be followed by apprentices in addition to d;
(f) full-time technical training courses and
…
(i) the circumstances under which employers should pay the whole or any specified portion of the fees payable for attendance at courses or examinations.

'Designated institution' was defined to be 'any declared institution in terms of the Higher Education Act, 1923 (Act No. 30 of 1923), which has been designated by the Minister as an institution having an interest in the education or training of minors or apprentices in an industry or in an area in respect of which a committee has been established.' The 1944 Act also made provision, in clause 9(4), for 'a representative from a designated institution, or if there is none, then a representative 'authorized thereto by the Secretary for Education' to attend and participate but not vote in the apprenticeship committees themselves.

Beyond curriculum

Although these extensive linkages between the employer, the trade union, the Department of Education and the technical colleges in respect of the setting of curricula were most developed in the case of large parastatals like the Post Office and the Railways, they were not restricted to these entities as Aspinall noted in 1948:

> As a matter of interest, it may be mentioned that the trade theory syllabuses were originally compiled by representatives of employers, trade unions and technical colleges in conjunction with the Union Education Department.[249]

Collaboration between these parties in the country did not stop at the setting of curricula. At the time many of the technical college lecturers were part-time and Post Office officials were often paid to fulfil this role, part-time, especially where Departmental students predominated (such as was the case for Telephony and Telegraphy).[250] Bird was one of these: whilst he was finishing off his final exams he lectured part-time at the Witwatersrand College. In 1927 the College had 87 full-time lecturing and instructing staff, 19 administrative staff including clerks, typists, storemen and caretakers and 517 part-time lecturers.[251] Johnson for one did not think that this arrangement was ideal but appreciated that there was not an easy alternative: 'Post Office employees are not trained teachers and … are liable to be transferred at far less notice than the length of the college term … On the other hand, whole-time lecturers trained in communication subjects are not easy to find, and when they are, they have to take particular care to remain up to date in a field which alters so rapidly.'[252]

Conclusion of apprenticeship: completers and improvers

Bird qualified as a Telegraph and Telephone Electrician in 1938 – he had 'done his time'. He was one of the 1,220 apprenticeships which the Department of Labour reported were terminated in that year (with 10,568 still in operation).[253] Time was then the principal criterion

[249] Aspinall, 'Presidential Address', p. 14.
[250] Telkom Archive, DPT IDIC/A30/2740/77, Inaugural meeting of the Departmental Engineering Staff Committee, 3 December 1936, Agenda Item 15, p. 11.
[251] Lurie, *Technikon Witwatersrand, A History 1925 – 2000*, p. 20.
[252] Johnson, 'Training in the Engineering Branch of the Post Office', p. 288.
[253] Department of Labour Annual Report, December 1940, UG 45, 1941, p. 45.

for completion – although the Post Office did conduct a final written examination and Johnson hoped, in 1940, 'when we have settled down properly we shall probably classify all students as Highly Qualified, Qualified, or Not Qualified, and no boy who falls in the third category will be allowed to be employed in a skilled capacity in the class of work concerned'.[254] But in 1938 the majority of apprentices who 'had done their time' became qualified artisans, and their apprenticeship papers signed off by the Inspector of Apprenticeships.

Those who were deemed 'not qualified' at the end of their time generally fell into a category known as 'improvers' and their contracts were extended for a period of time. The system had been around for many years and was cited in the title of the Wages, Apprentices and *Improvers* Act, 1918 (Act No. 29 of 1918). In that Act an 'improver' was defined as 'any person who, owing to his previous experience or length of employment (in any trade or occupation) being insufficient to qualify him as a skilled worker or for other reasons is serving an additional period of apprenticeship not exceeding three years in such trade or occupation'. It was an area of sensitivity with the unions – especially when the Transvaal Education Department tried to argue that 'three years training in Transvaal trades schools is equivalent to two years of the apprenticeship period' and the graduating 'lads' should be employed as 'improvers'.[255] The issue was sufficiently contested and a major investigation led by Orr, (who, at the time, was also the Chairman of the Governing Body of the Johannesburg Trades School) was initiated. The investigative team consulted widely, including with the SA Institution of Engineers (the mechanical engineers) and the Association of Certificated Engineers. The latter 'condemned the ordinary use of this term and wished "improver" to be understood as one who had served his full apprenticeship but was not expert enough at his trade to command the standard rate of wages paid to journeymen".' The Association also favoured the training at trades school, but argued that it should be seen as preparatory for and *not* replacement of the apprenticeship itself.[256] The Association's view finally held and informed the launch of the Preliminary Technical Certificate (PTC) in 1919 which Bird and others later completed at school.[257] The term 'improver' was not used in the Apprenticeship Act (No. 26 of 1922), but continued to appear in industrial council agreements for some time. In 1927, for example, 'improvers' were defined in the Transvaal Industrial Council for the Engineering Industry as 'any person who has completed a full term of apprenticeship under indenture, and who, by reason of lack of opportunity or skill, cannot be regarded as a skilled artisan'. In this case the contract was extended for one year and special rates of pay were set.[258] The inclusion of the phase 'lack of opportunity' in this latter definition speaks to the industrial shifts taking place in the 1930s, which meant that the companies to which the apprentices were contracted did not always do the full range of work expected of a qualified man.

POLITICAL ECONOMY

Griffith, the Chief Engineer at the Department of Posts and Telegraphs was to observe in 1939: 'prior to 1931 the number of lines working to automatic exchanges was only 7 820, at

[254] Johnson, 'Training in the Engineering Branch of the Post Office', p. 276.
[255] Orr, 'Technical Education and Training', p. 114.
[256] *Ibid, p.* 115.
[257] *Ibid,* p. 117.
[258] GG 1617, Government Notice 32, 7 January 1927, p. 48.

date [1939] - including Durban – 60 per cent of the total telephones in the Union are working on automatic exchanges'.[259]

This massive increase in the demand for the installation and maintenance of automatic telephone exchanges, that kept Bird and others like him busy, was but one sign of the massive economic change post 1932. This was largely due to a momentous decision made by the Pact Government, before it lost to the United Party in 1933 (another coalition party this time between the National Party and the South African Party, but still led by General Hertzog built on the back of the Depression and their shared resolve to fight it). The decision, made in 1932, was to leave the gold standard and to allow the currency to depreciate – in effect lifting the price of gold. 'Within a year, the price per ounce rocketed by 45 per cent, from £4 12 shillings and 3 pence to £6 9 shillings and 3 pence. The next year it rose to over £7 and continued to climb for the rest of the decade.'[260] This heralded profit levels 'beyond the dreams of avarice'.[261]

A second consequential decision made a dramatic difference to the capacity of the state to support growth and development. This was to increase the tax rate on the mining industry from 5 to 15 per cent by 1936. As a result state revenue rose dramatically: 'total receipts rose from £4.3m in 1932 to £13.5m in 1933 and did not drop below £12.6 for the rest of the decade'.[262] The state used this income to bolster economic diversification through tariff protection. The state also expanded the infrastructure and stimulated the manufacturing sector through a policy of import substitution. The manufacturing sector's contribution to the national income rose steadily from 15 per cent in 1935 to 24 per cent in 1970.'[263] It also allocated a massive 15% of its income to fund job creation schemes for unskilled whites, which effectively settled the 'poor white' saga'.[264] By 1939, employment by the central government totalled 98 000, 59% of which was made up of relief work employment.[265]

The private sector also benefited from the increased cash flow in the 1930s. During the First World War, small craft shops had emerged to meet the wartime challenges of importation. This resulted in an expansion of the local manufacture of goods in the furniture, boot-making, food and clothing sectors – as well as basic metal industries and metal products for the mines.[266] However, after South Africa left the gold standard, and growth took off, capital was increasingly available for further investment in machinery and there was a dramatic rise in such investments and in mechanisation.[267] These factors, together with the rapid rise in urbanisation which expanded the market for these goods, created the conditions for these industries to transform their 'craft' based forms of production to machine-based ones.[268]

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[259] Griffith, 'Presidential Address to the South African Institute of Electrical Engineers', *SAIEE Transactions*, Vol. 30, Part 2, February 1939, p. 32.
[260] Yudelman, *The emergence of modern South Africa*, p. 251.
[261] Quoted in Yudelman, *The emergence of modern South Africa*, p. 252.
[262] Yudelman, *The emergence of modern South Africa*, p. 259.
[263] Giliomee, *The Afrikaners*, p. 410.
[264] Abedian and Standish, *An Economic Inquiry into the Poor White Saga*, p. 33.
[265] Abedian and Standish, *An Economic Inquiry into the Poor White Saga*, p. 50.
[266] Lewis, TITLE OF BOOK, 1984, p. 48.
[267] Webster, *Cast in a racial mould*, pp. 44-5.
[268] Lewis, *The rise and fall of the SATLC*, p. 49.

As early as 1933 the Department of Labour was to reflect on the skill consequences of these shifts:

> The use of the system of indentures is, however, declining to a certain extent owing to the multiplication of repetitive machine processes in industry which require machine operatives and not skilled craftsmen; this and the recent depression account for the fact that the total number of apprentices under contract at the end of 1929 was 9,000, whilst in 1933 the figure was 6,000.[269]

And by 1940, with the Depression long gone, the trajectory was even clearer:

> It is evident that the compulsory system [of apprenticeship] is primarily suitable to an industry in which all the production employees other than labourers are either skilled artisans or apprentices, for here the semi-skilled work is performed by the apprentices while they are learning the trade of the skilled artisan with whom they work; …. But with the increasing sub-division of occupations demanded by the highly mechanised processes of to-day, operative and less skilled grades of employees are being introduced for the most part in the production of consumption goods, the more highly skilled workers being required for the manufacture of capital goods; these are not suitable for control under a contract of apprentice.[270]

Naturally the craft unions in the affected sectors were concerned about these changes and the studies of Lewis,[271] with a focus on the Trades and Labour Council, and Webster[272] on the foundry industry, have documented the multiple strategies they adopted to resist or, where resistance was not possible, to control the pace of this process of deskilling where the craftsman's skill was increasingly taken-over by the machine. Some craft unions abandoned the notion of 'craft unionism' altogether (such as the tailors and cabinet makers) in favour of all-inclusive industrial unionism,[273] whilst others blurred the boundary creating pseudo-craft unions in which lower skilled workers were admitted on an unequal basis – with race playing an important role as Davies summarised:

> For the skilled 'labour aristocracy' [these changes] threatened to erode their position, and the thirties accordingly witnessed a considerable upsurge in militant action by this stratum to protect differentials and the restrictions against easy access to their trade by either black or white. …To the previously unskilled, on the other hand, these changes meant more permanent jobs and hence greater leverage against employers than previously. Not surprisingly therefore the thirties were also a period which saw a considerable increase in the number of non-skilled white workers unionised and involved in industrial action. But whereas the struggles of the skilled were against, as they saw it, an erosion of privileges by other workers in the new situation, i.e. were reactionary, the struggles of the non-skilled were more recognisable worker's defensive struggles at the trade union level of consciousness (i.e. were over wages, conditions, etc.). … Many thousands of black workers had also been drawn into semi-skilled machine operator-type positions, fairly similar to those filled by whites in at least the following industries: metal, leather goods, clothing, textiles, chemicals, cosmetics, and the processing of food and tobacco. And they too had begun to become organised to a much greater extent than hitherto fore despite the disabilities imposed on them under the Industrial Conciliation Act [No. 11 of 1924].[274]

Standing in sharp contrast to these developments in the private sector (as well as Iscor and Eskom) is the absence of these developments in the Post Office. Kaplan notes that:

> Before 1958, the principal contractors to the British Post Office supplied very similar equipment to meet the bulk of SAPT's* requirements. The Automatic Telephone Electric Company (ATE) supplied principally electromechanical switching equipment, and Standard Telephones and Cables (STC) supplied transmission equipment. Siemens AG was far less significant, supplying

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[269] 'Review of the first ten years of the Act', in DoL Annual Report of 1933, UG 43, p. 45.
[270] DoL, 1940, UG 45/1941, p. 29.
[271] Lewis, *The rise and fall of the SATLC*.
[272] Webster, *Cast in a racial mould.*
[273] Lewis, *The rise and fall of the SATLC*, p. 64.
[274] Davies, 'The Political Economy of White Labour in South Africa', pp. 169-170.

> principally magneto telephones through its local company, Siemens SA. The majority of telecommunications products were imported. Local manufacture was non-existent.[275]
> [* SAPT = South African Posts and Telecommunications]

This means that there was no equivalent mechanisation and no need for the artisans to feel threatened by the lesser skilled in the Post Office. SATTA continued to represent all. This created the conditions for collaboration across job bands – which, it is argued, was fundamental to the possibility of creating career paths.

LADDERS AND LEVERS

Incentives and support to keep learning

For those wanting to progress beyond artisan level there was a clear path to travel: they had to complete their three NTC certificates and then proceed to do their ATC I and II. This was a personal decision, however, as whilst there was plenty of encouragement, there was no requirement to do so.[276]

The apprenticeship programme was five years long, and the post-PTC certificate courses outlined above were each one-year part-time (based on lectures for one day a week), so it was theoretically possible for an apprentice to complete his ATC II concurrently with his apprenticeship.[277] But initially only four hours a week for two years was given for study (basically covering NTC I and II). This meant that students wishing to study beyond the minimum qualification had to make up the difference in their own time. Even in the Post Office paid time-off for study beyond the minimum was initially[278] not automatic as Johnson conceded: 'where possible they are released for courses provided they make up the time – it is not often possible, and these young men generally have to do the work privately or by correspondence'.[279] As Bird admitted, 'It was tough. I continued to work throughout the time I was training. I studied at night.'[280] He did not complete his ATC II during his apprenticeship – his certificate is dated 15 February 1941, so it was written in 1940, two years after his apprenticeship was over.

In 1931 a Government Notice was published which made it compulsory for all apprentices to attend classes for no less than six hours a week, with or without paid time-off, for the full

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[275] D. Kaplan, *The crossed line: The South African telecommunications industry in transition*, Witwatersrand University Press, 1990, p. 28.
[276] Government Notice No. 388, 6 March, 1931, as cited in Johnson, 'Training in the Engineering Branch of the Post Office', p. 287.
[277] 'A little consideration of the curriculum will show that the apprentice is very favourably situated with regard to promotion to the ranks of the engineers, for he can acquire the A.T.C. 2 – a qualification for admission to the Assistant Engineer's examination – before finishing his apprenticeship, without undue exertion. A few boys have reached this stage in their fourth year, and there is no reason whatever why more should not do so. Boys who enter with matriculation can do it in less if they are prepared to work. 'Training in the Engineering Branch of the Post Office', p. 289.
[278] The position later improved, if the conflict with the union that took place in 1943 – when this right was again withdrawn – suggests. *The Live Wire*, April 1943, pp. 12-13, Agenda Item no. 4.
[279] Johnson, 'Training in the Engineering Branch of the Post Office', p. 289.
[280] Interview with K. Bird, date unknown.

duration of their apprenticeship or until they completed their National Technical Certificates.[281] As a result the apprenticeship committees made this a requirement - with some positive outcomes as Aspinall later observed:

> It has resulted in acquainting apprentices with the technical aspects of their work, which normally they would have lacked. Without compulsion many engineers would have been lost to industry.[282]

As for apprentices these students' class and examination fees were refunded in the Post Office and they too were assisted with the purchase of textbooks and drawing instruments.[283] But over and above this, bonuses were also paid:[284]

	Per subject	
	Pass	**Distinction**
N.T.C. 2		£1.10
N.T.C. 3	£1.50	£2.00
A.T.C. 1	£1.50	£2.00
A.T.C.2	£1.50	£2.00

Such a system of rewards was not restricted to the Post Office alone:

> Some companies such as the African Explosives Ltd. pay bonuses and certain mines and firms award prizes to apprentices who have made satisfactory progress in their technical studies and in the workshops. Sir Thomas Price, when General Manager of the South African Railways and Harbours Administration, encouraged the technical education of railway apprentices by instituting the Price Shield for competition amongst apprentices attending the various technical colleges.[285]

The problem was not only time, however. For some the content was itself challenging, being learnt as it was, with tired heads at the end of a working day. In the Post Office, less formal sources of help and encouragement were made available as Bob Round's story of learning for his ATC II below well illustrates:

> I was transferred from Potchefstroom to Pietersburg, where I met the Bank Manager's daughter. She got me thinking about picket fences and rambling roses. I decided that it was worth giving up half of my food to ensure that the other half was properly cooked. The sort of money which the Post Office was paying me wouldn't have enabled me to keep a budgie – never mind a wife – and I had to devise a scheme to work up a nest egg and a better income.
>
> The 'better income' would come if I managed to qualify as a Post Office Engineer. The 'nest egg' problem I addressed by getting myself onto Country Carrier Construction. This entailed a gypsy existence of shuttling from one country town to another, installing electronic equipment. Because you were away from your headquarters you were paid Subsistence and Travelling Expenses (S and T). This more than doubled my salary. The disadvantage was that because I was doing my best to save money I would stay in boarding-houses and run-down hotels.
>
> I was doing my outstanding ATC subjects by correspondence and it was extremely tough going. The courses were advanced and, in many instances, obscure. Locally, there was nobody that had the vaguest clue about the subject. My post chased me around the country, and it was the norm for a reply from the chap who marked my answer papers to take a month or more. Often the replies were shallow and only added to my confusion.

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[281] Government Notice No. 388, 6 March, 1931, cited by Johnson, 'Training in the Engineering Branch of the Post Office', p. 287.
[282] Aspinall, 'Presidential Address', pp. 15-16.
[283] Johnson, 'Training in the Engineering Branch of the Post Office', 1940, p. 289.
[284] *Ibid,* p. 289.
[285] Aspinall, 'Presidential Address', p. 18.

> I was working extremely hard and was getting by on five hours sleep a night, often having to study by candlelight after the generating plant was switched off. Things had reached dire straits when the knight in shining armour, in the form of Eric Wood, came on the scene. He was a Post Office Engineer who had played a part in the development of radar during the Hitler War. He was extremely able technically, very clever, and a gentleman through and through.
>
> He was stationed in Jo'burg and every couple of months I would take a day's leave, hitch a ride through to 'The Big Smoke'. Eric would spend the day patiently sorting out my problems. If it had not been for Eric, I would not have been able to complete my ATC II.
>
> For the record – the Bank Manager's daughter and I broke up and I blew the 'Nest Egg' on a sports car![286]

The role that Eric Woods played for Bob Round was strongly encouraged by the professional institute to which he probably belonged – the South African Institute of Electrical Engineers (SAIEE). The SAIEE was concerned about the training of apprentices – as is evidenced by the fact that a number of papers on the subject, including those of Orr, Johnson and Aspinall which have been much cited here, were presented to them – and by the fact that the apprentices were strongly encouraged to become Student Members of SAIEE whilst still completing their apprenticeships.

The final hurdle

When Bird had passed his ATC II in 1941, there was one last hurdle to jump to become an engineer. It could be tackled in one of two ways in the Post Office: by selection or by examination.

The selection route had been established way back in 1917 when engineers were critically scarce and experienced practical men, in the Supervisory Electricians grade with enough experience to do the work, were 'selected' for promotion. Over time this custom-and-practice was elevated to principle and agreements were struck with the union as to the minimum and maximum number of posts on the Assistant Engineer rank that would be filled in this way. Similar arrangements were also in place in the South African Railways and Harbours, but no other government department made use of them as people were concerned that these men lacked sufficient technical knowledge. For men like Bird this was an uncertain route depending on long years of experience and, in part, on favour being curried, as there was 'no claim to a right for appointment by selection'.[287] So those with ambition looked to the other route.

The other route was to sit for the Post Office's Assistant Engineers' Examination. Before 1937, to be eligible to do so, officials had to have passed their ATC II and have completed at least eight years' service, but at the end of that year the rule was amended to read 'that Post Office officers with ATC II Certificates, who have attained the age of 23 years, be eligible to enter for the Assistant Engineers Examination'.[288] This change was agreed in order to bring the age

[286] Personal correspondence B. Round, 1 January 2007.
[287] Telkom Archive DPT IDIC/A30/2751/77, Engineering Staff Committee, November 1944, Agenda Item 3, p. 13.
[288] Telkom Archive, DPT IDIC/A30/2742/77, Engineering Staff Committee, 6-8 December 1937, Agenda Item no. 2.

limits for university graduates and rising artisans into alignment because until 1954 graduates were also required to pass the examination before appointment.[289]

The examination was introduced in 1927[290] in response to the acute shortage of engineers the Department faced. In earlier times such shortages would simply have been met by recruitment from abroad,[291] but there was a growing demand to lessen this dependence on immigrants and yet the numbers of university graduates in engineering was far too small when measured against the numbers needed to oversee the expansion of the telecommunications network – a scarcity that was compounded by parallel demands for electrical engineers from other sectors, such as those needed for the design and installation of electrification schemes 'on a scale never before considered'.[292]

The Assistant Engineers' Examination was commonly called the Competitive Examination because 'if the Post Office needed two Engineers that year, the two chaps with the highest marks (providing they had got more than 65%) were accepted'.[293] It was set by the Chief Engineers' Office of the Post Office and whilst not as broad as a university-based qualification, its depth was certainly comparable.[294]

The Post Office established courses to prepare those wishing to take this exam. The courses were run at the Post Office's own training centres. There were three centres where they were run: in Cape Town, Pietermaritzburg and Johannesburg.[295] Advanced courses were given to update staff generally as well as to prepare those wishing to take the Competitive Engineers Exam.[296]

The union, SATTA, also did all it could to assist those taking on the challenge of this difficult examination, including publishing past examinations papers and comments from the examiners. In June 1940, for example, *The Live Wire* published the following before an evaluation of specific questions:

> General. – There was a noticeable improvement in the standard of the answers over that of the 1939 examination, but still a decided tendency on the part of some candidates to treat the questions superficially. In certain instances, it was very apparent that a hope existed that specialised knowledge in particular subjects would be ample to secure a pass. It is reiterated that what is required of candidates is a sound fundamental knowledge of the subjects detailed in the syllabus and, to prevent undue concentration on any particular subject, it is probably that in succeeding years each paper will be divided into at least three sections, thus restricting the choice of questions.[297]

Here are two examples of the questions taken from the paper set for 18 February 1941.

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[289] H.A. Matthews, 'Technical training in the South African Post Office', *The Transactions of the SA Institute of Electrical Engineers,* July 1975, p. 39.
[290] *Ibid,* p. 39.
[291] Orr, 'Technical Education and Training', p. 78; Crouch, *Sparkling Achievements*, p. 5; I, Abedian and B. Standish, 'An Economic Inquiry into the Poor White Saga'; G.R. Bozzoli, *Forging Ahead,* gives accounts of each of the men listed and many more.
[292] There was also a growing demand for engineers in the mining industry – see *Social and Industrial Review*, June 1928, p. 473.
[293] Personal correspondence, B. Round, 1 January 2007.
[294] Interview M. Gow, 22 January 2007.
[295] Personal correspondence with Bob Round, 1 January 2007.
[296] Personal correspondence with Rod Harker, 30 October 2006.
[297] *The Live Wire*, June 1940, p. 6.

1. It is proposed to convert a large multi-exchange area to automatic working. Discuss the various factors which would need to be taken into account to determine the type and location of the exchanges and to decide whether a director or non-director system should be installed.
2. Why is it necessary to lay down limits for the resistance of exchange and extension lines connected to Private Branch Exchanges? Discuss the question fully and illustrate your answer with fundamental circuit diagrams. Select a suitable battery voltage for the Private Branch Exchange and give reasons for your selection.[298]

Pass rates were low, as can be gauged from the following report from the Postmaster–General:

Table 4.4. Examination entries and successful candidates for the Staff Assistant Engineers' Examination

Examination Entries								**Successful Candidates**							
1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46
17	17	14	13	9	19	17	13	4	7	3	**6**	1	6	2	2

Source: *Post Office Progress 1939-1946, Postmaster-General's Annual Report for 1945-6 embodied in a resume of developments since the year 1939, Government Printer, Pretoria, 1948, pp. 47-48.*

Bird was one of the six successful candidates who passed in 1942, and his promotion to Assistant Engineer was thereby assured. The certificate he later received was signed by the Chief Engineer, DPJ Retief, and the Postmaster General. This in itself was an honour as Michael Crouch, Executive Director of the SAIEE, recalled:

> This guy DPJ Retief, he was Chief Engineer of SAPO as it was called. I well remember as a young engineer I went to a liaison meeting with Telkom and we were stuck in this great big room with this huge wooden table. And in came this man, quite portly, really a good-looking man in his 50s. He pushed the door open and walked in and everyone stood up.[299]

Much more will be heard of D.P.J. Retief in later chapters, but here the emphasis falls on the pathway itself and it is worth listening to Malcolm Gow's story of the journey he travelled to finally pass the examination after a number of failed attempts:

> Then one year I thought, 'Now I'm wasting time! I've just got married but I'm going to give it one last go!' We got married in the June and I was going to write in the February, that was when the exams were written. I said to my wife, 'I'm studying', and when she was doing the ironing, I'd sit at the bottom of the bed and I'd work. And when it came to the exam, because you can learn all rote stuff and so on, that's easy, but how do you apply it? So, I just learnt and made sure that I knew the background to everything and when it came to the exam, I passed.[300]

SAIEE membership

Passing the Department's Competitive examination gave these men automatic promotion to Assistant Engineer, Grade III that they had worked so hard to secure. But real status came from another source – from membership of the professional body, the South African Institute

[298] *The Live Wire*, June 1941, p. 8.
[299] Interview M. Crouch, 24 October 2006.
[300] Interview M. Gow, 22 January 2007.

of Electrical Engineers (SAIEE). The Institute gave the final mark of arrival, those coveted letters of membership which could be written after one's name and which signalled to the world that you were indeed an engineer of standing. At the time most advertisements for senior engineering positions on the open labour market set membership as a requirement as it signalled the person had been accepted as a peer by the community of engineers themselves.[301]

The men at the top of the engineering branch of the Post Office knew this all too well and strongly encouraged those in their charge to seek membership at the earliest possible opportunity. Bird remembered being so encouraged whilst he was still an apprentice and in 1935 he became a Student Member. This entitled him to participate in meetings of the Student Section of the Institute, which consisted of students from both the university and the technical college. Their meetings consisted of the reading of technical papers, visiting works to see procedures and technology in action as well as social functions which helped to induct them into the community of engineers.[302]

Allan Bennett, who traversed the same path as Bird, joined at a later point in his career, he was already an engineer, but he was similarly encouraged:

> The Chief Engineer – what was his name? Mitchell! I used to drive Mitchell to meetings of the Institute. I drove. He didn't like to drive, and I had the job of driving for Mitchell. When I started driving for Mitchell, he'd sort of encourage me. He was a *helleva* fine gentleman. Quiet sort of gentleman, and he never tried anything. So that's where I developed an interest in the Institute. I used to go to the meetings – because I took him.[303]

Membership of the Institute was tightly controlled by its constitution and by-laws and these set out clearly the conditions to be met for each grade of membership. Only once a person met their conditions and had been proposed by an existing member as being suitable and membership fees paid, were these men permitted to use the prestigious letters after their names. A more detailed account of the evolution and rules governing the Institute are given in Chapter 10, but here it must be noted that passing the Post Office's Assistant Engineers Examination was accepted as a qualifying examination for Associate Membership of the Institute in May 1935. This was no doubt a major victory for the Post Office as signalled by the gravitas of its announcement at a meeting of the SAIEE:

> The President: I would like to take this opportunity of announcing that the Council has decided to accept the G.P.O. Assistant Engineers examination as one of the qualifying examinations for Associate Membership of the Institute, and it is hoped that this step will lead to much closer co-operation between the communication engineer and the power engineer than hitherto.[304]

This new partnership, between the communication engineer and the power engineer, reflected the growing stature of the former in comparison to the more established latter. This inevitably meant a partnership with the Post Office which was the main communication engineering agency in the country at the time.[305] In recognition of this, several papers on the subject of communication engineering had been presented by the Post Office to the SAIEE. The first was in 1935, when J.A.F. Mitchell (presumably having been transported by Allan) presented a paper entitled 'The Technical Development of the Telegraph Service in the Union of South

[301] Interview Rod Harker 18 November 2006.
[302] Aspinall, 'Presidential Address', p. 26.
[303] Interview Allan Bennett, 13 November 2007.
[304] *SAIEE Transactions*, May 1935, p. 133.
[305] *SAIEE Transactions*, 1940, p. 293.

Africa'.[306] In 1939 C. Griffith, by then himself the Chief Engineer, was elected as the SAIEE's President, the first communication engineer to be so honoured. His Presidential Address was devoted to the development of the telecommunications system in the country.[307] And following the presentation of Johnson's paper a year later Griffith himself presented the vote of thanks indicating that Johnson's was the sixth communication paper to have been presented since 1935.[308] There was clearly a close partnership between the Post Office and the SAIEE at this stage.

But it was not only the management who were sensitive to the status and authority of the professional body. The SATTA subscribed to the SAIEE's Journal[309] and reproduced Johnson's paper that was presented to the SAIEE, as mentioned above. At this stage they still had members from the senior ranks and encouraged their members, in the ways that have been shown above, to strive towards these ranks.

The Post Office's examination was not the only non-degree programme accepted by the SAIEE for Associate Membership however:

> The Advanced Technical Certificate (Part II) with an approved course of study, or the Engineering Diploma, each including Electrotechnics V as a subject, is accepted by this Institute as technical qualifications for corporate membership. …The South African Railways and Harbours Administration recognises the Matriculation and the ATC II as technical qualifications for promotion to the grade of assistant mechanical or electrical engineer. …The cases quoted of recognition of the higher grade certificates represent the majority and much remains to be done to bring the technical content of the relevant syllabuses to the notice of employers for consideration of certificates as a basis for staff promotion.[310]

And students wishing to secure membership of the SAIEE through this route were able to turn to the technical colleges and technical high schools that provided part-time courses in the required subjects.[311]

Matriculation and National Engineering Diploma

In the early years it was assumed that people who had completed their Advanced Technical Certificate (Part II) were qualified to take the final step towards becoming engineers, but later a matriculation and National Engineering Diploma were also required.[312] The process to 'upgrade' an ATC to a Diploma required two additional subjects.[313]

Given the politics of the post-war years (apartheid years), the attainment of a Senior Certificate required Afrikaans as a compulsory subject. Bird struggled with this. His sister tells how he struggled four times to pass Afrikaans. As she explained, 'There was not much Afrikaans spoken in Durban and so he had few opportunities to practise'. In 1958, he finally succeeded

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[306] SAIEE, May 1935.
[307] SAIEE, Feb 1938, p. 25.
[308] *SAIEE Transactions*, 1940, p. 293.
[309] *Executive meeting held in the Lounge on November 29 1918 at 8pm:* 'That the account of £1.8.0 Modern Press and 2/- for a copy of the monthly S.A. Institute of Engineers be sanctioned. Carried.'
[310] Aspinall, 'Presidential Address', p. 15.
[311] De Villiers Report, 1948, para. 1243-5.
[312] Interview M. Gow, 22 January 2007.
[313] Chosen from: Theory of Machines, Industrial Administration and one language from the National Senior Certificate. Aspinall, 'Presidential Address', Table I, p. 12.

in passing both English and Afrikaans – which enabled him to upgrade his NTC III to a National Senior Certificate with the following subjects:

Table 1.5. Ken Bird's National Senior Certificate results, 1958

UNION OF SOUTH AFRICA DEPARTMENT OF EDUCATION, ARTS AND SCIENCE National Senior Certificate Standard X November 1958	
English	A
Afrikaans	B
Mathematics	III
Electrotechnics	III
Telephony	II
Introductory Transmission and Radio Communication	I

Bird was unwittingly assisted by SATTA in this achievement. In 1939 SATTA had approached the Department of Education to recognise the Post Office specific NTC qualifications for credit towards the National Senior Certificate. Their success enabled Bird to have Telephony II and Radio Communication I recognised towards his National Senior Certificate; hence he was saved from yet more study.[314]

To make the final jump to 'Diploma' he had to add two additional subjects to his ATC II. Bird chose Industrial Administration and senior-level English.[315] In 1959 – 17 years after completing his ATC II – he earned his National Diploma in Engineering with the following subjects:

Table 4.6. Ken Bird's National Diploma in Engineering results, November 1959

UNION OF SOUTH AFRICA DEPARTMENT OF EDUCATION, ARTS AND SCIENCE National Diploma in Engineering, November 1959	
Mathematics	V
Electrotechnics	V
Telephony	IV
Radio Communication	III
Industrial Administration	
English (Senior)	A

Bird's SAIEE membership journey

Bird received a certificate issued by the SAIEE in 1935 recognising him as a Student Member. But as the years ticked by, he accumulated more certificates. In the end he had travelled a journey past many milestones:

[314] *The Live Wire*, March 1940, p. 9.
[315] Interview M. Gow, 22 January 2007.

Table 4.7. Ken Bird's record of SAIEE Membership 1935-1985

SAIEE Membership category	Date	Qualification status	Employment status
Student member	12 September 1935	National Junior Certificate 1931 Apprenticeship	1933-8 Apprentice
Associate	6 January 1941	ATC II passed in 1941 Competitive exam 1942*	1939-42 Artisan 1942 Assistant Engineer
Graduate member	31 December 1946		1946 Senior Assistant Engineer
Associate member**	23 October 1947	National Senior Certificate 1958 National Diploma 1959	1953 Engineer Grade IV 1958 Engineer Grade III 1959 Engineer Grade II 1963 Engineer Grade I 1965 Principal Engineer (Natal) 1966 Engineer-in-Chief (Transvaal)
Member***	31st July 1972 (?)	As above	
50-year Member	3rd October 1985		1975 Retired

** Members in the Historical Section of the SAIEE today note that each level of membership was associated with an increased membership fee, so there was an incentive to delay upgrading until there was an incentive or improved income to support the upgrade.*
*** Equivalent to 'Member' today*[316]
**** Equivalent to 'Senior Member' today*[317]

Sadly, Allan Bennett's journey in this detailed, step-by-step form is not available, but he certainly rose higher than Bird both at work and in the SAIEE. At work he occupied the position of national Chief Engineer from 1 July 1974 to 31 December 1978[318] and in the SAIEE he became the President in 1972 and was acknowledged for his contribution to the profession by being appointed an Honorary Fellow, earned in large part by his chairing of the SAIEE Constitution and By-laws Committee for many years.[319]

EVALUATION AND IMPACT

It is difficult to evaluate the success of the Post Office career pathing model from occupational statistical tables as they do not indicate how individuals arrived there. So, the measure of the success of the Post Office's internal career path system has to be found from other sources and in this case from statements made on the subject by those most familiar with it: senior officials. In 1940 Colin Griffith, when giving the vote of thanks after Johnson's paper, made the following comment:

[316] Personal interview A. Meyer, MSc(Eng), Pr.Eng. FSAIEE, 13 February 2007.
[317] *Ibid.*
[318] Telkom archives, photograph with this information inscribed at the base.
[319] SAIEE telephonic conversation, 3 February 2009 and interview with Allan Bennett, 13 November 2007.

> It is worthy of note that in the ranks of assistant engineer and upwards, 50% of the grade 3 engineers (the lowest grade of engineer) came from the electricians' grade …, 30 per cent in the senior assistant engineer's grade and 30 per cent from the assistant engineer's grade. You may perhaps think that the percentages show a falling-off in the standard attained by the electricians and mechanician, but that is not the case. It is due to a combination of circumstances and the fact that we have expanded very rapidly during the last seven years. For instance, in 1933, the number of engineers and assistant engineers embraced in the higher professional division was 60; to-day [1940] it is 93. Including replacements due to retirements and death no fewer than 52 officers were appointed to the grade of assistant engineer during this period.[320]

By comparison over the same period there had been 15 university graduates who had passed the Competitive Examination and been 'welcomed' into the Department.[321]

In the mechanical engineering section Johnson himself observed that:

> Out of eleven engineers in the Chief Engineer's office at the present time, four began their careers in the mechanician's workshops.[322]

The Post Office was not an exception, as John Orr noted in 1932:

> In the great majority of cases, those aspiring to become mechanical and electrical engineers have to reach that goal through an ordinary apprenticeship and continuation technical classes, with or without the advantage of a preliminary day technical or trades school training.[323]
>
> The great majority of those holding important positions in the engineering world have not had the advantage of such [university] training. In spite of many drawbacks and early lack of opportunity, they have overcome the difficulties that confronted them and reached high positions in the engineering profession, as is fully demonstrated by reference to many members of this Institute [the SAIEE].[324]

Certainly, the railways applied a similar system:

> As a result of representations made to the General Manager of the S.A.R.& H., the Administration decided to make the appointments to Assistant Mechanical or Electrical Engineer more or less equally from the ranks of pupil engineers possessing the requisite university degree, and the staff with the alternative qualifications of practical experience with a Matriculation Certificate and the Advanced Technical Certificate, subject always to efficiency being the deciding factor. The adoption of this procedure has provided equal opportunities for promotion for technical college and university trained personnel.[325]

He further noted that:

> Advancement from the status of the artisan to that of the professional engineer is largely dependent upon general education, aptitude and keenness in the workshops, assiduity in technical studies and the ambition to progress. It is worthy of note that the great majority of resident engineers on the gold mines, managers and proprietors of engineering firms, began their careers as ordinary apprentices.[326]

However, there is another measure of the success of this route – and that lies in the work that was done. As Orr has stressed, the majority of engineers who held office at that time had come up this route, and so the engineering which underpinned the 7.9 per cent growth rate of the 1930s was undertaken by just such men. Bird's proudest contribution was made in 1949 when, as the engineer in charge of networks in Durban, he was taken off his routine duties

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[320] Johnson, 'Training in the Engineering Branch of the Post Office', p. 294.
[321] *Ibid,* p. 295.
[322] Johnson, 'Training in the Engineering Branch of the Post Office', p. 289.
[323] Orr, 'Technical Education and Training', p. 113.
[324] *Ibid,* p. 112.
[325] Aspinall, 'Presidential Address', p. 22:
[326] *Ibid*, p. 22.

and given the responsibility of overseeing the laying of the first co-axial cable in South Africa, between Durban and Pietermaritzburg – commissioned in 1952 as later reported by Bozzoli.[327] It was initially capable of carrying 600 (later many more) telephone conversations simultaneously – over a single pair of wires bound around a common core – hence the name CO-axial. He told how he walked the distance of the cable 'dozens of times' seeing it was laid, jointed, tested and commissioned properly - an experience he wrote up and presented to the Natal Institute of Electrical Engineers in 1952.[328]

So there it is – the story of how Bird, and others like him, rose from 'sweepers' and became engineers in the Post Office in the 1930s. Whilst their ability, determination and effort clearly played their part, on their own they do not explain their ascent. Below is a summary of some of the key contextual factors that made it possible.

Many conditions surrounded these individual journeys

- at the macro political-economic level there was the 'civilised labour policy' and other politically crafted legislative measures, which kept competition from other applicants for places to a minimum;
- industry policies, funded by the bounty that flowed from the country's departure from the gold standard, increased the number of opportunities available;
- the administration created a qualification architecture where one qualification led to the next in a sequential fashion to support progression;
- the employer structured its programmes and support measures in a fashion that optimised the chances of success. Even weaker students were accommodated with 'streamed' options;
- on the institutional level there was the growth and responsiveness of the technical colleges which interwove in multiple, complex ways with the pro-active employer and trade union bodies to ensure quality, relevant, up-to-date programmes were provided;
- the union, with members drawn from temporary labourers to artisans, also played its part. It actively sought to strengthen progression pathways for all its members and was not caught in the artisan/operator feuding that characterised many other workplaces at the time.
- The wages of workers in the Post Office were set by the Public Service Commission. They therefore were 'shielded' from the artisan-dominated bargaining councils established under the Industrial Conciliation Act, No. 11 of 1924.
- The union's and the department's positive relationship with the professional body, in this case the SAIEE, meant those at the helm of the destination of the career path were pulling in the same direction in many ways (setting exams, encouraging student membership, etc.)
- And at the micro level was a web of social networks and 'helpful individuals' that bonded people belonging to a language-community at an even more fundamental level – a sub-micro or identify level, the 'us' of the British-descended insiders of the time.

These 'insiders' helped each other but excluded the outsiders in ways that ranged from harsh and militaristic to subtler forms. The exclusion of Africans fell into the first category – with

[327] Bozzoli, *Forging Ahead*, 1997, p. 151.
[328] K. B. Bird, A.M.(S.A.)I.E.E., 1952, 'Carrier Telephony in South Africa, with Special Reference to the Durban-Pietermaritzburg Co-axial Cable System', Proceedings of the Natal Institute of Engineers, Vol. 33, February 1952, No. 2.

compounds, taxes, movement restrictions, land seizures and many absences, like the lack of the vote and the lack of compulsory schooling. History has rightly judged these as crimes against humanity. It was to take decades for these wrongs to be righted.

CHAPTER 5

FROM SCHOOL TO ENGINEER

There are missing rungs in our ladder to the peak of our efficiency, let us get together and provide the means to bridge the gaps
L.H.L. Badham, 1945 President, SAIEE[1]

From the late 1800s to 1939

PEOPLE AND PLACES

There are many actors in this period – too many to profile – but none were alive at the time of writing, so sadly no interviews were possible. A brief selection is shown below, although in truth it is not even representative. It nevertheless hopefully provides some insight into the lives of some of the more dominant players. Reinhardt Ludwig Straszacker, whilst introduced here, will rise to even greater prominence in the next period, and whilst John Orr's obituary could just as easily have been profiled earlier, his voice is also heard in this discourse.

Henry Selby Hele-Shaw 1854–1941

Henry Selby Hele-Shaw was born in the UK in 1854. In 1871 he began his apprenticeship under Edwin Roach at the Mardyke Engineering Works of Roach and Leaker in Bristol. The apprenticeship lasted for four years and on its completion he remained in Bristol to work for Messrs G.K. Stothert and Co., Marine Engineers and General Engineers. He continued with his studies during this time and his brother recorded that he worked for ten hours at the engineering firm every day and then attended night classes.

He was, by all accounts, a dedicated and clever student, even winning the Senior Whitworth Scholarship in 1877, which enabled him to resume his studies at the 'red brick' University College Bristol, established just a few years previously.

Hele-Shaw completed his studies at the University College Bristol in 1879. After he completed these studies, he was appointed lecturer in Mathematics and Engineering at the same institution and, two years later (aged 27), he was promoted to the new Chair of Engineering. Hele-Shaw thus came to be in charge of the best engineering laboratory in Britain at that time and found himself in an excellent educational institution. In 1897, Hele-Shaw was awarded an honorary doctorate from St Andrews and, in 1899, he was elected a Fellow of the Royal Society of London.

Hele-Shaw, aged 50 and at the peak of his career, arrived in South Africa in January 1904 for a two-year period. Although he was never allowed free rein on his own research initiatives during his Transvaal period – which, in view of his interests in fluid mechanics and its

[1] L.H.L. Badham, 'The Education and Training of Engineers for Industry', seconding the vote of thanks to A.P.M. Fleming, *Transactions of the SAIEE*, October 1946, p. 236.

application to mining, might well have revolutionised aspects of the mining industry – his legacy remains the sound foundation upon which the Faculty of Engineering at the University of the Witwatersrand was built.2

John Orr 1870 – 1954

Professor John Orr, OBE, BSc, Hon, LL.D, M.I.C.E., M.I.Mech.E., was born in 1870 in Lanarkshire, Scotland, entered Glasgow University in 1887, where he graduated with a Bachelor of Science in Mechanical and Electrical Engineering. He received further technical education at Coatbridge Mining College, at the Royal Technical College, Glasgow, and in 1893 was awarded a Whitworth medal and Exhibition tenable at the Royal College of Science, London.

He served an engineering apprenticeship with Messrs AF Craig & Co, Paisley, and Messrs Gibb and Hogg, Airdrie, and obtained practical experience with various engineering and shipbuilding firms, including Messrs Anchor Line Works, Glasgow, Simpson, Strickland and Co, Dartmouth, and Wigham Richardson and Co, Newcastle-on-Tyne.

He came to South Africa in 1897, being initially attached to the SA College, Cape Town, and a year later proceeded to Kimberley as Professor of Mechanical and Electrical Engineering at the newly established School of Mines. In the South African war he served in Kimberley during the siege.

Retaining his professorship he came to Johannesburg in 1903 on transfer from the S.A. School of Mines. The Institute in Johannesburg became known successively as the Transvaal University College, the SA School of Mines and Technology, the University College, Johannesburg, and finally the University of the Witwatersrand.

In December, 1925, Professor Orr resigned the De Beers Professorship of Mechanical Engineering at the University to organise technical education on the Rand, being the first President of the Council and later Director of the newly created Witwatersrand Technical College.

When the Apprenticeship Act was introduced in 1925, Professor Orr was appointed Chairman of the Transvaal Committee, serving as such for a continuous period of fifteen years. He was a foundation member of the Controlling Executive of the Associated Scientific and Technical Societies of South Africa of which he was President during 1937-38. He was President in 1908-9 of the Transvaal Institute of Mechanical Engineers. He was instrumental in establishing, in 1909, what became known as the SA Standards Institution and was its Chairman for 37 years. He was President in 1917 of the SA Association for the Advancement of Science. He died on 17 May 1954, in Johannesburg.[3]

[2] J. Carruthers, 'Henry Selby Hele-Shaw LL D, DSc, EngD, FRS, WhSch (1854–1941): Engineer, inventor and educationist', *South African Journal of Science*, Vol. 106, No. 1/2.
[3] 'Obituary, Professor John Orr', *Journal of the South African Institution of Mechanical Engineers*, July 1954, p. 392.

John Orr became known as the 'father of technical education in South Africa, who built up, with the greatest dedication and alacrity, a massive technical education edifice when it was needed most to serve primary and secondary industry'.[4]

Hendrik Johannes van der Bijl 1887 – 1948

Hendrik Johannes van der Bijl was born on 23 November 1887 in Pretoria.[5] His father, Pieter Gerhard, was the seventh generation of the van der Bijl family to be born in South Africa and was very well connected with the political leaders of the Republic – counting amongst his friends President Kruger and such men as Louis Botha, Jan Smuts and Barry Hertzog, who were all to take the reins of state in their time.

When Pretoria fell to the British he was advised to leave after he refused to continue delivering grain to the new British-controlled government. So the family returned to the Cape, where young van der Bijl finished his schooling and embarked on his university studies at what was then called the Victoria College (later the Stellenbosch University). Victoria College was one of a handful of colleges that taught post-matriculation programmes to students wishing to sit for a degree examination set by the University of the Cape of Good Hope (UCGH).

He studied for a BA degree in chemistry, mathematics and physics which he passed, in 1908, with honours. Van der Bijl's degree was called a BA because pure science was considered to be too specialised (a first degree in science was only introduced in Cape Town in 1922). He had to study at least two of his required nine subjects from the Arts.[6] This was no problem for the young van der Bijl who was passionately interested in language – even collaborating with a few student friends to found the 'Afrikaans Taal Vereeniging' (the Afrikaans Language Society) which lobbied for Afrikaans and not Dutch to be the second official South African language. This was a burning issue at the time and the student organisation preceded by a short year the establishment of De Zuid-Afrikaanse Akademie voor Taal, Letteren en Kunst (hereafter die Akademie) which was set up on 7 July 1909 by a senior group of Afrikaner nationalists for the same purpose – fearing as they did the demise of their culture and influence after their defeat in the South African war.

After he completed his first degree, van der Bijl decided to study further. As local opportunities for post-graduate study were limited, he looked abroad, to Germany, not Britain. There were at least two reasons for this. The first was his family's clear antipathy to British influence in South Africa. The second was the stature of German universities as compared to British ones. Germany had been the first country to embrace the sciences and establish dedicated technical universities for its study and the study of its useful applications and had, by the mid-1800s, implemented integrated systems for technical training and scientific research.[7]

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[4] J. Lurie, *The Technikon Witwatersrand*. Quotation taken from dedication at the front of the book, and pp. 58-64.
[5] This account is largely taken from G. R. Bozzoli, *Forging Ahead*, pp. 172-183 and from A. Jacobs, *South African Heritage: A biography of H.J. van der Bijl,* Pietermaritzburg: Shuter & Shooter, 1948.
[6] H. Phillips, *The University of Cape Town 1918 – 1948: the formative years,* UCT in association with the UCT Press, 1993, p. 45.
[7] G.S. Emmerson, *Engineering education: a social history*, New York: David & Charles, Newton Abbot, Crane, Russak & Co, 1973, pp. 88-9.

Van der Bijl spent his first semester of 1909 at Halle where he read inorganic chemistry and philosophy, where after he moved to the University of Leipzig, where he completed his Master of Arts and Doctor of Philosophy in Physics, Mathematics and Chemistry. His success as a researcher led to him being offered a lecturing and research position in Physics at Dresden in 1912. This enabled him to continue his pursuit of knowledge 'as an end in itself'. But this was short-lived.

Daniel Pieter Johannes Retief 1904 – 1985

D.P.J. Retief was born in Pretoria on 5 November 1904 and attended school there. He graduated at Cape Town University in 1929 obtaining the degrees of BSC (Electrical Engineering) and BA after which he spent two years in Germany at Siemens to gain engineering experience.[8]

In 1932 he joined the Post Office Engineering Division where he remained until his retirement as Deputy Postmaster General Telecommunications in 1969 after occupying the post of Chief Engineer. As a senior engineer in Posts and Telegraphs he was involved, together with Dr. Boyce, with pioneering research on the effects of lightning on telephone systems. He also oversaw the installation of the microwave network for South Africa which made long distance dialling possible.[9] Indeed during his career in the Post Office he was concerned with the development and planning of all aspects of the telecommunications network, also the South Africa-Portugal Submarine Telephone Cable project, which was carried out by the South Atlantic Cable Company of which he was a Director. This made direct dialling to Europe and the rest of the world possible.

Retief functioned on a number of committees and commissions, including: membership of the Straszacker Commission on Engineering Training after WWII, Vice-Chairman of the Electronics Committee and member of the Scientific Advisory Council of the Prime Minister.[10] *(Retief, as Chief Engineer, signed Ken Bird's Department of Posts and Telegraphs' competitive examination certificate in 1942 thereby enabling Bird to be appointed as an Engineer in the Professional Division of the department.)*

Reinhardt Ludwig Straszacker, 1910 - 1999

Reinhardt Ludwig Straszacker was born in the Free State in 1910. At the age of 15 years he matriculated at Vrede High School. He received a BSc *cum laude* in mechanical engineering from the University of the Witwatersrand. Two years later he graduated *cum laude* from the *Technische Hochschule Charlottenburg* in Berlin in 1933 followed by a *summa cum laude* doctorate. On his return to South Africa he became a lecturer at the University of the Witwatersrand until 1941 when he moved to Stellenbosch to establish the first Afrikaans engineering faculty there. He became a professor in 1944 until he became the chairman of Eskom in 1962, a position he held until 1980.[11]

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[8] https://family.morkel.net/wp-content/uploads/Retief-Pt-2-2-.pdf (Accessed 31 January 2019.)
[9] https://family.morkel.net/wp-content/uploads/Retief-Pt-2-2-.pdf (Accessed 31 January 2019.)
[10] D.P.J. Retief, 'Profiles of some pioneers in South African electronics', *The Professional Engineer*, Vol. 6. No. 2, April 1977, p. 65.
[11] S.R. Conradie & L.J.M. Messerschmidt, *The Symphony of Power: The Eskom Story*, Chris Van Rensburg Publications, 2000, p. 128.

> He was a founding member of the Ingeneursafdeling of the Akademie vir Wetenskap en Kuns in 1941 and had risen to the position of the afdeling's deputy-chairman in 1951-2. He joined the Akademie's central Council in October 1956.[12]

As shall be seen in the following chapters, in the post-war years he was to play a very important role in the shaping of engineering education in South Africa.

EDUCATION AND TRAINING LANDSCAPE

Traditionally, at least in Britain, engineers were up-skilled artisans – up-skilled through part-time courses provided by new 'red brick' university colleges that had grown up in London and the northern industrial areas. Henry Selby Hele-Shaw and John Orr, whose careers are summarised above, exemplify this route. However, an alternative pathway developed – informed by strong Germanic traditions – which held that engineers should gain a solid foundation in science before being exposed to the practical challenges to be faced in industry. This was a foundation that could also prepare them for undertaking research, as the careers of Retief, van der Bijl and Straszacker illustrate. Interestingly, whilst the former route was initially the majority route, it was the latter tradition that informed the South African university development path and it was on this foundation that the 'school to engineer' pathway was built. However, it should be noted that the former route cannot be equated with an 'anti-science' or 'anti-research' position as both Hele-Shaw and Orr were strong advocates of scientific work as their careers show.

The first university in sub-Saharan Africa as the University of the Cape of Good Hope (UCGH). It was established in 1873 and received a royal assent on 26 June of the same year[13] and was allied to the University of London via a Royal Charter in 1877.[14] At the time it was an examination body only. It offered degrees in a narrow range of subjects. 'The B.A. was a composite arts and science degree in the early years, but after the introduction of an Intermediate B.A. examination in 1883, the finals could be taken in literature and philosophy or in mathematics and natural science. A candidate could either read for a pass or an honours degree.'[15] A master's degree was introduced a little later. It also offered a Matriculation certificate that acted both as a school leaving test and a university-entry examination.[16] In 1875 the Junior and Senior (school leaving) certificates were introduced.[17]

The largest of the teaching colleges that prepared students for the post-matriculation examinations of the UCGH was the South African College (SAC). It had first been inaugurated as a private, bilingual high school for boys in Cape Town in 1829 but gradually began to offer post-matriculation courses in English. This was a slow process with only 18 of its 90 students taking such courses in 1883. However, with the discovery of gold and diamonds, an initiative

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[12] Feesalbum 1909 – 1959, *In opdrag van Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, Pretoria: J.L. Van Schaik Bpk., 1959, pp. 158-9.
[13] M. Boucher, *Spes in Arduis: a history of the University of South Africa*, *1873–1946*, Pretoria: Unisa, 1973, p. 26.
[14] Boucher, *Spes in Arduis,* p. 40 & 75.
[15] Boucher, *Spes in Arduis,* p. 37.
[16] Boucher, *Spes in Arduis,* p. 27.
[17] Boucher, *Spes in Arduis,* p. 43.

was born to train mining engineers. In 1894, the SAC instituted a scheme providing for two years' preliminary instruction to be given at the South African College, (or theoretically at any other College with suitable facilities such as Victoria College, Stellenbosch) followed by a third year of technical instruction at Kimberley (the base of diamond mining) and a fourth, and final year, in Johannesburg. Professor John Orr accorded credit for taking the initial steps in the process to Professors Hahn and Lewis who were members of the staff of the South African College.[18]

> The mining course commenced at the South African College in January 1895 and the first five students, having passed the first part, proceeded to Kimberley where the so-called School of Mines was inaugurated under the presidency of Gardiner Williams of De Beers. Professor John Orr, who had been a master at the South African College, appointed specifically for the preparatory year of the course … (was later appointed for) mechanical and electrical engineering (in Kimberley)...
>
> Altogether seven groups of students passed through the system until 1903 when a commission appointed by the Lieutenant-Governor of the Transvaal recommended that temporary premises be acquired in Johannesburg to offer technical education embracing the whole of the mining course. Thus, the Transvaal Technical Institute was established in August 1903 and arrangements were made to transfer the staff and 30 students from the School of Mines at Kimberley to Johannesburg.[19]

The Transvaal Technical Institute was renamed the Transvaal University College in 1906 due to the nature of its work.[20] Different colleges continued to provide programmes for the UCGH examinations post-1873, but they were troubled years as Boucher, in his history of the UCGH[21] notes, and-language was a major source of rancour. The Afrikaans speakers believed that all qualifications should be able to be written in 'Dutch' (or 'Afrikaans' as van der Bijl's vignette above shows) but this was opposed by the English-speaking majority on the various Boards. The Afrikaners also held that the Royal Charter meant that the institution was not truly South African. By 1914/5 the UCGH had accepted Dutch up to Matriculation level but was not prepared to entertain it at degree level.[22] This fuelled intensive debates between the various players and was finally resolved by the Union government in 1916 when it passed three discrete pieces of university legislation: one establishing the University of Cape Town (incorporating the South African College), one establishing the Stellenbosch University (which was to become the home of Afrikaans-medium university programmes) and the University of South Africa (which was a 'federal', teaching university, into which the UCGH was merged but incorporating the remaining six colleges).[23] Each university was responsible for its own examinations.

Behind these 'formal' processes stood other political and financial ones. For example, in 1906 Alfred Beit, a wealthy entrepreneur, bequeathed £200 000 for the development of a new university in Johannesburg, stipulating however that it should be residential, should be open to English and Dutch-speakers alike and be launched by 1916, ten years after his death. This became a hot issue as the Capetonians looked with envy at this bequest. As indicated, the South African College was the most advanced college at the time and it came to pass that two of Rhodes's erstwhile associates, Otto Beit and Sir Julius Wernher, were persuaded to allow

[18] Lurie, *Technikon Witwatersrand*, pp. 9-10.
[19] Lurie, *Technikon Witwatersrand*, p. 9.
[20] Boucher, *Spes in Arduis,* p. 96.
[21] Boucher, *Spes in Arduis*.
[22] Boucher, *Spes in Arduis*, p. 112.
[23] Boucher, *Spes in Arduis,* p. 136.

the late Alfred Beit's bequest to be re-directed to Cape Town and, in addition, to add a further £300 000 to this sum. This enabled the new Groote Schuur building to be constructed. This is but one instance of the investments made by the private sector into the establishment of the university sector, alongside government contributions.[24]

At first the Transvaal University College was one of the colleges affiliated under the new University of South Africa, but in 1916 it broke away to became a stand-alone institution (the South African School of Mines and Technology). In 1921, under Act No. 15 of 1921, it became the University of the Witwatersrand.[25] And in 1930, its Pretoria 'wing' declared independence and with the passing of Act No. 13 of 1930 became the University of Pretoria (the latter being declared an Afrikaans institution in 1932).[26] Other colleges based in Pietermaritzburg, Durban, Bloemfontein, Grahamstown, Potchefstroom and other centres followed in subsequent years. However only three of these – Cape Town, Witwatersrand and Durban – had engineering faculties and their graduate output was small. Between 1918 and 1922 the average per annum was 55 and between 1923 and 1932 the average fell to 44.[27] (See Table 1)

In the early years there were two engineering programmes provided by the Transvaal University College, over and above apprenticeship training courses. The first was a continuation of the partnership with the South African College, where courses for third and fourth year students, who were preparing for the final examination of the University of the Cape of Good Hope, were provided; and, secondly a three-year general course in preparation for all branches of the professions, followed by a fourth year of study or practical work and a thesis of sufficient merit on an approved subject.[28]

By 1918, when the SAC was legally established as a university, it had a School of Engineering with 72 students, a number which grew to 169 by 1930.[29] The faculty offered a basic, four-year science degree in engineering (BSc (Engineering)), with common courses in scientific subjects for the first two years and two years of specialisation in civil, electrical or mechanical engineering with chemical engineering being added in 1921.[30] The programme was not purely theoretical however:

> … students had to spend twelve weeks at an engineering works off campus during their four years, while on completion of their degree they were obliged to serve 2-3 year indentureships with practising engineers before their own qualification to practise was recognized.[31]

This arrangement was influenced by the close links the university had with the engineering profession via the Faculty Advisory Board. The Board contained several leading engineers many of whom had commenced their training as apprentices followed by years of practical

[24] Phillips, *The University of Cape Town 1918 – 1948,* pp. 2-3.
[25] Boucher, *Spes in Arduis,* p. 163.
[26] *Ad Destinatum 1910 – 1960*: *Gedenkboek van die Universiteit van Pretoria*, Johannesburg: Voortrekkerpers Beperk, 1960, p. v.
[27] *Commission of Enquiry into the method of training for university degrees in engineering,* Report Part I and II, (The Straszacker Report), Pretoria: Department of Education, Arts and Science, 27 November 1964, p. 167.
[28] Lurie, *Technikon Witwatersrand*, p.12.
[29] Phillips, *The University of Cape Town 1918 – 1948*, p. 70.
[30] Phillips, *The University of Cape Town 1918 – 1948*, p. 71.
[31] Phillips, *The University of Cape Town 1918 – 1948,* p. 71.

work in engineering firms (like Hele-Shaw and Orr) who would have stressed the need for practical experience.

The numbers of Engineering Baccalaureates issued by the three universities began slowly, but grew gradually once the country came off the gold standard and the boom years kicked in. Significant growth however only happened during WWII as shown by the table below:

Table 5.1. Annual average (5 year blocks) of Engineering Baccalaureates: 1918 - 1952

Annual Averages (5 year blocks) of Engineering Baccalaureates	
1918 – 1922	55
1923 – 1927	33
1928 – 1932	54
1933 – 1937	97
1938 – 1942	163
1943 – 1947	203
1948 – 1952	334

Source: *Data for 1918-1952 from National Bureau of Educational and Social Research (51.3), Table 11) extracted from Commission of Enquiry into the Method of Training for University Degrees in Engineering, Report Part I and II, Table 7-22, Department of Education, Arts and Science, 27 November 1964, p 130.*

From the beginning it appears that there was a commitment by the universities to provide a theoretical foundation for engineering work. Carruthers attributes this to men like Henry Selby Hele-Shaw, an engineering scientist recruited from Britain 'to put technical education in South Africa … on a firm foundation'.[32] He was based at the Transvaal Technical Institute during his time in South Africa, 1904-1905. Carruthers has argued he …

> energised the study of engineering at a higher level in the country, emphasising its academic credentials and the importance of creative, innovative research. Additionally, he campaigned for an intellectual, rather than purely vocational approach to higher education, promoting engineering as a research discipline and employing competent teaching staff.[33]

Alfred Snape, appointed to head of Civil Engineering at the South African College in 1910, and himself one of the first university trained engineering lecturers, held that the faculty should:

> train the student well in fundamental scientific principles, to give him some indication of how these can be applied in practice and to develop his mental faculties so that he will be capable afterwards in practical life of functioning rightly as an engineer.[34]

It was apparently his brainchild, in line with dominant Germanic traditions at the time, that the first two years of the BSc (Engineering) course should be largely dedicated to scientific subjects as was the requirement that final-year students write two mini-theses, one on a design subject and one on a practical one.[35] This set it apart from apprenticeships that began with a more practical focus.

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[32] J. Carruthers, 'Henry Selby Hele-Shaw LL.D, DSc, EngD, FRS, WhSch (1854–1941): Engineer, inventor and educationist', *South African Journal of Science*, Vol. 106, No. 1/2, p. 36.
[33] Carruthers, 'Henry Selby Hele-Shaw', p. 38.
[34] Cape Town Branch of South African Institution of Civil Engineers, *The Snape Papers,* Cape Town, 1969, p. 34 as cited in H. Phillips, *The University of Cape Town 1918 – 1948*, p.76.
[35] Cape Town Branch of South African Institution of Civil Engineers, *The Snape Papers,* Cape Town, 1969, p. 34 as cited in H. Phillips, *The University of Cape Town 1918 – 1948*.

As university education was being restructured, so too was that pertaining to apprentices and more broadly, of technical training. The Higher Education Act No. 30 of 1923 brought the institutions for technical training under the Union Education Departments and provided for their development as technical colleges.[36] In 1924 arrangements were made with the Transvaal Education Department that all continuation classes of the Department should be administered by the Technical Education Board set up by the University of Witwatersrand and chaired by John Orr.[37] As a result there was a growing division between the examinations set for the Preliminary, National and Advanced Technical Certificates (PTC, NTC and ATC). This separation, of university qualifications and non-university qualifications, is arguably the first major 'rupture' of the career path ladder outlined in Chapter 2. The fact that the certificates and diplomas previously issued could be converted to degrees only 'if their qualifications were considered of sufficient standing'[38] did not resolve the disjuncture that had been created as the question of 'standing' or equivalence was not automatic. And although the British-influenced technical colleges fought to retain the right of apprentices to study beyond the minimum qualification required for artisan status and to study throughout their apprenticeship, the value of the final qualification along this path – the Advanced Technical Certificate II – ceased to be viewed as equal to a university degree.[39] This was because they were not viewed as having acquired sufficient 'fundamental scientific knowledge' to undertake high level engineering work.

There were those who attempted to bridge this divide, such as L.H.L. Badham, Past President of the SAIEE and the employer association, the Steel and Engineering Industries Federation of South Africa (SEIFSA), who proposed an alignment between the two:

> The standard of the subjects available at the technical colleges must be raised so that the part-time can attain technical knowledge equal to that given at the university. National examinations should be instituted of a standard recognized by the large chartered professional engineering institutes. …
> What we must do, however, is to break down the barriers that have been set up, by tacit agreement between the technical colleges and the universities of this country, whereby the part-time engineering student cannot obtain a standard of technical knowledge equal to that of a degree, without attending a university. Are the university graduates afraid of competition?[40]

He went on to elaborate his views: 'There are missing rungs in our ladder to the peak of our efficiency,' Badham warned, 'let us get together and provide the means to bridge the gaps'.[41] He had practical suggestions on how this might be achieved:

> After entry into industry, apprentices could be interchanged between factories to obtain wide experience. It may even be advisable for the apprenticeship contract to be between the apprentice and an employers' organization instead of an individual employer. The grade of 'engineering apprentice[42] must be introduced either under the Apprenticeship Act or by means of

[36] Malherbe, *Education in South Africa, Volume 2*, p. 170.
[37] J. Lurie, *School of Mines and its Alumni, 1926 – 2002*, Technikon Witwatersrand, Fishwicks, 2003, p. 12.
[38] Boucher, *Spes in Arduis*, p. 137
[39] As they had been in the Post Office: 'Editorial', *The Live Wire*, The Official Organ of the South African Telephone and Telegraph Association, Cape Town, April 1945, p. 3.
[40] L.H.L. Badham, 'The Education and Training of Engineers for Industry', seconding the vote of thanks to A.P.M. Fleming, *Transactions of the SAIEE*, October 1946, p. 238.
[41] 'The Education and Training of Engineers for Industry', p. 242.
[42] Engineering Apprenticeship was a term used for a higher form of apprenticeship leading to engineer status. F.C. Fensham, *Die pad van die Akademie (1909 – 1984)*, Akademie 75, Goodwood, Kaap: Nasionale Boekdrukkery, pp. 3-4.

> an industrial agreement. Technical colleges must raise the standard of part-time technical education, which may be accomplished in association with the provisions of the Adult Education Act. 'Pupil engineer' training must be recognized throughout the Union and suitable provision made. The grading and transfer of apprentices could become one of the functions of the apprenticeship committees. Finally, ample funds must be provided in order that our finest raw material, namely, the youth of this country, shall not be restricted.[43]

Sadly his views were not engaged with. The question for this study is 'why not?' The answer would seem to lie under the following two headings: Occupation and organisation and Political Economy. The question will also be revisited under the final Evaluation and Impact section.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

> In the 18th century, all engineers had been military engineers and were regarded as manual workers with a low status. 'Civil engineering' (engineering for civilians and civilian life) came into its own in tandem with a growing academic trend in engineering education, which saw the foundation of the Institution of Civil Engineers in 1818, the Institution of Mechanical Engineers in 1847, and the Institution of Electrical Engineers in 1871.[44]

As noted in earlier chapters, equivalent organisations of engineers were established in South Africa in the early 1900s (South African Institute of Civil Engineers - 1903, South African Institute of Electrical Engineers - 1909, the South African Institution of Certificated Engineers - 1910, the South African Institution of (Mechanical) Engineers - 1911). But whilst these organisations were being brought into being, John Orr noted, when presenting his paper on '*The Education and Training of Artizans and Mechanical Engineers, with Special Reference to South Africa'* to the Transvaal Institute of Mechanical Engineers, in 1908, that:

> Unlike the case of Germany and some other countries, here (in South Africa) we have no sharp line of demarcation between the artisan and the engineer. Many of the best men have by sheer ability, force of character, and hard work risen from the ranks of the former to the latter.[45]

It took over half a century for the 'sharp lines' to gain definition. They only began to crystalize during and after the Second World War, but new organisations, established precisely to drive these debates, began taking shape in the 1930s. They are briefly introduced here but a fuller account of their deliberations will be given in both the later *War Years* and *Professional Engineers* chapters. These debates have a seminal importance for the discussion on career pathing.

These organisations are given the focus they are because they were to play a key role in the re-design of engineering training in South Africa. The three to be considered are:

1. The 'Status Committee' (led by the traditional engineering societies)
2. The Engineering Graduates Association (EGA), which became the Engineers' Association (South Africa) (EA(SA))
3. Die Akademie van Wetenskap en Kuns ('die Akademie').

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[43] Badham, 'The Education and Training of Engineers for Industry', p. 242.
[44] G.S. Emmerson, *Engineering education: a social history*, New York: David & Charles, Newton Abbot, Crane, Russak & Co, 1973, as cited in Carruthers, 'Henry Selby Hele-Shaw', p. 35.
[45] J. Orr, 'The Education and Training of Artizans and Mechanical Engineers, with Special Reference to South Africa'*, The Journal of the Transvaal Institute of Mechanical Engineers*, Vol. VII, August to July, 1908-9, pp. 68-69.

They had two common characteristics: they spanned all engineering disciplines, and were focused primarily on securing a 'closed' occupation of 'professional engineer', discrete from that of artisan, with its own unique identity and entry pathway and with equivalent status to that of other professionals such as lawyers and doctors.

The 'Status Committee'[46]

A discussion about the status of the engineer, vis-à-vis other professions and the artisans, had begun even before the traditional engineering societies had been established, according to J. H. van den Heever, a Government Attorney, in an address to the Engineers' Association (South Africa) in 1946:

> About the year 1890, so far as I can ascertain, this matter was first raised in the old Cape House of Parliament by Sir Gordon Sprigg. He introduced a Bill which had for its object the protection of Civil Engineers and Architects. Apparently both professions then in South Africa were not highly qualified, because they opposed it on the ground that overseas men had opportunities and facilities which local youths did not have, and these would, therefore, be penalised if the protection depended upon high qualifications. The Bill was dropped.[47]

He went on to quote from the Presidential Address of G. Steward delivered to the first meeting of the SA Society of Civil Engineers:

> The next attempt to obtain 'legal status' was fostered by this Society. In 1904 it persuaded the then Attorney-General of the Cape to introduce a Bill entitled: "Bill to control and regulate the practice of the profession of Civil Engineers". … The Bill was read a first time and put down for second reading on 10th April 1905. Owing to opposition from mechanical and electrical engineers, land surveyors and others, an amended Bill was considered. ….. but in 1907 it was dropped, principally because of the difficulty of defining the respective spheres of activity of several branches of engineering.[48]

John Orr lamented that this issue had been dropped, and asked the Transvaal Institute of Mechanical Engineers in 1908:

> Can nothing be done to give a status to members of the engineering profession? The certification of mine resident engineers has undoubtedly increased their prestige, but there is nothing at the present moment to prevent the veriest novice from styling himself an engineer. … To become a properly qualified engineer probably involves more years of hard work and exacting study than any other profession, and yet we have remained content to allow any unqualified man to practice in a professional capacity. The establishment of systematic courses for the training of engineers will, I hope, tend to place mechanical engineering on a level with other professions.[49]

In his paper Orr made reference to a British committee, consisting of representatives of the different engineering organisations there, that had been set up to review 'The Education and Training of Engineers'. This Committee's report, tabled in April 1906, specified that 'the principle shall be maintained that the education of an engineer must include both practical experience and scientific training'. Orr went on to explain that the Council of the Transvaal Institute of Mechanical Engineers 'has followed such an excellent precedent in forming a

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[46] A history of this process is provided on the Engineering Council of South Africa's website: https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf accessed 31 January 2019. This history provides more detail but does not deal with the issues of this study i.e. the position of artisans vis-à-vis engineers.

[47] J.H. van den Heever, 'Have Engineers a Legal Status?', *EASA Bulletin*, Vol 3, No. 1, July 1946, p. 17.

[48] *Ibid,* p. 17.

[49] Orr, 'The Education and Training of Artizans and Mechanical Engineers, with special reference to South Africa', p. 75.

Committee to consider the local education and training of engineers and artisans'. He went on to propose a 'sandwich' system for training of engineers along the following lines:

First year	In workshops
Second year	First six months at College; second six months in workshops
Third year	Ditto
Fourth year	Ditto
Fifth year	First six months at College; second six months in drawing office

However he claimed that the bottom line was that 'it has come to be generally recognised all over the world that to become a qualified engineer involves a college training'.[50] The issue therefore was less whether scientific principles should be taught but in what sequence with practical training and at what cost.

Some feared that one 'systemic course' for engineers could mean that the progression route from artisan would cease. Lashinger was one of these. He argued that where the profession had been effectively closed, as in Europe and England:

> … the apprentices had no chance of getting to the top of their profession, and it was the inventive genius of men who had risen from the ranks who had evolved these inventions which made for progress of engineering and civilisation generally. The time might come when engineering should be made a closed profession, but he thought that in the present stage of advancement, which came more from the bottom than from the top, the time was not yet when mechanical engineering should be made a closed profession.[51]

Lashinger went on to argue that an error of judgement by an engineer did not have the same 'life and death' consequences as did such an error on the part of a doctor, lawyer or an architect. However this point was countered by A.S. Osteicher who argued that the consequences for such an error of judgement were indeed as severe saying:

> Let us recognise what an error in judgement on the part of an Engineer means: If he designs a part of a structure too weak, say a grandstand, then a large number of lives are endangered, or if he omits the overflow in an earth dam, scores of persons may be drowned, and property destroyed. Should a steam engine cover or part of an engine be badly designed, an explosion may occur with loss of life, in fact it is difficult to imagine a profession where more serious responsibilities arise. At present any man could style himself a Mechanical, Structural or Civil Engineer and he therefore was firmly of opinion that Engineering should be a closed profession.[52]

But at the end of the day this was not the hottest issue. At the heart of the matter was the affordability of full-time college/university training not whether or not it was desirable. Aspinall argued in 1948 that:

> Full-time attendance at a university for a period of four years is almost invariably out of the question owing to the lack of financial resources, even though the student is prepared to work as a journeyman during the university vacations. … It is apparent that, under present conditions, the students concerned have practically no access to the higher scientific training such as that conducted by the universities.[53]

[50] Orr, 'The Education and Training of Artizans and Mechanical Engineers, with special reference to South Africa', pp. 68-72.
[51] As cited in, J. Orr, *The Journal of TIME*, Vol VII, August to July 1908-9, pp. 165-6.
[52] As cited in, J. Orr, *The Journal of TIME*, Vol VII, August to July 1908-9, p. 274.
[53] H.T. Aspinall, 'Presidential Address', p. 18.

In other words this was, at least in part, a class question, as working class parents were presumably the ones that could not *afford* university training for their children. It had already been recognised as such in the British system prior to 1939:

> There were then two clear routes to professional engineer status:
> (1) If one's parents possessed sufficient money, one went to university, and then into a suitable engineering concern to obtain practical training and experience for about two years. …
> (2) [If one's parents didn't possess sufficient money] [o]ne became a craft apprentice, studied in the evenings or part time to take craft and/or national certificate examinations, and to satisfy the examination requirements of the appropriate engineering institutions. …
> In essence, the form of education was determined largely by the form of the Society in the country. … (S)election was made mainly on material wealth, not personal abilities.[54]

The matter was still in discussion decades later. Aspinall argued that there would be economic consequences if only the university route was available:

> At the Witwatersrand Technical College approximately 8000 apprentices in the mechanical and electrical engineering, building and associated trades attend classes. Excluding the apprentices in the building and allied trades and assuming 10 per cent of the annual outflow as a very conservative estimate of those ambitious students capable of benefiting by advanced technical training, we find that there are approximately 100 apprentices each year, on the Witwatersrand alone, denied the advantage of a full-time course leading to a standard equal to that of a university degree. From the point of view of higher scientific training the loss to the country over a period of years is considerable.[55]

And Rowe supported him in his presidential address a year or two later:

> While giving the fullest recognition to the many advantages to be derived by attendance at a full-time course in engineering at the university, it is both unfair and unnecessary to withhold corresponding part-time facilities from talented young men whose sole shortcoming is on the financial side.
>
> The view has been expressed by opponents of projected developments in this direction in South Africa, that there would be no need for the creation of these facilities if adequate bursaries could be made available for full-time attendance at the universities. This sentiment will meet with universal agreement, but when one considers that the young man concerned will have completed his apprenticeship, and started to earn journeymen's pay – and in some cases will have added to his responsibilities by marriage – it is clear that such bursaries would have to include, not only tuition and books – about £100 per year – but also subsistence on a substantial scale, so that the amount involved would be at least £400 - £500 per annum for four years. It is scarcely likely that the most altruistic minister of Finance would agree to the creation of many bursaries of this magnitude.[56]

One must therefore question whether another dimension of the debate had to do with controlling the supply of engineers for market-benefit reasons, as for the dentists discussed below?

A third attempt to formally address the matter was made by the Civil Engineers in 1914, according to van den Heever:

> In April, 1914, a third attempt was made by members to raise the status of the profession of Civil Engineers in South Africa. … The Society decided that the difficulties to be overcome to obtain a Bill were too great. The Council considered it would be better that the first step to be taken should be to obtain a charter similar to the Charter of the Canadian Civil Engineers. A draft

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[54] H.L. Haslegrave, 'The evolution of education and training for engineering in a changing environment', Twentieth Bernard Price Memorial Lecture 1971, *The Transactions of the S.A. Institute of Electrical Engineers*, Vol 63, 1972, pp. 261-2.
[55] H.T. Aspinall, 'Presidential Address', pp. 19-20.
[56] A.W. Rowe, 'Presidential Address: Present Trends in Apprenticeship Training and Technical Education', *The Journal of the South African Institution of Engineers*, July 1951, p. 359.

> Charter was being prepared when war broke out in 1914, and under the special circumstances existing at that time, it was felt to be useless to approach the Government, and the matter was left in abeyance.[57]

This issue of a Charter, with its British roots, was the model to which the early societies returned again and again – because it conferred onto the *institutions* the authority to determine the rules for entry into (and exclusion from) the profession – and not the *government*. This was seen to be highly desirable even though it did not necessarily, as in the British case, stop non-members from practising (which was the ideal), but it did confer a status to members that had market value. Certainly the mechanical engineers were of the view that 'society recognition' was preferable to the 'registration of individual engineers'.[58] Apparently little was done between the years 1918-1929 but in July 1929 at a meeting of the Society held in Pietermaritzburg, Walter M. Campbell brought forward the question of protection for the profession. And for all that the Certificated Engineers were 'not affected', as they already had statutory recognition, they too were engaged in debates on these issues as Braidwood in his Presidential valedictory address in 1929 said:

> The status of the qualified engineer has for some considerable time exercised the minds of your Council, with a view to improving that status. Much work has been done, and more still has to be done before the results of our labours will bring fruit, and I trust that in the coming year we shall be able to come before you with concrete proposals.[59]

It took a few years longer but:

> On the initiative of the S.A. Institution of Engineers in 1935, a so-called Status Committee was created. It consisted of representatives of the SA Society of Civil Engineers, SA Institution of Electrical Engineers and the SA Institution of Engineers. It's duty, broadly speaking, was to go ahead with a Bill which would obtain a legal status for the three branches of the profession. [60]

As seen in Chapter 3 the SAIEE had a dedicated committee to prepare their input into the meetings of this broader joint Status Committee. This flurry of activity took place in a context where many of the other professions were making headway with their closure claims:

> The twenties were generally a difficult decade for the professions, giving rise to alarmist talk of an over-supply of university graduates. It was simultaneously an important decade for defining and protecting access to the professions in South Africa. During the decade Parliament enacted legislation to supplement or supersede pre-Union laws regulating admission to several of the professions. It passed the Admission of Advocates Act (No. 19 of 1921), which amended the pre-Union laws on the admission of advocates; the Chartered Accountants Designation (Private) Act (No 13. Of 1927), which conferred upon the members of the four provincial societies of accountants the use of the designation Chartered Accountant (South Africa); the Architects and Quantity Surveyors (Private) Act (No. 18 of 1927), which established the Institution of South African Architects as a national statutory body and restricted the right to practise to registered architects and quantity surveyors; and the Medical, Dental, and Pharmacy Act (No. 13 of 1928), which established the South African Medical Council and the South African Pharmacy Board as statutory bodies. This last Act had first been proposed in 1923 but had been held up by the contentious clause 34, which provided penalties for practising by unregistered persons.[61]

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[57] J.H. van den Heever, 'Have Engineers a Legal Status?', *EASA Bulletin*, Vol 3, No. 1, July 1946, pp. 17-18.

[58] J. Ralph Draper, *The Engineer's Contribution: A history of the South African Institution of Mechanical Engineers 1892 – 1967,* Kelvin House, 2 Hollard Street, Johannesburg, 1967.

[59] 'Presidential valedictory address: Braidwood', *Journal of the Association of Certificated (S.A.) Mechanical and Electrical Engineers*, January 1929, p. 157.

[60] J.H. van den Heever, 'Have Engineers a Legal Status?', *EASA Bulletin*, Vol 3, No. 1, July 1946, pp. 17-18.

[61] Bruce K. Murray, *WITS the early years: A history of the University of the Witwatersrand, Johannesburg, and its Precursors, 1896 – 1939*, Witwatersrand University Press, Johannesburg, 1982, pp. 162-3.

These Acts were demonstrably assisting the relevant professions to deal with another problem – that of over-supply and falling incomes during the depression years. Murray has recounted the case of the dental profession:

> What concerned the *Dental Journal* was that 'the practical effect of this disproportion between the supply of dentists and the demand for their services has been to reduce the average income of the dentist throughout the country'. … The Dental Association responded to the problem of declining incomes in a number of ways. One was to secure protection for registered dentists against the competition of 'dental mechanics' and this was finally achieved in 1928 with the passage of the Medical, Dental, and Pharmacy Act.[62]

It is unlikely that the dentists were alone in this.

So the pressure was on the engineers. They rose to the challenge, undertaking huge amounts of work in this area. The progress of the Status Committee was reported by Dr. F.E. Kanthack to the SA Society of Civil Engineers.

(1) The question of protection for qualified Engineers had worried the profession for many years.
(2) Protection was necessary in the interests of the public, and he mentioned, for example, unqualified mining engineers.
(3) Protection for all Engineers – Civil, Mechanical and Electrical – was essential because the Government would consider nothing less and, therefore, the three chief bodies were co-operating.
(4) A Bill had been drafted by these three bodies.
(5) The drafting of this Bill had entailed lengthy and numerous meetings, much travelling and interviews with Heads of Departments and Ministers of State.
(6) The draft Bill could not be circulated amongst members because:
    a. Members could not keep it secret and if they did not, antagonistic parties would make propaganda against it.
    b. Before the Government agreed to it, it would be unwise to make its contents public.[63]

His report carried significant authority given that he, together with J. White, had both been appointed by the Association of Scientific and Technical Societies (to which the engineering institutions were all affiliated) to advance this work.[64] Kanthack had heard the presentation and had been confidentially shown a copy of the Draft Bill, and whilst not at liberty to disclose its contents, he nevertheless outlined its key propositions:

(1) The Bill was for the protection of the public and the Profession.
(2) It would lay down a minimum qualification.
(3) Vested rights would and must be protected, i.e. those who presently were looked upon as engineers, would have to have their rights entrenched in the Bill.
(4) The Bill was based on membership of the three Societies. In other words, only members of these Societies would in future "qualify" as engineers in terms of the Bill.
(5) These Societies would determine what future qualifications were necessary.
(6) Membership in the Societies would become compulsory.
(7) Certificated Engineers i.e. 'Government ticket men' would be unaffected.[65]

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[62] Murray, *WITS the early years: A history of the University of the Witwatersrand, Johannesburg, and its Precursors, 1896 – 1939,* Witwatersrand University Press, Johannesburg, 1982, pp. 185-6.
[63] Dr. F.E. Kanthack, 'Minutes of Proceedings of the SA Society of Civil Engineers', reported in the Minutes of Proceedings of this Society at their fifth meeting in the Session 1937, as cited by van den Heever, in *EASA Bulletin*, Vol. 3, No. 1, July 1946, pp. 18-19.
[64] Dr. M. R. Gericke, *Period 1890 to 1968,* See ECSA History, 'Towards the end of 1938 the Controlling Executive of the Association of Scientific and Technical Societies became interested in the matter and appointed Messrs Kanthack and White to approach the responsible Minister', http://www.ecsa.co.za/ p. 4. Accessed 28 May 2008.
[65] Van den Heever, 'Have Engineers a Legal Status?', pp. 18-19.

Van den Heever noted that 'nothing much more was done from 1937 to 1939 and in that year war came and presumably everything was abandoned'.[66] However he understood that the Status Committee was again functioning in 1946 - 'In fact it held a meeting the night before last.' Of importance to note in this account is the emphasis given to the Societies in the proposed system. This was to be a point of great difference between the traditional Societies and the university graduates as the account in later chapters will show. The engineering societies wanted the right to determine the criteria of membership enabling them to retain their authority to continue to recognise those with more practical experience alongside those with higher theoretical qualifications as engineers – both of whom occupied the membership seats of these institutions at this time. Whilst, as will be shown below, the graduates favoured BSc (Engineering) as the minimum entry qualification.

What is interesting to note here is *where* the battle lines were being drawn: they set the two pathways to engineer – apprenticeship plus further 'college' study on the one hand and university BSc(Engineering) on the other – as the alternative, not as parallel possibilities. This in a context where, as already noted in Chapter 2, the level of depth reached through the former route could be at least equivalent to that of a university degree, albeit without necessarily covering the same breadth[67] and where a number of state departments such as the Department of Mines, the South African Railways and Harbours Administration, the Post Office, gave recognition to the Advanced Technical Certificate (part II) for access to entry-level engineering posts.[68]

The remaining two organisations began to participate in this discussion during the war years. Their contribution will therefore be detailed in later chapters, but as they were to play a major part, their roots are briefly outlined below.

The Engineering Graduates Association (EGA) later called the Engineers' Association (South Africa) (EA(SA))

In October 1931 eight final year Electrical Engineering undergraduates of the University of the Witwatersrand arranged to meet, ten years after graduation, in order to exchange notes on experiences gained during that decade.[69] One of these men, Henry Phillip Alexander, ensured that this undertaking was met. He co-convened a reunion dinner on 15 November 1941 to which other 1931 graduates of the Mechanical and Civil Engineering Branches, and also some members of the University engineering teaching staff, were invited. At this dinner the idea of the Engineering Graduates' Association (the EGA) was formulated.[70] The Association was formally launched on 18 August 1942 and continued to operate until 25 October 1945. During this period it launched a Pretoria Branch at the University there. Once there were two branches it was resolved to broaden the remit of the organisation and re-name it the Engineers' Association (South Africa) (EA(SA)). Its principal and primary objective being 'Promotion of

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[66] Van den Heever, 'Have Engineers a Legal Status?', pp. 18-19.
[67] Interview M. Gow, 22 January 2007. See Chapter 2: 'The Assistant Engineers' Examination was commonly called the Competitive Examination because 'if the Post Office needed two Engineers that year, the two chaps with the highest marks (providing they had got more than 65%) were accepted'. Personal correspondence B. Round, 1 January 2007: 'It was set by the Chief Engineers' Office of the Post Office and whilst not as broad as a university-based qualification, its depth was certainly comparable.'
[68] H.T. Aspinall, 'Presidential Address', p. 15.
[69] 'Memorandum of the National Council [EA(SA)] on the Principal Aims and Objects of the Engineers' Association (South Africa)', *Journal of the Engineers' Association (South Africa),* year and volume unknown, [about 1947/8], p. 4.
[70] *Journal of the Engineers' Association (South Africa),* September 1956, p. 120.

the Status of the Engineer'.[71] Of significance to this discussion is the fact that *only* university engineering graduates (of any branch) were permitted to join.
The principal aims were embodied in a Memorandum issued by the newly-named National Council [E.A.(S.A.)]:

PRINCIPAL AIMS

(a) To promote a spirit of co-operation amongst graduate engineers in this country and to include in our roll of Senior Members, Members and Graduate Members, all engineering graduates of Universities recognised by the Association, so as to enable qualified engineers to present a solid front in their endeavours to obtain legal status for their profession.
(b) To draft, submit and pilot through Parliament a Bill establishing the status and defining the qualifications required of statutory engineers, thereby ensuring their protection and that of the community against the incursion of unqualified persons into the profession.
(c) To publish, quarterly at the onset, an Association "Journal and Digest", the object of which would be to provide a printed publication, the material of which would consist mainly of
  (i) Original articles relating to investigations and researches carried out by members of the Association.
  (ii) Critical reviews of papers and articles of current interest relating to matters of engineering or general scientific interest.
  (iii) To establish, in a suitable centre, an Engineers' Association Club, with a comprehensive Technical Library, conference and club rooms and a competent secretarial and catering staff, to meet the needs of the Association as a whole. Branch clubs to be established in other centres as and when considered necessary.[72]

Regarding the first of these principal aims the following text of the Memorandum made clear that '(t)he admission of University graduates only' would be permitted as members of the Association.[73]

In concluding this brief introduction to EA(SA) it warrants noting that the Association did not see itself purely as a technical society. It envisaged itself playing a role in the broader political and social arena. This was underlined by R.M. Seawright, BSc (Eng.) in a paper published in the Association's Journal, entitled '*Quo Vadis?'*:

> It is painfully obvious to most of us that whilst the engineer may be well qualified to deal with the manipulation of material resources, he is not always so well equipped to engender conditions favourable to this manipulation in the social and economic sense. … It is becoming more and more apparent that social and economic factors have to be given some specialised technical attention if they are not to discount all our modern technology.[74]

[71] 'Memorandum of the National Council [EA(SA)] on the Principal Aims and Objects of the Engineers' Association (South Africa)', *Journal of the Engineers' Association (South Africa),* year and volume unknown, [about 1947/8], p. 4.
[72] Memorandum of the National Council [E.A.(S.A.)] on the Principal Aims and Objects of the Engineers' Association (South Africa), *Journal of the Engineers' Association (South Africa),* year and volume unknown, [after October 1945], p. 5.
[73] *Ibid.*
[74] R.M. Seawright, 'Quo Vadis?', *Journal of the Engineers' Association (South Africa),* year and volume unknown, [after launch in 1946], p. 64.

And in this vein he took a side-swipe at the traditional societies saying that there was a tendency to organise on an increasingly specialised *technical* basis 'which could be carried to unproductive extremes'.[75]

Die Akademie vir Wetenskap en Kuns

Before 1942 there was no university in South Africa that offered an engineering degree programme in Afrikaans.[76] And in 1939 only 4.7 per cent of all engineers were Afrikaans speaking - the remaining 95.3 per cent were 'others', of whom the majority were English speaking of British descent.[77] This represented a decline from the 5.1 per cent in 1926.[78] This was a source of deep concern to those affected. Their story has been told by Dr. A.J.A. Roux[79] and it is from him that the following account is largely taken.

In 1937 a group of Afrikaans speaking students at the University of the Witwatersrand, supported by sympathetic professors, lecturers and others further afield, formed *Die Afrikaans Vereeniging vir Wetenskap en Wysbegeerte* (Afrikaans Association for Science and Philosophy) (AVWW). They published a journal called *Die Afrikaanse Denker*, (The Afrikaans Thinker), the first edition in October 1937, foreseeing it to be not only of great intellectual benefit to the Afrikaner nation but more broadly, culturally, 'as hulle die geleentheid gegee word om in hulle eie taal te dink, te praat en te skryf' (if they are given the opportunity to think, speak and write in their own language).[80] The same publication foresaw the benefit of a national Afrikaans Academy for Science and Philosophy – but it was early days.

Leading this group was a small number of Afrikaans-speaking engineering students concerned that there was neither a faculty of engineering where they could study in their own language nor was there an engineering society where they could discuss engineering matters in their own language. The organisation was short-lived and did not survive their departure from university. However the idea of such an organisation proved to be more resilient. On 11 November 1940 another group of Afrikaans engineers and scientists established the '*Afrikaanse Akademie vir Wetenskap en Tegniek'* (Afrikaans Academy for Science and Technology). R.L. Straszacker was at its launch, as too was F.J. de Villiers, both of whom were to play important roles in discussions about the future direction of engineering in the country. The oft-quoted Dr A.J.A. Roux and Dr Mönnig, a veterinarian, were also key drivers.[81]

No sooner had this Academy been launched than it was approached by the *Suid-Afrikaanse Akademie vir Taal, Lettere en Kuns* requesting a merger. The Suid-*Afrikaanse Akademie vir Taal, Lettere en Kuns* (the Akademie) had been established in 1909 to promote Afrikaners' language, their culture and history. The Bill ushering in the Union of South Africa was signed

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[75] R.M. Seawright, 'Quo Vadis?', *Journal of the Engineers' Association (South Africa),* year and volume unknown, [after launch in 1946], p. unknown.
[76] A.J.A. Roux, 'Die Konsolidering van die Afrikaner in die Natuurwetenskappe'*, Opdrag van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, *Feesalbum 1909 – 1959*, J.L. van Schaik, Bpk. Pretoria, 1959, p. 52.
[77] S. Pauw, *Die Beroepsarbeid van die Afrikaner in die Stad*, Pro Ecclesia-Drukkery (Edms.) Bpk, Stellenbosch, 1946, Table XXVI, p. 236.
[78] *Ibid,* Table XXIII, p. 222.
[79] A.J.A. Roux, 'Die Konsolidering van die Afrikaner in die Natuurwetenskappe'*,* pp. 51-56.
[80] *Ibid*, p. 52.
[81] Interview with Prof. Kapp, 30 July 2008.

in May 1909 and the founding meeting of the Akademie was on 2 July 1909. The proximity of the two dates being no accident according to Professor Kapp, a prominent Akademie historian, who has shown that the Afrikaners were afraid that the English victory in the South African war would translate into the loss of their identity.[82]

As Prof. Kapp explained, the Akademie was modelled on European rather than British traditions:

> It was modelled completely on the European model. That's something very important to understand. There's no equivalent of this in England or America, it's a completely European concept of an Academy that invites its own members to join, provided that they have reached a certain stage of excellence before they can become (members). The model was based on Germany, France, Belgium, Holland, Sweden and Italy. And until today, the Dutch one still has only 100 members – so you can't become a member before one of the 100 has died! So it is very, very difficult to become a member of the Dutch society. The Belgium and the French ones were the strongest influence, and then the Italian … Germany has an Academy for every state, so they have several academies.[83]

When it was first established the Akademie limited the number of its members to 50 – a limit which was confirmed when the Akademie was given legal status in 1921 with the passing of a Private Members' Act (Act No. 23 of 1921, clause 3).[84] However the Act permitted the Akademie to adjust its membership limit (clause 5a) and using the powers under this provision its membership cap rose first to 100, then to 150, to 200, to 400. Prof. Kapp recounted that 'for many, many years people could not become members unless there was a vacancy, which kept many people out'. Vacancies, as they arose, were filled by the governing council which selected from those who met three criteria: they had to be Afrikaans speaking, hold a doctoral degree and be an acknowledged expert in their field.[85] This was the cordon they drew around themselves to sustain their highly elitist body.

When they looked back on their first fifty years in 1959 they were able to count amongst their members four prime ministers (J.B.M. Hertzog, J.C. Smuts, D.F. Malan and J. G. Strijdom) and the same number of education ministers (F.S. Malan, D.F. Malan, J.H. Hofmeyr and H.A. Fagan). This membership profile predisposed them to support high entry qualifications to the profession of engineering and to pay little attention to alternative progression routes from 'humbler' places. They wanted to train an increasingly large Afrikaner elite. One of the first motions of the *Akademie* was to mobilise for the equal use of English and Afrikaans by the University of the Cape of Good Hope. As a step in this direction they mobilised successfully to secure a seat on the UCGH's Council.[86]

The Akademie was formally independent of any political party in spite of this membership profile, as Prof. Kapp explained:

> The Akademie is very insistent that they are an independent organisation and that they will not be prescribed to by anybody. So the links were informal, it was individuals rather than organisations. ... the Akademie was older than the Broederbond. They were rather sceptical about the founding of the Broederbond, and they were keeping a very good distance from them

[82] P. Kapp, *Draer van 'n Droom: Die geskiedenis van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, 1909 – 2009, Hemel & See Boeke, 2009.
[83] Interview with Prof. Kapp, 30 July 2008.
[84] F.C. Fensham, *Die pad van die Akademie (1909 – 1984),* Akademie 75, Nasionale Boekdrukkery, Goodwood, Kaap, p.5.
[85] Interview with Prof. Kapp, 30 July 2008.
[86] Kapp, *Draer van 'n Droom*, p. 334.

> although for a period they had the same person as Secretary – but that was between 1930 and 1947 when they had no fulltime Secretary at the Akademie. The Akademie got its first fulltime Secretary in 1947.[87]

The Akademie's networks and contacts enabled it to function like a 'think tank' for Afrikaners which those in power were predisposed to listening to very sympathetically. Indeed, its members enabled the Akademie to have a '*noue aanraking en vrugbare samewerking'* (close contact and fruitful cooperation) with government as Dr. Serfontein, the Minister of Education, Arts and Science, was to say on the occasion of the Akademie's 50th anniversary in 1959. He went on to say on the same occasion: 'The Department greatly values the friendly cooperation of the Academy with different aspects of its exceptionally important work.' Indeed some, like F.J. de Villiers, were both members of government departments and the Akademie. Through this access and status they were able to exert considerable influence on government in the areas where they were active.

Initially the *Akademie* had no interest in science, it focused rather on formalising spelling and grammatical rules for Afrikaans. However, from 1918, one of its literary members, D.F. Malherbe, had been advocating the widening of its scope to prevent Afrikaans scientists being lost to English organisations. When Malherbe became Chairman of the *Akademie* in 1927, he was able to advance this idea further and he established a reorganisation committee, which in 1929 led to its opening up its membership to individual scientists. Whilst some prominent Afrikaans scientists joined, there was little organisational progress until 1937 when the initiative at the University of the Witwatersrand, outlined above, began to stir. Roux notes that amongst those driving this initiative were F.J. de Villiers, R.L. Straszacker and himself, men who were subsequently appointed to the Council of the new Faculty.[88] This is how Prof. Kapp recounted these events, echoing an account given earlier by Fensham:[89]

> When the *Akademie vir Taal, Lettere en Kuns* appealed to the founders of '*Afrikaanse Akademie vir Wetenskap en Tegniek'* to join with them and at a meeting on 23 and 24 May 1941 agreement was reached. This led to the renaming of the Academy and the broadening of its scope. This was given legislative effect when Act No. 8 of 1942 was passed. It became *Die Akademie vir Wetenskap en Kuns* (The Academy for Science and Art). It then divided its work under two branches or what it called 'Faculties', one for the arts and one for the sciences … The Faculty for Science and Technology was launched at the meeting in 1941. This Faculty initiated a number of '*Afdelings*' (Sections) to facilitate work in different areas of specialisation. The *Afdeling Ingenieurswese* (Engineers' Section) was the first to be established in 1942. They introduced two new levels of membership based on their experience with other engineering societies: one for Associate Members which was supposed to include all qualified Afrikaans engineers and the other for Student Membership. In that way, in the '50s, they were able to play so powerful a role in the *Akademie*. They had the numbers behind them.[90]

This shift in membership rules was clearly also a break from the earlier 'closed shop' approach. National meetings were difficult to convene as members were spread across the country and transport difficult, so the *Afdeling Ingenieurswese* established branches in Pretoria, Johannesburg, Sasolburg, Bloemfontein and Stellenbosch where members could meet and

[87] Interview with Prof. Kapp, 30 July 2008.
[88] Roux, *Die Konsolidering van die Afrikaner in die Natuurwetenskappe,* p. 53.
[89] F.C. Fensham, *Die pad van die Akademie,* p. 6.
[90] Interview with Prof. Kapp, 30 July 2008.

exchange ideas.[91] And with this move came an expansion of its membership: on 3 December 1942 it had 35 members, in 1948, 86, and in 1958 the number had risen to 180.[92]

It was from this base that the *Akademie* urged government to allocate public funds for an *Afrikaans* university engineering faculty. In this they were successful and in 1942 just such a faculty was launched at Stellenbosch University. Staffing this faculty was a challenge, but as many of the *Ingenieursafdeling's* members had completed their post-graduate studies in Germany before the war,[93] it was from this pool that they recruited. Dr. Straszacker (a founding member of the engineer's faculty of the *Akademie*), was deployed in 1942 to establish the Stellenbosch faculty personally.[94] This strengthened the German influence in the engineering faculties of the South African university system.

POLITICAL ECONOMY

As previously shown, the 1930s were a time of growth for South Africa. This is clearly shown in the table below:

Table 5.2. Growth in Basic Metal Industries: Establishments, machinery, employment and net output – 1933-1939

Basic Metal Industries (1933-1939)

Year	Establishments	Machinery	Employment	Net Output
1932/33	322	1 465	11 900	2 737
1933/34	359	3 162	15 886	3 797
1934/35	373	3 825	20 086	5 490
1935/36	410	4 087	24 925	7 112
1936/37	433	4 360	27 895	8 222
1937/38	445	4 306	29 958	9 748
1938/39	448	4 692	29 340	9 285

Source: *Union Statistics for 50 years: 1910 – 1960, quoted by E. Webster, Cast in a racial mould, p 45.*

There was also an increasing array of products produced including more sophisticated electrical goods such as batteries, accumulators, heating and cooking apparatus and other appliances.[95]

The bulk of this work was however of a repair or jobbing nature based on artisanal skills, although early signs of change were apparent:

> (A) large portion of the industry is still engaged on maintenance and repair work, principally for the mining industry and shipping companies, an increasing portion of its activities is gradually

[91] Roux, *Die Konsolidering van die Afrikaner,* p. 53.
[92] *Ibid,* p. 54.
[93] For example DPJ Retief had spent two years in Germany after completing his BSc and BA degree 'to gain engineering experience' (*The Professional Engineer*, Vol. 6, No. 2, April 1977), and Dr R.L. Straszacker studied at the Technische Hochschule Charlottenburg in Berlin in 1933 where he completed his Ph.D. (Morgan, *The Symphony of Power,* p. 128). Dr Hendrik Johannes van der Bijl had also studied there in 1912 (Bozzoli, *South Africa's Pioneering Engineers*, p. 174).
[94] F.C. Fensham, *Die pad van die Akademie (1909 – 1984),* p. 146.
[95] M.F. Drake, 'The Iron and Steel, Metal and Engineering Industry in the Pretoria-Witwatersrand-Vereeniging Region', Unpublished Masters Dissertation, University of the Witwatersrand, 1971, Fig 2.9, p. 47.

> being diverted from repair and jobbing work to the manufacture, and in some cases even to mass production, of specialized articles. …[96]

But the change had not yet taken hold, as the statistic that in the period 1933-1939 the number of apprenticeships nearly doubled from 6,103 in 1933 to 11,583 in 1939 illustrates.[97] In this period many artisans were still engaged in designing and planning their own work on the back of 'traditional apprenticeships':

> Traditional apprenticeships commonly included training in mathematics, including algebra, geometry, and trigonometry, in the properties and provenance of the materials common to the craft, in the physical sciences, and in mechanical drawing. Well-administered apprenticeships provided subscriptions to the trade and technical journals affecting the craft so that apprentices could follow developments. But more important than formal or informal training was the fact that the craft provided a daily link between science and work, since the craftsman was constantly called upon to use rudimentary scientific knowledge, mathematics, drawing, etc,. in his practice.[98]

The journals to which Braverman refers here were the means whereby early inventors – who were commonly practical men and innovative amateurs – shared their research findings with all who were interested.[99] As seen in Chapter Two, the South African Telegraph and Telephone Association (SATTA) subscribed to the journal of the South African Institute of Electrical Engineers (SAIEE) so the practice persisted in South Africa.

But the change referred to above was indeed afoot. Some engineers had begun to view the costs of the artisans as the biggest constraint inhibiting the growth of manufacturing. For example, van Eck, another member of the Akademie and later celebrated for his work at Iscor and Sasol,[100] was to say to the Mechanical Engineers in 1942:

> One of the basic problems we have to face in the manufacturing industry is the high cost of production in this country. Numerous factors enter into this high cost structure, but the outstanding feature – I think I can put it very bluntly – is the fact that the minimum wage for an artisan in the engineering industry in South Africa is 2s. 9d. per hour, as against approximately 1s. 1½ d. per hour for the British artisan before the war, and even less on the Continent. In actual fact, of course, the South African artisan to-day earns considerably more than 2s. 9d. per hour. You may say that as a compensating factor we have an abundant supply of cheap native labour in this country. It is, however, my considered opinion that native labour in the Engineering and Metal Industry for instance is not cheap. … The ratio of non-European to European labour in the Gold-mining industry is about 7.4 to 1. … In manufacturing industry, including Public establishments, … the ratio of non-European to Europeans is 1.45 to 1. Cheap Native labour is, therefore, not utilised to the same extent in manufacturing industry as in gold and coal mining. … (I)ndustrial production, to be economical, must be organised on mass production lines. This enables the work to be divided into such simple processes that, with the aid of labour-saving devices such as the belt system, an efficient and economic use can be made of semi-skilled workers and unit costs can be reduced to a minimum.[101]

In general South African mass production techniques lagged behind those in America and Germany in the private engineering sector, although fragmentation of the trades began early

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[96] A.J.A. Roux, 'Mechanical Engineering Research in South Africa', *Journal of the South African Institution of Mechanical Engineers*, June 1952, p. 329.
[97] Department of Labour reports, 1933-1939.
[98] H. Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century,* Monthly Review Press, New York and London, 1974, p. 133.
[99] G.S. Emmerson, *Engineering education: a social history*, New York: David & Charles, Newton Abbot, Crane, Russak & Co., 1973, p. 105. The Journal was itself edited by a group of civil engineers and practical mechanics.
[100] Bozzoli, *South Africa's Pioneering Engineers,* pp. 198-205.
[101] H.J. Van Eck, 'South African Industry, Present and Future'*, The Journal of the South African Institution of Engineers*, April 1942, pp. 203-4.

on the mines and on the railways. As Krikler has argued: 'the Witwatersrand was cruel to the skills of the white miner. It snatched these up, ripped them into their constituent parts and very rapidly made the white miners' supervisors'.[102] Davies has illustrated this assertion by recording that when white miners first arrived in South Africa they undertook mechanical drilling with the help of two African assistants. By 1913 the miner was supervising between 6 to 8 African drillers and by the time of the 1922 strike, the white miner supervised between 8 and 12 drills.[103] On the railways, fragmentation of the artisan's skills was accelerated when the Pact government adopted the 'civilised labour policy' in 1924 and all government-funded agencies were pressured into employing 'poor whites' as opposed to Africans. This translated, *inter alia*, into an expansion of unskilled and semi-skilled workers at the expense of artisans.[104]

Even though fragmentation took hold in these two sectors, it was relatively slow to take hold across the board in the years before the Second World War. Lewis has analysed the reasons for this slow uptake of 'scientific management' in the private sector and concluded that it was attributable to: the threat of artisan resistance to deskilling; the high cost of investment in new plant and machinery, particularly in the metal and engineering sector as compared to that required in the clothing and other consumer-goods sectors where there was greater uptake; and, the limited size of the South African market for mass produced goods in all but the consumer sectors compounded by the interests of the overseas, particularly British, firms who provided mass produced imports to the country and who opposed competitive capacity being built.[105]

Van Eck, quoted earlier, clearly shows his support for the work of Frederick Winslow Taylor, and his 'scientific management'. Taylor, a mechanical engineer from a well-to-do Philadelphia family, was a leading corporate reformer. He came to the fore in 1895, and again in 1903, with papers on differential piece–rate wage systems and on shop management.[106] These papers were based on the earlier work of Charles Babbage and subsequent experimentation which he, Taylor, had undertaken in steel mills in the 1880s and 1890s.[107] Babbage had formulated a principle, named after him, which stated:

> **The Babbage principle**
> That the master manufacturer, by dividing the work to be executed into different processes, each requiring different degrees of skill or of force, can purchase exactly that precise quantity of both which is necessary for each process; whereas, if the whole work were executed by one workman, that person must possess sufficient skill to perform the most difficult, and sufficient strength to execute the most laborious, of the operations into which the art is divided.[108]

Taylor elaborated this principle with three of his own:

> **Taylor's first principle**
> The managers assume … the burden of gathering together all of the traditional knowledge which in the past has been possessed by the workmen and then of classifying, tabulating, and reducing

[102] Krikler, *The Rand Revolt*, p. 32.
[103] R.H. Davies, 'The 1922 strike on the Rand and the political economy of South Africa', mimeo, 1978, as cited in J. Lewis, *The rise and fall of the South African Trades and Labour Council,* pp. 15-16.
[104] Lewis, *The rise and fall of the South African Trades and Labour Council,* and Webster, *Cast in a Racial Mould*, have both analysed this process in detail.
[105] Lewis, *The rise and fall of the South African Trades and Labour Council,* pp. 39-41.
[106] Noble, *America by Design,* p. 268.
[107] Braverman, *Labor and Monopoly Capital,* p. 91.
[108] *Ibid, pp.* 79-80.

this knowledge to rules, laws, and formulae …This first principle we may call the *dissociation of the labor process from the skills of workers.*[109]

Taylor's second principle

All possible brain work should be removed from the shop and centered in the planning or laying-out department… This could be called the principle of the *separation of conception from execution,* rather than by its more common name of the separation of mental and manual labor … This is because mental labor, labor done primarily in the brain, is also subjected to the same principle of separation of conception from execution: mental labor is first separated from manual labor and … is then itself subdivided rigorously according to the same rule.[110]

Taylor's third principle

Perhaps the most prominent single element in modern scientific management is the task idea. The work of every workman is fully planned out by the management at least one day in advance, and each man receives in most cases complete written instructions, describing in detail the task which he is to accomplish, as well as the means to be used in doing the work... This task specifies not only what is to be done, but how it is to be done and the exact time allowed for doing it… Scientific management consists very largely in preparing and carrying out these tasks.[111]

It was this expanded menu of propositions that led to a style of management that viewed the workforce as another cost item whose expense had to be minimised. Training, one such expense, became ever more directed to that required for the performance of an immediate and specific task – such as the 'learnerships' registered under the Industrial Council for the engineering industry - and where it required a greater base of knowledge, it was undertaken by large corporations, industry associations and by the universities (on contract to or by direction from industry) for their own use. As Noble was to note:

> It was no coincidence that Frederick Taylor, the father of scientific management, spent as much time systematizing the methods of cutting metals as he did formulating his principles of shop management. Each was the complement of the other. He systematized and standardized the processes of production in order to concentrate control over them in the hands of management; and he formulated his strategy of shop management in order to make maximum use of the newly rationalized operations.[112]

The class character of this argument is clear. These engineers were siding with industrialists to reduce costs and optimise profits. This naturally destroyed the earlier collaboration between engineers and artisans that previously existed. Indeed it can be argued that these changes in the production process were a pre-condition for the separation of engineer and artisan occupations.

Politically the 'Pact' government and later the United Party, which came to power in 1934, supported industrialisation measures and *de facto* supported 'scientific management' in so far as fragmentation had been implemented on the railways.[113] They also implemented policies of protection and subsidisation which benefited capitalist agriculture and industrial capital as well as the 'protective measures' (job colour bars) to benefit white labour, as well as the so-called 'civilised labour' policy discussed in Chapter 2. On the more proactive front, the Pact

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[109] *Ibid*, p. 112.
[110] *Ibid*, p. 113.
[111] *Ibid*, pp. 117-8.
[112] Noble, *America by Design,* p.82.
[113] The United National South African Party (United Party) was a 'fusion' of the National Party and the South African Party in the wake of the Great Depression and Gold Standard crisis. The National Party was the dominant party.

government passed, in the face of fierce opposition, the Iron and Steel Industry Act in 1928, which established ISCOR.[114]

Van der Bijl, then Chairman of the ISCOR board, in a more conciliatory tone, explained:

> My interpretation of the Government's policy which put the Iron and Steel Industry Act on the statute book is that it was not the intention to bring into being and assist financially a powerful corporation for the purpose of competing with existing industries in the country, but, firstly, to contribute in a very substantial measure towards building the foundation of our engineering and other industries by the establishment of the basic industry, namely, the manufacture of iron and steel, in recognition of the experience that the manufacture of iron and steel in a country has a powerful influence in stimulating industrial growth generally, and secondly to ensure the development of subsidiary industries should private enterprise fail to follow in the wake.[115]

This initiative was however not whole-heartedly supported by the craft unions as ISCOR was one of the first major industrial sites where deskilling occurred.[116]

The craft union resistance to mechanisation and deskilling to which Lewis refers above took multiple forms in these years which both he and Webster have analysed in detail.[117] In summary they battled against the introduction of piece-work which negatively affected their ability to control the pace and intensity of work and fought for 'closed-shop' agreements where only craft union members would be permitted to do specified work at particular enterprises. They also closely monitored the work of the artisan on the apprenticeship committees and they resisted the allocation of 'their' work to so-called semi-skilled workers using whatever means they had, including the industrial council negotiation forums set up under the Pact government.

Webster quotes Marx who said, 'the worker's illusion (is) that it is the machine, rather than capital, that oppresses him'.[118] One vignette which both illustrates this point and highlights the role played by engineers is given below:

> During the period 1928 – 1934 the railway administration introduced a new moulding machine in the foundries, with the result that considerably more work was given to machine moulders*. In 1928 the IMS (Iron Moulders' Society) formed a branch in Pretoria, submitting a memo shortly afterwards which sought to obtain a guarantee from the administration that in future moulding machines would be worked by moulders. A meeting was then held between the chief mechanical engineer and delegates from the Pretoria branch, at which the society received a guarantee that the latest Peacock machine would be operated only by moulders**. … Meetings with the administration, however, seemed to be having very little effect. … In fact, they reported that at their last meeting with the chief mechanical engineer he had left the meeting and the

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[114] C.S. Richards, *The Iron and Steel Industry in South Africa, with special reference to the South African Iron and Steel Industrial Corporation Ltd* ("ISCOR") *more particularly in relation to its relation to the Gold-Mining Industry of the Transvaal*, Witwatersrand University Press, Johannesburg, 1940, Ch.1 and Drake, 'The Iron and Steel, Metal and Engineering Industry in the Pretoria-Witwatersrand-Vereeniging Region'.

[115] H.J. van der Bijl, 'Address to the AGM of Iscor shareholders', Pretoria, 30 June 1931, p. 16.

[116] 'The period between 1933 and the Second World War', SEIFSA records, 'can truly be said to have witnessed the vital development of the metal industries. It was the period wherein the main activity of engineering jobbing commenced its transition to mass production, mostly through the establishment of a few substantial plants, the operation of which more or less coincided with the commencement of production in the first ISCOR plant located in Pretoria', as cited in Webster, *Cast in a racial mould*, p. 53.

[117] Lewis, *The rise and fall of the South African Trades and Labour Council,* and Webster, *Cast in a Racial Mould*.

[118] Webster, *Cast in a Racial Mould,* p.5.

discussions had taken place with the piece work engineer.[119] (* semi-skilled operators; ** qualified artisan moulders)

Braverman's analysis provides useful insights about the changes being affected by the diffusion of 'scientific management':

> For the worker, the concept of skill is traditionally bound up with craft mastery – that is to say, the combination of knowledge of materials and processes with the practiced manual dexterities required to carry on a specific branch of production. The breakup of craft skills and reconstruction of production as a collective or social process had destroyed the traditional concept of skill and opened up only one way for mastery over the labour process to develop – in and through scientific, technical and engineering knowledge. But the extreme concentration of this knowledge in the hands of management and its closely associated staff organizations have closed this avenue to the working population.[120]

In this context an expanding demand for the engineers who carried out the 'conceptual and planning work' was emerging as explained by Roux:

> (T)he change-over from servicing to manufacture has brought with it the need to know the properties of the materials from which the articles are to be made. Reliable and economical design of manufactured goods is dependent on such information that our manufacturing industry will not be able to compete with overseas manufacturers in satisfying the internal market, let alone creating external markets, unless the required data are placed at its disposal.[121]

There is clearly no inference here that the knowledge of materials might be sought from artisans or might be learnt by them. It is clearly the preserve of 'scientific research' which, as shown above, was no longer within reach of craft workers – although earlier efforts by the traditional engineering societies (with links to the artisans and their organisations) had proposed that such research be promoted. As early as 1916 the mechanical engineers under the auspices of their South African Institution of Engineers, consisting of members (the majority of whom had begun their careers as artisans), formed an Industrial Research Committee to coordinate the WW I efforts of the individual engineering disciplines.[122] After the war they did not disband:

> The Committee formulated proposals for submission to the Minister of Mines and Industries the most important of which were: the proposed formation of a separate Department of Industries and Commerce, one of the main functions of which would be the furtherance of industrial research; that a Technical Board composed of scientific and technical men be set up in addition to the Advisory Board already appointed by the Government with half its members nominated by the Government and the other half by the scientific and technical institutions; and that the research section of the proposed Department should collaborate with similar bodies throughout the Commonwealth (or, as it was then styled, the Empire). It was also urged that the research section organize at once an economic survey of the resources of South Africa and a scheme for industrial and scientific standardization.
>
> The Union Government adopted the recommendations of the Industrial Research Committee as a basis for further action and appointed the suggested advisory committee, which was entitled 'The Scientific and Technical Committee on Industrial Research'. Of its ten members seven were nominated by the institutions … and three by the Government. The Research Committee nominees represented the disciplines of physics, metallurgy, chemistry, biology,

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[119] *Ibid*, pp. 47-48.
[120] Braverman, *Labor and Monopoly Capital*, p. 443.
[121] Roux, 'Mechanical Engineering Research in South Africa', *Journal of the South African Institution of Mechanical Engineers*, June 1952, p .
[122] D.J. Vermeulen, *Living amongst the Stars at the Johannesburg Observatory,* Johannesburg: Chris van Rensburg Publications (Pty) Ltd, March 2006, p. 107.

> geology and mechanical and electrical engineering. The two engineering seats were filled, fittingly enough, by John Orr and Bernard Price respectively.[123] [124]

This initiative was further bolstered in 1920 when it was decided to bring the scientific and technical societies then in operation under a single umbrella, which they called the Associated Scientific and Technical Societies (AS & TS).[125]

Roux, quoted earlier, instead, refers to research being undertaken by corporations themselves, by research associations, by national laboratories and by universities.[126] These forms were all at an infant stage in South Africa in the 1930s although Roux reports that both the mining and railway industries had their own research capability. With respect to universities in particular, Roux had the following to say:

> I think it is also safe to say that a large portion of the research which has been carried out [in universities] bears no direct relation to the immediate problems facing industry. This is not in any way intended as criticism of the research work of universities, but only serves to prove the need for a system of coordinated research in which the universities, as one group of participants, could be brought into contact with the most urgent requirements of the country. [127]
>
> Although the problem of deciding on the nature of such investigations is the task of the research worker, it is a responsibility which can only be carried successfully with the advice of leading engineers and industrialists. [128]

Straszacker, an *Akademie* member just like Roux, and like Roux also a member of the SA Institution of Mechanical Engineers, expanded on the role of universities in his comment on the Roux paper:

> In spite of having to provide ever increasing numbers of graduates to meet the … demand [from industry] they have to do their share in research. Their task in this respect is a twofold one. Firstly it should be their function to carry certain kinds of research … centring mainly round basic research, which is carried out primarily for the sake of increasing our stock of knowledge from which future engineers can draw. Secondly they should be responsible for the initial training of research engineers, in providing sufficient foundations in at least some of their graduates for research institutions and research departments in industry to build upon for recruiting their specialized personnel.[129]

Roux and Straszacker both recognised the distinction between basic and fundamental research: 'basic research' being a search for new knowledge whatever that knowledge may prove to be, while 'fundamental research' being that undertaken to investigate a particular problem, i.e. work which can be directly linked to an existing industrial process or commercial commodity.[130] And both agreed that basic research was the primary preserve of the universities, however it appears that internationally even this distinction was being blurred.

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[123] Both of these men have been introduced earlier: Orr being central to the advent of technical training on the mines and Price heading up the first large electricity works, the Chief Engineer for the first major electricity generation company, Victoria Falls and Transvaal Power Company (VFP).
[124] Draper, *The Engineer's Contribution*, p. 34.
[125] A. Jacobs, *South African Heritage: A biography of H.J. van der Bijl*, Pietermaritzburg: Shuter & Shooter, 1948, p.100.
[126] Roux, 'Mechanical Engineering Research in South Africa', p. 322.
[127] *Ibid*, p. 331.
[128] *Ibid*, p. 329.
[129] R.L. Straszacker, written contribution to discussion on paper presented by Roux, 'Mechanical Engineering Research in South Africa'*, Journal of the South African Institution of Mechanical Engineers*, June 1952, p. 342.
[130] Roux, 'Mechanical Engineering Research in South Africa', p. 324.

Noble recounts that American corporations fully appreciated the importance of particularly 'fundamental' research, but, for all of its strategic importance, the high costs of the laboratories did lead the profit-focused corporations to look for ways to economise. Their first efforts led them to establish joint ventures with others with whom costs and consequential patents could be shared, but before too long their gaze fell on the universities which still contained many gifted lecturers, equipped laboratories and well-stocked libraries. So they set about influencing them to become more responsive to their needs, a process which in America took the form of conditional donations, targeted research funding, and, partnership projects, *inter alia*. Noble concludes that:

> This reorientation affected not only what kinds of questions would be asked but also what particular questions would be asked, which problems would be investigated, what sorts of solutions would be sought, what conclusions would be drawn. Science had, indeed, been pressed into the service of capital.[131]

Furthermore there was the question of the ownership of knowledge produced. Patents were the prized target of research and innovation funded by industry. It was even evident in the employment contracts that people had to sign when joining ISCOR:

> 8. The Employee shall, should the Corporation so desire, make over to the Corporation, by Deed of Licence or other Deed or Document, the right to the exclusive and unqualified use in South Africa, free of any charge for royalties or otherwise, of any invention or new process or any Patent or other protected right or any extension or modification of the same, which the Employee may discover, register or obtain whilst in the service of the Corporation, provided that such invention, process, Patent or right is such as can be used in any of the Works or business in which the Corporation is by law entitled to engage. In respect of any right so taken over, the Corporation shall pay the costs and expenses of obtaining and maintaining in South Africa any such Patent or other protected right.[132]

In general then the principle was established that the funder, not the innovator, owned the new knowledge produced.

Braverman believed that this notion of research represented a scientific-technical revolution:

> This was accomplished by means of the transformation of science itself into a commodity bought and sold like the other implements and labours of production. From an 'external economy', scientific knowledge has become a balance-sheet item. Like all commodities, its supply is called forth by demand, with the result that the development of materials, power sources, and processes has become less fortuitous and more responsive to the immediate needs of capital. The scientific-technical revolution, for this reason, cannot be understood in terms of specific innovations – as in the case of the Industrial Revolution, which may be adequately characterized by a handful of key innovations – but must be understood rather in its totality as a mode of production into which science and exhaustive engineering investigations have been integrated as part of ordinary functioning. The key innovation is not to be found in chemistry, electronics, automatic machinery, aeronautics, atomic physics, or any of the products of these science-technologies, but rather in the transformation of science itself into capital.[133]

And in the context of this revolution the engineers were emerging into a new space – somewhere between that of a worker and that of an owner/manager. Like workers they lacked ownership of the means of production but like the owner/managers, they designed and directed the work of others. They also invented better ways of doing the work and improved

[131] Noble, *America by Design*, p. 147.
[132] National Archive, SAB, ARB, Vol. No. 4025, Iscor Conciliation Board complete set of minutes of meetings, 1937, 'Memorandum of Agreement'.
[133] Braverman, *Labor and Monopoly Capital,* pp. 166-7.

the machinery with which it was done – inventions which aimed to improve the efficiency and productivity of the industrial processes, but which were owned by the employers for whom they worked. They had a degree of independence in the workplace (to innovate, plan and design) but remained ultimately accountable to the owner/managers that provided their employment. Braverman argues that they earned more than just a 'wage' in exchange for their labour, they also earned a 'share of the surplus' (the profit),[134] albeit a modest share and as a result shared the interest of the owner/manager to grow the profit margin.

A complementary new alliance was being constructed between the engineers and the universities – for example the South African Institute of Electrical Engineers undertook, in 1931, to hold an annual meeting with the University of the Witwatersrand[135] and the SA Technical Society did the same in 1942 with the hope that 'this policy will grow with other Technical and Scientific Societies because as the years roll on it becomes more and more imperative that the modern University should be closely linked with the practical side of the outer world.'[136]

LADDERS AND LEVERS

As has been shown, the university-based degree route to becoming an engineer involved initially a two year theoretical course with two years of structured practical (as was the mining engineering programme between the South African College and the Kimberley School of Mines) and later a four year university course followed by a number of years of practical experience at an engineering works. Entry into such a programme necessitated a matriculation pass such as that offered by the University of the Cape of Good Hope.

There was no designed pathway between the programmes that apprentices followed and the degree programme and working folk were effectively financially excluded from the full-time degree programmes. The career path from artisan to engineer continued in parallel to that of the degree programme route but there were warning signs that it was under threat. These are discussed below.

EVALUATION AND IMPACT

The impact of these changes had begun to be felt across the society. The availability of steel, made possible by men like van der Bijl and van Eck and supported by the Pact government, made the manufacture of a wider range of goods possible and more readily available locally, and, even though Retief's automatic exchanges were manufactured abroad, they were making telephone conversations both locally and abroad much easier. The list goes on. This, however, was not work that traditional artisans, on the basis of an apprenticeship only, could have designed or planned – it was dependent on the scientific knowledge of the day, learned by

[134] Braverman, *Labor and Monopoly Capital,* pp. 404-5.
[135] A.M. Jacobs, 'The second Bernard Price memorial Lecture of the SAIEE - The Work and Training of the Engineer', *SAIEE Transactions*, August 1952, p. 225.
[136] J.H. Dobson, 'South African Industry – Present and Future', comment on the paper by van Eck, 'South African Industry, Present and Future', p. 210.

men across the globe working for industry in a new way. However, as illustrated, there might well have been some artisans who could have acquired the knowledge had Badham's suggestions been implemented. But they were not. This chapter has tried to explore the reasons why not.

This was a period of transition. Prior to the diffusion of *scientific management,* science had not yet been brought into service of industry and there was no clear boundary between 'artisan' and 'engineer' as John Orr affirmed. In the earlier period collaboration between artisans and engineers was strong, as evidenced by the membership profile of many of the engineering associations, in the sharing of 'knowledge' through journals and the 'helping hands' of engineers to artisans who wished to study further, as shown in earlier chapters.

Arguably, it was only as '*scientific management'* began to find real expression in the economy that the rift between engineers and artisans began to deepen and an altogether new occupation, albeit one with a traditional name, 'engineer' (or as it was later termed, 'professional engineer'), clearly began to separate from that of the artisan. This separation was driven by the fact that ever deeper science was needed to break new boundaries on the one hand, and on the other, the view that the artisan was essentially the 'problem'. He (no women at the time) was expensive and that 'efficiencies' could only be achieved if his skill was broken into its component parts, with each component being performed by the lowest skilled person possible in a process fully designed and controlled by management. Going were the days when the artisan set the pace of the work and determined its organisation.

Owners and managers coveted in particular that fraction of an artisan's work that dealt with planning, design and innovation which they needed to control to support their competitive position and profit drive. A dedicated group of men, the new graduate engineers, were being created, on whom the owners could depend to advance these interests and whom they were prepared to reward for their knowledge. However, whilst this alliance grew stronger, it cannot be viewed as a merger. As argued above the engineers were critical partners for the employers but they were separated from them in that they did not own the assets of production and did not, in many instances, own the innovations and production improvements (patents) they developed. The status of this new occupation was still uncertain, and it was this that those classified as engineers were trying to secure. The principle line of distinction was control over access to scientific knowledge – access which was *de facto* denied to artisans because of the financial obstacles they would have to overcome to secure.

These changing roles set engineers and artisans at odds – with engineers mandated to design processes that would effectively 'de-skill' the artisan and expand the 'semi-skilled' layer, whilst the craft unions mobilised to retain as much control over the work as possible. In this context the alliance between the two groups became increasingly strained, although before the Second World War it was not yet broken, given the support that a layer of the traditional engineering societies, who had themselves attained 'engineer' status through artisan progression, gave to the progression route.

Badham's argument, that the scientific content of the progression programmes available part-time to apprentices and artisans should be raised, appears to have been viewed through a class lens rather than a technical one. There seem to have been no technical reasons why his ideas could not have been implemented, but there were powerful interests that were

organising against this option and those in favour of it were simply not strong enough. The balance of forces was clearly also being played out within the state, with both the Pact and the United Party governments supporting this path of development as illustrated by ‘mass production’ strategies adopted by ISCOR and Railway developments, albeit it for reasons of their own (linked to tax income and the ‘civilized labour policy’).

During this period the ‘infrastructure’ to support these developments was being laid, although it had not yet fully matured:

a. The building of a new set of learning institutions, the universities, on the back of considerable contributions from the wealthy of the day, but from which working folk were denied access through the financial constraints they faced;
b. The creation of a new, parallel qualification architecture (consisting of matriculation and degrees) which did not articulate clearly with the progression qualifications available to artisans (NTC and ATCs). This process, of creating a dominant qualification linked to a new occupation, is one to be replicated as shall be seen again in future;
c. The separate governance arrangements of these two qualification ladders without articulation between them;
d. The emergence of new forms of social occupational organisation, set up in open opposition to the craft unions, through which these new views and interests were to be advanced and a ‘new’ occupation ‘(professional) engineer’ were to be recognised;

But whilst this ‘infrastructure’ was being built and the economy was restructuring, the balance of power between the traditionalists and the new graduates was unresolved. The question of the ‘status of engineers’ concerned them both, but the pathway to arrive at this desirable destination was still open. The War Years to be discussed in the next chapter were to be critical in the resolution of this dispute.

CHAPTER 6

WAR AND POST-WAR OCCUPATIONAL SHIFTS

What is an artisan without a brain!
Ben Nicholson[1]

PEOPLE AND PLACES

Many of those who will be referenced in this chapter have already been introduced – Bird, Tinderholm, van der Bijl, Retief and Straszacker – however there is one new voice, that of Ben Nicholson, the General Secretary of the South African Electrical Workers Association (SAEWA) and later chairperson of the Confederation of Metal and Building Unions (CMBU).

Ben Nicholson[2]

Ben was born in 1927. His father was a ship owner in Britain with great hopes that his young son would go to university. When the war broke out his father joined the navy and went 'missing in action'.. Young Ben left school at 14 and joined the British Post Office 'on the telegraph side doing telex and teletex'. But he wanted to find his father. So, at the age of 16, in 1943, he too joined the Navy with this aim in mind. He had to sign up for 12 years – as the war was expected to last that long. He was given basic training and then sailed from the Far East to South Africa. Only years later did he learn that his father had been killed. When he returned to Britain in 1947, he was sent to an electrical school in Plymouth and thereafter to Cambridge to undertake a two-year intensive degree in electronics that had been specifically designed for the Navy. This is how Ben continues the story:

> I left the Navy in 1956 and I got a job with a firm called Elliot Brothers in Borehamwood, just outside London …they were building the first computer for South Africa – Cape Town City Council had ordered it - it was a huge valve-top that would have filled my cottage twice over! They asked me if I would go to South Africa to help with its assembly and commissioning. Well, I had spent a lot of time in South Africa in the Navy, and had a lot of friends there, *and I was a rugby player, you know*, so I agreed. So, as I say, I came to South Africa to build this computer but it never came, because the first of the series of economic disasters hit South Africa in '58 which meant they could no longer afford it. … So, again through naval connections, I was introduced to a lieutenant-colonel of the army. He was starting what eventually became a huge electronic firm that was eventually bought out by Plessey. This guy, he was a genuine gentleman, he said, 'We've got a new project coming up which is going to revolutionise everything, but it's not ready yet, but as you know radar, would you like to come and work on the Cape Town docks for a few months and work on radar till we are ready?' So I did. … I don't know if you've heard of a tellurometer?[3] It's a distance measuring device by electronics. Dr. Trevor Wadley was the engineer who invented the whole thing. He was based at the equivalent of the CSIR in Durban, and I spent a couple of months with him learning about it. …

[1] Interview with Ben Nicholson, 15 August 2008.

[2] This account is based on two interviews with Ben Nicholson on 10 November 2006 and 15 August 2008.

[3] The engineers speak proudly of this South African invention: Dr. Trevor Wadley 'invented the radio surveying device called the "Tellurometer". The receiver became the standard for the British Navy and the Tellurometer was manufactured locally and used worldwide until the arrival of Global Positioning Satellite (GPS technology).' Crouch, (ed.), *Sparkling Achievements*, p. 14.

> And the funny thing was that when I went to the dock for that few months to work on the radar, I was working for a company called IMC, but when I got to the docks, on the Monday morning at the manager's office of the maintenance department of this company, I sat there chatting to the chap about what the set-up was, you know. And then an old grey haired man came in, said good morning to the manager and sat down and said 'Who are you?' He said to me. I said well I've just come down to start working on the radar before we start with the building of this equipment. He says, 'Ah, you'll be filling in this form then.' This is now '57. I said 'What is this all about?' He said, 'Just fill in the form'. I said 'No, no, what is this all about? Then he said you have to be a member of the union to work here.

That was when Ben learned about the 'closed shop' system and the start of a lifetime of involvement in the trade union movement in South Africa, where he held many leadership positions.

POLITICAL ECONOMY

When South Africa declared war on Germany in 1939, the United Party was still in power. However the alliance with the National Party was put under serious strain as the Afrikaner Nationalists were bitterly opposed to siding with Britain in the war. As a result, Hertzog, then Prime Minister, resigned and the Afrikaner leaders of the financially strong agricultural sector followed him. General Smuts replaced him.

Smuts set out to meet the challenges of war. One of his first appointments was van der Bijl as Director-General of War Supplies, who 'set out to organise the manufacture of those commodities the country was equipped to make and import the rest. But when France fell in 1940, it became obvious that no war equipment could possibly be coming from Britain, and that America was already over-extended by British demands. Suddenly South Africa was called upon to provide everything for its soldiers, from the boots they wore to the fighting equipment they needed.' [4]

Industry at the time was ill-prepared for the challenge:

> When the Union declared war on Germany in September, 1939, there were 1,156 establishments in the Union engaged in engineering, employing some 25,000 Europeans and 41,000 non-European workers and representing a total capital investment of £12,566,000. The gross value of engineering production during the financial year 1939/40 amounted to £30,629,000.
>
> The bulk of this industry was concentrated in the Transvaal Province, where it was engaged for the most part in jobbing work for the maintenance requirements of the mining industry … and had very limited experience of manufacture.[5]

Bozzoli recounts that 'van der Bijl set to and organised all the existing factories and workshops to make war material – these included ISCOR itself, the South African Railways repair workshops, the entire mining industry and hundreds of smaller manufacturing centres.'[6] The combined achievement of these efforts was impressive:

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[4] Bozzoli, *Forging Ahead,* p. 180.

[5] A.G. Thomson, (ed.), *The Years of Crisis, Published by the South African Federation of Engineering and Metallurgical Associations (*SAFEMA), *as a record of the work of the Metal Industries during the War Years 1939 – 1944*, Rostra Printers, Johannesburg, 1946, p. 1.

[6] G.M. Bozzoli, *Forging Ahead,* p. 180.

> During the period 1940-1944, the Union's munitions production included more than 50,000 tons of shells and shell cases; more than 28,000 tons of mortar bombs, grenades and landmines; nearly 20,000 tons of small arms ammunition and over 70,000 tons of high explosive bombs. Over 5,700 armoured fighting vehicles were delivered and, in addition, 35,000 motor vehicles. In structural steel the fabricating yards in the Union made component sections of a very large number of aeroplane hangars of different types and two types of bridges, these bridges and hangars alone consuming some 60,000 tons of steel. Over 1,500,000 steel helmets were manufactured in the Union. Deliveries of engineering stores to the Eastern Group armies included stone-crushers, rock-drills, heavy chains, steel wire rope, a great variety of pumps and valves, water purification plants, water and steam piping, electrical conductors and wire, electric motors, transformers, travelling cranes, donkey boilers, sterilising plant for hospitals, barges, hangars and numerous other items. Thousands of miles of telegraph and telephone wires manufactured in the Union were used by the signal services of the fighting forces. The Western Desert pipe line, which ensured an adequate supply of water for troops, was constructed largely from material supplied from South Africa. … [7]
>
> Production on this scale required a transformation of the industrial landscape. The war was a catastrophe for the world, but its effects on the South African engineering industry were wholly stimulating. For the first time in South Africa assembly plants became necessary because the various firms making components had to send them to an assembly depot. Commercial firms, mine and railway workshops, Government Departments and municipalities mobilised their resources for co-operative manufacture.[8]

Alpha Harris (Pty) Ltd was one the first private factories commissioned to redesign and manufacture a number of alternators for the war effort.[9] Given that it was foreseen that the demand for this equipment would be enormous, a new department was established for the purpose, followed by repeated expansions in order to deliver, by the end of the war, an output to the value of approximately £1,500,000.[10]

How the small firm rose to the challenges set by the Director General of Supplies has been graphically recounted in a report by the Engineering Graduate Association (EGA). It organised a tour of Alpha Harris Engineering Co. Ltd for a group of 80 engineers and guests in February, 1945.[11]

> The tour commenced at the Assembly Section in Webber Street, where the visitors were shown assembly lines of transformers, generators and motors of various types and sizes in the course of construction and also large numbers of completed machines. …
>
> The Testing Department is also located in this section of the Works. Every completed machine is tested on overload in the presence of D.G.S. Inspectors to ensure that it has no defects, while one of every batch is thoroughly tested in order to determine the rating and characteristics. All research testing of experimental machines is also done here.
>
> After the party had been over these workshops they were taken to the main factory in Booysens. … It was explained that a great amount of time had been spent in splitting up processes into simple operations and that much attention had been paid to jigging, tooling and gauging, with the result that all production work is done by semi-skilled and unskilled labour. Furthermore, production times are low and quality very high. With the aid of very rigid inspection high standards are maintained in spite of the difficulties experienced in producing a very large range of machines.

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[7] Thomson, *The Years of Crisis*, p. 1.
[8] *Ibid,* p. 5.
[9] *Ibid,* p. 200.
[10] *Ibid,* p. 201.
[11] 'Minutes of 28th Conversazione, Visit to the Factory of Alpha Harris Engineering Co, Ltd', *EGA Bulletin*, Vol 1 No. 9 April 1945, pp. 7-8.

> The above method of manufacture was clearly illustrated in the Machine Shop and Armature Winding Departments. In the former, very close limits are adhered to, the working tolerances often being less than one thou'. In the latter section visitors were surprised to see stators, armatures, etc. which had been neatly wound by practically inexperienced people. Naturally, this Firm, like all other South African Industries, cannot exploit mass production methods to the fullest at present, because they are confronted with the difficulty of obtaining sufficient modern automatic machinery. Some machines such as those used for covering copper wire with cotton had been designed and built by the Company themselves.
>
> Great interest was aroused in the Tool Room where the jigs, fixtures, formers, gauges and dies used by the Firm are made. In the Pressing Shop, where the dies were shown in operation, composite dies were seen blanking and piercing laminations in one operation, whilst the slots were being pressed by an automatic notching machine at a rate of 400 per minute.
>
> An interesting fact is that 80 to 90 per cent of the raw materials, used in the manufacture of these electrical machines are manufactured in South Africa, the only notable exceptions being ball and roller bearings and certain insulating materials.
>
> At the conclusion of the tour tea was served in the Design Office, where visitors were shown drawings of the articles they had previously seen in the course of manufacture.

The *National Industrial Bulletin*, 1946, elaborated a little further on the work being undertaken in the Design Office of this factory:

> (G)raduates were busy drawing designs and charting the progress through the works of the various machines and materials. Skilled men are in charge of each department, with tool setters or supervisors, under them and all specifications are issued by the planning and progress department to the skilled man in detail. The industry claims it can train men within twenty-four hours to become skilled workmen [i.e. operators]. [12]

And as for other workers, Thomson was later to note that:

> (T)he number of workers and staff employed by the company had risen at the end of the war to approximately 680, of whom under thirty were skilled men, these being required only for tool room and supervision. The future expansion of the industry will therefore, provide for the absorption of a very large number of unskilled workers.[13]

Not all workers welcomed these changes. Craft workers feared their trades were being diluted, but there was little they could do about this as their industry was 'controlled' by the government-appointed Controller of Manpower whose powers were:

> to take such action as he deems necessary to ensure that the resources of any controlled industry are used in the manner calculated to yield the best results in the interests of the defence of the Union or the efficient prosecution of the War, or for the maintenance of supplies and services essential to the life of the community.[14]

These powers were used extensively:

> Wage increases, for example, were prohibited except with the Controller's consent and no artisan was permitted to be engaged except with the Controller's permission. These restrictions plus other measures caused considerable inconvenience to engineering artisans, who were being placed at a decided disadvantage as compared with other groups of employees during the war period.[15]

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[12] *The National Industrial Bulletin*, April 1946, p. 8, as cited in Lewis, *Industrialisation and Trade Union Organisation in South Africa*, p. 94.
[13] Thomson, *The Years of Crisis*, p. 203.
[14] Department of Labour, *Annual Report for 1940*, U.G. No. 45, 1941, p. 4.
[15] Thomson, *The Years of Crisis* , pp. 6-7.

Artisans were targeted because they were in extremely short supply. For all that the total number of apprentices more than doubled between 1936 and 1946.[16] Local supply was still inadequate so immigrants were recruited. When the 1944 Apprenticeship Bill was debated in parliament it was estimated that the number of immigrants was roughly equal to those locally trained – about 5000 each.[17] The problem persisted after the war as manufacturing expanded, and whilst not all the existing or new firms were using the new production techniques, a growing number were.[18] In 1951 the Minister of Labour told parliament that:

> My department carried out a survey and it came to light that we have an immediate shortage of approximately 10,800 artisans, and that when supplies of materials return to normal, we will need a further 17,000 skilled artisans during the next three years. This is over and above the number of apprentices that are being trained.[19]

The demand can be partially understood in the context of the growing number of metals and engineering firms that were burgeoning during and after the war, growth that continued until the 1960s.

Table 6.1: Data Relating to the Growth of the Metals and Engineering sector from 1935/6 to 1947/4820

Item	Metals and engineering				
	35/36	38/9	45/6	46/7	47/8
No of establishments	1,129	1,249	1,436	1,545	1,940
Total cost of materials (x £1,000,000)	15.4	24.9	38.1	45.7	59.3
Gross value of output (x £1,000,000)	33.0	47.4	88.4	102.0	125.5
Value added (x £1,000,000)	17.5	22.8	50.2	56.2	66.2

Source: A.J.A. Roux, 'Mechanical Engineering Research in South Africa', in *Journal of the South African Institution of Mechanical Engineers*, June 1952, pp. 328-9.

Mechanisation and the introduction of new working practices generated different views about the demand for skills. Braverman believed that craft work would 'sink to the level of general and undifferentiated labour power'.[21] The De Villiers Commission took a different view:

> While mechanisation has dispensed with many operations formerly performed by hand, it has at the same time created numerous other operations which make higher demands on the intelligence and technical knowledge and skill of the worker, and the general belief that the rapid development of the use of machinery would gradually supersede or at least reduce the need for apprenticeship training has proved to be unfounded. Although there are industries

[16] For example, in engineering the numbers increased from 4,343 in 1936 to 9,690 in 1946. Department of Labour, *Annual Report*, 1946, Table C, p. 49, U.G. No. 62, 1948.
[17] Hansard, 14 April 1944, 5095.
[18] Roux, 'Mechanical Engineering Research in South Africa', p. 329; Malherbe, *Education in South Africa*, p. 184, notes that in 1946 there were 5,335 artisan immigrants; in 1947 there were 16,606, in 1948 there were 18,113; in 1949 there were 7,406 and in 1950 there were 6,257.
[19] Hansard, 20 April 1951, 5147.
[20] Roux, 'Mechanical Engineering Research in South Africa', pp. 328-9.
[21] Braverman, *Labor and Monopoly Capital*, p. 121.

> which do not require considerable manual skill of the workers, there are on the other hand many industries (for example engineering, building, mining) which demand manual skill of a high order from a large percentage of their artisans. And while it is probably true that the craftsman of today knows less about some branches of his trade than thirty, forty years ago, he certainly has to know more of those branches of his trade which he has to practise.[22]

This shortage of artisans who 'knew more about less' was to drive many of the alternative strategies adopted.

This chapter does not analyse these trends in detail, since this has been done authoritatively by others.[23] It will endeavour, however, to draw out the implications for engineers, artisans and operators and the learning pathway between them.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

Occupations are largely defined by the range of work which a person is deemed to be *able* to perform in any context, not only within a single workplace or industry. These definitions change over time dictated by developments in production techniques and related social agreements. The profile of tasks required by both 'engineers' and 'artisans' during the upheavals of war and the following two decades changed. Increasingly a distinction was drawn between *artisans,* practical workers, and *engineers,* conceptual planners and designers functioning on a growing scientific knowledge base. This section seeks to explore the drawing of this line in South Africa, both in engineering and telecommunications industries.

Occupational shifts in the engineering industry

Between artisans and operators

The engineering industry was under pressure to meet wartime demands and firms had to respond both individually and collectively. Before the war, employers were provincially organised, each with their own industrial agreements with 'considerable divergences in the working hours and conditions in the various centres'.[24] There were, no doubt, also differences in the demarcation of functions performed by different occupational categories. This was increasingly dysfunctional in an industry producing munitions and engineering equipment based on international standards. This was recognised in the establishment of the South African Bureau of Standards (SABS) in 1945, whose object was 'to promote standardisations in industry and commerce.[25] It had also become clear that a national organisation of employers was needed.

A national conference of provincial employer associations was convened by the Natal Engineers' and Founders' Association in Durban in March 1942 which laid the basis for the

[22] De Villiers Report, paragraph 1101.
[23] Lewis, *Industrialisation and Trade Union Organisation in South Africa*; Webster, *Cast in a racial mould;* Davies, 'The 1922 strike'.
[24] Thomson, *Years of Crisis,* p. 4.
[25] Union Government, Board of Trade and Industries, Report No. 282, *Investigation into manufacturing industries in the Union of South Africa*, para. 202, as cited in Lewis, *Industrialisation and Trade Union Organisation in South Africa*, p. 113.

launch, on January 25, 1943 of the South African Federation of Engineering and Metallurgical Associations (SAFEMA), whose immediate task was to establish a dialogue with the Director-General of Supplies.[26]

An important component of these discussions was labour relations. The registration of SAFEMA laid the foundation for the establishment of a national industrial council, under the Industrial Conciliation Act No 36 of 1937, where wages, conditions and functional ranges of work for artisans, operators and others could be set nationally through negotiation with registered unions. At the time - 'registered' meant 'white only' as unions with black (African) members were prohibited from registering.

In 1944, two industrial councils were formed: the larger one was the National Industrial Council for the Iron, Steel, Engineering and Metallurgical Industries (NICISEMI) and the smaller one was the Electrical Engineering Industry Industrial Council (EEI). Although the councils functioned separately, employers coordinated their strategies under SAFEMA.

The first NICISEMI agreement, signed with the then five registered unions[27] in 1944, was a eulogy to Taylor's four principles, bringing to full fruition the promise of the earlier provincial agreements on which it was based.[28] The NICISEMI agreement split engineering work into six grades with declining wage rates and ever-narrower tasks, from which some examples are drawn below:

Table 6.2. Iron, Steel, Engineering and Metallurgical Industries, Union of South Africa

Grade	National Agreement 1944[29]	Rate p.h.
Journey-man's work	Journeyman's Work not elsewhere specified* (n.e.s)	3s 3d
A	Grade A, Operative's Work (n.e.s) (list including: case and/or tool hardening and/or heat treatment; die casting machine operative (supervisory work) …)	2s 11½d
AA	Grade AA Operative's Work (Riveting)	2s 9d
B	• Grade B, Operative's Work (list including: • 'Assembling by means of jigs and/or templets; • Bending and/or fixing steel reinforcement; • Drilling with templets or without templets where the marking off is done by a journeyman*;	2s 3½d

[26] Thomson, *Years of Crisis,* pp. 4-5.
[27] Amalgamated Engineering Union, Ironmoulders' Society of SA, SA Boilermakers, Iron and Steel Workers' & Shipbuilders' Society, SA Electrical Workers' Association and the SA Engine Drivers' & Firemen's Association (members of the latter were required to attain Government Certificates and were paid according to whether they had attained their Certificate or not i.e. 3s3d per hour if certificated and 2s 11 ½ d per hour if not. See Note (1) of NICISEMI 1944 agreement following vehicle driving.
[28] See for example the Metal Engineering Industry, Durban Agreement published as Government Notice No. 1565, GG 2960, 7 November 1941 and Iron and Steel Manufacturing and Engineering Industry, Transvaal, published as Government Notice No. 912, GG No. 3197, 21 May 1943.
[29] Iron, Steel, Engineering and Metallurgical Industries, Union of South Africa, Government Notice 997, *Government Gazette*, 23 June 1944.

	• Machining on repetition work by means of jigs and/or stops and /or fixtures where the setting up of the machines and/or tools is done by a journeyman*; • Punching and/or shearing and/or cropping to jigs and/or stops in manufacturing engineering etc.)	
C	Grade C, Operative Work (list including: • Crane driving – floor operated power cranes (operator full-time); • Drilling with jigs and/or fixtures; • Overseer – supervising any or all operations in Grade D and/or labourers**, • Special purpose tool operation on machine specially designed for and performing *one* only operation in manufacturing engineering etc.	1s 11d
D	Grade D Operative's work (n.e.s.) (list including: • Application of anti-corrosive coatings; • Automatic straightening and/or rounding and/or reducing and/or expanding and/or extracting; • Boiler stoking; • Boss boy (term for African team leaders); • Metal buffing and/or polishing • Metal coating and/or plating • Storeman's boy; etc. •	1s
E	General labourers (in the Cape 9d per hour elsewhere 7 ½ d ph.)	7 ½ d

* Underlining not in the agreement, but discussed below.

** As shall be discussed in the next chapter, Grade C supervisory work was reserved for white workers, whilst the ceiling for black workers and women was Grade D.

It is possible from the sections underlined above to see the work to be performed by the artisan:

- 'journeyman's work' (not elsewhere specified) being that which required the full range of artisanal skills learnt through a full apprenticeship (although special apprenticeship contracts were permitted, if approved by the Industrial Council);[30]
- Making of jigs or templates – however these jigs or templates would now be made according to drawings prepared in the 'Drawing Office';
- Marking off for drillers – these too would be following specifications set in the Drawing Office;
- Setting up of machines or tools – here too the machines or tools would have prescribed settings (with narrow tolerances) set by those in the Drawing Office. The reference to machines also signals increased mechanisation, not handwork as previously performed.

[30] See definition of a journeyman in the 1944 NICISEMI Agreement: '"journeyman" means an employee who has completed a contract of apprenticeship under the Apprenticeship Act or a contract of apprenticeship recognised by the Industrial Council. Section 4(1) specifies 'No person other than a journeyman or apprentice may be employed on journeyman's work, without the prior permission of the Industrial Council" [emphasis added].

The NICISEMI agreement graded supervisory work at Level A, below the general artisan, but artisans commonly performed this role as well. However supervisors were not always within the bargaining remit as some foremen or supervisors began to organise separately. For example, in the electrical industry they formed the Association of Supervisory Electrical Engineers (ASEE). The Engineers' Graduates Association welcomed this move in 1945 as 'a step in the right direction' as it stratified labour and brought the supervisors closer to management.[31]

Under this Agreement the artisan was no longer directly making the end product. He was creating the enabling environment for operators to do so. It was also the case that whilst the artisan was responsible for making the jigs, marking off for drillers and others, setting up machines and so on, he was no longer the one deciding what the specifications for each should be – drawings from the Design Office set these and it was the duty of the artisan to apply these in practice. This proved to be a key change when making munitions for the war:

> The average skilled worker is conscientious in respect of the materials with which he works. He is reluctant to scrap a job just because it does not conform exactly to specification. On munitions this outlook proved very costly because many parts were made and had all the appearances of suitability, but on final examination had to be scrapped.[32]

As will be recalled from the Alpha Harris visit, in the machine shop 'very close limits are adhered to, the working tolerances often being less than one thou' and close attention was paid to quality. As the Department of Trade and Industry put it: 'Planning is basically divorced from the functions of execution. The planning functionaries analyse each objective and determine the best means for its realisation. The workers merely carry out the tasks in accordance with detailed specifications.'[33]

The craft unions saw these changes as a major challenge. As one unionist put it:

> Of late, (the) separation of craft knowledge and craft skill has actually taken place in an ever widening area and with an ever increasing acceleration. Its process is shown in the two main forms which it has been taking. The first of these is the introduction of machinery and the standardization of tools, materials, products and processes, which makes production possible on a large scale and the specialization of the workmen. Each workman under such circumstances needs and can exercise only a little craft knowledge and a little craft skill. But he is still a craftsman, though only a narrow one and subject to much competition from below. The second form, more insidious and more dangerous than the first .. is the gathering up of all this scattered craft knowledge, systematizing it and concentrating it in the hands of the employer and then doling it out again only in the form of minute instructions … When it is completed the worker is no longer a craftsman in any sense, but is an animated tool of the management.[34]

Thomson, in 1946, confirmed this when he spoke of the scarcity of artisans and an agreement with the unions that 'unskilled' workers could do some of the 'artisan's' work in the war years.[35]

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[31] *Engineering Graduates Association (EGA) Bulletin*, Vol 2, No 2 October 1945, p.11.

[32] Thomson, *Years of Crisis,* p. 3*,* as cited in Lewis, *Industrialisation and Trade Union Organisation in South Africa,* p. 92

[33] Union Government, Board of Trade and Industries, Report No. 282, *Investigation into manufacturing industries in the Union of South Africa, para. 226,* as cited in J. Lewis, *Industrialisation and Trade Union Organisation in South Africa,* p. 112.

[34] *Cape Federation of Labour Unions Official Organ,* September 1939, p. 14-15, as cited in Lewis, *Industrialisation and Trade Union Organisation in South Africa,* p. 112.

[35] Thomson, *Years of Crisis,* p. 203.

Although it should be noted that there were functions that needed to be performed by artisans that were of a more sophisticated, specialised nature,[36] these tasks were increasingly neglected by the apprenticeship system, and so began the movement for a higher level skilled worker – albeit below the level of an engineer - which will be discussed in a later chapter.
Unions reacted differently to these changes. The Amalgamated Engineering Union (AEU) had allowed operators into their ranks in the 1920s, whilst the Ironmoulders' Society of SA and the SA Electrical Workers' Association, 'pure artisan unions', both held out much longer.[37] As Ben Nicholson explained:

> (O)n the 4th April '37 the Electrical Workers was registered as a union itself.[38] Membership was restricted to artisans *at that time*. … Then of course the war came and people started coming into the trade who weren't qualified so they had to allow operatives and it had to go from there. The union was still basically artisan. In fact the whole of the executive was artisan ... But … the union gradually opened up. … When the (operators) came to our national Executive Committees, which they didn't actually because they would be lost completely as to what was being discussed … but of course they were always at our conferences and we had annual meetings. So people started to get together BUT the base, unless you were an artisan you weren't going to be on the executive.[39]

Craft unions with 'second class' non-artisan members have been called 'pseudo-craft' unions by commentators such as Webster and Lewis. One of the strategies these pseudo-craft unions adopted was to expand the range of their closed shop agreements – allowing in white operators in order to exclude the black majority. Other strategies were also adopted as recounted by Webster and Lewis, but the tide had turned away from traditional craft working to machine manufacturing and mass production techniques.

Not all operators were satisfied with this 'second class' status and instead formed themselves into industrial unions. Before, during and after the war this form of organisation was largely on a racial basis. The *South African Yster, Staal en Verwante Nywerhede Unie* (Yster and Staal – Iron & Steel), covering white workers in the iron and steel industries, was a prime example. It had been formed to protect the white workers at Iscor.

The 1944 NICISEMI Agreement was a two-year agreement 'or until three months after the date which the Governor-General has by Proclamation declared to be the date on which Union of South Africa shall cease to be at war, whichever is the sooner.' So the concessions made by the craft unions, to permit certain of 'their' work to be performed by lower paid operatives, were intended to be time bound but after the war these divisions were deepened as the number of wage grades increased.

The character of those below the level of artisan was essentially that of 'task performer' (were 'jobs' not 'occupations') – with tasks outlined as shown in the Agreements.

> In this context (of rapid accumulation of capital through production on an ever larger scale) new drafts of workers are brought into jobs that have already been degraded in comparison with the craft processes of before; but inasmuch as they come from outside the existing working class, chiefly from ruined and dispersed farming and peasant populations, they enter a process unknown to them from previous experience and they take the organization of work as given.[40]

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[36] Lewis, *Industrialisation and Trade Union Organisation in South Africa,* p. 93.
[37] *Ibid,* p. 95.
[38] Having previously been a sub-division of the AEU.
[39] Interview with Ben Nicholson 10 November 2006.
[40] Braverman, *Labor and Monopoly Capital,* p. 129.

As was the case globally, in South Africa those who had no option but to aspire to fill Grades A to E jobs *were* predominantly recent immigrants from an impoverished countryside. They were also poorly educated and desperate for work. For them these new degraded jobs were all they were qualified for, so they competed for them. This rationale stands in sharp contrast to that put forward by some, who argued it was a lack of 'ability', not circumstance that drove people to these jobs.[41] The frequency of 'ability' as a rationale for allocating the disadvantaged to mindless work grew, but it was one which Braverman discounted with the following acerbic comment: 'a belief in the original stupidity of the worker is a necessity for management; otherwise it would have to admit that it is engaged in a wholesale enterprise of prizing and fostering stupidity.'[42]

Between engineers and artisans

Thomson argues that the engineers, through their societies, played a significant role in introducing new production methods::

> The opportunities afforded by the technical associations for the discussion of common problems played an important – perhaps a vital part – in improving the efficiency of manufacture. The large attendances at meetings throughout the war testified to the keenness of a very large section of the industry, thanks to whose enthusiasm and progressive outlook South African munitions acquired a reputation second to none overseas and in some instances were actually more cheaply produced than by any other country in the Empire.[43]

What it meant for engineers' functions was fundamental as Straszacker was to note in his 1964 report:

> A shift is now taking place in the functions of engineers of various branches from installation and maintenance to production. This entails a move from the control of plant to a control of some process in which financial, economic and human aspects start playing an ever increasing role, so that finally the engineer has to carry more administrative and managerial responsibilities. This change is due to the increased tempo of industrialization at present occurring in the Republic.[44]

These additional functions, not only influenced all branches of engineering, but formed a new specialisation.. Finding 28 of the Straszacker Commission Report, using the later term 'industrial' in favour of 'production' engineer, indicated that this was the *only* 'new direction which clearly calls for the establishment as a separate branch', which was defined as:[45].:

> **The Work and Function of the Industrial Engineer**
>
> 385. The task of the industrial engineer is basically that of ensuring that the organization that employs him uses its raw materials, capital and labour to the best economic advantage. To achieve this aim continuously and with progressive improvement, he has to:-

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[41] The de Villiers Report, introduced later, similarly took the view the I.Q. tests should allocate individuals to job categories: those with an I.Q. rating below 70 being for those jobs which required no job training; those with I.Q. between 70 & 85 qualifying for lower grade factory operatives, waitresses and those between 80 & 95 for higher grade shop assistants, lower grade clerical workers and high grade factory operatives; those in the skilled grades should have an I.Q. of between 90 and 110, the semi-professional occupations between 105 and 120 for technical supervisory positions and professional occupations being above 115. (Union of South Africa, 1948. *"Report of the Commission on Technical and Vocational Education",* UG 65/1948, printed by Government Printer, Pretoria, paras 555 (1-5).)

[42] Braverman, *Labor and Monopoly Capital,* footnote p. 108.

[43] Thomson, *Years of Crisis,* p. 5. See also p. 201.

[44] *Commission of Enquiry into the method of training for university degrees in engineering,* Report Part I and II, (The Straszacker Report), Department of Education, Arts and Science, 1964, paragraph 134, p. 16.

[45] Straszacker report, paragraph 404.

(a) Provide the link for co-ordinating the efforts of the various specialist departments and particularly for linking together the purely technical and purely administrative departments; i.e. linking together research, construction, maintenance and production operations on the one hand with personnel, sales, buying, storekeeping, accounting financing and housing on the other hand. As a corollary to this linking function, he is charged with the co-ordination of planning for the whole undertaking. The field of operations thus covers the technical as well as the economic and administrative aspects.
(b) Examine the profitability of products or processes in order to promote and improve productivity.
(c) Provide a service to management at all levels, in regard to production control, cost control and quality control, productivity, costs and economic studies, development studies, statistics and administrative methods.[46]

This new branch of engineers reorganised themselves into a society, the South African Association of Production Engineers, with their first meeting in January 1944. This new association made such rapid progress that by the end of the first year its membership had reached the 'very satisfactory' total of 171, clear evidence that it had been started at the right time and was serving a real need.[47] Certainly this Association appears to have been very active. Webster[48] notes that in March 1944, a Dr Berliner read a paper in which he spoke of 'the evolution of a nation (South Africa) becoming aware for probably the first time of the need for scientific organization in production' and two months later another paper was delivered which detailed Taylor's methods in detail.[49]

Although many engineers continued to work as employees, and remained loyal members of the early traditional engineering societies, there was a growth in the numbers of engineers who became employers. Ben Nicholson suggests that up to as many as 15 to 20 per cent of their artisan members set themselves up in their own businesses.[50]
When industrial councils were first established in Britain in 1919, following the publication of the Whitley Report, the fact that engineers had been excluded was bemoaned by some. For example Wordingham, a member of the Institution of Electrical Engineers (IEE) at the time, is recorded in the Institution's Journal as saying:

> 'The Whitley Report', he said, 'most unfortunately recognises only two classes: workmen and employers. The brains of manufacturing, works and of all technical Industries are left out altogether. … It is a gross injustice and a most extraordinary oversight.' [51]

Reader, who reports this observation, goes on to comment:

> It was also an unspoken, probably unconscious, recognition that in British business there was a growing hybrid class of which the members were more likely to be allied in sentiment with the 'employers' than with the 'workmen' but who were themselves employees with interests which differed from the interests of employers and might conflict with them. This class consisted of professional managers, and since the Institution's earliest days many electrical engineers and their predecessors, the telegraph engineers, had been professional managers in such organisations as the British Post Office. If they felt that their profession, as well as engineering,

[46] Straszacker Report, paragraph 385.
[47] Thomson, *Years of Crisis*, p. 5.
[48] Webster, *Cast in a racial mould,* p. 75.
[49] Dr. H.N. Berliner, 'Mass production in South Africa: a study of scientific management' and H.H. Fraser, 'Incentive payment in scientific management', *Engineer and Foundryman,* May 1944.

[51] W.J. Reader, *A History of the Institution of Electrical Engineers, 1871-1971,* Peter Peregrinus Ltd., London, UK, 1987, pp. 97-8.

> was management, then union membership, if they could find the right union – had much to offer.[52]

These British engineers did initially join a union, to protect their material interests[53], but continued to seek a more satisfactory way to promote their broader interests.. They looked to the other professional societies for guidance, but none meet their needs. The first Institute of Electrical Engineers' constitution, for example, did not include the promotion of the 'material interests' of their members given their fear of being viewed as a trade union.

In South Africa the two industrial councils referred to above did not include 'the brains of manufacturing, works and of all technical Industries' substantively, although as Badham noted in 1946, provision had been made for 'vacation students' (or 'pupil engineers'[54]) in the 1944 Electrical Engineering as well as the Iron, Steel, Engineering and Metallurgical industries agreements. However, he reported then that relatively few applications were made and that there had been initial opposition from the trade unions who argued:

> a trade apprentice cannot obtain the same standard of technical education by part-time study as a degree man; if he wants that knowledge he must attend university, therefore, if the university man wants trade experience he should serve a full-time apprenticeship.[55]

The early South African Society of Electrical Engineers added to their 'learned society' functions the promotion of 'the general and material interests of members'.[56] However, possible perceptions that it might be developing trade union functions remained sensitive in South Africa, too. Dirk Vermeulen's account of Sivewright's appointment as the first chairman of the SASEE notes the following:

> As a member of the Cape House of Assembly Sivewright was based in Cape Town and could not attend SASEE meetings in Johannesburg. The committee were, nonetheless, glad to have such a distinguished practitioner at the top as '*his name undoubtedly helped to remove any slight misunderstanding which had arisen through the small suspicion of trade unionism which had at one time threatened the society's career.*[57] [emphasis added].[58]

In this sensitive environment the issue of the 'material interests of members' still needed to be addressed. The engineers believed that the matter hung on their 'status', which in turn depended on a clear entry qualification.[59] J.C. Park, at a meeting of the Engineering Graduates' Association saw engineers as 'poorly paid', and was most explicit in this regard, directly linking the question of 'status' to income.

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[52] *Ibid,* pp. 97-8.
[53] *Ibid*, p. 97.
[54] This was resonant of the earlier 'pupillage' that was a form of apprenticeship which existed at least up until the 1930s – in which pupils who had usually obtained a post-school engineering qualification at a technical college or university, subsequently entered an 'apprenticeship' which involved more varied workshop training than the trade apprentice, specifically spending time in the drawing office. Trade apprentices could rise to become 'pupils' through merit. G.W. Woolliscroft, The Training of an Engineer*,* in *The Proceedings of The Institution of Mechanical Engineers Institution*, London, pp. 705 – 712., Vol. 120, 1931, January – June, p. 710.
[55] Badham, 'The Education and Training of Engineers for Industry'*,* p. 241.
[56] Crouch (ed.), *Sparkling Achievements,* p. 4.
[57] M.A. Crouch (ed.), *Sparkling Achievements*, p.4.
[58] D.J. Vermeulen, 'The beginnings of the South African Institute of Electrical Engineers (SAIEE)', in Crouch, (ed.), *Sparkling Achievements*, page unknown.
[59] See for example, Silberman, 'The Function of the Engineer in Modern Society', summarised by Alexander, *Engineering Graduates' Association Bulletin*, Volume 1, Number 3, October 1943, p.7; and J.G. Park, 'Status of the Engineering Profession', *EGA Bulletin*, Volume 1, Number 8, January 1945, pp. 30-36.

> The establishment, in consultation with Government departments, the existing employers' and professional protective associations and others, of an equitable basis of remuneration, which, under the existing economic system, is one of the principal factors defining status, whether in the Corporate or the individual sense.[60]

He was voicing the views of many engineers and the EASA invited the 'Tak Witwatersrand Ingenieursafdeling van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns' to a meeting to discuss matters of common interest.[61]

> The first meeting took place on 27 May 1947 … (and at) the members of the Akademie agreed to explore all ways and means to enlist the support of their Akademie engineering colleagues in obtaining the status of the engineers as envisaged by EASA.[62]

The reason why this invitation was issued is not hard to fathom. The Akademie was a logical ally: not only did it share a common goal (to advance the status of engineers), but from 1948 it could leverage significant political pressure, necessary if the goal of the legal recognition of engineers was to be achieved.

To secure such status, however, there needed to be greater clarity on WHAT, precisely, an engineer was. The graduates believed that only those with a B.Sc. Engineering degree, from an association-approved university, could qualify for this 'status'. Walker gave a defence of this argument at an early paper to the Engineers' Association (South Africa), which was the new name of the Graduates' Association (EGA) when it became a national organisation on 25 October 1945:[63]

> How is such training to be achieved? To our mind it can come only by determined efforts on the part of all university-trained engineers to secure legal status for the profession. To be sure there will be opposition to such a move from many quarters. There will be those who will give us examples without end, of men who, rising from the ranks, have demonstrated, without the advantages of a University education, their natural aptitude for engineering work and have been proclaimed as some of the most prominent members of the profession. There will be others, ready to criticise, often let it be admitted with justification, the scope, content and arrangement of many University engineering courses. All such contentions are beside the point. We are aware that the engineering art has advanced throughout the years in spite of the lack of organised collaboration among engineers, but we are nonetheless convinced that, at the present stage of scientific development, the achievement of such organised collaboration would ensure a standard of performance, both technically and ethically, which would leave any previous rate of advance well in the shade. [64]

This became a matter of hard principle, although somewhat tautologically stated: 'The admission of University graduates only, as members of the Association, is a recognition of the essentiality of a University Engineering Course in any Branch of the profession, as a part and a very important part of the required education and training'.[65]

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[60] J.G. Park, 'Status of the Engineering Profession', *EGA Bulletin*, Volume 1, Number 8, January 45, point 4, p. 34.

[61] *A Century of Mechanical Engineering, 1892 – 1992*, South African Institution of Mechanical Engineers, 1993, p. 21.

[62] ECSA history, ECSA website, https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, p.4, accessed 19 November 2019.

[63] 'Memorandum by the National Council [EA(SA] on the Principal Aims and Objects of the Engineers' Association (South Africa)', *Journal of the Engineers' Association (South Africa),* 1947, Volume 4, No. 1, p. 5.

[64] W.J. Walker, 'The Status of the Engineer'*, EASA Bulletin*, Vol 2 No 4, April 1946, p. 34.

[65] 'Memorandum by the National Council [EA(SA] on the Principal Aims and Objects of the Engineers' Association (South Africa)', *Journal of the Engineers' Association (South Africa),* No. 1, Volume 4, pp. 5-6.

As the argument strengthened over time, so the distance from artisans increased – albeit that certain engineers, particularly those in the traditional engineering societies, continued to maintain that men 'from the ranks' had a valuable contribution to make. The next 'instalment' in this journey of the engineers will be picked up again in Chapter 10. But how did this debate impact on the well-established career path in the Post Office?

Occupational shifts in the Post Office

The Post Office was not exempt when van der Bijl took office. Some of the critically needed 'material and apparatus' was built in the Post Office's own workshops for the first time:

> The workshops at Johannesburg and Cape Town were, in pre-war times, utilised mainly for the purpose of repairing, overhauling and reconditioning apparatus and equipment but the manufacture, on a small scale, of certain components was also undertaken. As, however, the difficulties in obtaining replacements of essential component parts increased, it became necessary to expand the manufacturing activities of the workshops. At the conclusion of hostilities, numerous types of components which were formerly imported from overseas were being satisfactorily produced in the workshops.
>
> Another phase of the activities of the workshops during the war period was the large-scale production work undertaken on behalf of the Department of Defence. Among the items manufactured were ammunition boxes, morse keys, radio headphones, field telephone switchboards, and component parts for aircraft, tanks, armoured cars, bombs and shells.[66]

By the end of the war the Post Office workshops had produced 100,000 different items for the South African Air Force, 350,000 parts for 991 heliographs, 1,250,000 articles for use in the Post Office (such as teleprinter parts, automatic exchange parts, etc.), hundreds of field telephones for Defence Department, and much else besides.[67]

But the Post Office did not make all the items it needed itself nor was it solely responsible for meeting the Department of Defence's needs. For instance, private engineering firms produced the copper wire, arms for poles, insulators, safety belts, cables, bakelite mouldings for instance, that the Post Office needed.[68]

These changes brought the 'scientific management' discourse into the 'install, maintain and repair' environment of the Post Office and led to some of the same tensions as those in the engineering industry more generally. The site of struggle was not an industrial council however. In the public service, grading was set nationally by the Public Service Commission – at which negotiations on grades and wage levels were negotiated between the representatives of public sector employers and the respective unions.

The grading system for the Post Office in 1940 is shown below. As can be seen assistant engineers were on the same grading system as artisans and other lower ranked officials:

1. Casual Labourer
2. Temporary Workman
3. Permanent Construction Workman
4. Apprentice Telegraph and Telephone (T & T) Electrician

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[66] Telkom Archives, *Post Office Progress, 1939 – 1946*, *Being the Postmaster-General's Annual Report for 1945-6 embodied in a resume of development since the year 1939*, Pretoria, Foreword, pp. 33-34.
[67] 'Exhibition of Items Manufactured in the Departmental Mechanician Workshops*', The Live Wire*, May 1945, Journal of SATTA, pp. 8-9.
[68] *Ibid,* p. 8.

5. Apprentice T & T Mechanician
6. T & T Electrician, Grade II
7. T & T Mechanician, Grade II
8. T & T Electrician, Grade I
9. T & T Mechanician, Grade I
10. Supervising Electrician
11. Supervising Mechanician
12. Assistant Engineer[69]

Traditionally the artisans had helped those 'below' them to find opportunities to climb and the engineers did the same for the artisans, as has been shown in Chapter Two. What is discussed below is how this collegiality across ranks fared as 'scientific management' took hold.

Between artisans and workmen

The 'Three Clauses' Agreement

In the Department of Posts and Telegraphs there was a long-standing agreement on the conditions that had to be met by those aspiring to the grade of Telegraph and Telephone Electrician or Mechanician Grade II (T&TE/M), the first artisan grade. It was generally referred to as the 'three clauses' agreement:

(1) He has previously completed, satisfactorily, the full course prescribed for Apprentices in the Engineering Branch, or
(2) He has completed a full course of Training or Apprenticeship with a Corporation, Firm or Service, engaged in the manufacture, installation or use of Telegraph or Telephone apparatus, which, in the opinion of the Chief Engineer, is equal to or higher than the course prescribed for Apprentices indentured to the Union Department of Posts and Telegraphs …
(3) Being an officer or employee in the service of the Department without special training or experience outside the service, he is selected for such an appointment on the grounds of special aptitude, merit and good conduct: provided that he has served in one or other of the capacities indicated for a total period of not less than five years (not necessarily continuous); that his standard of education is not lower than the 'Junior Certificate' or its equivalent and that he possesses certificates of a technical nature connoting a theoretical knowledge of electrotechnics, which, in the opinion of the Chief Engineer, are of a standard at least as high as that required of Apprentices trained within the Department'.[70]

Inevitably these three clauses became the pivot around which negotiations on deskilling and fragmentation revolved. For example in 1945 there was a spat which led the Pretoria Branch of the union to declare that it was 'opposed to any of the Three Clauses being waived to allow Permanent Telephone Workmen (PTWs) to be appointed to T&TE Grade II'.[71] PTWs, or Permanent Telephone Workmen used to assist artisans to 'install, maintain and repair' in the past. However compromises were extracted as the following minute from the July 1948 Executive Committee of SATTA verify:

> 5776 Staff Committee The Chairman said the office bearers had convened the meeting in order to discuss and decide on an item (No. 13) included by the Official Side on the Agenda of the 17th meeting to be held at Port Elizabeth commencing July 26th. The item read:-

[69] Johnson, 'Training in the Engineering Branch of the Post Office', p. 266.
[70] *The Live Wire,* The Official Organ of the South African Telephone and Telegraph Association, November 1943, p. 8.
[71] Telkom Archives, Item 5238, SATTA, 'Minutes of Fifty-third Meeting of the Central Executive Committee of the SAT&T Association', held at Groote Kerk Gebou, Cape Town, on Wednesday, 12 December 1945.

'The relaxation of the educational and technical qualifications prescribed in paragraph 1(c) of Chapter XVII of the Report of the Public Service Committee of Enquiry dated November, 1933, as amended, to permit of the appointment of a limited number of Permanent Telephone Workman, with not less than five years' experience in the grade and who have rendered outstanding service over a period of years, to the rank of Telegraph and Telephone Electrician/Mechanician, Grade II.'

He referred to Association policy regarding the Three Clauses which governed the number of PTWs to the T&TE/M grade, and past discussions on the matter. A comprehensive discussion thereupon ensued on the subject from various angles: eligibility of certain PTWs of long service. Shortage in the T&TE grade, Association policy against creation of further special PTW posts and allowances, further T&TE posts implied additional 1st grade and SE posts. The Chairman gave it as his opinion that the number selected would probably not exceed 20 and that such men would have long service in the PTW grade. It was ultimately resolved:

(1) That the Association agree to the Department's proposal as set out in Item 13 of the Agenda, suspension of the conditions of the Three Clauses to apply only to a list of candidates supplied by the Department to the Association and finalised in consultation with the SATTA.
(2) That no PTW appointed shall have less than 15 years' service.
(3) That the new appointees must serve at least 2 years before becoming eligible for promotion.[72]

The outcome of this particular negotiation is less important perhaps than the tactics used by management at the time – they extracted concessions with bribery, holding back other promotions pending their agreement on such 'dilution'.[73] And the unions responded by trying to set ratios or quotas to restrict this movement.

It would appear from this brief vignette that the issue of 'dilution' was producing the same cautionary response from the union as that in the wider engineering industry.

Between artisans and engineers

In 1945, the SAT&TA, later renamed the South African Telecommunications Association (SATA), explored the possibility of recruiting engineers and established that the Public Service Commission had no objection to their changing their Constitution to include engineers. The Association was advised, however, that until it had recruited a majority at this level it could not claim to represent them.[74] The decision to admit engineers was subsequently rescinded[75] and engineers were prevented from joining the Association. The union was even forced to ask artisans to resign when they were promoted to these higher ranks. They lost a fair number of

[72] SATTA, 'Minutes of the Ninety-eighth (Special) Meeting of the Central Executive Committee of the SAT&T Association', held at 803, Groote Kerk Building, Cape Town, on Thursday 22 July 1948.

[73] '[The official side] wished to replace 6 T&TEs second grade by 6 PTWs on auto exchange maintenance who the Chief Engineer said were able to carry out these duties and are available, the interpretation of the departmental letter being that the filling of the 49 (Supervisory and First Grade) posts would all be held up pending this dilution.' SAT&T Association (SATTA), 'Dilution of work of artisans', 12 December 1945, 27 March 1946.

[74] Telkom Archives, Item 5148SATTA, 'Minutes of Forty-eighth Meeting of the Central Executive Committee of the SAT&T Association', held at Groote Kerk Gebou, Cape Town, on Wednesday, 22 August 1945.

[75] Telkom Archives, Item 5224, SATTA, 'Minutes of Fifty-second Meeting of the Central Executive Committee of the SAT&T Association', held at Groote Kerk Gebou, Cape Town, on Wednesday, 14 November 1945.

members this way, including Rankin, the Western Cape Branch representative on the Central Executive Committee, when he passed the Engineers' Competitive Exam in 1956.[76]
In 1956 the possibility of extending the Association's constitutional scope to include engineers took an unexpected turn. The engineers had formed a committee of their own and its chairman approached the President of SAT&TA in December 1955 to ascertain whether they could possibly join.[77] SAT&TA resolved to hold a special meeting on 23 March 1956 to discuss the matter and at that meeting:

> The matter of the approach made by the Engineers' Committee was discussed from all angles, each CEC member stating his view, and ultimately the meeting accepted the following as a basis for discussion at the joint meeting:
> (1) That Post Office Engineers as a Group or Section be accepted into the Association.
> (2) That no Engineer should represent a Branch of the Association on CEC.
> (3) That the Engineers' Group have one representative on the Central Executive Committee.
> (4) That an Engineer can hold office on the CEC i.e. either as President, 1st Vice President or 2nd Vice President, but not more than one office is to be made available to the Engineers at any one time.
> (5) That the Engineers' Group be allowed representation at Association Conferences.
> (6) The finances of the Engineers' Group to be conducted on the same basis as the Branches of the Association.
> (7) CEC opinion is that Engineers should not attend General Meetings of the Branches.
> (8) The Main Committee of the Engineers' Group be permitted to use the Association's offices for Committee meetings.
> That a joint meeting between CEC and the Engineers' Committee be held on 3rd April, 1956 …[78]

These points were apparently mutually agreed at the joint meeting and the engineers undertook to consult members on these proposals.[79] The expectation was so strong that there would be a positive outcome that a resolution was drafted for the SATA October Conference to secure the change to the Constitution.[80] But the SATA received a letter, dated 27 August 1956, in which they were informed that 'the Engineers' Committee had finally decided not to join the Association to enable it to represent the Higher Professional Group' and '(i)n view of this reply … the CEC Conference item automatically fell away.'[81] The possibility of a full alliance between artisans and engineers in the Post Office was lost.

The engineers proceeded to form their own organisation, known initially as the Society of Post Office Engineers (SOPOE). A senior Post Office official at the time, recalled to me that my father, Ken Bird, played a significant role in these developments.[82] The Society had their own engagements with the office of the Post Master General and was registered as a sub-section

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[76] Telkom Archives, SATTA, Opening remarks in 'Minutes of 49th meeting of Central Executive Committee of the Association' held at Ryalco House, 363 Schoeman Street, Pretoria, on Friday, 20 April, 1956.
[77] Telkom Archives, Item 7390, SATTA, 'Minutes of SAT&TA', 9 December 1955.
[78] SATTA, Higher Branch Personnel, 'Minutes of Special Meeting of the Central Executive Committee of the SAT&TA', Friday 23 March, 1956, Telkom Archives, Item 7454.
[79] 'Editorial: Post Office Engineers', *Live Wire*, Official Organ of the SATTA, February 1957.
[80] 'Item 90, Membership: Engineers', *Live Wire*, Official Organ of the SATTA, October 1956, p 15.
[81] SATTA, 'Minutes of 55th meeting of the CEC of SAT&TA', 28 September 1956.
[82] This person requested not to be named when interviewed in Pretoria on 24 October 2007. He had however followed the same route to engineer as had Ken Bird, doing his apprenticeship from 1949 to 1953 and completing the Competitive Exam at the end of 1954 whereafter he was appointed as an engineer. He proceeded to complete a BSc and ended his career as a Senior General Manager in Telkom in 1993.

of the PRO/TECH Division (Professional/Technical Division) of the PSA (Public Service Association).[83] Dawie Malan represented the Society for many years.[84]

In an uncharacteristically blunt editorial in the SATA's journal *Live Wire* in February 1957, the Association expressed their disappointment and their understanding of why this outcome had been arrived at:

> As this question (of the Engineers joining SATA) is now out of the way we can attempt to speak somewhat openly. It was not the Association which made the approach on this occasion but the Engineers' Committee for the reason that there is a feeling among some engineers that the proper body to which they should belong is the Telecommunications Association, an essentially Post Office Engineering organisation which has a proud record of achievement and which is constantly putting before the public the important role which the entire Engineering Division plays in the design and planning, construction and maintenance, of the country's electrical communications systems.
> Post Office engineers were 'qualified' through three possible streams:
> 1. A University.
> 2. The Engineers' Competitive Examination.
> 3. By selection*
>
> Among the graduate engineers there has always existed a hidden hostility to joining the Association. What is more, they feel they are not only superior to the non-graduate engineers, but that no matter how intricate an examination paper may be or how able and qualified a man may be who is appointed by selection, none of these men are really professional engineers and that it is only the graduate who has the right to describe himself as an engineer.[85]
> [* a system of performance appraisal which was seldom applied].

Whilst no equivalent statement from the engineers' perspective was found, their stand can be inferred from the report of a 1955 departmental inquest that was undertaken. The account suggests that it was indeed the graduates who were behind this decision:

> Die Ingenieurs wat aangestel is op grond van die feit dat hulle graduandi van Universiteite is of gekwalifiseer het deur die departementele eksamen af te lê, het by monde van 'n paar van hulle, bedemkinge ge-opper teen die aanstelling van Hoofelektrisiëns as Ingenieurs, Graad IV. Die mening word gehuldig dat laasgenoemdes nie behoorlik gekwalifiseer is om as Ingenieurs aangestel te word nie en dat die departement, deur sulke aanstellings te maak, 'n kanaal skep waarlangs sulke aangesteldes tot die hoër gegradeerd ingenieursposte toegaan sal hê. Hulle het dit een van die redes genome waarom graduandi van die universiteite onwillig is om 'n loopbaan in die poskantoor te soek. [86]
>
> The engineers who were appointed on the grounds of being graduates of Universities or qualified after passing the departmental examination, by way of a few of them, raised objections to the appointment of Chief Electrician as Engineers, Degree IV. It is believed that the latter are not properly qualified to become engineers and that the department, by making such appointments, is creating a channel through which such employees will have access to the higher rated engineering positions. They gave this as one of the reasons why university graduates are unwilling to seek a career in the Post Office.

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[83] In the late 1960s, when the Department received autonomy in the Public Service domain, while Stan de Vigne was the chairman, it was decided to break away from the PSA and stand alone. See *Abridged History of the Society for Telkom Engineers*.

[84] *Abridged History of the Society for Telkom Engineers*, Society of Telkom Engineers, 12 November 2007, p. 1. [Provided to me by Neil Jooste, President, Society of Telkom Engineers]

[85] 'Post Office Engineers', *Live Wire*, Official Organ of the SATTA, February 1957, pp. 2-3.

[86] Telkom Archives, Vol 2 Box 20 9B1A/30/926/72 (Verw.), Staatsdienskommissie, 'Pos-en-Telegraafwese inspeksieverslag oor Hoofingenieurstak, Pretoria', 30 June 1955, pp. 17-18. Reference followed from Stofberg Ph.D. thesis, footnote 536 p. 129.

Post Office graduate engineers, like D.P.J. Retief, (a Cape Town university graduate introduced in the last chapter, who was appointed to the position of Chief Engineer in the Post Office in December 1955, and to the Pretoria Branch Executive of EGA when the branch was formed[87] and was also active in Die Akademie),[88] played a critical role in the campaign to secure legislation to protect the status of the *graduate* engineers. In a pile of my father's photographs, there is one of him attending the first Congress of the Society of Post Office Engineers in 1961.

From this account it is apparent that the Post Office was part of the broader society and the graduates in the Post Office were engaged in the discussions that had been initiated by the graduates at the University of the Witwatersrand.

> It is not enough to be merely a good engineer and nothing else. The groove is too narrow. Too seldom is university education looked upon as a preliminary equipment wherewith to set about *complete* living through post-Varsity educational development; to prepare yourself to take a wider interest in the other pursuits of life; and to play a wider and more enlightened part in social, economic and political activities. [89]

EDUCATION AND TRAINING LANDSCAPE

Accelerated training for the war effort

The state faced a critical shortage of engineers and artisans during the war to meet production demands – not only to perform design, planning, tool room and supervision functions in mass production firms like Alpha Harris, but also to carry out civilian work. There were also still a plethora of functions required of traditional artisans in small firms, of which there were estimated to be 9,837 across all sectors in 1938/9, having on average only 31 employees.[90]

'Artisans'

So, 'shortly after the outbreak of hostilities, in September 1939, the question of available manpower for industry, munitions work and the technical branches of the Defence Department exercised the minds of those in authority. A Defence Technical Committee was appointed in October 1939 to investigate and report upon the position and the means to be taken to provide the necessary personnel'.[91] In November 1939, the defence authorities called a meeting to which they invited representatives from the Department of Labour, the Education Department,

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[87] See Minutes of General Meeting held on 12 March 1945, at the Iscor Club, to discuss the formation of a Pretoria Branch of the Engineering Graduates' Association, *EGA Bulletin*, Vol. 1, No. 9, April 1945, pp. 17-18. Also 'Activities of Pretoria Branch of EASA during the quarter ending December 31, 1945', *Journal*, Vol. 2, No. 3, January 1946, p. 21.

[88] Die Akademie appointed D.P.J. Retief to join a commission in the middle of 1943 on 'Verslag in verband met die Behoefte aan en Opleiding van Semi-professionele Tegnici in Suid-Afrika'. In *Feesalbum, 1909 – 1959*, Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns, J.L van Schaik, Bpk, Pretoria 1959, p. 155.

[89] 'A Retrospect – The Engineering Graduates' Association – What it is and hopes to do', reprinted in the *EASA Bulletin*, Vol. 25, No. 1, January / February, 1968, p. 3.

[90] Badham, 'Presidential Address', p. 18.

[91] De Villiers Report, 1948, paragraph 1078.

the eight technical colleges and the Griqualand West Technical Institute.[92] At this meeting it was resolved to set up a central organisation to provide the trained technical personnel required for national mobilisation. It was also resolved to use existing institutions to the best advantage.[93]

> The Central Organisation of Technical Training (C.O.T.T.) was formed early in 1940 to provide basic technical training for personnel required for war industries and for building up the technical units of the Union Defence Force. It initially trained civilian personnel only but to-day its activities are practically confined to the training of military personnel. It has, however, retained its previous form of administrative and technical organisation and its civilian status. By the 30/6/42, 17,632 trainees had been admitted for training: of these 11,904 had been posted or remustered to military units, 270 had been placed in industry, 3,560 proved ineffective for various reasons such as desertion, inaptitude etc. and the balance of 1,898 were in training on that date. [94]

> The period of training was 25 weeks, and consisted of 23 weeks of bench fitting, including marking off, drilling and inspection, and 2 weeks of blacksmithing. The hours of work were 48 per week, and included one hour per week for physical training and two hours per week for what was designated 'technical information'. Trade tests in both trades were conducted at the end of the course. [95]

During the war there were some who felt that this signalled the way forward for the apprenticeship system in general,[96] but as we shall see they were in a minority. In passing it can be noted that Professor Orr, who was at the time the Principal of the Witwatersrand Technical College, became the Officer-in-Charge of the Witwatersrand Centre of the Central Organization of Technical Training (known as COTT Centre No. 8).[97] He was also a member of the De Villiers Commission that sat after the war and concluded that:

> The Commission, while fully conscious of the excellent work done by the C.O.T.T. during the war, feels that this technical training scheme had a definite purpose and a particularly sharp focus, to meet specific war emergency demands. It was not intended to be an educational scheme, and was never claimed to be such, but mainly designed to lay a foundation for certain technical requirements of the Army. It closely resembled modern basic training of highly skilled operatives.[98]

Engineers

A commensurate set of programmes were established to produce engineers quickly during the war, but the EGA suggested that these should not be the post-war model. Its views are reflected in the EGA Bulletin of 1945, which summarises 'A Report of a Committee on the Aims and Scope of Engineering Curricula', published in 1944:

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[92] A. Pittendrich, *Technikons in South Africa*, The Building Industries Federation (South Africa), Halfway House, South Africa, 1988, p. 130.
[93] Ibid, p. 130.
[94] G.M.14, CENTRAL ORGANISATION OF TECHNICAL TRAINING – D.G.W.S., SURREY HOUSE, JOHANNESBURG, 5 September, 1942., 'Memorandum Upon The Establishment Of Centralised Control Of Technical Training After The War', National Archive, Government Apprenticeship Committee Recommendations, Circulars and Correspondence, SAB, ARB, Volume 325, Ref. G/5.
[95] De Villiers Report, 1948, paragraphs 1080 – 1083.
[96] G.M.14, CENTRAL ORGANISATION OF TECHNICAL TRAINING – D.G.W.S., SURREY HOUSE, JOHANNESBURG, 5th September, 1942., Memorandum Upon The Establishment Of Centralised Control Of Technical Training After The War, National Archive, Government Apprenticeship Committee Recommendations, Circulars and Correspondence, SAB, ARB, Volume 325, Ref. G/5.
[97] Draper, *The Engineer's Contribution,* p. 232.
[98] De Villiers Report, 1948, paragraph 1084.

> The 1940 Report on Aims and Scope of Engineering Curricula advocated the strengthening of engineering education by concentration on basic elements in the undergraduate years, organisation of the curriculum in parallel integrated sequences of scientific-technological and humanistic-social subjects, and by transfer of some of the more specialised subjects to the postgraduate period.
>
> The exigencies of war have tended to cause a reversal of the process embodied in these recommendations. Special war training programs of limited duration must necessarily be concentrated on the attainment of specific technical objectives. Even their basic phases include only such general studies as have a direct relationship to military requirements. No one will question the necessity of training men for military service by intensive methods in time of war. We believe, however, that with the cessation of hostilities the policy of expediency in engineering education should be abandoned. The evolutionary process of strengthening engineering education at its base should then be resumed as quickly as possible.[99]

So neither the artisan nor the engineer 'quick fix' solutions of the war years were deemed adequate for peace time.

Post-war review of the apprenticeship system

There was a cacophony of policy debate during and after WWII in relation to the apprenticeship system in the light of the changes taking place in industry. The Apprenticeship Act of 1922 was amended in 1930, 1944, 1951, 1959 and 1963. The stage was somewhat quieter for engineers although there was a growing call for more work to be done to improve the quality, nature and level of their training. The focus of this section will therefore primarily focus on the changes underway for apprentices, although comparisons will be drawn with the *strategy* underpinning artisan training as compared to that of the engineers. The chapter on Professional Engineers will unfold the engineer's story further.

There had been a call, from as early as 1935, for the revision of the Apprenticeship Act. The Industrial Legislation Commission of that year noted that

> The evidence points to the necessity for reviewing the lists of designated trades in all scheduled industries with a view to eliminating those in which apprenticeship can no longer be justified or reducing the prescribed periods when the necessary skill be acquired in shorter periods. We recommend that the whole position be examined at the earliest possible date, and that thereafter it be reviewed from time to time.[100]

This recommendation was not accepted by the Minister of Labour in the General Smuts-led United Party government, Walter Madely. Instead, he tabled a new Apprenticeship Bill in 1940, but after two readings suddenly withdrew it in the face of strong opposition. There was another Commission whose report in 1941 influenced the debate further.[101] Dr. H.J. van Eck, the Chairman of this second Commission, summarised his views when giving his Vote of Thanks to Badham after the latter presented his Presidential Address to the SAIEE in 1945. When doing so he also referenced another report, the Second Report of the Social and Economic Planning Council:

> The Council considers that these various possibilities of improving apprenticeship training should be thoroughly investigated before the new Apprenticeship Bill contemplated by the

[99] Extracts from 'Engineering Education after the War', A Report of a Committee of the S.P.EE. Published in *Mechanical Engineering*, October 1940, pp. 727 – 730, and further discussed in the same Journal June 1944, p. 403 et seq., reproduced in *EGA Bulletin*, Vol 1 No 9, April 1945, p. 13.
[100] Hansard, 21 April 1944, 5558.
[101] Union Government, UG40-1941.

> Labour Department is introduced. … The tendency in some industries to substitute apprenticeship by learnership without providing for continuation classes is depreciated by the Council … In the circumstances, the Council is of opinion that the closer integration of general vocational instruction into the curriculum of the ordinary schools must receive early consideration. At the same time the trade training given under the apprenticeship and learnership systems, and possible new development in these fields, must be reviewed. [102]

However, in spite of this and other pleas for a major review of the apprenticeship system, the Minister of Labour decided to re-submit his Bill to parliament and it was passed, in the midst of much dissatisfaction, in 1944, becoming Act No. 37 of 1944.

On introducing the Bill to parliament, the Minister of Labour stated: 'The Bill does not propose any fundamental changes in the machinery for regulating apprenticeship. Fundamentally our apprenticeship system is sound.'[103] The Bill therefore retained the apprenticeship committees as before and made a number of their functions explicit. But it did introduce four key new elements:

- It introduced the notion of 'designated institution';
- It established the National Apprenticeship Board whose duty was to advise the Minister on matters pertaining to apprenticeship;
- It gave the Minister wide-ranging powers to modify the earlier apprenticeship framework in nearly all respects;
- It prohibited race discrimination.

These are each briefly considered below.

'Designated institution'

> Whereas the earlier Apprenticeship Acts had indicated that the Apprenticeship Committees could 'after consultation with the educational authority, recommend to the Minster the nature and number of educational classes to be attended by an apprentice in terms of his contract of apprenticeship' (Act No. 26 of 1922, clause 14 (f)) and 'defin(e) the education authority' (Act No. 22 of 1930) to which apprentices had to study educational classes, the 1944 Act introduced a new concept – that of a 'designated institution' which it defined as
>
> > any declared institution in terms of the Higher Education Act, 1923 (Act No. 30 of 1923), which has been designated by the Minister as an institution having an interest in the education or training of minors or apprentices in an industry and in an area in respect of which a(n apprenticeship) committee has been established. (Definitions, Act No. 37 of 1944).
>
> The Act went on to require apprenticeship committees to consult with these designated institutions before putting forward recommendations to the Minister on the classes to be attended by apprentices (be they by correspondence or by attendance), the period and intervals of such courses and the circumstances under which employers were to pay the fees.[104]

The National Apprenticeship Board

[102] H.J. Van Eck, 'Vote of thanks to Badham', *Transactions of SAIEE*, January 1945, pp. 24-5.
[103] Hansard, 13 April 1944, 5075.
[104] Act No. 37 of 1944, Section 13(a) and 16(d), (e)(f) and (i).

The role of the National Apprenticeship Board was to 'advise the Minister on all matters in which he may, in terms of this Act, act on the recommendation of the board, and on such other matters as the Minister may refer to it' (clause 3(1)).

The composition of the Board, as set out in the Act, was to consist of the Minister and ten other members appointed by him:

- The Secretary for Labour and the registrar;
- Two appointed by the Minister of Education for their knowledge of matters relating to technical training;
- Two shall represent the interests of the prospective apprentices in or from rural areas*;
- Two shall be appointed for their special knowledge of matters relating to apprenticeship;
- One representing employers and one representing workers both chosen from 'organisations the Minister may deem qualified to represent the interests of employers'[105]

  [* This was in response to a push to get more Afrikaans-speaking apprentices at the time.]

Ministerial powers

Much of the 1944 Act is the same as the earlier act with one major caveat – whereas the earlier acts prescribed a fixed framework for all apprenticeships, the 1944 Act gave the Minister powers to modify every detail 'on the recommendation of the board and after consultation with the [apprenticeship] committee concerned, by notice in the Gazette'. So, after receiving the views of these parties, he could vary: the qualifications, the minimum age and educational standard required for apprenticeship, the period of apprenticeship; the pay rates; the part-time, correspondence or full-time technical classes to be attended and the period during which they shall attend such classes; the practical training to be provided by employers; the examinations to be passed; and so forth.[106] This introduced flexibility into the system which had not previously been there, but solely at the discretion of the Minister – which the opposition was greatly concerned about: 'From A to Z there is just one provision after the other which says "the Minister can"'.[107]

Two of the powers given to the Minister under the 1944 Act were of particular concern to those parliamentarians that were sympathetic to employers - the power to designate trades and the power to determine their length.[108] There was a fear that this would result in a proliferation of trades. Molteno representing an employer voice and speaking in a language very consistent with 'scientific management', made much of these points:

> The evidence which has been laid before the Planning and Economic Council indicates that, having regard to the increase of mechanisation of industry, apprenticeship periods need not be prolonged and the need for apprenticeship is lessening … All we are concerned with is that skilled rates should be applied to occupations which are in truth skilled occupations, and that the system of apprenticeship should be limited to its proper sphere, which is training for jobs which require special skill, and not operate in

[105] Ibid, Section 3 (2)(e).
[106] Ibid, Section 16.
[107] Hansard, 1944, 5538.
[108] Act No. 38 of 1944, section 16(1) and (2)(b).

order to exclude large sections of the working class from performing operations which they are in fact perfectly competent to perform.[109]

Both the employer-sympathisers and the Afrikaner nationalists were concerned that the advice that the Minister was going to receive on these matters was to come from the apprenticeship committees, consisting of craft unionists with a vested interest in maintaining the current system. The legislation was felt by many to be 'half-baked' and seriously in need of more substantial consideration. Whilst the Act was passed in spite of these concerns, the concerns did not recede and a Commission was finally appointed in 1946, as shall be seen below.

Prohibition of race discrimination

Somewhat surprisingly for the times, the 1944 Act prohibited the Minister from establishing an apprenticeship committee on racial grounds (see Act No. 37 of 1944, Section 5). There were however many ways in which racist practices persisted. These are discussed in the next chapter.

De Villiers Report

As indicated above there remained many concerns with the 1944 Act. As a result, in March 1945, the United Party government appointed the *Commission on Technical and Vocational Education* to investigate the problems and recommend solutions to them.

It is interesting to note that the person chosen to chair this important Commission was a prominent leader of the Akademie vir Wetenskap en Kuns[110] – the organisation to which the engineering university graduates had turned to strengthen their campaign for legislative 'status'. The influence of this body straddled the Nationalist/United Party divide, as Prime Minister Smuts had been a member. The person chosen, Dr. Franscois Jean de Villiers, was a particularly influential figure who had helped to launch the South African Bureau of Standards in 1945 and was the Chairman of the Defence Resources Board. As Chairman of the Electronics Committee, and with the enthusiastic and expert help of D.P.J. Retief, he initiated large scale electronics manufacture.[111]

Sitting on the Commission with De Villiers were Badham, Crompton, Orr and Sinton. Badham is a person who has been introduced already: he held a number of positions, including Chairman of the Electrical Engineering Industry Industrial Council, President of the SAIEE in 1945[112], the President of SEIFSA in 1948 and member of the National Apprenticeship Board.

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[109] Hansard, 21 April 1944, 5558-9.
[110] Franscois Jean de Villiers was a key member of the Akademie van Wetenskap en Kuns: holding various offices and in 1954 – 1956 became the Chairman of the Fakulteit Natuurwetenskap en Tegniek as a whole and in 1956-7 became Deputy Chairman, together with AJA Roux when R.L. Straszacker became Chairman (both of whom were also to play key roles in the story of this study). From July 1955 – June 1958 he was elected the Deputy Chairman of the Akademie as a whole, and in July 1958 - June 1961 he became the Chairman of the Akademie. Information outlined in Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns, *Feesalbum, 1909 – 1959*, J.L. van Schaik, Bpk, Pretoria, 1959, pp.158 – 159.
[111] *The Professional Engineer*, (the re-named EASA Journal following the passing of the 1968 Professional Engineer Act) Vol. 6, No. 2., April 1977, p. 65. Events recounted in Chapter 9.
[112] SAIEE, 1959, p. 8.

Crompton was the secretary of the craft union, the Ironmoulders' Society. Professor John Orr, whose work has been described, retired from the Commission in May, 1947, before it completed its work. He died in Johannesburg on 17 May 1954 in his 85th year.[113]

The De Villiers Commission began its work in 1945. It was given extremely wide-ranging terms of reference which straddled the mandates of both the Minister of Labour and the Minister of Education:

Terms of Reference:

(1) The most suitable methods of training for industry, having regard to the role of apprenticeship and learnership in such training, and the providing of facilities therefor.

(2) (a) Whether and to what extent greater provision should be made than at present for instruction of a vocational character in the curriculum of primary and secondary schools which provide educational facilities of a general character.
(b) The scope of the vocational and technical instruction which should be given in educational institutions established for that specific purpose.

(3) The parts that should be played by the Union and Provincial Education Departments respectively in the matter of vocational and technical education, having regard to-
(a) the functions on the whole of technical colleges as they have developed as institutions of higher education under Act No. 30 of 1923;
(b) the relationship between the work of the vocational schools of the Union Education Department and of the technical colleges in so far as they fall within the field of secondary education on the one hand and the ordinary secondary education activities of the Provinces on the other;
(c) the relationship between the work done at the vocational schools of the Union Education Department and the work done at technical colleges in so far as it is of the same general character;
(d) the desirability of co-ordinating the various activities mentioned.

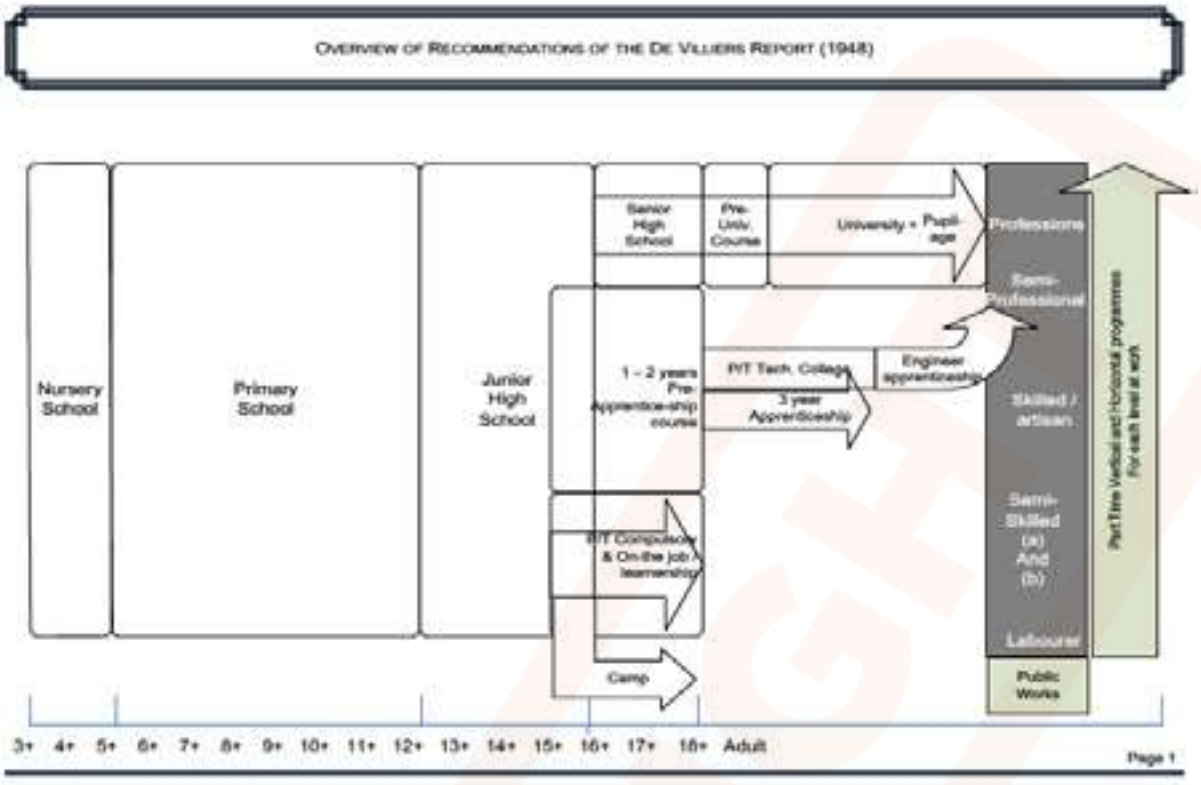
(4) Any financial implications arising from the above. [114]

The Commission rose to the challenge and tabled an extremely comprehensive report in 1948.[115] The report was positively received by the Nationalist Party government even though it had been appointed by a United Party-led one – a consequence perhaps of the central role of the Akademie.[116]

It is beyond the scope of this study to interrogate all of its proposals in depth, but the diagram below summarises the system recommended:

Figure 6.1. An diagrammatic overview of the De Villers Report.

[113] Draper, *The Engineer's Contribution,* p. 232.
[114] UG 65/1948, *De Villiers Commission Report*, Appointment Letter from N.J. De Wet, Officer Administering the Government By Command of His Excellency, the Officer Administering the Government-in-council, to Dr de Villiers, L.H.L. Badham; C.H. Crompton; Prof. Orr and A. Sinton, 15 March 1945, p. ii.
[115] UG 65/1948, *Report of the Commission on Technical and Vocational Education,* Government Printer, Pretoria, 1948.
[116] The new Minister of Labour stated in 1951 that 'to a very large extent' the findings and recommendations of the Commission coincided with his views. Hansard, 20 April 1951, 5089.



Source: *Prepared by the author from the De Villiers Report*

Of relevance to this chapter is their proposals with regard to the apprenticeship system. As mentioned previously, the terms of reference of the De Villiers report straddled the mandates of the ministries of Education and Labour and their responses are considered.

Government responses

The Minister of Education, Arts and Science

> From the standpoint of technical education the following were the main recommendations of the De Villiers Report which affected the implementation by this Department:
> (a) The establishment of a national council for education by act of Parliament in order to provide co-ordination of the various educational services.
> (b) The provision of 'three years post-primary general differentiated education' for all pupils between the ages of 12 and 15 years so that pupils would receive effective vocational guidance.
> (c) The extension and improvement of vocational education.
> (d) The provision of free vocational education up to the age of 18 years.[117]

With regard to the second matter, little progress was made due to opposition from the Provincial education departments who feared that their 'admirable' academic standards would be compromised.[118] Malherbe dedicated two chapters of his weighty record of *Education in South Africa, Volume 2, 1923 to 1975*, to an analysis of this tension between the national

[117] U.G. 60, 1952, p. 6.
[118] See A.W. Rowe, 'Presidential Address: Present Trends in Apprenticeship Training and Technical Education', in *The Journal of the South African Institution of Engineers,* July 1951, p. 351.

department and the provincial departments of education, which he refers to as 'administrative dualism'[119] and of which he wrote:

> From the beginning, the growth of technical as well as vocational training was handicapped by a vacillating policy as to where the administrative and financial responsibility for its development lay. This in turn led to an arbitrary dichotomy in the education of pupils at the adolescent stage.[120]

This underplays the fact that the apprenticeship system was an 'administrative triangle' with the Department of Labour concurrently in the mix.

With regards to the remaining items, the Ministry appointed a Committee, whose deliberations (interspersed with interactions with a much-concerned Association of Technical Colleges) led to the passing of the Vocational Education Act No. 70 of 1955.[121] This Act enabled the Minister to take direct control of all of the vocational schools (clause 2(4) and to 'vest the maintenance, management and control of any declared institution' [i.e. technical college] 'in the Government in its Department of Education, Arts and Science' (clause 3 (1)). The Act also permitted the Minister to 'conduct examinations and issue diplomas and certificates in respect of (a) any course conducted at a vocational school or at any institution under the control of the Department; and (b) any other course approved by him' (clause 11). The aim was to bolster the interests of Afrikaner Nationalism at the time by enabling the Minister to determine the language of study and examination.[122]

Malherbe was to note years later that:

> The technical colleges themselves did not seem to prosper as a result of the Government's take-over in 1955. For example, their total staff dropped from 2 193 in 1956 to 1 978 in 1962 and the number of apprentices registering for courses decreased from 8 434 to 6 306 during the same period. … Probably the main factor in the decline of the technical colleges was the loss of their autonomy and a decline in local interest and initiative.[123]

The 'dualism' was reversed in 1960 following the recommendations of another Commission, the Schumann Commission.[124] This was formally done with the passing of the Educational Services Act No. 41 of 1967. This same Act also led to 19 former 'apprenticeship schools' being named technical colleges – bringing the total of such institutions by 1968 to 26.[125] These remained departmental institutions which taught principally part-time apprentices – only 14% of whom were post-Standard 10.[126]

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[119] Malherbe, *Education in South Africa*, Chapters XX and XXV.
[120] Ibid, p. 200.
[121] Pittendrich, *Technikons in South Africa*, p. 130.
[122] Malherbe, *Education in South Africa*, p. 207: 'The real underlying motive was, however, the attitude fostered by the Broederbond that hitherto the State-aided technical colleges had not taken the Afrikaners' national character and philosophy of life sufficiently into account'.
[123] Malherbe, *Education in South Africa*, p. 208.
[124] *Report of the Commission of Enquiry into the Financial Relations between the Central Government and the Provinces*, R.P. 35/1964, chapters III-XII and XXX cited in Malherbe, p. 144.
[125] By virtue of the Education Services Act No. 41 of 1967, 19 institutions known previously as schools for apprentices became known as technical colleges. This number, added to the seven existing colleges at Bloemfontein, East London, Kimberley, Kroonstad, Pietermaritzburg, Welkom and Stellenbosch, brought the total number of institutions to 26. E.G. Malherbe, *Education in South Africa*, p. 331.
[126] E.G. Malherbe, *Education in South Africa*, p. 330; pp. 331-4

The Minister of Labour

In June 1949, the Minister of Labour, appointed a Ministerial Committee on Apprenticeship System Revision. This included Badham who represented employers and Dr. Rowe who ensured educational interests were catered for. The latter was then the Director of the Witwatersrand Technical College. He had been the President of the South African Institution of Engineers and a very active member of *die Akademie* and so brought a broad perspective.[127] These two were joined by Mr Glastonbury, from the trade unions, and together all three men represented the National Apprenticeship Board, of which they were members. Representing government was H.S. le Roux from the Department of Education, Arts and Science and J.J. Scheepers from the Department of Labour, the latter acting as the chairperson.[128]

Their terms of reference were 'To examine the recommendations of the Commission on technical and vocational education and enquire into, report upon and make recommendations to the National Apprenticeship Board and the Minister of Labour (including where necessary recommendations for amendments of the law).'[129] This was then followed by 14 specific points on which their advice was sought. Badham later recalled that:

> (W)hen briefing the committee the Minister was insistent that the operative phrase was 'get cracking'. The committee's investigations involved the collation and analysis of some 20 000 units of information obtained from responses to a questionnaire. The report was tabled in December 1950, and the amendments to the Apprenticeship Act became law in April, 1951.[130]

The amendment of the 1944 Apprenticeship Act No. 28 of 1951 was not the only outcome. The Training of Artisans Act No. 38 of 1951 (an act covering the training of adults as artisans) and the Native Building Workers Act No. 27 of 1951) also followed (the latter will be discussed in the next chapter). However problems with the apprenticeship system persisted and in 1958 the Minister of Labour commissioned another major investigation, this time undertaken by the National Apprenticeship Board (NAB) itself. The NAB tabled a substantial report in September 1960, but legislation was postponed because of major opposition from the craft trade union movement. This took over two years to settle and delayed the passing of the 1963 Apprenticeship Amendment Act No. 46 of 1963. The substance of these various reports are now considered.

Evolution of the apprenticeship system

The 'invisible hand' of scientific management took hold of the apprenticeship system and moulded it to suit its purposes, although the form it took was influenced by the political and social forces in operation at the time. What follows is a brief overview of these shifts in relation to each of the major components of the apprenticeship system over the period under consideration:

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[127] Rowe, 'Presidential Address', p. 365.
[128] Report of the Ministerial Committee on Apprenticeship System Revision, 1950, Part I..
[129] Ibid, p.1.
[130] In discussion on Rowe's paper, 'Presidential Address', pp. 362-3.

CRITERIA FOR ENTRY INTO AN APPRENTICESHIP

Language, Class, Race and Gender

A more detailed discussion of these criteria will follow in the next chapter. However here it can be noted that the British (English) craft tradition was being challenged by language, class, race and gender challenges of a peculiarly South African character.

Age

In the main, apprenticeships were restricted to the young ('juveniles'). In the engineering industry, for example, in 1943 a juvenile was any employee under 21 years of age,[131] but in 1944 the limit was lowered to 'an employee between the age of 16 and 19 years'[132]

Older people (variously called 'adults' or 'major apprentices') were not formally excluded from the apprenticeship system, but either the Registrar or the Industrial Council had to approve their contracts. These were considered to be separate from the 'normal' apprenticeship system and were legislated under the Training of Artisans Act No. 38 of 1951.

Educational entry requirement

Pre-vocational programme

At the time, there was pressure from employers to shorten the 'normal' apprenticeship.[133] One solution, supported by the De Villiers Commission, was to introduce a pre-vocational programme that would have the effect of shortening the period of time at an employer from five to three years (building on lessons learned from COTT[134]). Sadly the technical colleges at the time did not have the facilities to provide the practical workshop experience required for such a programme for two years, so a one-year programme was introduced instead, in exchange for which an apprentice would receive a full one-year's remission from his apprenticeship.[135]

> A course was introduced at most Technical High schools and Technical Colleges to take effect from the beginning of 1953 which would make it possible for prospective apprentices to receive a year's intensive pre-apprenticeship training in certain trades in the engineering, building, motor and furniture industries. The curriculum provided for at least 20 hours'

[131] Iron and Steel Manufacturing and Engineering Industry, Transvaal, Government Notice No. 912, 21 May 1943.
[132] NICISEMI Agreement, *Government Gazette* No. 3361, Government Notice No. 997, 23 June 1944.
[133] De Villiers, Para. 1130.
[134] De Villiers, para. 1217 and 1223, 1154/5. 'The following general principles are recommended for adoption in future apprenticeship in the engineering industry. (1) Youths aspiring to become apprentices should, at an appropriate age and suitable standard of general education, complete a pre-apprenticeship period of basic training extending over some 12 to 24 months. During this time they should follow a course of training generally similar to that in vogue in C.O.T.T. but modified and expanded to cater for peace-time conditions and requirements. (2) Admission to apprenticeship should be restricted to youths who have successfully completed the above pre-apprenticeship training. (3) Apprenticeship agreements should provide for a further period of training in approved industrial engineering workshops for say 2 years and such training should be upon lines which will guarantee that the training of the apprentice as a craftsman should take complete precedence over activities whose primary aim is industrial production.' G.M.14, CENTRAL ORGANISATION OF TECHNICAL TRAINING – D.G.W.S., SURREY HOUSE, JOHANNESBURG, 5 September, 1942., 'Memorandum Upon The Establishment Of Centralised Control Of Technical Training After The War', National Archive, Government Apprenticeship Committee Recommendations, Circulars and Correspondence, SAB, ARB, Volume 325, Ref. G/5.
[135] Hansard, 20 April 1951, 5096; U.G. 45/1953, *Report of the Department of Labour*, 31 December 1951, para. 88, p. 46.

workshop practice per week as well as six hours' theoretical instruction per week in mathematics, trade theory and draughtsmanship; in addition, approximately 10 hours per week would be devoted to subjects such as languages.[136]

The programme was *not* made compulsory however as some larger firms and the parastatals, including the Post Office, had the facilities to provide their own programmes which were often of a standard that exceeded that which colleges or schools could provide.[137]

However, the programme does not seem to have been a great success and was later discontinued. J. Ettershank, the incoming President of the Institution of Mechanical Engineers in 1954 gave insight into the reasons for this:

(a) The scheme was not popular with parents.
(ii) The numbers enrolled would have made no appreciable difference to the number of artisans.
(iii) The scheme was expensive to run.
(iv) The scheme of work was not suitable for the type of boy enrolled.[138]

Education entry requirement

The 1944 Act determined that youngsters had to be in possession of a Standard VI, although the mining industry in the Transvaal and the Orange Free State set Standard V as the minimum in 1950.[139] But as Ettershank noted when he presented his Presidential Address in 1954, that it was 'largely farcical' because of the variable range of standards, or non-standards, then in operation in provincial schools.[140] Aspinall, the 1948 President of the SAIEE, in discussion on the Ettershank paper, concurred: 'The statement that the school Standard VI and VII are, in general, meaningless is indisputable'.[141] Nevertheless these standards continued to be the benchmark for several years, as shown below:

Table 6.3. Educational qualifications of engineering* apprentices whose contracts were registered in the years indicated (a. private; b. mines and c. government undertakings)

Year	Minimum Prescribed Educational Qualification	Standard					Total
		Below Std 6	6	7	8	9-10	
1956	a. Std 6	5	419	687	552	199	1 862
	b. Std 6	4	194	250	269	42	832**
	c. Std 6	-	23	29	45	6	112
1960	a. Std 6	6	292	365	478	177	1618***
	b. Std 6	-	96	134	239	43	649***

[136] U.G. 46/1954, Report of the Department of Labour, 1952, para 78(e), p. 40.
[137] De Villiers, para. 1154-5.
[138] J. Ettershank, 'Presidential Address: Some Reflections on the Apprenticeship Act and its Implications', *Journal of the South African Institution of Mechanical Engineers*, July 1954, p. 376.
[139] Official Year Book of the Union, No. 26, GP-S10275-1952-3, 1950, paragraph 6(i), p. 313.
[140] Ettershank, 'Some Reflections on the Apprenticeship Act and its Implications', p. 372.
[141] H.T. Aspinall, in discussion on the paper of Ettershank, 'Some Reflections on the Apprenticeship Act and its Implications', p. 379.

	c. Std 6	-	18	33	51	8	141***
1969	a. Std 7	5	123	376	966	436	2394***
	b. Std 7	-	9	41	330	106	535 ***
	c. Std 7	-	8	42	85	67	252***

* Where no figure for engineering alone is given for mining and government, engineering and building combined totals are included.
**Totals include building contracts
*** The difference between numbers indicated and total had qualifications such as NTC I – III.

Source: *Relevant Department of Labour Annual Reports for each year indicated.*

Unlike the engineers, who were promoting the degree as their qualifying examination and for which a matriculation was the specified entry requirement and for which there was a National Matriculation Board responsible for setting a national standard, there was no equivalent national standard for Standards VI and VII. As Aspinall noted in 1948:

> (The apprentice's) school record indicates that he has passed Standard VI, for example, but he is found generally to be deficient in a knowledge of the basic academic subjects. Quite frequently he cannot read, write or spell correctly, and he possesses only the most elementary knowledge of arithmetic. … The existing standard of education for admission to apprenticeship is too low.[142]

The theoretical part of the qualification

As indicated above the 1944 Apprenticeship Act introduced the notion of 'designated institutions'. Representatives from such designated institutions were then permitted to attend the relevant apprenticeship committee and participate in their deliberations, although they were not given a vote (Section 9(4)). This relationship was to be further strengthened by the legal prescription (Section 13(1)(a)), that before an apprenticeship committee could forward any recommendation to the Minister on educational matters relevant to the apprentices in their trade (such as the part-time or full-time classes to be attended, the nature and number of correspondence courses apprentices could alternatively follow, and the payment of fees to be made by the employers), they were *required* to consult with 'the designated institution concerned or if no institution has been designated … after consultation with the Secretary for Education'.

This noble objective, of linking apprenticeship committees to 'designated institutions', appears however not to have achieved the desired purpose of synchronising the theory and practice of apprenticeships. The problem seems to have evolved from one anomaly in the 1944 Act: under this Act the Minister of Labour was empowered to control private training schools or institutions which provided trade training. This was in response to the unethical behaviour of some such colleges at the time.[143] Section 33 of the 1944 Act required private providers who offered 'practical manual training or tuition … in any designated trade' to get the written consent of the Minister of Labour to operate – and before providing such consent the Minister in turn was required to consult the Minister of Education, the NAB and any committee 'with a material interest in his decision'. However, in 1957 the 1955 Vocational Education Act was amended by the insertion of its own 'Section 33' which obliged the Minister of Education, Arts and Science to do much the same. In 1958, *precisely* the same powers as set out in the Apprenticeship Act's Section 33 were inserted into the Vocational Education Act No. 25 of

[142] Aspinall, 'Presidential Address', p. 9.
[143] Hansard, 20 April 1944, 5521.

1958. In order to bring the two Acts into better alignment the Minister of Labour proposed to withdraw section 33 from his Act in 1959.[144] However, as one Member of Parliament, Durrant, pointed out in the 1959 debate, the change withdrew the statutory right of the apprenticeship committee to object to the granting of a licence to any such provider. He lamented this because:

> I submit to the hon. the Minister that by retaining these consultative provisions he would indicate to the people concerned, first of all, to the apprentices that any course they are permitted to subscribe to has the full approval of the Apprenticeship Committee, of their trade unions, of the employer organisations, of the Apprenticeship Board, of the Department of Education, and of the Department of Labour. As such the course will be acceptable. … We feel that the control should remain in the hands of the Department of Education, but that there should be a measure of consultation between the various Departments, the Apprenticeship Boards and the Apprenticeship Committees. That, in our view, is most desirable in this case.[145]

The Minister of Labour dismissed this concern saying it should have been raised when the 1955 Act was first amended and Act No. 29 of 1959 was passed. However, the exchange is interesting as it highlights a sharp difference between the apprenticeship system and that which evolved for the professional engineers. For them, their statutory professional body, the equivalent of the apprenticeship committee, was aiming to have the power to quality assure the university providers of engineering programmes. This was never the case for the apprenticeship committees – a fact which no doubt contributed to the dislocation between the theoretical and practical components of their training which deepened over time.

As early as 1948, Aspinall had noted in his Presidential Address to the SAIEE, that not only was there a breakdown between apprenticeship committees and technical colleges but also between technical colleges and local universities.[146] The problems seem to have intensified over the years as by 1963, when the Apprenticeship Act was again amended, it was noted that:

> The one Department cannot run the other nor do they attempt to. <u>But</u> the greatest weakness in regard to the technical training of apprentices is that the system in accordance with which apprentices have to be examined is totally out of date. Although it has been acknowledged by the Department of Education nothing has been done to bring it up to date. The last handbook and syllabus for technical education were produced in 1951 and have been unprocurable for several years. [147]

The dislocation between the departments was also illogical as was also pointed out in 1963:

> The present position where the Department of Labour controls the body of the apprentice and disciplines him and the Department of Education attempts to control and train the mind is not a satisfactory one, notwithstanding the high degree of liaison which we have between these two Departments.[148]

Malherbe confirmed this breakdown when he noted that '(t)here was apparently little correlation between theoretical and practical work' for apprentices.[149]

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[144] Hansard, 16 March 1959, 2558.
[145] Hansard, 16 March 1959, 2560-1.
[146] Aspinall, 'Presidential Address', p. 26.
[147] This problem was compounded by the difficulty of keeping college equipment up to date (Hansard, 19 April 1963, 4402) making up to date practical work also illusive.
[148] Hansard, 19 April 1963, 4403.
[149] Malherbe, *Education in South Africa*, p. 185.

This problem was to erode the relationship between the two departments over time and no doubt contributed to the tensions that the new government inherited in 1994.
During these exchanges, the trade union movement was not silent. The Trades and Labour Council, an influential trade union umbrella body at the time, recommended that there be:

> A gradual overhaul of the method and system of training apprentices must be undertaken, and provision made for a more general and cultural education. Technical education alone in any one sphere or trade has left the individual ignorant in respect of many aspects of modern production. We advocate that a much closer collaboration take place between trade schools, technical colleges and mines, factories and workshops, with a view to securing a more systematic and practical training. The apprentice should be given full opportunity to study forms of industrial organisation, control and social relations of modern production.[150]

This was resonant with the engineers' discourse – an argument in favour of keeping artisans up to date with the changes in industry. But the De Villiers Commission did not adopt this view, although it did propose in general that a higher level be attained which was welcomed by all'.[151] It also criticised those colleges that short-changed learners on the planning tasks of trades:

> The practical performance of any task divides itself naturally into two parts: First, the work must be planned in accordance with its exact purposes, the specific materials required and the processes to be used, and plans must be drawn of the work. This may be called the antecedent performance, which from an educational point of view is the most important part of the performance provided it is followed by action. Students will be forced to take the initiative to plan and take decisions for themselves and then see that they carry out their plans successfully.
>
> Unfortunately the error is frequently made to leave out a large portion of this ideational element, by giving the students ready-made plans to follow, for example shop-manuals, blue-print plans, ready-made models or detailed directions. Where this happens, students may get little else than practice in mechanical manipulation without any insight into the reasons for the processes, that is, narrow training and limited experience which is bound to be ineffective. The student must therefore, not be deprived of the 'antecedent performance' by having his thinking done for him by the teacher or by a class manual.[152]

What De Villiers deemed simply 'unfortunate' lay at the heart of scientific management – the artisan was indeed being denied the 'ideational element' as these functions were at the time being transferred to the 'Design or Drawing Office' as discussed above. What is apparent however is that the trade union movement was not present at discussions on these matters – certainly when I asked Ben Nicholson if he had attended any such discussion, he said, 'not once'[153]. This too is in stark contrast to the experience of the engineers.

The fact that these matters were left vague appears to have supported the 'decapitation' of the artisan.

Attendance and achievement of theory, compulsory or voluntary?

As had been the case since 1922, attendance at college was strongly recommended but was not compulsory until 1963. In an attempt to encourage apprentices to attend college, the 1951 Apprenticeship Amendment Act introduced for the first time paid time-off during working hours. Amendment 7(a) of the 1951 Act gave apprentices the right to attend classes for one day a

[150] De Villiers Report, Paragraph 1131.
[151] Rowe, 'Presidential Address', p. 357.
[152] De Villiers Report, paras. 605 and 606.
[153] Interview with Ben Nicholson 10 November 2006.

week (or two half days), on full pay, during the first two years of their apprenticeship. In 1963 this provision was amended in a nuanced way: all apprentices were required to attend classes for one day a week for the first year of their apprenticeship. However Malherbe noted in 1977 that:

> … nearly 60% of them (apprentices) dropped out without attaining any certificate whatsoever. In the South African Railways workshops, the dropouts were 63% and in the motor industry as high as 80% in certain large centres. These drop-out percentages were distressingly high in comparison with what prevailed in a country such as the United Kingdom where only about 33% enter these vocations without attaining a certificate after apprenticeship.[154]

This, it seems, was not only the fault of the apprentice:

> (W)e find, with many small firms, that they are inclined, if they have a rush of work, to say to the apprentice, 'Oh, well, you don't require to go to school this week; you stay and help us out with this job.' If this happened once no one could take exception to it, but unfortunately the firms find it a very easy way of keeping up production, and the apprentice is kept more and more often away from his classes, until eventually he, like his employer, begins to develop a contempt for these classes, and does not see why he should ever go to them at all. It is this thin end of the wedge that always starts the trouble.[155]

The pass rates were correspondingly low, as the following notes testifies even decades later:

> In 1960-1 something like 22,749 White apprentices entered for examination. Only 1,696 candidates obtained a full certificate, and 4,000 obtained subject successes. There was a slight improvement in 1962. In 1962, 22,931 candidates entered, 2,009 passed with a full certificate and 7,600 obtained partial certificates. This is a very low standard.[156]

And, as was noted in parliament in 1963:

> the vast majority of apprentices are not interested in their technical studies … in spite of the fact that if they attend 75 per cent of the total number of classes, the class fees which were deducted from their wages are refunded to them. … This type of apprentice is keenly aware of the fact that artisan status does not depend upon the passing of any test at all.[157]

The situation improved somewhat when the 'block release' system came later in 1960s:

> Considerable improvement came about as a result of industry agreeing to release these apprentices for ten weeks at a time for continuous training at the technical colleges. This system, known as the 'block release' system, was introduced in the sixties and superseded the one-day-per-week release system and increased the percentage of passes in the general subjects taught at the technical colleges.[158]

Financing

Technical colleges were state-aided institutions and were expected to gather fees from students. Apprentices could be recompensed by their employers if they attended (not even passed) their courses. The scale of the fees charged was influenced by the size of the state subsidy to these colleges, and it is worth noting that:

> During the years preceding World War II, the amount of the State's grant for technical education was about two-thirds of that for university education and with the two lines on the graph fluctuating together more or less on a plateau. After the war, however, though there was a small rise in the State's support for technical education, it was rapidly outstripped by the money made

[154] Malherbe, *Education in South Africa*, pp. 183-4.
[155] J. Ettershank, 'Some Reflections on the Apprenticeship Act and its Implications', pp. 380-1.
[156] Hansard, 19 April 1963, 4400.
[157] Hansard, 19 April 1963, 4373-4.
[158] Malherbe, *Education in South Africa*, p. 184.

> available for university education, so that by 1970 it amounted to only about one-eighth of the support for university education.[159]

This resourcing inequality further compromised the quality of programmes and the possibility of securing a progression pathway from college to university. It is also a perplexing development given the shortage of artisans at the time.

Incentives

Financial incentives for students were put in place in an attempt to improve the situation in the metal and electrical industries. These ranged from 50c a week for a Standard IX schooling certificate without mathematics to R1.50 for an NTC II and R4.00 for a National Certificate.[160] When I asked Ben Nicholson if these incentives were effective, he scoffed: 'It was 'a tickie an hour'… it was so small'.[161] Nevertheless the system persisted for many years, and the amounts were adjusted annually, as a 1977 report confirmed.[162] It also suggests that the demand NUMSA tabled in the nineties, for 'the payment of skills acquired, not necessarily used' had been notionally accepted in principle decades earlier in relation to artisans.

A second incentive was the granting of remission of apprenticeship time. Apprentices got up to 12 months off if they had completed a National Senior Certificate (Technology) or National Senior Certificate (Matriculation Exemption). A pass at Standard IX gave 6 months and a matriculation certificate 9 months.[163]

In summary then there was clearly little incentive for apprentices to either attend college or pass as there was no requirement for them to do so in order to become an artisan. This too stands in sharp contrast to the engineers who were mobilising for a B.Sc. to be an absolute minimum requirement for engineering status. This no doubt contributed to the 'decapitation' of the artisan.

The practical part of the qualification

The De Villiers Commission recommended the introduction of *practical training schedules* to ensure that apprentices were inducted into the full range of skills associated with their trade. They recommended that these schedules be drawn up using the techniques of scientific management:

> … after each particular trade has been subjected to a careful analysis, and all the important components graded and arranged in a gradually increasing order of difficulty. The time allotted to the training of each of these elements or skills will, of course, depend on the time required

[159] Malherbe, *Education in South Africa,* p. 176; see also Diagram 9 on page 177 and Appendix 37 of the same.
[160] Metal Engineering Industries Bargaining Council (MEIBC) Archive, Memorandum to staff, 9 July 1964, issued by J.C. Pretorius, Legal Assistant, NICISEMI, in which reference is made to Government Notice No. R929 of 26 June 1964 in Government Gazette Extraordinary No. 835, read with Government Notice R426 of 29 March 1964 in Government Gazette Extraordinary No. 748. See also Hansard, 19 April 1963, column 4379.
[161] Interview with Ben Nicholson 15 August 2008.
[162] MEIBC Archive, NICISEMI, Transvaal Regional Council notice, 'National Apprenticeship Committee for the Metal Industry: Withdrawal and prescription of conditions of Apprenticeship', Circular 397, 8 March 1977.
[163] GG 4705, 12 October 1951, p. 15.

> normally for an individual to master completely such a skill. It is only by using such a job analysis as the basis for preparing a training schedule that one can ensure that the training will be truly effective and functional, and that no more and no less time will be allotted to training of any particular phase than is necessary.[164]

In this regard it seems that Posts and Telegraphs Department was their inspiration.[165] The Apprenticeship Amendment Act No. 28 of 1951, embraced this recommendation and made the development of such schedules an obligation for apprenticeship committees (Section 16(2)(g)). The early schedules were quite rudimentary as that for Roll Tool and Template Making in 1951 shows:

> General training in the cutting out and shaping of tools, drilling holes, grinding and filing to the required profile, repairing worn tools, dressing grinding wheels and engraving of rolls, template making involving to a high degree of accuracy (± .0005).[166]

But over time they became more detailed and, in effect, more difficult for individual firms to comply with as mass production and specialisation took hold. Somewhat at variance with this, the De Villiers Commission had proposed that firms should appoint dedicated responsible people[167] and the Department of Labour should appoint inspectors with the necessary trade experience to ensure that these schedules were followed.[168] Some of the larger enterprises, such as the mines, were able to appoint 'apprentice supervisors' to oversee this training but smaller companies were unable to do so.[169] Many larger employers were however similarly constrained as they had 'specialised in a rather narrow field'.[170] As a solution to *this* problem, the De Villiers Commission had recognised this problem and recommended the introduction of multi-employer apprenticeships[171], which the government adopted in 1951:

> Now we are making provision that the apprentice can be indentured with more than one employer, so that in the case where one particular employer has not the facilities of providing that apprentice with his full training he can also be indentured to another employer who has got those necessary facilities.

Even when an employer *was* approved to take on apprentices, however, the question of how many was another issue. Too often the quota restriction imposed by the artisan unions allegedly constrained willing employers. So the 1951 Apprenticeship Amendment Act permitted the Registrar of Apprenticeship 'to authorise a quota of apprentices in respect of approved employers', thus eliminating the necessity for obtaining the Registrar's consent in each individual case before engaging a prospective apprentice.[172]

Aspects of these recommendations were adopted in the Apprenticeship Amendment Act No. 28 of 1951 but the Apprenticeship Amendment Act No. 46 of 1963 took them on more comprehensively and proposed the introduction of log books to be monitored by the Department of Labour's inspectors on a monthly basis.[173]

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[164] De Villiers Report, para. 1165.
[165] See J. de Ridder, 'Training Mechanician Apprentices', *The Live Wire,* August 1941, pp. 14 – 16. Scheme introduced in February 1937. Also see De Villiers Report, para. 1167.
[166] GG 4698, 28 September 1951, 2509.
[167] De Villiers Report, para. 1175.
[168] De Villiers Report, para. 1178.
[169] Ettershank, 'Some Reflections on the Apprenticeship Act and its Implications', pp. 379-80.
[170] De Villiers Report, para. 1170.
[171] De Villiers Report, para. 1216.
[172] Hansard, 20 April 1951, 5092.
[173] Hansard, 19 April 1963, 4375.

This bureaucratic system might have been prescribed in law, but had it been followed in practice, the trade test outcomes, discussed below, would surely have been different to what they were in reality.

The trade test part of the qualification

The De Villiers Commission recommended a final *trade test* be instituted to promote the efficiency and raise the standard of workmanship of apprentices.[174] This test, they said, should be for 'both trade theory and trade competency' and success should be marked by a trade competency certificate (para 1199). This matter was extremely sensitive and contributed to substantial delays in tabling both the 1951 and the 1963 Acts.[175]

At the heart of the matter was the question of whether or not it should be obligatory for apprentices to *pass* the final trade test. In 1951 the Minister of Labour explained in his discussion on the Apprenticeship Amendment Bill that:

> The De Villiers Commission recommended a trade test at the completion of the apprenticeship period. It is this recommendation which led to the suggestion of the committee of inquiry that a person who fails in the final test should not be entitled to journeyman's rates, … it has not been found feasible to adopt this suggestion, and the Act accordingly merely provides for a test during the apprenticeship period which, if passed will have the effect of terminating the contract.[176]

The question is, why was it not feasible to adopt this suggestion? This was one of the matters which the Minister requested the National Artisan Board to investigate in 1958 and it again explored the possibility of making the test compulsory. Again this was resisted by the craft unions and a further weakened compromise was arrived at which was passed into law in 1963. This was that the trade test should be a practical test only and should only serve to shorten the apprenticeship contract on successful completion. Failure to pass the trade test at the end of the contract should simply require a further year of training, and if still not passed, the person would qualify through the effluxion of time.[177] Ben Nicholson was later to complain about this: 'Some of those guys never had any training. They just let time slip by as it were. And those people were a menace to the industry, and still are, of course'[178] but his hands were tied as were those of his fellow unionists.

The additional year was itself not a new idea – it had been previously known as an '*improvership*' about which De Villiers wrote: 'by an "improver" is meant one who has served his full apprenticeship but who is not regarded proficient enough at his trade to command the standard rate of wages paid to journeymen'.[179]

This convoluted 'compulsory', practical-only trade test compromise – which apprentices had to take but did not have to pass - was the outcome of two years of negotiation. The lifting of the theory requirement did lead to increased pass rates, but not dramatically so, as the theory component did not have to be passed anyway.

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[174] De Villiers, para. 1191, 1199.
[175] Hansard, 20 April 1951, 5090-5092 and 19 April 1963, 4424.
[176] Hansard, 20 April 1951, 5095.
[177] Hansard, 19 April 1963, 4375.
[178] Interview Ben Nicholson 10 November 2006, p. 14.
[179] De Villiers, para. 1227.

Table 6.4. Pass rates of apprentices from 1956

Year	Engineering			Government Undertakings		
	Tested	Passed	Percentage	Tested	Passed	Percentage
1956	1061	279	26.3	114	40	35.0
1958	1322	217	16.4	109	25	22.9
1960	1426	247	17.32	90	21	23.33
1962	726	144	19.83	137	32	23.36
1964	**1191**	**442**	**37.11**	**62**	**21**	**33.87**
1966	1478	412	27.74	41	14	34.14
1968	2070	552	26.66	152	44	28.94
1970	2606	664	25.48	248	66	26.61

Source: *Department of Labour Annual Reports for the relevant years. Highlight added.*

This poor profile led the Minister of Labour to remark:

> I think that it is generally known that the vast majority of apprentices gain artisan status through the passage of time, and the question as to whether they are qualified artisans who are fully qualified in the true sense of the word can seldom be answered with any certainty. That is particularly so in the case of artisans in the rural areas where employers often do not have the necessary equipment and where the type of work does not vary sufficiently to train an apprentice properly in all the facets of his trade.[180]

Why did so few apprentices pass the trade test? The reason given in parliament points to the realities of a changed labour process:

> I know that many an apprentice has failed his trade test because he was asked to do a particular job with which he is completely unfamiliar through no fault of his own, because in the particular workshop where he was trained that type of work was never done. … I am convinced that many youngsters fail the trade test because they are not familiar with the work they are asked to do.[181]

And why *were* the unions so afraid of making passing the trade test a requirement for journeyman status? A question which was directly put to parliament in 1963:

> I cannot understand the opposition of that section of the trade union movement because the artisans in the engineering industry in particular have been agitating for professional status for a number of years now and yet in this instance they are opposed to one of the most important aspects of professionalism – proof of qualification.[182]

The answer given was:

> (The unions) would be prepared to accept not only the position of every apprentice passing a trade test before becoming an artisan and further the extension of a year to enable him to do that, but the proviso that they put forward was that the Minister should not permit any apprentice who fails to qualify from practising in the trade at all. Now this is a very important consideration and I think the Minister will agree it would place the trade union movement in an impossible position if

[180] Minister of Labour, Hansard, 19 April 1963, 4374.
[181] Hansard, 19 April 1963, col. 4389.
[182] Hansard, 19 April 1963, col. 4377. For evidence of this see Aspinall, 'Presidential Address', p. 26. 'The South African Electrical Workers' Association had established a section for apprentices with a somewhat similar object'. p. 26. See also p. 22 of same.

> they were to agree that only apprentices who have passed a trade test could become artisans, then subsequently discovering that all who had failed could practise as artisans and possibly work at a rate far less than that laid down for artisans.[183]

It seems that the craft unions were caught between a rock and a hard place. As the De Villiers Report had conceded when it stated that 'while it is probably true that the craftsman of today knows less about some branches of his trade than thirty, forty years ago, he certainly has to know more of those branches of his trade which he has to practise.[184] These 'specialist' artisans (such as those trained in manufacturing environments where the product range was limited and the process streamlined) *could* continue to be productive in those workplaces knowing, as they did, more about less' and yet this endangered the position of the 'whole man'.

Adult entry to artisan status

As indicated above there was an acute shortage of artisans both during and after the war. A search went out for emergency workers who could do the work (besides immigrants that were also sought). As Thomson reported in 1946:

> In order to comply with the urgency of Defence requirements, the Controller of Industrial Manpower and various engineering unions were approached early in the war for assistance in providing skilled labour. This type of labour proved unobtainable, and again the unions were approached, this time with the request that unskilled labour be permitted in the electrical industry. It was decided that unskilled labour be given a trial. The experiment proved so successful that today its employment is an accepted fact, and has proved so acceptable to the unions that provision has been made for 'piece-rates' for operatives in the industry.[185]

In truth, this solution was far from 'acceptable' to the craft unions but they had little choice. However, after the war a more nuanced approach was developed, whereby workers older than 21 years could be assisted to attain artisan status in one of three ways: training plus trade test; trade test only; and, the submission of information to the Registrar of Apprenticeships who could decide on the basis of the evidence presented whether a 'certificate of proficiency' could be issued.

The unions, the Minister reported, had insisted that these routes to journeyman status be legislated separately from the Apprenticeship Amendment Act of which it had originally been a part because 'it had nothing to do with the ordinary apprenticeship system'.[186] So the Training of Artisans Act No. 38 of 1951 was passed as a free standing Act and promulgated on 1 June 1951.[187] Its declared aim was 'to make further provision for the training of persons other than minors as artisans, where there is a serious shortage of artisans, for the recognition of skilled persons as artisans, and for matters incidental thereto'.[188]

The 'training plus trade test' option led to the construction of dedicated training and testing facilities for adults. With the assistance of the Department of Education, Arts and Science a training course in building-related trades was launched at a Training Centre near Kimberley and further collaborative steps were taken by the two state departments to establish further

[183] Hansard, 19 April 1963, 4385.
[184] De Villiers, Paragraph 1101.
[185] Thomson, (ed.), *The Years of Crisis,* p. 203.
[186] Hansard, 20 April 1951, 5149.
[187] Report of the Department of Labour, 31 December 1951, para. 34, page 17.
[188] Training of Artisans Act No. 38 of 1951.

such training centres.[189] In 1953 the Department of Labour reported that a site for the establishment of a dedicated Technical High School for Adults at Olifantsfontein had been bought and a training and trade testing institution for that centre was inaugurated on 1 April, 1953.[190] They also announced plans to open a training and trade testing centre at Westlake (Cape Peninsula) during 1954. In the same year there were 84 trainees at the Technical High School for Adults in Kimberley.[191] The third route enabled those who believed they had sufficient work experience to be immediately recognised as artisans by the Registrar.[192]

The scheme was fairly successful as by 1970, over 2,000 people had benefited: 1,853 having undergone training; 591 having passed their trade test and 186 having been issued certificates of proficiency by the Registrar.[193] As early as 1955, however, the Secretary of Labour, was disappointed by the numbers and, in an attempt to further promote the scheme, introduced slightly higher wages for adults in training.[194] The scheme continued as an option for white male workers until the Act was repealed and the Manpower Training Act No. 56 was passed in 1981.

In the NICISEMI Agreement the scheme was later adopted as the 'Journeyman-recognition agreement.[195] In essence the agreement enabled adults ('major persons') who had already worked 'on any of the classes of Rate 1 (artisan) work', who had done work which fell 'within the scope of any one designated trade' (clause 1(b)), or who wished to do so (clause 1(c) – (e)), to become a journeyman. If the person had already worked seven years on such work (and it was accepted by the Industrial Council that this was the case) they could immediately be awarded a journeyman recognition certificate. If however they had never worked on such Rate 1 work, or had worked some lesser period, the agreement stated that they could sign a Journeyman-Recognition contract with one (or sequentially more than one) employer who was willing to guarantee that they would in future perform such work for a minimum prescribed period, then they too could become journeymen without completing an apprenticeship. There was no mention of either technical studies at a college or of a trade test. Simply evidence of having performed the work – such as that outlined in the practical schedules illustrated above. Workers accredited in this way were perhaps 'shallow' artisans.

The craft unions won the right of people on such contracts to be paid 'the wages … and (earn) the working conditions … applicable to journeymen employed on Rate 1 work' (clause 7). And likewise, as the agreement only applied to the employers' organisations and trade unions which had entered into the agreement and to 'the employers and employees who are members of the said organisations or unions' (opening statement by Minister of Labour) – black Africans were excluded as they were still barred from joining registered unions..

Learnerships

[189] Report of the Department of Labour, 31 December 1951, U.G. 20/1955, para 37, page 18.
[190] DoL Annual Report, 1953, UG 20/1955, para. 47, page 18.
[191] Report of the Department of Labour, 31 December 1953, U.G. 20/1955, para. 47, p. 18.
[192] GG. 4705, Notice No. 2610, 12 October 1951, clause 2.
[193] Annual Report of the Department of Labour, 1970, R.P. 83/1971, p. 22.
[194] J.F. Hannah, Secretary for Labour, Department of Labour Annual Report, 1955, Foreword.
[195] Government Notice No. 1286, Government Gazette Extraordinary, No. 1211, 27 August 1965.

In parallel to the apprenticeship routes outlined above, the Learnership system persisted. However, those who underwent these programmes would still have to comply with the above 'adult' prescripts if they were to transition to artisan status.

In the Iron and Steel agreement nearly every job required an initial 'learnership period', expressed as a specified number of shifts, during which the learner earned a proportionately lower rate than the person who had completed their required shifts. Here is an example from 'General Jobs', but some of the specialised jobs, such as First Roller in the Light Milling Rolling and Finishing Sections (Annexure 'H') required 1,800 shifts to qualify:

Table 6.5. Works of the South African Iron and Steel Industrial Corporation, Ltd, at Pretoria & Vanderbijl Park

Annexure 'N': General Jobs

Designation	Learnership Periods. No. of Shifts to be Worked	Rate per Hour after completion of Learnership Period
	4 year apprenticeship	
• Painter	600	3s 2 1/4d
• First Gas holder Attendant	600	3s 0d
• Second Gas Holder Attendant	600	2s 9d
• Lubricator	450	2s 9d
• Coke Screening Plant Attendant	450	2s 2d
• Native Labour Supervisor …	Shifts in designated positions after qualifying as General Hand	2s 2d

Source: *Government Notice number 1530, 15 September 1944, p. 15.*

Whilst these learnerships appear to have been principally periods of on-the-job learning, another system was piloted in the umbrella cluster of metal industries. Under the 1951 NICISEMI Main Agreement, under Schedule A for General Engineering, it was stated that for Drilling Machinist's work graded Rate 2, a learnership of three years was required, and to the list of occupations under Rate 3 a note read:

> (ii) No employer shall employ any person thereon at a rate of pay of less than 3s 6d per hour [artisan rate], except with the prior consent of the Council and under a Learnership Contract. Such Contracts, which shall be in the form prescribed by the Council from time to time and shall be registered with and at the Head Office of the Council, shall prescribe the group of machine tools in the use of which a learner shall be trained. Learners shall undergo such approved technical instruction as may be determined by the Council throughout the period of the learnership, and it shall be a condition precedent in the approval of any Contract that the learner shall be given facilities to undergo such approved technical instruction.[196]

This is an under-recorded feature of the training system, showing that technical training was not restricted to apprentices; it suggests that a more inclusive system of training might have been possible. It also shows that the De Villiers Commission was not completely accurate when it outlined the difference between learnerships and apprenticeships in the following way:

[196] NICISEMI, 'Wage Schedules for the Iron, Steel, Engineering, Metallurgical and Electrical manufacturing Industries', Date of Operation, 1 December 1951.

> (Learnership) differs from apprenticeship training in that the trainee is not under contract, does not have to attend technical classes and normally does not have to attain as high a level of skill as the apprentice. Learnership periods are thus often very much shorter than apprenticeship periods.[197]

But it was this definition which promoted the Commission to recommend that 'learnership contracts involving a period of one year or more should be brought under the jurisdiction of the National Apprenticeship Board (para. 1232) - a recommendation which seems to have contributed to the demise of learnerships and the introduction of 'periods of probation' instead.[198]

At this time the government kept lowering the bar and widening the recruitment circle in order to enable more white workers to improve their prospects.

Post-war review of the training of engineers

In his 1947 Presidential Address to the South African Institution of [Mechanical] Engineers, W.G. Jackson summarised the training of engineers at the time under two headings: the training of the university graduate and the training of self-selected apprentices.[199]

Under the university heading he represented the 'old school' when expressing the view that many engineering students were 'over-educated' for 'not all can, or will, find a purely academic career in their post-university years'.[200] He stressed the importance of the 'operational engineers' believing that more jobs were available in this field and they supplied 'the backbone of engineering enterprise and progress'.[201] On the legislative front, he held up the Certificate of Competence as the standard. When T.P. Stratten proposed the Vote of Thanks to Jackson, however, he highlighted weaknesses as well as strengths in the capacities of engineers at the time. He said that their strengths included the ability 'to execute quick repairs, to improvise and to meet the sudden emergency'. He described the weaknesses as the lack of experience 'in mass production methods and very few of our engineers had been trained in the problems of production engineering. We (also have) no knowledge of close engineering inspection methods and … no nucleus of research workers.' Stratten went on to welcome the recent establishment of the South African Bureau of Standards and the National Council for Scientific and Industrial Research to address these weaknesses. But he felt that 'there is room for more training in this aspect of engineering than is normally received by a young engineer'.[202] The University of the Witwatersrand's Department of Mechanical Engineering obviously shared this view as after the war it began delivering courses in factory layout, whilst sponsoring

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[197] De Villiers Commission, para. 1230.
[198] See for example NICISEMI Agreement, Part I, 1 Scope, definition of 'probationer', published in GG 6590, GN 1253, 19 August 1960.
[199] W.G. Jackson, 'Presidential Address: The Training of Engineers in South Africa', *The Journal of the South African Institution of Engineers*, July 1947, pp. 360-369, (specific reference 363 ff.)
[200] Ibid, p. 363.
[201] Ibid, p. 364.
[202] T.P. Stratten, Vote of Thanks to W.G. Jackson, 'Presidential Address: The Training of Engineers in South Africa', *The Journal of the South African Institution of Engineers*, July 1947, p. 367.

research into questions of layout in several leading Rand engineering shops.[203] The 'new' was clearly reaching beyond the 'old'.

Under the heading of the training as engineers of self-selected apprentices, Jackson focused on the pathway to be navigated by an artisan to that of a Certificated Engineer. He criticised the narrow range of trades for which this pathway was available. And even for those for which it was available, he argued that it was unfair that such a man is 'drafted immediately from the status of a self-reliant workman to that of a controller and director of a labour force, and this in the majority of cases with no previous experience of such a transition. I suggest that this state of affairs is unfair to the man and to his employer' and proceeded to recommend that a scheme be put in place to remedy this and that it should take place during ordinary working hours. He also bemoaned the fact that 'many university students have been able to avail themselves of the education offered by the Institutes, but the non-university men are unable to avail themselves of the training provided by the universities.[204] Stratten, interestingly, made no comment on this suggestion.

The training of engineers was in transition in the post-war years. The traditional engineers were still seeing those rising from the ranks as being legitimate entrants to engineering and were recommending that the pathway between the two should be improved whilst the graduates were seeking to exclude them. The differences between these two views intensified and their resolution is discussed in the chapter on the Professional Engineer.

LADDERS AND LEVERS

In the context outlined above, it is clear that the pathway from operators to artisans was becoming ever easier – with some operators becoming artisans through experience only. The emergence of 'pseudo craft' unions (with craft unions at the helm but with non-artisan members permitted), would also have softened the transition, albeit without much support from the artisans themselves. And finally, the industrial unions, with members drawn from all industrial council grades, would have done all they could to support progression.
Both the craft as well as the 'pseudo-craft' unions appear to have been focused on maintaining what status remained for their trades, with ever-weakening ties to the engineers. This was bolstered by an ever stronger group of graduate engineers who wanted none other than university men in their ranks.

In between the artisans and the engineers there remained, in this period, the traditional ATC I and II route to Assistant Engineer, as too did other direct routes based on experience, competency and recognition. In addition the route up necessitated for some the passing of the competitive exam, such as in the Post Office or the Certificate of Competency on the mines and certain other economic sectors. These routes were still open and protected by traditional engineers.

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[203] Johannesburg Public Library cuttings collection, *Sunday Express,* 22 February 1948, cited in Lewis, *Industrialisation and Trade Union Organisation in South Africa*, p. 112.
[204] Jackson, 'The Training of Engineers in South Africa', p. 365.

It would seem, however, that there was a mind shift taking place. No longer were those who were promoted to Assistant Engineers keen to assist those seeking to follow suit. Ben Nicholson reported that men who passed the Advanced Technical Certificate lost their loyalty to the craft union and were aligning ever closer to management:

> They considered themselves *better* than an artisan – which is foreign to the thinking of artisans by the way. A true artisan will say he's a fellow … we're all in the same industry together. But those people thought that getting technical qualifications put them in the engineer class. That they would now be the bosses. Well, this is my theory anyhow as to how it worked. Because when I spoke to any of these people, 'No we are above that – we don't work with our hands anymore, we're the brains people.' Which is elitism in its purest form. And they considered themselves better than most and they never appeared *ever* with us in any negotiations whatsoever.[205]

History shows that Ben was not quite right in this. Artisans had been less collegial than he suggests in relation to operators, however the ideological shift taking place amongst those with 'technical training' in so far as they were increasingly aligning to management, not the craft unions from which they came, was true. The phenomenon was evident in SATA as we have seen.

Badham, just after the war, commented that '(t)here are missing rungs in our ladder to the peak of our efficiency, let us get together and provide the means to bridge the gaps'.[206] He was referring to the widening space between artisans and engineers, with the theoretical requirements of the former falling and those of the latter rising. He was recommending that the 'ladder' be repaired and a clear pathway between the two occupations be constructed. He was progressive but 'old school' in this regard, as the graduate engineers were mobilising to break the ladder completely.

There was also a growing voice calling for a form of training, based on a 'sandwich system' – with blocks of training at the workplace and at 'college'. For some, like Jackson[207], this was the ideal way to train engineers.

EVALUATION AND IMPACT

The manufactured goods needed to wage war and to support a growing domestic economy in the 1940s were made, and the skills were provided to make this happen. Changes were 'in the wind' that would impact artisans and the training of engineers.

There are two quotations which point to the sharp difference between artisans and graduate engineers:
Firstly, with regard to artisans, Rowe said in his Presidential Address to the South African Institution of Electrical Engineers in 1951:

> The chief shortcoming of the present [apprenticeship] system is that the penalties for non-success do not exist.'[208]

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[205] Interview with Ben Nicholson 15 August 2008.
[206] L.H.L. Badham, seconding the vote of thanks to A.P.M. Fleming, 'The Education and Training of Engineers for Industry', *Transactions of the SAIEE*, October 1946, p.236.
[207] W.G. Jackson, 'The Training of Engineers in South Africa', p.363.
[208] Rowe, 'Presidential Address', p. 357.

He was pointing to the absence of clear entry requirements, the lack of compulsion to complete theoretical programme or to pass the exit trade tests. Parallel routes existed for would-be artisans and journeyman status could be achieved with few prescriptions.

This was expanded by Prof. MacMillan, cited by Malherbe:

> Vocational education which should be a socialized form of education was given too early to pupils who lacked a sound foundation of general education; there was little vocational guidance; little or no correlation between training and the occupational demands of the country; a lack of co-operation between industry, labour organisations and the educational leaders; and a too narrow training. …'[209]

And secondly, with regard to graduate engineers a J. Conway put the matter bluntly, albeit in Britain back in 1926:

> A properly trained engineer is of as good a mental calibre as, say, a doctor. He therefore deserves the same status, and one of the reasons why he does not get the same recognition is because he is poorly paid. The engineer will never attain to that status until the qualifications required to practise in the profession are as rigid as those for medicine.[210]

Here was the view that only once a 'rigid' qualification was set for entry would the status of engineers be enhanced and their wage issues be resolved. This was not the view of all the traditional engineers and the tension between the two positions was not yet settled.
An important contributing factor to this difference is the way in which the respective organisations, craft unions on the one hand and professional bodies on the other, related to their theoretical training partners. The artisans themselves did not have a direct link to the colleges. Even the apprenticeship committees on which they sat with employers, had a weakening relationship with those who set the exams and delivered these programmes at college. There was also the question of 'with whom' they should engage as the technical colleges themselves lost their autonomy in 1955. As a result the programmes were increasingly out of date. In contrast the engineers were working closely with the universities and whilst some were below par, others were excellent and the graduates were looking to 'approve' the ones that met their criteria.

A completely different legal architecture underpinned these two arrangements: colleges were under the national control of the Department of Education, Arts and Science, or, post 1955 and pre 1967 under the provinces (where 'school-logic' applied) whilst the universities each had their own legislation. The 'registration' of engineers was still controlled by membership of the professional engineering societies whilst for artisans the trade test was under the authority of the Department of Labour not the Department of Education, Arts and Science – another deep disjuncture in the system.

On the financing side, it was also the case that far more resources were increasingly allocated to the universities as compared to the colleges[211] and contributed to the relative weakening of the latter.

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[209] MacMillan & Behr, Education in South Africa (1966), p. 188, as cited in E.G. Malherbe, *Education in South Africa*, p. 206.
[210] J. Conway made this observation in Britain at a meeting of the Institution of Electrical Engineers, on 11 February 1926, *Journal of IEE*, 1925-6, p. 879, cited in Reader, *A History of the Institution of Electrical Engineers,* p. 127.
[211] Malherbe, *Education in South Africa,* p. 177.

On the shopfloor, artisans and operators were viewed as 'workmen' and their terms and conditions of employment were set through the industrial council system. The engineers sided with management, for all that they were 'employees' too. They had 'private' meetings with management on wage and other issues. The mention of 'pupil engineers' in the NICISEMI agreement was no bridge, as it related only to the workshop practical of the engineering graduates and was not available to artisans (and was seldom used).

Furthermore, as Jackson was to note in his presidential address: '(m)any university students have been able to avail themselves of the education offered by the Institutes [e.g. in preparation for Certificates of Competency exams], but the non-University men are unable to avail themselves of the training provided by the universities'.[212]

The shifting boundaries and loyalties of these various players highlight the fluid nature of 'occupations' and the role played by organisations set up to defend them. Further illustrations of this principle will follow after the next chapter which shows how the previously excluded were increasingly permitted to, and assisted to, enter the workforce at differential levels.

[212] Jackson, 'The Training of Engineers in South Africa', p.365.

CHAPTER 7

THE APARTHEID YEARS

All people shall have equal rights … to enter all trades, crafts and professions.[1]
Freedom Charter

There are three significant and important actors whose stories are not recounted in this chapter: women workers (black and white), Indian workers and Coloured workers. This omission is regretted, and it must be for others to tell their stories. This narrative concentrates on broad trends in education and training; it is not an inclusive account of the experiences of every group, and there are rich stories and experiences to relate.

Counter-intuitively the advent of apartheid in 1948 led to the first formal state commitment to the training of black artisans (albeit under apartheid conditions). More intuitively, the government sought to accelerate the training of Afrikaans-speaking youngsters to bolster its political programme.

PEOPLE AND PLACES

The post-war period will be explored through the experience of two people, located at different ends of the political spectrum: *Heinrich Dreyer* and *Petrus Mashishi*. Heinrich was born in 1930, and so lived, studied and worked during the post-war period; Petrus was only born in 1948, but was trained in the apartheid system, and his experiences help to shed light on how it worked.

Dr. Heinrich Dreyer[2]

Heinrich Dreyer was born on 9 July 1930, in Sea Point, Cape Town. His parents divorced when he was six years old and life changed dramatically for him and his mother. At first, they lived with his mother's father in the rectory of the Dutch Reformed Church where his grandfather was the Minister. But it was difficult for his mother to support them financially, so he was sent to stay with uncles and aunts in Worcester. Things changed when his mother re-married:

> She married an ex-Free State farmer, and then we moved up to Kimberley. He was a Free State farmer, but …he lost his farm due to problems, farming problems and all that – and he worked on the Railways. … He had a very senior job on the Railways in Works and Estates. It wasn't a technical job, but it had to do with technical. And he was a good provider, and I called him 'Dad'. My mother was a teacher ….

The shift from farming to urban-based employment was not uncommon. Farming had become increasingly mechanised from the 1920s; the percentage of economically-active whites

[1] https://www.marxists.org/subject/africa/anc/1955/freedom-charter.htm, accessed 19 April 2019
[2] This account is based on an interview with Heinrich Dreyer at his home in Olifantsfontein, 2 November 2007.

engaged in farming decreased from 30 per cent in 1926, to 15 per cent in 1950, to 10 per cent in 1960 to 7 per cent in 1970. The destination of many of these failed farmers was the railways – as Malherbe has recorded 'the length of open railway mileage grew from 2 300 miles in 1891 to … 11 000 miles in 1931[3]. The number of Whites employed on the railways grew from 30 000 in 1921 to 49 000 in 1931.'[4]

Heinrich went to an Afrikaans-medium school in Kimberley - Diamantveld Primary School and Diamantveld High School. He was at school during the war years:

> The War years were difficult. It was the Nationalist Party and the United Party – and politics was rife … There was a strong class difference between people as far as who you were and what you did. Being a Railway worker's son of course, you were on level one. You were not a professional's son. That was a strong difference and a rift that you could see and feel. … In the old days if you were very patriotic it wasn't a good thing for you! You had to toe the line with the government and … oh … you had to support everything! And as a youngster this wasn't very kosher for us and for me. … I could feel it at school – ja, discrimination. Typical old railway son! He's not supportive of the government – Government Generals / War Fund – all little things came through. … I was in Standard Eight. I did well. Then my mother said to me she thinks I should do Standard Nine and Standard Ten down in the Cape – and go to Paarl Boys' High, a dual-medium school.

He completed his schooling in the Cape and did very well. He wanted to go to university badly, but there was no money …

> I matriculated at Paarl Boys' High in 1947. I knew I was university material. I knew I could go to university. Some of my friends at Paarl Boys' High whose fathers were rich farmers and rich businessmen, they all went to Stellenbosch University. I knew I could go, but I knew there was no money and it couldn't be done. So all I said was – Press on 'rewardless'! Not 'regardless'. Press on 'rewardless', so I joined my family in Port Elizabeth. But there were no jobs there … Any rate, then I heard, or I saw in the newspaper, the Port Elizabeth Herald that the Post Office was looking for apprentices. And I went to the recruiting office and I spoke to the lady there, and she explained to me, 'Yes, ja, it is a five year apprenticeship.' And the pay was 6s. per day, per working day – not on a Saturday. And ag, in desperation, I said alright. And I enrolled. …

After qualifying as an artisan he applied for a posting at the Kroonstad training centre where he oversaw the training of others. He later worked as a trainer at the Post Office Baragwaneth Central Training Centre, established in 1945.In 1969, he was transferred to Olifantsfontein where a new centre had opened.[5] Whilst in Baragwaneth he enrolled as a correspondence student at UNISA and was awarded a B.Sc, then later an education masters and finally a doctorate in 1974. He was promoted over the years to be Principal of the Olifantsfontein College and then to Head Office to be responsible for technical education. He chose the degree route over the Post Office's competitive examination: 'I wanted a university degree because I wanted it – and that's how it worked.'[6]

Petrus Mashishi[7]

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[3] Malherbe, *Education in South Africa*, p. 168.
[4] Malherbe, *Education in South Africa*, p. 161.
[5] H.A. Matthews, 'Technical training in the South African Post Office', *The Transactions of the S.A. Institute of Electrical Engineers*, July 1975, pp. 140 – 141.
[6] Interview with H. Dreyer 2 November 2007.
[7] Based on an interview with Petrus Mashishi on 2 June 2009. He was still at the time President, South African Municipal Workers Union (SAMWU)

Petrus Mashishi was born in 1948. His parents both came from Mokopane, in Limpopo province. His father, born in 1914, had come to Johannesburg in search of work in the twenties. He was a domestic worker for a while before becoming a messenger in a law firm, where he worked for twenty-eight years, until the firm relocated without informing its staff, leaving him with just a bicycle after all his years' of service. His mother cared for the home and family. Home was Alexandra until they, and many others, were forcibly removed to Diepkloof in Soweto.

Petrus started school in Alexandra but after the removals continued in Soweto where he completed his 'JC' [Junior Certificate]. Whilst at school he built a reputation for his excellent skills on the soccer field. So famous did he become that in 1969 he was recruited by the local Vocational Training College to boost its team. As he himself put it 'I became an artisan by accident'. He began training as a bricklayer, but 'fell in love with plumbing' during his first year, so transferred and managed in the remaining six months to cover the year's syllabus. He completed the remaining two years with flying colours. As he tells the story:

> During the school holidays, you had to go and do community work, pay back the communities because the fees were cheap, and you get everything at the school, and all those things … So you have to go and do community work … repairing toilets, repairing gutters and all those things in the communities. And those that were doing glazing had to go and replace windows in the communities and painting and all those things … carpenters had to go and repair the doors, put new doors in … that was part of the training that we were doing. Not only in the townships, but all over, in the state-owned government houses. So it was all over in government owned houses. … That to me was a good thing because it helped us, because by the time you completed and had to go and work you don't start from scratch, you already know what you are supposed to do, you already know the work.

After training at the college, all the students were required to work for the state for two years. Petrus joined the Johannesburg Municipality. He and others built the houses for those removed to Soweto and other areas.

Besides his union work, discussed under Occupation and Organisation below, Petrus also became a trainer of others:

> But the other thing is that at a certain stage I was used as a trainer – training labourers ... training them to become artisans at the workplace - so I trained a lot of people in the municipality.[8]

After his death on 3 July 2018, a homage was written, a brief extract of which is reproduced below in honour of a great leader:

A UNION FOR ANGELS[9]

In loving memory of Comrade Petrus Mashishi

He was larger than life
Starting as a municipal plumbers assistant
As grudgingly allowed
By apartheid's hideous demarcations
Did all the work
While supervised by one

[8] Interview with P. Mashishi 2 June 2009.
[9] https://www.sahistory.org.za/archive/tribute-petrus-mashishi, accessed 28 April 2019.

Who couldn't do anything
Without him

He held no malice
Said he actually
Felt sorry for them
For deep down inside
They knew they were lost
And their time was coming to a close…

On the day he died
His sister said
He will be organising in heaven now
Imagine
A union for angels
Lead by a humble plumber

POLITICAL ECONOMY

Transition to machinofacture and job colour bars

Bruce Murray has summarised the economic growth that took place between 1945 and 1959:

> … the gross national income more than trebled in monetary terms, from £666m (R1 332m) to £2 225m (R4 450m), with per capita income rising from £59,1 to £141,5. The manufacturing industry provided the main engine of growth and in the process transformed the balance of the economy. By 1960 manufacturing contributed 23,3 per cent of the Gross National Product (GDP), as against 14 per cent for mining, 12,7 per cent for commerce, and 10,8 per cent for agriculture. Two factors underlay industrialisation, namely the expansion of the local market and import substitution, the latter often proving the more dynamic.[10]

The nature of this growth was largely capital intensive. Increases in employment were not as dramatic although both black and white workers benefited from new jobs. The table for the basic metal industries shown below is indicative of the broader trend:

Table 7.1. Basic Metal Industries, 1933 to 1950

Year	Establish-ments	Machinery £000	Employment		Salaries £'000		Net output £'000
			Total	Whites	Total	White	
1932/33	322	1 465	11 900	5 153	1 620	1 305	2 737
1935/36	410	4 087	24 925	10 151	3 807	3 047	7 112
1940/41	484	6 078	41 068	15 687	7 111	5 386	15 091
1945/46	623	14 756	61 835	22 642	14 904	10 272	26 308
1949/50	990	22 611	83 603	30 846	24 714	18 054	45 162

[10] Bruce K. Murray, *WITS the 'Open' Years: A History of the University of the Witwatersrand, Johannesburg 1939 – 1959,* Witwatersrand University Press, Johannesburg, 1997, p. 172.

Source: *Union Statistics for 50 years, 1910 – 1960, dates selected from E. Webster, Cast in a racial mould, Table 3, p. 45.*

Imports of machinery and transport equipment grew from 20% to 53%, paid for mining exports.[11]

Webster has described the period 1932 to 1950, from the white craft workers perspective, as 'contesting skill – deskilling and the transition to machinofacture' and the period 1944 to 1968 as 'witnessing the shift from craft to colour'. [12] The first of these periods has been outlined in earlier chapters, and this chapter concentrates on the second – essentially the weakening of skill as a means to protect wage levels, and its replacement by job colour bars to protect white workers and keep the labour of black workers' cheap. This trend began earlier but was much strengthened by the election of the National Party in 1948 with its willingness to enshrine these principles more forcibly in law.

The consequence of this strategy was inevitably to widen the wage gap between black and white workers dramatically:

> It rested upon what they called South Africa's 'peculiar wage structure', i.e. the existence of skilled wage rates which were high in relation to both skilled rates elsewhere and the average productivity of labour. Thus [the Board of Trade and Industries'] Report 282 argued that 'whereas in the western world the spread between the highest and lowest rates of wages is usually about 30% and seldom more than 50%, in the Union it is several hundred percent'.[13]

This differential was reinforced by the state's protection of white operatives through job reservation policies and the willingness of employers to restructure work and increasingly employ cheaper black labour.[14]

Mass struggles against unjust laws and the 1948 Nationalist Party victory

As seen in the table below, African workers, were drawn to the towns and factories in increasing numbers. This had its own political effects, as it precipitated labour shortages on farms and mines.

Table 7.2. Data Relating to the Growth of the Metals and Engineering Sector: 1935/6 to 1947/48

Number of employees	Metals and engineering				
	35/36	38/9	45/6	46/7	47/8
European male	36,150	41,934	57,309	62,100	

[11] R. Davies, D. O'Meara, and S. Dlamini, *The Struggle for South Africa: A Reference Guide to Movements, Organizations and Institutions, Volume One*, London: Zed Books, 1984, p. 52.
[12] Webster, *Cast in a Racial Mould*, pp. 45 - 70.
[13] Board of Trade and Industries Report No. 282 into the manufacturing industry in South Africa, 1945; and Report No. 286, into the Iron, Steel and Engineering Industries in South Africa, 1946, cited in Webster, *Cast in a Racial Mould*, p. 95.
[14] R.H. Davies, *Capital, State and white labour in South Africa 1900 – 1960,* Harvester Press, 1979, pp. 345-6.

European female	629	913	2,856	2,478	
Non-European (black) male	38,227	44,468	77,118	79,142	
Non-European (black) female	200	277	338	275	
Total	**75,206**	**87,592**	**137,621**	**143,995**	**156,133**

Source: *A.J.A.* Roux, 'Mechanical Engineering Research in South Africa*',* in *Journal of the South African Institution of Mechanical Engineers*, June 1952, *Table I, pp. 328-9.*

Even before the war, black industrial workers began to organise into industrial and general unions. For example, workers joined unions affiliated to the Joint Committee for African Trade Unions during the 1930s and at the beginning of the war it had 20 000 members. The war years saw African workers become stronger, partly due to the value of their labour to meet production schedules and partly to their sheer numbers; in 1939 there were 143 000 black workers in factories. In 1945 there were 249 000.[15] In November 1941, the Council for Non-European Trade Unions (CNETU) was formed. Gana Makabeni, from the South African Communist Party was its first President and Dan Tloome, from the African National Congress, its first Vice-President, reflecting the influence of these organisations in its establishment. By the end of the war there were 119 unions affiliated to CNETU, with a combined membership of 158 000 workers. There were small strikes on the mines and in various industries during the war. For example, in 1942, 8000 workers went on strike in Johannesburg and Pretoria for higher wages. After the war, in 1946, 50 000 black mineworkers went out on strike for higher pay and improved working conditions.[16]

The Smuts government made some concessions to these unions, allowing the Wage Boards to increase black workers' wages in some sectors. However, as this served to foster, not reduce, militancy, the government passed War Measure 145. This stated that anyone who went on strike or told others to go on strike would be fined £500.[17] This acted as a deterrent during the war, particularly as some union leaders supported the war effort and so opposed strike action.

This workplace militancy was accompanied by growing civil protests. Daniel Koza, for example, a militant member of CNETU helped organise the Alexander Bus Boycotts in 1943.[18]

Business and white labour were concerned by this growing militancy and looked to their whites-only government for solutions. Davies, O'Meara and Dlamini[19] have provided a cogent analysis of why the United Party lost the 1948 elections, to the nationalists. In summary, the Nationalists managed to recruit four major sections of society to their cause: The first was a powerful body of Afrikaans-speaking Agriculturalists and non-monopoly industrial capitalists.

[15] Labour History Group, *Workers at War: CNETU and the 1946 African Mineworkers' Strike*, Athlone Industria, Cape Town: Esquire Press (Pty) Ltd, April 1983, p. 6.
[16] Labour History Group, *Workers at War*, pp. 8-9.
[17] Labour History Group, *Workers at War*, p. 17.
[18] Labour History Group, *Workers at War*, p. 21.
[19] Davies et. al., *The Struggle for South Africa, Volume Two*, pp. 16-20.

They had been supporters of the United Party, but their loyalty wavered after the war as they grew tired of what they saw to be the vacillating and contradictory policies agricultural policies. In 1948, they threw their weight behind the Nationalist Party which promised them 'rigid influx control measures to stem the efflux of labour from white farms and general control of African workers. The NP also promised a pricing policy which would guarantee a higher rate of profit to agriculture'.[20]

The second group was made up of sections of the white working class, particularly in the mining, metals and building industries. The struggles and their ultimate success in this regard has been recounted in detail by a number of authors such as Lewis, Webster and Davies.[21]

> During and after the Second World War, the 'Christian national' trade union movement achieved a number of successes. It forced the railways administration to recognise *Die Spoorbond* in 1942, and captured control of the Mine Workers' Union in 1948, whilst its *Blankewerkersbeskermingbon*d (White Workers' Protection Society), formed in 1944, succeeded in recruiting white workers in various other sectors.[22]

Lewis clearly attributes this success to agencies of the *Broederbond.*[23] Davies et al. both argue that the ambition was to provide a mass base to the petty-bourgeoisie Afrikaner Nationalist movement and provide a savings base 'to finance the activities of the associated 'Afrikaner economic movement'.[24] This grouping wished to advance smaller Afrikaner capitalists and rejected the alliance of the then Nationalist Party with 'big capitalist interests'. To these workers the Nationalist Party promised 'rigid job colour bars to protect their position against the entry of black semi-skilled and skilled labour, and increased welfare measures financed through an attack on monopoly profits.' Lewis warns however that the *Broederbond* only succeeded where their message resonated with the state of current economic relations.[25]

The remaining two groups that swung the whites-only vote in favour of the National Party in 1948 were the authors of the 1934 Nationalist Party split, the *Gesuiwerde Nasionale Party* (Purified Nationalist Party) led by D.F. Malan who opposed the alliance with British monopoly capital and was strongly in favour of making South Africa a republic. 'It was the moving organisational force in the NP and in the formulation of its apartheid policies for the 1948 elections'.[26] Finally, there was a small Afrikaner finance, commercial and manufacturing capital group. The Nationalist Party promised this group 'a far greater measure of state intervention and control to ensure access to key resources and the conditions for the accumulation of this capital'.[27] This led to the creation of Volkskas Bank and other resourcing vehicles.

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[20] Davies et al., *The Struggle for South Africa: A reference guide to movements, organizations and institutions, Volume One*, p. 18.
[21] Lewis, *Industrialisation and Trade Union Organisation in South Africa;* Webster, *Cast in a racial mould;* Davies, *Capital, State and white labour in South Africa 1900 – 1960.*
[22] Davies, et al., *The Struggle for South Africa: A reference guide to movements, organizations and institutions, Volume Two,* p. 248.
[23] Lewis, *Industrialisation and Trade Union Organisation in South Africa,* pp. 70-71, p. 77.
[24] Davies, *Capital, State and white labour in South Africa 1900 – 1960,* p. 283.
[25] Lewis, *Industrialisation and Trade Union Organisation in South Africa,* p. 87.
[26] Davies, et al., *The Struggle for South Africa: A reference guide to movements, organizations and institutions, Volume One,* p. 19.
[27] Davies, et al., *The Struggle for South Africa: A reference guide to movements, organizations and institutions, Volume One,* p. 20.

These gains were long in the making, and were actively advanced by a secret underground organisation, the *Afrikaner Broederbond*, which infiltrated many sectors and worked actively to promote the interest of Afrikaner Nationalism. It was established after Union to advance the cultural interests of the Afrikaners but became increasingly and militantly anti-British. In 1922, it resolved to become a secret organisation built up of cells of 'Broeders', some in schools and churches. By 1943 there were more than 300 such cells with a membership of 2 528. They set out to advance the interests of Afrikaner Nationalism in all spheres of life and allied themselves politically with the *Gesuiwerde Nasionale Party* (1934 – 1939)[28] and then with the *Herenigde Nasionale Party*.[29] They opposed South Africa's participation in WWII and mobilised against it. The HNP later became the core of the Nationalist Party.

One way in which they worked is indirectly illustrated by the following account by Heinrich Dreyer. Heinrich was bright, he built his own radio at school with the help of an acquaintance:

> During the war years we were not allowed to have radios on at night. I had hidden aerials in the ceiling. And I had an old radio there. And I converted it so that I could listen to it with earphones on. Ja, and it was lights out in Kimberley. And we were especially not allowed to listen to 'Zeesen'. That was transmissions from Germany by Eric Holm. And it was in Afrikaans. He was a journalist there. And ja, you'd listen to how many British and American ships the Germans had sunk. And I listen to this on the earphones all huddled with all the lights off – very exciting, very adventurous – and I could do it with my radios!

Zeesen is described by Malherbe[30] as a powerful broadcasting station at Zeesen (Germany) which broadcast vitriolic anti-British, anti-Jewish, pro-German propaganda in Afrikaans into South Africa. Malherbe suggests that:

> There can be no doubt that this slimy, hate-generating stuff which was poured nightly in Afrikaans into South African homes must have left its mark on the receptive minds of the Afrikaner youth at the time. (Malherbe, 1977 p. 26-7)

Holm was a young South African teacher who was studying in Germany, employed by the Nazis and paid by Goebbels himself. In 1947 he was tried in South Africa and found guilty of high treason. He was given a prison sentence of ten years. When the Nationalist Party came into power he was liberated, and received an appointment in the Union Department of Education[31].

Once the Nationalist Party came to power in 1948 it lost no time in passing legislation in support of its apartheid programme. In 1950 it passed the Suppression of Communism Act (No. 44) which not only banned the Communist Party, it also empowered the Minister of Justice to restrict anyone he believed to be engaged in communist activities (very broadly defined, including union officials and militants). In the same year the Group Areas Act (No. 41) became law, under which the responsible Minister, on the advice of a Group Areas Board, could reserve specific areas in cities, towns and villages for particular race groups. Provision was also made for the compulsory vacating of such proclaimed 'group' areas by people of other race groups. This was accompanied by a strengthening of the pass laws such that the movement of African people in urban areas was highly restricted. In 1953, the government passed the Native Labour (Settlement of Disputes) Act (No. 48) and in 1956 the Industrial Conciliation Act (No. 28), which excluded black workers from the industrial conciliation

[28] Davies, *Capital, State and White Labour in South Africa, 1900 – 1960*, pp. 281 ff.
[29] Malherbe, *Education in South Africa, Volume 2,* pp. 668-9.
[30] Malherbe, *Education in South Africa, Volume 2, p*. 26.
[31] Malherbe, *Education in South Africa, Volume 2,* p. 26 incl. footnote 4.

machinery and restricted them to employer-controlled Works and Liaison Committees.[32] The Industrial Conciliation Act also expanded and deepened the protection of white workers through the job colour bar provisions in line with the government's commitment to white workers in its 1948 programme.

A powerful group within the Afrikaner Nationalist ranks believed that the South African population should be geographically segregated *literally* (in spite of the reality that the 'white' economy was based on cheap black labour and depended on that labour in the urban areas for its survival). Chief amongst the protagonists of this view was another organisation of Afrikaner intellectuals known as the South African Bureau of Racial Affairs (Sabra). It advocated a vertical division of races, not just a horizontal one (where the best opportunities were kept for the whites, with inevitable consequences for blacks). The vertical division notion held that the areas reserved for black communities should become economically viable black states – and, running with the logic of this argument was the view that assistance should be given to help make them so.

> Sabra's impact on the early legislation of the NP government was substantial. Laws such as the Native Building Workers' Act, the Native Services Levy Act and the Native Labour (Settlement of Disputes) Act were passed soon after the Sabra congresses of 1950 and 1951 called on the government to train black building craftsmen, to ensure that only African labour should be used in the building of African housing in the urban areas, to make employers responsible for part of the cost of housing urban Africans, and to refuse to recognise black trade unions in white areas.[33]

These ideas contributed to the mass removals of black people from so-called white areas on a huge scale, Seekings and Nattrass have noted more 'than one million people, about one-third of the resident African population, were removed from white-owned farms to the reserves; half a million people were removed from black spots as they, too, were cleared'[34] These removals continued over decades and by 1982, over 3.5 million people had been forcibly removed and many more faced removals thereafter.[35] The ideas also supported the notion that the state should assist Africans to acquire craft skills in 'their' areas. Sabra believed that the areas to which black people were removed, should be assisted to grow into viable economic zones.

The removals themselves in turn led to a humungous housing crisis – which compounded an already critical problem which the National Housing and Planning Commission had estimated to be in the region 300,000 units just after the war in 1946-47[36] and which no doubt informed the De Villiers Commission's recommendation that 'Natives (should) be trained to build houses for their own people'.[37]

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[32] Davies et al., *The Struggle for South Africa: A Reference Guide to Movements, Organizations and Institutions, Volume 1,* p. 21 and p. 171.
[33] J. Lazar, 'Verwoerd versus the 'Visionaries'*:* The South African Bureau of Racial Affairs (SABRA) and Apartheid, 1948-1961', in P. Bonner, P. Delius, and D. Posel, *Apartheid's Genesis 1935 – 1962,* Johannesburg: Wits University Press, 1993, p. 364.
[34] Seekings and Nattrass, *Class, Race and Inequality in South Africa,* p. 94.
[35] L. Platzky, *The surplus people: forced removals in South Africa,* Johannesburg: Ravan Press, 1985, Cited in https://www.sahistory.org.za/article/forced-removals-south-africa#endnote-22, accessed 20 November 2019.
[36] Hansard, 7 February 1951, 887.
[37] De Villiers Commission, Recommendation 123, p. 282, paras. 1851-53.

The African National Congress, formed in 1912 was initially a small organisation based on traditional chiefs and the small African petty bourgeoisie. Its early aims were limited to opposing the colour bar, the 1913 Land Act and to promote the interest of Africans. Their strategies were predominantly petitions, deputations and propaganda campaigns. This changed in the 1940s. In 1943 when a new democratic constitution was adopted together with the ANC's first comprehensive political programme demanding full political rights. In the same year the Congress Youth League (CYL) was formed and effectively took over leadership in 1949. It began to work actively with the Communist Party and other Congress groups. In that year the Youth League Programme, known as the Programme of Action – was adopted as the programme of the ANC and set out a policy of boycotts, strikes and civil disobedience. It was implemented in the 1952 'Defiance Campaign against Unjust Laws'. The latter gave rise to the convening of 'Congress of the People' by the Congress Alliance in June 1955 at Kliptown, Johannesburg, on June 25 and 26, 1955. Over 3000 delegates from all regions adopted the *Freedom Charter* as the basic demands of the people of South Africa. Importantly for this discussion is the fact that the following words were included in the Freedom Charter.[38]

FREEDOM CHARTER:

'THE PEOPLE SHALL SHARE IN THE COUNTRY'S WEALTH!'

All people shall have equal rights to trade where they choose, to manufacture and to enter all trades, crafts and professions.[39] [emphasis added]

The mass campaigns and radicalisation of the ANC in the 1950s led to increasing state action against it. In 1960, at the height of the anti-pass campaign, and in the wake of the Sharpeville massacre, the ANC was banned and was forced underground. Its banning also led to the formation of an overseas mission and to its military wing, *Umkhonto we Sizwe* which drove its armed struggle strategy from 1961 and, away from its earlier non-violent campaigns. The state responded viciously, killing protesters and in 1963 arrested the leadership at their headquarters in Rivonia, Johannesburg, which led to the Rivonia Trials and the life imprisonment of Mandela, Sisulu and Govan Mbeki.[40]

One of the ANC's principal campaigns was that against the introduction of the Bantu Education in 1953, an Act which is discussed further below.

EDUCATION AND TRAINING LANDSCAPE

Context

[38] Davies et al., *The Struggle for South Africa, Volume Two*, pp. 285-286.
[39] Davies et al., *The Struggle for South Africa, Volume Two*, p. 315.
[40] Davies et al., *The Struggle for South Africa,* Volume Two, p. 288.

Before the Afrikaner Nationalists came to power the law did not present explicit obstacles to racial indenture of artisans. However, it did not prevent those with a will to exclude black youngsters from doing so, using such provisions as those in the following clauses of the 1944 Apprenticeship Act:

22 (1) Any person who –
(a) has the qualifications prescribed under section *sixteen;*
(b) has obtained a certificate of physical fitness in the prescribed form;
(c) has attained the age of fifteen years; and
(d) is not required by law to attend any school …
may … bind himself as an apprentice in any designated trade.
(2) If any such person is a minor he shall be assisted by his guardian, and if he is not a minor he shall not so bind himself, except with the consent of the registrar, who shall, before granting his consent, consult the committee concerned.

23 (3) … the registrar may, in addition to any other ground on which he may lawfully do so, refuse to register any contract of apprenticeship if the committee concerned has reported that in its opinion it is not in the interest of the prospective apprentice to register the contract and he may, in coming to a decision under this sub-section, have regard, in addition to any other circumstance, to the prospective apprentice's prospects of obtaining employment in the industry concerned at the expiry of the contract.

With regards to the attainment of prescribed educational qualifications, in the parliamentary debate on the Apprenticeship Bill in 1944, opposition member of parliament, Donald Barkly Molteno[41] made the situation most blacks faced abundantly clear, quoting from the Industrial Legislation Commission of 1935:

> Our apprenticeship legislation excludes youths who have not attained certain prescribed educational requirements which differ in different trades. This rules out the majority of non-Europeans for whom the educational requirement is a definite barrier. The required attendance at technical colleges during the period of apprenticeship, which non-Europeans in Cape Town only are able to comply with, constitutes a further barrier.
> Racial prejudice, backed to some extent by legislation, constitutes a barrier for non-Europeans.[42]

Furthermore training depended on the 'whim of some private employer as to whether or not he will train the apprentice, and that again must operate as a colour bar.'[43] A view confirmed by Dr. H.J. van Eck, himself the chairman of a key government commission,[44] who said in 1945: 'We must face the fact that the training of natives for skilled and even semi-skilled work is frowned upon by a very large number of [white] people in this country'.[45]

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[41] Donald Barkly Molteno was an opposition MP from 1937 to 1948 'and represented Africans in the House of Assembly as MP for Cape Western [during that time]. Molteno played a leading role in organizations such as the Cape Joint Council of Europeans and Bantu, Cafda and the Civil Rights League. He was chairman of the Liberal Party's constitutional committee, and after joining the Progressive Party became chairman of the commission which advised it on constitutional policy.' https://www2.lib.uct.ac.za/mss/existing/Finding%20Aids/bc_579_Donald%20Barkly%20Molteno%20Papers.htm, accessed 7 December 2019.

[42] Industrial Legislation Commission, U.G. No. 37, 1935, p. 19, quoted by Molteno in debate on 1994 Apprenticeship Bill in Hansard, 5559, Union of South Africa, 1944.

[43] Statement made by Molteno in debate on 1994 Apprenticeship Bill in Hansard, 1944, 5561.

[44] See for example Union government, UG 40, 1941, *Third interim report of the industrial and agricultural requirements commission* (Van Eck report), Pretoria, 1941.

[45] Dr. H.J. van Eck, 1945, in proposing a vote of thanks to Badham after his Presidential Address, *The Transactions of the SAIEE*, January 1945, p. 27.

Indeed some Afrikaner nationalist voices who were members of the then opposition Nationalist Party (NP), expressed openly in the parliamentary debate their opposition to such training. When the NP came to power in 1948, they tackled these issues more directly. [46]

The white unions also used their power on the apprenticeship committees to block black apprentices as Ben Nicholson, who sat on such committees representing the South African Electrical Workers Association, recounted:

> Nothing ever prevented anybody from being an apprentice BUT, and this is a big BUT, apprenticeships had to be registered through an Apprenticeship Committee. And the App. Committees met, discussed the applications to register an apprentice and said 'yea' or 'nay'. Now either the employer wasn't acceptable, couldn't train, didn't have the facilities to train or the person did not have the correct qualifications to be an apprentice. Now, on the Apprenticeship Committees were representatives of all the unions. And the name from the building side, what did they call themselves? The Building Workers Union (*AB: Bouwerkers Unie? BN: No I think it had another name*) and *Yster en Staal* was there. Anyway, it was a 'vara Afrikaner' who was a secretary of that (building workers union), and he was a monster of the first degree. So whenever a black name came up, forget it, they wouldn't agree. That was where it as stopped. …
>
> And they could always come up with something which prohibited them from being accepted. So whenever a black name came up, the whole thing was researched and it was found that he didn't have this or he didn't have that or whatever in many cases, but in many cases they did. But you couldn't get it passed them. And of course, to our discredit, if we did fight them they would pinch our members, we'd have to go back and they would say to our members these guys want black artisans. We had that problem to deal with. Bit selfish perhaps, but it was the reality of the situation at the time. [47]

Bantu Education Act, No. 47 of 1953

Education and training were not exempt from the upheavals that followed the Nationalist Part ascent to power. Against a backdrop of schooling for black students having been seriously neglected, only offered by churches with small subsidies from the state from as early as 1904, the Afrikaner Nationalists embarked upon an entire system revision. As Malherbe has recorded:

> Shortly after the National Party had come to power in 1948, it appointed a commission under the chairmanship of Dr W.W.M. Eiselen to go into the whole question of Bantu Education. In 1951 this commission brought out a report[48] which proved to be the blueprint of Bantu education for the next few decades.[49]

The Bantu Education Act No. 47 of 1953 was the result. Dr. H.F. Verwoerd, Minister of Native Affairs at the time, explained its central purpose to the Senate in 1954:

> It is the policy of my Department that [Bantu] education should have its roots entirely in the Native areas and in the Native environment and in the Native community. There Bantu education must be able to give itself complete expression, and there it will have to perform its real service. The Bantu must be guided to serve his own community in all respects. There is no place for him in the European community above the level of certain forms of labour.[50]

Luli Callinicos records just how inferior this schooling was compared to that provided to whites:

> [Verwoerd believed] a 'suitable' education for black students included firstly religion, a three-hour school day, with teachers working morning and afternoon shifts, and gardening and

[46] Hansard, 1944, 5508.
[47] Interview with Ben Nicholson 10 November 2006.
[48] U.G. 54/1951.
[49] Malherbe, *Education in South Africa, Volume 2,* p. 545.
[50] Malherbe, *Education in South Africa, Volume 2,* p. 546.

> maintenance courses executed by practising on the school buildings and its grounds – an augmentation to the syllabus that certainly did not feature in the curriculum of white children. As Henry Makgothi, graduate of St Peter's and president of the [ANC] Transvaal Youth League, noted, the syllabus provided for 'a smattering of English and Afrikaans in order to understand the commands of their bosses', but excluded History or Geography. The budget for the education of black children in 1951-2 was £7 5s and 8d per pupil, compared with £43 8s and 8d per white pupil.[51]

There is no mention of mathematics or science. And whilst the introduction of this system did lead to a massive increase in the *number* of pupils in primary schooling (from under a million to over 3.5 million between 1950 and 1970), the quality of the 'education' declined as a result of falling real per-pupil allocations.[52] In passing it can be noted that the number in post-primary school also increased over the same period, from 48 892 to 257 929, but this constituted a very small percentage of the school population, a rise of only 3.1 per cent (from 6.3 per cent to 9.4 per cent).[53] It did however begin to lay the foundation for the student uprisings of 1976 as evidenced by the NUMSA Research and Development Group members (see Chapter Two). The Bantu Education Act was also the first in a sequence to place, under separate national administrative departments, the responsibility of education and training for 'non-whites': Bantu Affairs (1953), Indian Affairs (1963) and Coloured Affairs (1964).[54]

The introduction of this Act led to widespread militant school boycotts and even the establishment of alternative schools by the ANC and its allies. The legislation was hated from its inception, and it was difficult to sustain a parallel system without state resources and in the face of vicious state attacks[55].

Bantu Building Workers' Act, No. 27 of 1951

Very few African students received formal technical and vocational training supported by the state[56] before, or after, 1948. This was conceded by the Minister of Labour when introducing the Bantu Building Workers' Bill. The fear had always been that, once qualified, they would do skilled work at lower rates of pay and make white artisans unemployed – a voting constituency on which the white government depended.

Only 160 black people had been trained for building work under the 'COTT scheme', [57] not called artisans but 'Native building operatives'. They received their practical training on government department or municipality (local government) 'Native building projects'. They were trained in bricklaying, plastering, painting, carpentry, plumbing and electrician work.[58]

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[51] L. Callinicos, *Oliver Tambo, Beyond the Engeli Mountains*, Claremont, South Africa: David Philip Publishers, 2004, p. 211.
[52] Malherbe, *Education in South Africa, Volume 2,* p. 553 and p. 557.
[53] Malherbe, *Education in South Africa, Volume 2,* Annexure 17, 'Number and Percentage of Pupils in Post-Primary Classes (Standards VI-X) in public and private schools', p. 714
[54] Malherbe, *Education in South Africa, Volume 2,* p. 190.
[55] Callinicos, *Oliver Tambo,* pp. 211-213.
[56] Malherbe, *Education in South Africa, Volume 2,* pp. 193-197.
[57] See: Annual Reports of Department of Labour, 1950, UG 71/1951, paras. 41, 46, Table 14 p. 19 and Annual Report, Department of Labour, 1945, U.G. No. 9-1947, p. 2.
[58] See: Annual Reports of Department of Labour, 1950, UG 71/1951, paras. 41, 46, Table 14 p. 19 and Annual Report, Department of Labour, 1945, U.G. No. 9-1947, p. 2.

But even with such tiny numbers, the fears of the white and Coloured artisans had to be assuaged:

> The *quid pro quo* for this was that the skilled artisans received a guarantee of an 80 per cent wage in the event of unemployment for a period of ten years. About 5,000 Europeans and Coloureds availed themselves of this. [59]

This astounding '*quid quo pro'* indicates the level of concern facing the white government on this question.

This was not the sum of all training and skills development however. The Minister continued:

> Large numbers of Natives are being trained by the mission schools. They are being trained as masons, cabinet makers and all the rest of it. Then there are also a number of Natives who have learnt the trade on their own. They have worked for years for building contractors as handymen, or as helpers, they have seen how the work is done, and they have become fairly handy and able to do the work themselves. … (T)he position is that the overwhelming majority of the other Natives – we can say today that there are hundreds of them – have infiltrated into the white areas, and are employed there as building workers. They do building work and repair work and in some instances they even do speculative building work. Those Natives constitute a pretty serious menace to the European and Coloured artisans in the white areas.[60]

Malherbe has recorded the number of institutions training black artisans between 1936 and 1946:

> In 1936 there were 12 centres in the Cape Province and 5 in Natal where specialized trade instruction was given to a total of 543 Bantu boys. 621 Bantu girls were trained in household work. At that time no such training was given in the Transvaal and O.F.S. In 1946, however, the Transvaal had 10 such centres with 623 pupils. This brought the total for the whole country to 2015 Bantu pupils receiving some form of vocational training.[61]

Chisholm describes that when the Bantu Education Act was introduced in 1953, there were only two technical colleges, five technical secondary schools and ten trade schools for African learners.[62]

The inadequacy of this provision became all the more evident when the Group Areas Act was promulgated. There was already an acute housing shortage amongst black communities, as shown above. With the passing of this Act the problem was compounded as those that had been forcibly removed from 'white' areas now also needed homes. The Minister of Labour faced a serious conundrum:

Minister of Labour:

> Now hon. Members will agree that there is a serious shortage of houses for Natives in this country. It is difficult, of course, to give an estimate of the existing shortage, and particularly of what the probable shortage will be over a period of years. But although there is a serious shortage, native houses are not being built on a large scale. One of the important reasons is that, that to build Native houses with white labour, which has to be paid the wages laid down, is quite uneconomic. The Natives are simply unable to pay an economic rent for such houses, and the result is that the taxpayers have to bear the cost, and I think that we already have, to a certain extent, reached the stage where the taxpayers are not prepared, any longer, to bear this heavy burden. There is only one alternative, and that is to enable the Natives to build their

[59] Hansard, 7 February 1951, 859.
[60] Hansard, 7 February 1951, 859.
[61] Malherbe, *Education in South Africa, Volume 2,* p. 193.
[62] L. Chisholm, *South African Technical Colleges: Policy Options,* Johannesburg: University of the Witwatersrand: Education Policy Unit, 1992, cited in S. McGrath, A. Badroodien, A. Kraak and L. Unwin, *Shifting Understandings of Skills in South Africa: overcoming the historical imprint of a low skills regime,* Cape Town, South Africa: HSRC Press, 2004, p. 42.

own houses. From the very nature of things they must first have a reasonably good training, and then they should be enabled to put up their own buildings for their own use. …

But when we give the Native that opportunity, and when we enable him to build economic houses for himself, which will give considerable relief in the serious shortage of Native houses, we must, at the same time, protect the trained and skilled artisan in the white areas against undermining of his wage standard by cheap Native labour.[63]

This led to a heated debate in Parliament on 7 February 1951, an extract of which is reproduced below to show the tension, and contradictory nature, of the government's position:

Minister of Labour:

The Natives who are trained as building workers will, naturally, not get the wages that are now paid to white skilled artisans. It is not contemplated to turn them into skilled artisans. To a large extent their work will be semi-skilled work. … On account of the fact that they are paid a lower wage – it is a wage commensurate with the standard of skill they have reached, and which will take into account particularly the standard of living of the Native – it will mean that they will build considerably cheaper than the skilled artisans are building at the moment. (col. 861)

Major van der Byl (United Party):

The Minister's statement … that the training provided for the Native … would not be equal to that of the European artisan and that they could never become skilled men in the full sense of the term was, in my opinion, somewhat unfortunate, because I feel that a native employer employing a Native building worker to build a house for him in a Native area is entitled to have that house properly built, and not jerry-built by a semi-skilled man. (col. 872)

Minister of Labour:

I said that they would not attain the same degree of proficiency as a skilled European artisan. (col. 875)

Major van der Byl:

In other words you will get the houses cheaper built in that way. But the point is that if a man is an inferior worker, less efficient, although he gets a lower wage, his work will be of a lower quality. This is an aspect you have to see… (col 875)

Mr. Hepple (Labour Party):

As the Minister well knows, you cannot teach a man to be a three-eighths mechanic or a three-eighths artisan. He either has it in him to become a top-class artisan in the building trade or he has not got it in him. Some of the better artisans in the building trade have come in as what is known as chancers. They swung the lead. They bluffed the boss as regards their experience. A trained worker stood between them and the boss, but they acquired skill, and they did it in a very short time. (col. 885) …

Mr. Eaton (Labour Party):

I have recognised and others have recognised the danger to the skilled artisan of the provision for semi-skilled European artisans. We had it during the war years. We discovered that these semi-skilled men, given the opportunity, could perform skilled work of a very high standard and they did perform it. Why? Because they had the knowledge and the use of tools and that is the point that I want to make to the Minister. He is not going to succeed in keeping the standard of the Native building worker down to a certain level. (col. 897)

Minister of Labour:

But surely that is all to the good?

Mr. Eaton:

[63] Hansard, 7 February 1951, 860-1.

> We are not going to instruct the Natives up to a certain standard. This Bill, when it becomes an Act, is going to produce skilled Native artisans. … The Minister says that they will not be quite as good as European artisans. Even if they are going to build houses to be occupied by Natives, we still want to see the walls straight and we want to see one brick on top of the other.[64]

Certainly no black building workers were able to present their own case in any of the engagements leading up to the preparation of the Bill, in parliament itself, or afterwards in the proposed oversight Board. And the craft unions, which had fought so hard to keep their 'effluxion of time' colleagues inside the artisan fold, fought as hard to keep these black artisans out. As the Labour Party reported in parliamentary debates, 'No Native should be allowed to touch the tools of the trade, either in a Native area or in a European area'.[65] But in this instance the state overrode their objections in the name of what they euphemistically and misleadingly called 'positive apartheid'.

The Bantu Building Workers Act (Act No. 27 of 1951) was passed: 'to provide for the training and registration of native building workers, for the regulation of their employment and conditions of employment, and for other incidental matters' (Long title of the Act). It led to the introduction of a training and testing scheme not dissimilar from that established under the Training of Artisans Act described above.[66] It provided for a training period of four years in the trades of bricklayer, carpenter, joiner, painter, plasterer, electrician and plumber.[67] The training could be reduced to a minimum of two years by the learner passing prescribed trade tests.[68] On completion the person was required to register with the Department. The Act also provided for the wages and conditions of employment well below those paid to white artisans. In later years the Act was revised and the training scheme itself was modified:

> Bantu of at least 18 years of age are placed in employment as learners Grade B. After one year's training, they are allowed to take a test and, if successful, they become learners Grade A. The prescribed training period is four years, but a learner Grade A may, after one year's training, take a trade test and if successful he is issued with a certificate as proof that he is a qualified building worker. Any other Bantu who submits evidence to the effect that he has performed skilled building work for at least two years, may likewise apply for a trade test and thus obtain registration as a building worker.[69]

Petrus Mashishi believed that the standards they had to meet were more rigorous than those for white and coloured workers 'the difference was that with us we were required to have certificates, with coloureds and whites they were only required to produce a card … and we had to train them in the workplace, we had to train them to be artisans, but they will be our supervisors! That was the difference.'[70] And as shown in the previous chapter, many of the white artisans would not have passed any trade test but would have qualified through 'the effluxion of time'.

By the end of 1969, nearly 5000 (4,926) Africans had been registered as building workers under the scheme.[71] Mashishi was one of these.

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[64] Hansard, 7 February 1951, columns as shown.
[65] Hansard, 7 February 1951, 865.
[66] The scheme was published in Notice No. 789, in *Government Gazette,* 17 April 1953.
[67] DoL, 1969, R.P. 93/1970, p.24.
[68] DoL, 1953, UG 20/1955, para. 43, p. 18.
[69] DoL, 1969, R.P. 93/1970, p.24.
[70] Interview with Petrus Mashishi 2 June 2009.
[71] DoL, 1969, R.P. 93/1970, p.24.

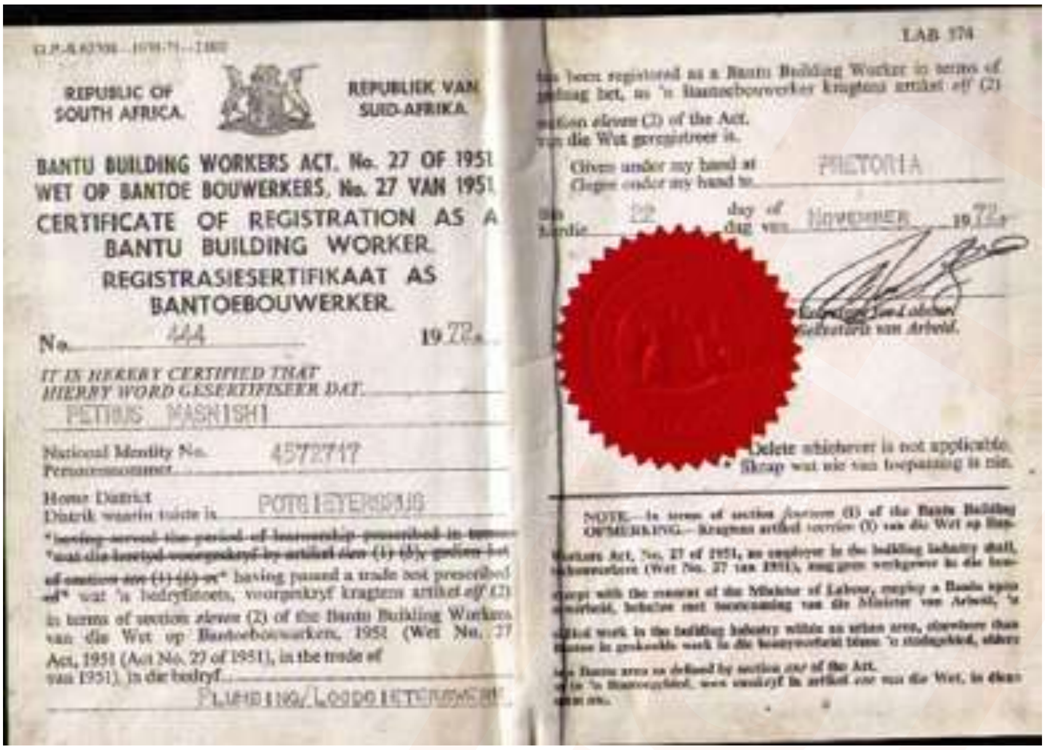

Figure 7.1. Petrus Mashishi's Bantu Building Workers' Act registration card, issued 1972.

Petrus repaired and maintained state-owned houses under the jurisdiction of the Johannesburg Municipality from the time he qualified. As Petrus put it: 'The Soweto houses in the township, most of them were built by ourselves. We used to do drain-laying … all those things.'[72] There should have been many more such artisans given the scale of the housing shortage and the dearth of alternative opportunities for advancement, but there were simply insufficient training facilities – as the government was unwilling to fund their expansion.

Registered black building workers were prohibited from working in the urban (white) areas and in any other area besides that in which 'their own' lived. Ben Nicholson refuted the efficacy of this measure in his discussion on the subject, although he would have had more experience of the later years:

> They had these technical colleges in the homelands, and we had in the ranks of our black union we had 400 artisans right from the beginning, from the early '70s, who were artisans qualified in the homelands, but they were never considered as fully qualified artisans. … There were black electricians in the homelands in those days and they were tested. They had some organisation in the homelands that tested them…
>
> There were (also) blacks trained in industry, under the counter if I can put it that way, but were not given the status. But those that were trained in the homelands were actually not supposed to work in the white areas, they were confined to the black areas. They were qualified. They could work in Soweto. And they were given the status of artisans, but they gradually went to the white areas, white employment if I can put it that way, but were not recognised and they

[72] Interview with Petrus Mashishi 2 June 2009.

were qualified. And they were used, or shall I say misused – to the detriment of the white artisans.[73]

Petrus Mashishi confirmed this view:

> There was the Act which barred black artisans from working as artisans in white areas – they had to work in the rural areas or the townships. …(but) they were not strict in implementing it. To me, in the private sector, the law was strict … but when it came to state departments they were not enforcing it.[74]

If Ben Nicholson is to be believed, it was not enforced in the private sector either although more skulduggery took place there.

Vocational Education Act, Act No. 70 of 1955

The special place given by the Nationalist Party to the 'interests of prospective [Afrikaans-speaking] apprentices in or from rural areas' had been a subject of debate for a number of years. For example, during the debate on the 1944 Apprenticeship Bill, the then leader of the opposition (to become the President in 1948), Dr. Malan of the Herstigte Nasionale Party explained that there were many Afrikaans-speaking young people streaming off 'the platteland' (rural areas) to the urban areas looking for work. He urged the government in the parliamentary discussion on the second reading of the Bill on 20 April 1944 to:

> Help those people who come from the platteland to become skilled workers, who come to the towns to become apprentices, and establish hostels where they can be under proper supervision and accommodated as cheaply as possible. Many of those young fellows and young girls come from the platteland to the towns because they have to make a living somewhere. When they arrive in the towns they are young – they are 15 or 16 years of age, and they often deteriorate in the big towns because they are not under proper supervision and because their wages are so small that they have to find accommodation in the slums, and so they get lost.[75]

They were concerned that without such training opportunities this group of youngsters would then have to find unskilled work for which they would have to compete with black people similarly coming in from the rural areas but for whom there was no voice in parliament or on the bargaining councils and hence whose labour was rated by their bosses cheaply.
The government introduced a range of measures to advance the interests of the Afrikaans speakers in every field – measures which spread far wider than the apprenticeship system alone. For example in the Defence Force, taken from the Afrikaner historian, Giliomee's account and referring to E.C. Erasmus the new Minister of Defence after 1948:

> Erasmus instructed the Permanent Force to alternate between Afrikaans and English every month in its communications. Members of the force would no longer be promoted without first passing a strict bilingual test. Especially in the Air Force a spate of resignations occurred as a result of this. By 1956 three-quarters of the recruits in both the Army and the Air Force were Afrikaners. The Defence Force was becoming an Afrikaner preserve.[76]

This policy of bilingualism was introduced into the civil service generally although it can be noted that there was a more even spread of English and Afrikaans speakers even before the WWII with some 42.9 percent of civil servants being Afrikaans speakers in 1939.[77] Gilliomee,

[73] Interview with Ben Nicholson 15 August 2008.
[74] Interview with Petrus Mashishi 2 June 2009.
[75] Hansard, 20 April 1944, Column 5495.
[76] Giliomee, *The Afrikaners,* p. 493.
[77] Pauw, *Die Beroepsarbeid van die Afrikaner in the Stad*, p. 237.

notes that '(new) recruits were predominantly Afrikaans-speakers and in the first twenty years of NP rule, the number of Afrikaners in the civil service doubled'. [78] But the Afrikaner Nationalists held that the senior posts were still too English and proceeded to accelerate the promotion and external recruitment of Afrikaans candidates, like Werner Eiselen who was brought in from outside as Secretary for Native Affairs. [79]

Heinrich recounts his experience as a young Afrikaans speaking apprentice in the Post Office:

> But then of course there was another complication – well I call it a complication. All our bosses were English-speaking bosses, engineers English-speaking. Some were very nice and some were understandable, others were hard cases. But it was a difficult thing – being Afrikaans and you worked to an English senior technician. Maybe he knew your … political affiliations, I mean Nationalist Party, United Party – in a little town like that, in an environment like that everybody knew what was what. So that was a difficult thing, but we towed the line. There we never had fights and arguments. And I knew that some of my senior technicians [English speakers] were from the old world, old style, and their technology wasn't very high ranking, and yet they were promoted already. It was so exciting for me because I could tell them a thing or two about transmission and technology because I had already then, in those days, started working towards my Radio Amateur's examination. So I knew my theory and maybe some of my bosses didn't like it very much that I was very theoretical. But we got on well and there was no fuss and arguments.[80]

Bilingualism was a particular challenge to those operating in more specialised technical environments where frequently the technical terms existed in English only or for which there was no agreed Afrikaans translation. This was the *raison d'être* of the 'Vaktaalburo' of the Suid-Afrikaanse Akademie vir Wetenskap en Kuns, which proceeded with the onerous task of remedying this situation.[81]

No stone was left unturned. In the skill area it was found that overall only a quarter of all artisans were Afrikaans speaking and in the 'cleaner' trades, like electrician, the percentage fell to 11.6 percent. [82] This was like a red rag to a bull. The government set about addressing this imbalance and decided it needed to bring the technical colleges under direct state control. One way in which they did this was to pass the Vocational Education Act of 1955. The political intent behind the passing of the 1955 Act Vocational has been stressed by many authors[83] but Malherbe put it most bluntly:

> The real underlying motive was, however, the attitude fostered by the Broederbond that hitherto the State-aided technical colleges had not taken the Afrikaners' national character and philosophy of life sufficiently into account.[84]

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[78] Giliomee, *The Afrikaners: Biography of a People*, p. 493.
[79] Giliomee, *The Afrikaners: Biography of a People*, p. 493.
[80] Interview with Dr. Heinrich Dreyer on 2 November 2007.
[81] *Post Office Progress* – Being the Postmaster-General's Annual Report for 1954-5, Government Printer, Pretoria, p. 8. In the Post Office a Terminology Committee consisting of, inter alia, D.P.J. Retief (himself a member of the Akademie) was set up to translate telecommunications vocabulary into Afrikaans and to produce a Woordeboek (Dictionary) of these terms. 'On more than one occasion the Committee was asked by the 'Vaktaalburo' of the Suid-Afrikaanse Akademie vir Wetenskap en Kuns to comment on certain proposed Afrikaans equivalents for specific conception in English, for which diverse translations existed. The Committee, in its own sphere, thus also contributed to the standardisation of technical terms in the country.
[82] Pauw, *Die Beroepsarbeid van die Afrikaner in the Stad*, p. 237.
[83] Pittendrich, *Technikons in South Africa,* p. 149; Lurie, *Technikon Witwatersrand, A History 1925 – 2000,* Fishwicks, South Africa, p. 107.
[84] Malherbe, *Education in South Africa, Volume 2,* p. 207.

And in support of this conclusion he cites the following extract from the Secretary of Education's 1955 Report:

> Afrikaans bodies urged the establishment of separate Afrikaans-medium technical colleges. This required considerable additional sums of money for capital and running expenses. The only acceptable solution was to take over the colleges as government institutions.[85]

This was to have a drastic effect on the [Witwatersrand Technical] College in terms of enrolments. Up to 30 June 1965, 21 branches and venues of the College activities in Johannesburg, on the Reef and at such centres such as Klerksdorp, Witbank, Vereeniging and Carletonville were transferred to State control.[86]

However, when the process of transfer began, it was found that many vocational schools and colleges had poor infrastructure and were ill-equipped to meet the new demands being made of them. A process of upgrading was therefore undertaken which slowed the transfer process. But just as the process was gaining momentum, in 1960, another Commission was appointed, the Schumann Commission,[87] to investigate the inefficiency of having divided control over a range of policy matters between the provinces and central government. One of the areas considered was that of full-time secondary education and training. Its report, submitted in 1964, led to a reverse transfer of all vocational schools, and all full-time secondary classes at the technical colleges back to the provinces.[88] This was formally done with the passing of the Educational Services Act, No. 41 of 1967. This same Act also led to 19 former 'apprenticeship schools' being named technical colleges – bringing the total of such institutions by 1968 to 26.[89] These remained departmental institutions which taught principally part-time apprentices – only 14% of whom were post-Standard X.[90]

The Schumann Commission also halted the transfer of the last remaining colleges to central government. They were the largest of the colleges in Durban, Pretoria, Cape Town and Witwatersrand. The Commission's report, as well as an influential report by Prof. H. O. Mönnig,[91] recommended that these four institutions retain their relative autonomy and become institutions focused principally on post-secondary education. In an about turn by the national department, these recommendations were accepted and in 1967 the Advanced Technical College Act, Act No. 40 of 1967 was passed which declared these four colleges as Colleges of Advanced Technical Education or CATEs. Later the Port Elizabeth, Vaal Triangle and M.L. Sultan colleges were also so designated.[92]

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[85] Malherbe, *Education in South Africa, Volume 2,* p. 207.
[86] Lurie, *Technikon Witwatersrand*, p. 107.
[87] Report of the Commission of Enquiry into the Financial Relations between the Central Government and the Provinces. (R.P. 35/1964, chapters III-XII and XXX cited in E.G. Malherbe, *Education in South Africa, Volume 2,* p. 326.
[88] Malherbe, *Education in South Africa, Volume 2,* p. 330.
[89] By virtue of the Education Service Act, No. 41 of 1967, 19 institutions known previously as schools for apprentices became known as technical colleges. This number, added to the seven existing colleges at Bloemfontein, East London, Kimberley, Kroonstad, Pietermaritzburg, Welkom and Stellenbosch, brought the total number of institutions to 26. Malherbe, *Education in South Africa, Volume 2,* p. 331.
[90] Malherbe, *Education in South Africa, Volume 2,* pp. 330-331, p. 334.
[91] H.O. Mönnig, Report on a Study of Scientific Organisation, written as Chairman of the South African Science Advisory Council and Scientific Advisor to the Prime Minister, Pretoria, July 1964, p. 27. He was also an ex-Chairman of the Akademie vir Wetenskap en Kuns, see *Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns, FeesAlbum 1909 to 1959*, Pretoria: Van Schaik Bpk., 1959, p. 159.
[92] Malherbe, *Education in South Africa, Volume 2, 1923 - 1975*, p. 330.

The change of policy from subordination of all colleges to national control to the 'release' of some for the purposes of post-secondary education was sudden and calls for explanation. This is part of a bigger story which will be covered in the next chapter.
In passing it can be noted that C.G.W. Schumann, the Chairperson of the first Commission, and H. O. Mönnig, the author of the cited report, had both recently held top leadership positions in the Akademie vir Wetenskap en Kuns, as had De Villiers, the Chairman of the Commission bearing his name.[93] This organisation was clearly acting as a 'think tank' for the Nationalist Party.

It is worth noting that the subsidies to the colleges were never equivalent to those given to universities. In addition to the fees, which restricted entry to the 'better off', state subsidies to universities were ten times those given to the colleges, even though the universities taught half the number of students.[94] There were eleven universities in 1969 which received a subsidy of R33,6m for a total of 72,729 students, of which only 3,679 were part-time and 69,050 were full-time. By contrast the number for the technical colleges is shown below:

Table 7.3. Numbers of Technical Colleges and CATEs and students – various years

Year	Number of Technical Colleges / CATE	Total Government Grant	Average Yearly		Total Number of Students
			Full-Time	Part-Time	
1926-27	7	£171,000	2,484	13,184	15,668
1946-7	11	£420,000	9,639	28,764	38,403
1969 Total	32	???	2,527	40,650	43,237
- Tech col.	- 26	???	- 117	- 19,920	- 20,097
- CATE	- 6	R3.4m	- 2410	- 20,730	- 23,140

Source: *Drost, 'The Apprentice and his Training', p. 75 and Pittendrich, Technikons in South Africa, p. 168.*

The bias towards universities and away from technical and vocational learning has a long history in South Africa.

Extension of University Education Act No. 45 of 1959

The universities were not excluded from the apartheid juggernaut as Bruce Murray, in his work '*WITS- The 'Open Years',*[95] has recorded. He summarises that the Extension of University Education Act No. 45 of 1959, which established separate ethnic university colleges for 'non-white' students and prohibited blacks from registering at the 'white' universities, except with

[93] Die Suid-Afrikaanse Akademie vir Wetenskap en Kuns, *FeesAlbum 1909 to 1959*, p. 159.
[94] Pittendrich, *Technikons in South Africa*, p. 168.
[95] Murray, *WITS - The 'Open Years'*.

ministerial permission',[96] was one of two education strands to their apartheid policies; the other was the Bantu Education Act.

The situation prior to 1959 was not exactly open, but did permit the enrolment of a small number of black students in medical and law faculties in 1940. The opening of the medical faculty was prompted by 'pervasive ill-health of the country's black labour force.'[97] Numbers remained low – with 95 per cent of medical practitioners being white and only 1,5 per cent African. Murray goes on to explain:

> After the war, both Wits and Cape Town began admitting 'non-whites' to the faculties of Architecture and Engineering, but numbers were low and the prospects limited. The main post-war drive in South Africa was to develop training facilities in the professions for Afrikaans-speaking whites. Apart from the Natal University Medical School for blacks, the new professional faculties created at South African universities between World War II and the 1959 Extension of University Education Act were all reserved for whites, and the large majority were established at the Afrikaans-medium universities. During the war Pretoria had acquired the first Afrikaans-medium Faculty of Medicine and Stellenbosch the first Afrikaans-medium Faculty of Engineers; in 1956 Pretoria established a Faculty of Engineering and Stellenbosch one of Medicine.[98]

But even the small numbers of black students in these universities concerned the Afrikaner Nationalists which were espoused by Viljoen in parliament in 1958: first, that the 'open' universities served as seed-beds for black discontent and agitation by exposure to white leftists; secondly that these 'open universities' were promoting racial equality; and thirdly that separate university colleges should promote their separatist ideology. Murray concludes:

> In other words, separate universities were seen by the government as essential for the maintenance of white supremacy, the promotion of segregation and the encouragement of difference among the people of South Africa, and the assertion of ideological control over the black elite.[99]

The university colleges for black students were designed to teach a limited range of subjects, 'this meant in effect that they would do little more than train teachers and bureaucrats. In Verwoerd's mind their sole task was to provide educational opportunities for a sufficient number of deserving Bantu for posts in service of their community that are essential to fill.'[100] There was strong resistance to the Bill from the universities which organised large public marches and senior representations, but to no avail. The law was finally enacted in June 1959 and swiftly implemented. In 1960 the Minister of Bantu Education, W.A. Maree, turned down 186 of the 190 applications he received from Africans to enrol at 'white' universities'.[101]

There was also a second Bill passed at the time of Extension of University Education Act No. 45 of 1959:

> A separate enactment, the University College of Fort Hare Transfer Act, provided for the transfer of control of Fort Hare to the new Department of Education, which was given the responsibility for all the 'Bantu' university colleges. As a consequence of the University of Natal's firm stand, with the members of its Faculty of Medicine threatening mass resignation,

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[96] Murray, *WITS - The 'Open' Years,* p. 113.
[97] Murray, *WITS - The 'Open' Years,* p. 31.
[98] Murray, *Wits - The 'Open Years',* p. 173.
[99] Murray, *WITS - The 'Open' Years,* p. 292
[100] *Report of the Commission on the Separate University Education Bill,* UG 32 of 1958*;* Beale*, Apartheid and University Education,* p. 104, pp. 108-10, pp. 142-43*,* cited in Murray*, Wits – The 'Open Years', p. 293.*
[101] Murray, *Wits – The 'Open Years',* p. 323.

> Natal University Medical School escaped transfer to government control, but it was firmly laid down that no white students might be admitted to it.[102]

Fort Hare was initially a missionary college founded in 1916 and prided itself on its strong African identity. The College produced its first two graduates in 1924 (a diploma to Edwin Ncwana and a degree to Z.K. Matthews) and in the following year was constituted as a university college. Callinicos explains that the College was frequently criticised for raising the expectations of African students by providing an education they would not be able to apply in society. The College had a response to that:

> Missionaries have been blamed for giving [the African] an education which is merely bookish, but when they teach him such arts as building and carpentry, they find that their protégés are debarred from employment by the only persons with capital enough for undertaking contracts required for their services. As long as such a condition of affairs prevails, the education of the African is bound to have a bookish bias, and his field of employment to lie amongst the professions: ministers, teachers, doctors, lawyers, civil servants, journalists, and the great majority being a band of labourers without the training or skill to qualify as artisans and form a middle class.[103]

It seems that even the professionals struggled when they qualified, especially those who wished to operate in the cities, as OR Tambo and Nelson Mandela's stories testify as law graduates from Fort Hare:

> Sometime before Tambo's articles had been served, Mandela asked Tambo if he would join him in forming a partnership. Mandela began his practice in 1951, a little before the Group Areas Act was passed. Even so, the main difficulty was overcoming the Urban Areas Act, which forbade any black professional operation in town without the permission of the Governor General. After a long and complicated process, and with the help of his white lawyer friends, Walter Sisulu had managed to receive permission for his estate agency a few years earlier. 'I don't think the lawyers, Mandela and Tambo, ever got permission. I don't think they did,' said Sisulu.[104]

The number of students in so-called 'non-white' universities rose from 481 in 1960 to 939 in 1964 and by 1970 was 2 022. The number in 'white universities' first dropped from 1 728 in 1960 to 1 346 in 1970. However a growing number were taking courses through UNISA – 2049 in 1960 and 4016 in 1970.[105]

Against this sordid background of reactionary social engineering there were of course developments within the whites-only sphere.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

As shown above in the Political Economy section above, black workers were militant and organising before, during and after the war. They formed industrial or general unions, not craft unions, to take their grievances to management. Their unions were affiliated to the Trades and Labour Council which embraced both registered (white) and non-registered (black) trade unions – and called for full legal rights for African trade unions. However the spectre of racism was never far off and the Council suffered internal splits from the 1940s. By the mid-1950s it

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[102] Murray, *Wits – The 'Open Years',* p. 293.
[103] A. Kerr, *Fort Hare, 1915 -1948, The Evolution of an African College*, C Hurst and Co, 1968, p. 130 cited in Callinicos, *Oliver Tambo,* pp. 102-103.
[104] Callinicos, *Oliver Tambo*, p. 173.
[105] Malherbe, *Education in South Africa*, *Volume II*, Appendix 27, p. 729.

had split into four federations: the South African Congress of Trade Unions (SACTU), the South African Trade Union Council (SATUC), the Coordinating Council of South African Trade Unions (CCSATU) and the South African Federation of Trade Unions (SAFTU). Whites were found in all federations and African workers were in SACTU or SATUC, even though the latter only provided them with subordinate parallel status.[106] SACTU, formed in 1955, refused to confine itself to narrow economistic forms of trade unionism. It argued that the fight for a living wage could not be separated from broader political, economic and social issues. They mobilised around 15 demands, the most significant of which were:

1. We demand the immediate right of all workers to form and join trade unions of their choice;
2. We demand the abolition of the pass laws and the migratory labour system;
3. … (right to strike);
4. … (national minimum wage)
5. We demand the abolition of all discrimination in the workplace on the grounds of sex or race, and an end to job reservation
6. We demand free and compulsory education for all children regardless of colour or creed, and extended training facilities for all workers. We demand the abolition of discrimination in education and training, including apprenticeships. …[107]

The other federations mobilised on a racial basis and the state was strong. In 1964, after the banning of the ANC and the Rivonia Trials, SACTU was forced to work underground and in exile. From the start they were in the Congress Alliance led by the ANC. It was not until the early 1970s however that some of these cadres, together with a new generation of militants from the factories and universities were able to build together a strong industrial trade union movement which was able to advance these demands. Initially these groups were supported by the Industrial Aid Society (IAS) and later by the Trade Union Advisory and Coordinating Council (TUACC) whose establishment and impact have been documented by Forrest[108] and Baskin[109] and which are referenced by Mashishi below.

The Nationalist Party government appreciated the challenge these militant unions posed and responded with the Native Labour Settlement of Disputes Act No. 48 of 1953. This withdrew employee status from African workers, and thereby excluded their trade unions from registration, which meant there was no African representation on any of the industrial council structures.[110] Instead black workers were given Works and Liaison Committees, convened by the employer at plant level. The trade unions which participated in them had no recourse to external mediation.

In parallel, the state against the wishes of employers, but in support of its commitment to white labour in the 1948 election, provided for their protection against competition from cheap black workers through the introduction of a vehicle to legislatively reserve certain jobs for whites. In 1956, after much consultation, the Industrial Conciliation Act No. 28 of 1956 was passed, which Davies describes as follows:

> Section 77 [of the Act] provided for the establishment of an 'industrial tribunal' consisting of various ministerial appointees and representatives of 'interested parties'. On instruction from

[106] Lewis, *Industrialisation and Trade Union Organisation in South Africa*, p. 1.
[107] Davies et al, *The Struggle for South Africa, Volume 2*, p. 331.
[108] K.A. Forrest, 'Power, Independence and Worker Democracy in the Development of the National Union of Metalworkers of South Africa (NUMSA): 1980 – 1995', Ph.D. thesis, University of the Witwatersrand, Johannesburg, 2005.
[109] J. Baskin, ***Striking Back: A History of Cosatu***, Ravan Press, 1991.
[110] Lewis, *Industrialisation and Trade Union Organisation in South Africa*, p. 145.

> the minister the tribunal was empowered to investigate complaints about 'unfair inter-racial competition' and if the complaints were considered justified it was to recommend to the minister that he issue a determination imposing some form of legally enforceable 'work reservation'. Several possible forms of determination were provided for in the Act. Determinations could, for example prescribe racial quotas … or they could reserve particular defined tasks for members of one racial group.[111]

The employers were against this legislation from the start, because it impaired their ability to flexibly assign workers to tasks (i.e. use cheaper labour wherever possible). It also impacted on the Industrial Council negotiations as the white unions were able to threaten to take the matter to the Tribunal if they failed in their efforts to negotiate what they considered to be a good deal with the employers in their Industrial Council.

In the National Industrial Council for the Iron, Steel, Engineering and Metal Industries (NICISEMI) the white unions (both craft and industrial unions in the form of Yster en Staal) used a closed-shop style measure as another vehicle to protect their wages. Clause 20 of the 1944 NICISEMI agreement and clause 19 of the Electrical Engineering Industry (Transvaal) agreement stated that:

> No employee who is not a member of one of the Trade Unions [party to the agreement] shall be employed by an employer who is a member of one of the Employers' Organisations [party to the agreement] and no employee who is a member of one of the Trade Unions shall work for an employer who is not a member of one of the Employers' Organisations: Provided that the application of this clause shall be limited in its scope to:-
> (b) Employees performing work for which a minimum rate of 3s 3d is prescribed for in this Agreement.
> (c) Other employees for whom a 'time rate' of 2s 3 ½ d per hour and more is prescribed for in this Agreement, if such employees have been employed in the Industry for a period of not less than six months *and are eligible for membership of one of the Trade Unions in accordance with their respective Constitutions*.[112]

Naturally, since the black unions were not able to register under the Act, they were excluded.

The application of this strategy has a long history in South Africa, but this legislation had a significant effect. In 1944 job reservation was restricted to those doing journeyman's work and those working at artisan Rate A, Rate AA and Rate B as shown on the table below. At this time those classified as 'African Team Leaders' were still able to work at Rate D. By 1968 the picture had changed substantially. Only white workers were permitted to work on Rates A to D, and the rates below these had been fragmented further, to accommodate an increasingly black, cheap labour force. So, as Webster has argued, trade union membership itself became a form of job reservation.[113]

Table 7.4. Iron, Steel, Engineering and Metallurgical Industries Agreements in 1944 and 1968, under Industrial Conciliation Act, 1937 and 1956 respectively.

[111] See Section 77 of Act No. 28 of 1956 (Butterworths statutes); also M.J. Piercy 'Statutory Job Reservation- Requirement of a Static or of an Expanding Economy' and 'Statutory Work Reservation in the Union of South Africa', *South African Journal of Economics*, vol. 28, 1960, cited in Davies, *Capital, State and white labour in South Africa*, p. 347.
[112] Electrical Engineering Industry Agreement, date unknown, clause 19.
[113] Webster, *Cast in a racial mould*, p. 109.

National Agreement 1944[114]	*National Agreement* 1968[115]
Grades	**Grades**
Journeyman's work	A
A	
AA	AA
B	B
C	C
D	D
	DD
	DDD
E	E
	F
	G
	H

Rates DD and DDD were a direct response to job reservation. DD was set aside for African operatives and DDD for Coloured and African women being brought into the telecommunications manufacturing industry which was then being established on the East Rand.[116]

Further concessions by unions in exchange for job reservation were made in 1965 with the passing of the Journeyman Recognition Agreement. This agreement essentially broadened the definition of 'artisan' to include any mature (over 21 years of age) white person who had done some or more work which was prescribed as artisan work in the Agreement for seven or more years (although shorter periods could be considered) and approved as such by the Industrial Council. It was a rudimentary form of what later became known as Recognition of Prior Learning (RPL) but there was no trade test required. It was simply a judgement call by Industrial Council members and officials on evidence presented by the applicant and his employer.[117] As long as the rate for the job was paid, the craft unions were happy with this arrangement.

Training for non-artisan, largely black workers was essentially a company responsibility. Only in 1970, was an Education and Training Fund Agreement passed, which introduced a levy of R7.80 per head payroll levy on all employers. The aim was to encourage employers to train such workers and they could reclaim training grants from the Council.[118] No external standards were ever placed on this training and at the time of the closure of this Fund, as outlined in Chapter Two, it was widely held that this was just company-specific training that employers should fund themselves.

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[114] *Iron, Steel, Engineering and Metallurgical Industries*, Union of South Africa, Government Notice 997, Government Gazette, 23 June 1944.
[115] *Iron, Steel, Engineering and Metallurgical Industries*, Union of South Africa, Government Notice 632, Government Gazette, 19 April 1968.
[116] Conversation with Lucio Trentini, Operations Manager, SEIFSA, 30 April 2019.
[117] *Journeyman Recognition Agreement*, Government Gazette No. 1211, 27 August 1965, No. R. 1286.
[118] *Education and Training Fund Agreement*, Iron, Steel, Engineering and Metallurgical Industry, GG. Vol. 63, No. 2809, 11 September 1970. This is the Fund referred to in Chapter Two from which experimentation, outlined in Chapter Eleven, was later to be funded.

Webster summarises the status of the craft unions in the following way:

> The process of mechanization and job fragmentation since 1944 had turned the turned the vast bulk of white wage earners into either supervisory and white colour workers, or semi-skilled machine operators with no other bargaining power than their colour. The very necessity of formalising their protection by resort to colour was a measure of their defeat. If they saw it as a victory, it was clearly a pyrrhic victory as the subsequent decade or so clearly revealed. By mobilising around colour the engineering unions were to strengthen capital's resolve to restructure the racial division of labour, and to remove the remaining impediments to capital accumulation presented by white privilege. Capital was to achieve its objective ten years later when, in the 1978 Industrial Council Agreement for the engineering industry, 'job reservation' was removed.[119]

Mashishi's account of helping to establish a militant predominantly black industrial union in the 1970s, the Transport and General Workers' Union, whilst working in the municipalities, illustrates this point very clearly:

> The white union started to fight the Council saying they don't need black artisans because there was an Act which barred black artisans from working as artisans in white areas – they had to work in the rural areas or the townships. So we were given time to go and look for a job somewhere else, because black artisans were not allowed anymore to work in the Johannesburg City Council. But as we were given days to go and look for a job somewhere, we were paid for that time off. But what we did, some of us did not go and look for a job, we went to look for a place that could assist us to fight that. And that's how I ended up with the Industrial Aid Society. They started to explain to us how a union works and then that became TUACC [Trade Union Advisory and Coordinating Council], and then TUACC evolved into the formation of FOSATU [Federation of South African Trade Unions]. And that's how the whole thing happened and how I ended up being a trade unionist even until today … because we were T&G (Transport and General Workers' Union) in Johannesburg. It started in that department, in the technical section. And once we started having a Works Committee we then spread and started organising others.[120]

From this base Mashishi later helped establish the South African Municipal Workers Union (SAMWU), of which he was President for many years.

In conclusion it is important to note that whilst Mashishi was an artisan, he helped build an *industrial* not a *craft* union. And even during the war the militant black unions were all industrial unions. The political climate at the time dictated a focus on larger issues, and solidarity across grading bands was imperative if the Nationalist Party and its apartheid policies were to be over-thrown.

On the side, in an increasingly separate space, the engineers were working away to distance themselves from all of these groups and establish their 'status' as professionals. This is further explored in Chapter 9.

LADDERS AND LEVERS

Viewed from the perspective of careering pathing, this period illustrates two disparate trends: the strengthening of exclusionary measures for Africans and inclusionary measures for whites, particularly for those who spoke Afrikaans.

[119] Webster, *Cast in a Racial Mould*, p. 117

[120] Interview with Petrus Mashishi, 2 June 2009.

For whites there was still the opportunity to rise 'from Sweeper to Engineer' as Aspinall explained in his Presidential Address to the South African Institute of Electrical Engineers in 1948:

> The Advanced Technical Certificate (Part II) with an approved course of study, or the Engineering Diploma, each including Electrotechnics V as a subject, is accepted by this (SAIEE) Institute as technical qualifications for corporate membership. Candidates in possession of the A.T.C. II are granted exemptions by the Department of Mines on a subject or subject basis from the Government Engineer's Certificate of Competency Examinations. The South African Railways and Harbours Administration recognises the Matriculation and the A.T.C. II as technical qualifications for promotion to the grade of assistant mechanical or electrical engineer. In the engineering department of the Post Office, a candidate must have passed the A.T.C. II examination in four approved subjects, before he is allowed to enter for the competitive examination to qualify for the post of assistant engineer. The cases quoted of recognition of the higher grade certificates represent the majority and much remains to be done to bring the technical content of the relevant syllabuses to the notice of employers for consideration of certificates as a basis for staff promotion.[121]

Every means available was used to promote whites, again particularly the Afrikaners in this period, to climb up the grading ladder – training facilities, finance, preferential contract arrangements and in the public service, quotas and bilingualism. Job reservation was used to further this objective. The support was mainly given by politicians and employers, less so by the professional bodies at this time.

For working-class whites it was still the case that the alternative, namely university education, was not available as only the rich could afford the fees charged, as illustrated by Heinrich Dreyer's story.

However, in the process, even for whites, the quality of apprenticeship training deteriorated in this period, not helped by the transfer of most colleges to state control. There were blurred conditions for entry and for qualification of artisans. In effect the notion of skill was itself diluted, as 'artisans' were increasingly employed as supervisors and performed a control function in the workplace.[122]

As shall be seen in the next chapter, an altogether parallel development was underway, apparently designed partially to bypass the artisan arena completely, namely the introduction of a new occupation, that of Technician, for which an altogether different training strategy was to be applied.

Black workers were kept out through a range of blunt measures – they received significantly inferior schooling, they were not allowed to sit at the negotiating table where training matters were addressed, they were given radically fewer training facilities and struggled to find employers willing to take on black apprentices mainly because of the restrictive practices of the white unions. From 1959, they were also excluded from attending 'open' universities and forced to attend university colleges with restricted subject choices and resources.

Opposition from predominantly black trade unions and their allies, including the Congress Alliance, as well as that from the universities, was not yet strong enough to take on the employers and the state in this hostile environment, and in the case of SACTU was driven underground.

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[121] Aspinall, 'Presidential Address', p. 15.
[122] Webster, *Cast in a racial mould*, p. 123.

The ladders available to different ethnic groups is summarised in the table below. Shown in 'orange' is an area of threat to the white career paths – the professionals looked increasingly inward to their own status and were less inclined to lend a helping hand to those rising through the ranks, albeit that this progression route was promoted by the Afrikaner Nationalists. Another threat to the white career path was the falling quality of the artisan occupation as outlined in the last chapter and further elaborated above. The talk of introducing a new occupation between that of an artisan and engineer – the technician – which would further decapitate the artisan was a 'threat' from the side, not engaged by the unions at the time but with the potential to further reduce the workplace control functions of the artisan and to obstruct the career path due to its parallel prescriptions. The picture that emerges can be schematically shown on the next page:

<table>
<tr><th></th><th colspan="4">Whites</th><th colspan="3">Blacks</th></tr>
<tr><td>Occ.</td><td></td><td colspan="2"></td><td></td><td colspan="2"></td></tr>
<tr><td rowspan="5">Engineer</td><td>Engineer - University route</td><td colspan="3">Engineer - Alternative Route</td><td>Engineer - university route</td><td colspan="2">Engineer - Alternative Route</td></tr>
<tr><td>Education requirement</td><td colspan="2">Education requirement</td><td>Workplace training requirement for registration with professional body</td><td>Education requirement</td><td>Education requirement</td><td>Workplace training requirement for registration with professional body</td></tr>
<tr><td>Facilitation: B.Sc. (Eng.) or equivalent</td><td colspan="2">Facilitation: Plus competitive exam in Post Office but in other state agencies not required.
Threat: graduate engineers organising</td><td>Threat: There is a growing withdrawal of support from professional bodies for this entry route. However still prevalent in state-owned enterprises and on the mines</td><td>Blockage: Post 1959 highly restricted.</td><td>Blockage: Access restricted due to limited number of facilities and resources. Excluded from white institutions.</td><td>Blockage: Without access to education requirement there was no access to workplace experience.</td></tr>
<tr><td rowspan="3">Facilitation: Matriculation required. Schooling compulsory and better resourced.

At lower levels facilitation through job reservation.</td><td colspan="2">ATC II
ATC I
NTC III
NTC II
NTC I</td><td>Facilitation: As accepted by employer and professional body. Paid time off for study. Incentives for passing</td><td rowspan="3">Blockage: Bantu Education - highly discriminatory curriculum, not compulsory. Separate university colleges with limited range of subjects.</td><td>Blockage: Few colleges open to black students.
Facilitation: Black Building Workers given training not formally recognised as fully up to standard, but requiring of an exit equivalent trade test.</td><td>Blockage: In specified black areas only although later on government premises, particularly those in black areas.

White unions obstructed the training of black apprentices.</td></tr>
<tr><td>Threat: no clear requirement to meet standards. Courses out of date.</td><td>Facilitation: Apprenticeship contract or alternative entry through learnerships, Journeyman-Recognition Agreement, and racial promotion</td><td>Entry requirement same as for whites which more difficult to attain given schooling provision</td><td>Blockage: Contract with 'own community' employers only. Obstruction by white unions on apprenticeship committees. Otherwise same as for whites.</td></tr>
<tr><td>Operators and labourers</td><td colspan="2"></td><td>Facilitation: Accelerated promotion and learnerships</td><td>none</td><td>Blockage: job reservation, workplace specific only</td></tr>
<tr><td colspan="4">Facilitation: Schooling compulsory</td><td colspan="3">Blockage: Bantu Education - significantly inferior curriculum</td></tr>
</table>

The underlying factors for both the blockages and the facilitations are considered in the next section.

EVALUATION AND IMPACT

The **facilitation measures** were both rooted in the changes taking place on the production floor (from craft to machinofacture) as well as in the desire of whites to maintain their privileges vis-à-vis black workers. They were able to do this because of the legislative support given to them by the government both before and after 1948 and through their recognised organisational strength on the industrial council system structures.

This facilitation was executed by the state, sections of capital and labour, to the absolute obfuscation of the word 'skill' in general and 'artisan' in particular. Mashishi repaired and maintained state-owned houses under the jurisdiction of the Johannesburg Municipality from the time he qualified. Were they trained 'qualified artisans' or not? They were called 'building workers' not 'artisans' in order that they might be paid lower wages – and yet their training was to be four years (later three years) and they had to sit a test and acquire a certificate, a certificate that the whites were not required to attain.

Such confabulation in the interests of one group against another was not unique to this place and time, as Webster has eloquently attested:

> … the evidence suggests that the concept of skill was *contested* by management and labour. This supports the view that the concept is socially constructed; thus different interpretations can be advanced by different contestants. [123]

He follows this observation with a quotation from Marx's who wrote:

> The distinction between higher and simple labour, skilled labour and unskilled labour rests in part upon pure illusion, or, to say the least, on distinctions that have long since ceased to be real, and that survive only by virtue of a traditional convention; in part on the helpless conditions of some sections for the working class, a condition that prevents them from exacting equally with the rest the value of their labour power.[124]

Braverman makes a similar point when he writes, focusing on operative work:

> It is only in the world of census statistics, and not in terms of direct assessment, that an assembly line worker is presumed to have greater skill than a fisherman or oysterman, the forklift operator greater skill than the gardener or groundskeeper, the machine feeder greater skill than the longshoreman, the parking lot attendant greater skill than the lumberman or craftsman. And with the routinization of machine operation, there is less and less reason to rate the operative above many other classifications of laborers, such as craftsmen's helpers. The entire concept of 'semi-skill', as applied to operatives, is an increasingly delusory one … for the category of operatives, training requirements and the demands of the job upon the abilities of the worker are now so low that one can hardly imagine jobs that lie significantly below them on any scale of skill.[125]

This obfuscation was used by the powerful, those recognised as citizens of South Africa, with their vote and their recognised organisations and their government, to protect their own. By sleight of hand, and much linguistic creativity (who is an 'employee' and who is not?), Africans

[123] Webster, *Cast in a racial mould.* p. 53.
[124] Quoted by Webster, *Cast in a racial mould*, p. 53, in which he cites footnote 12, J. Elger, 'Valorization and "deskilling": a critique of Braverman's', *Capital and Class,* Spring 1979.
[125] Braverman, *Labour and Monopoly Capital*, p. 430.

were excluded at every turn. In looking ahead this tendency of groups to protect their own, through the social construction of skill, must be addressed systemically in service of a new democratic order, balancing human rights with rights earned as a result of past injustices. One useful, practical 'facilitation' measure that might help in this regard is suggested by Mashishi's experience, namely the Bantu Building Workers' Act which gave employment and learning experiences to apprentices on government projects and maintenance of public buildings.

In passing it can be noted that the growing 'technician' debate seems not to have drawn the attention of the white unions, and yet in some respects this was a strengthening of the theoretical foundations of the trade which the unions could have exploited but did not.

The blockage measures were driven through the same lens but were aimed at keeping the majority of South Africans out of the competition for better opportunities and to maintain their poverty level wages. The vehicles for such exclusions were numerous as has been shown, including legislation, industrial council agreements, allowed and not-allowed forms of organisation based again on linguistic distinctions that bore no relation to reality (how was it that African workers were not 'employees'?), apprenticeship committee behaviours and shop floor practices.

Another blockage, at a more systemic level and applicable mainly to the white career path (there being highly limited career paths for Africans) was the growing lack of coordination between the different components of the system. As early as 1946, in his Presidential Address to the SAIEE, Aspinall made this point:

> The National Apprenticeship Board consists of representatives of the Ministries of Labour and Education, employers' and employees' organisations and other interests.
>
> An Apprenticeship Committee is representative of employers and employees who also have representation on the local technical college councils. There is scope for better coordination between industry and technical colleges, and this would be effected by allowing members of college staffs to serve on Apprenticeship Committees in an advisory capacity. In some cases there is a complete lack of coordination between technical colleges and the local universities. This condition of affairs could be improved by mutual representation of the two institutions on the representative Councils.
>
> For the success of a scheme of training it is essential that effective coordination exists between the organisations mentioned. [126]

He went on to suggest how this might be achieved:

> In a system of training this coordination could be effected by the formation of Regional Apprenticeship Training Committees for the particular trades comprising representatives of various bodies including the provincial education departments under the coordinating control of the National Apprenticeship Board.[127]

Without such coordination, in whatever appropriate form, there is little prospect of genuinely creating progression pathways for sweepers to rise. The boundaries between systems are simply set too high. The growing isolation of the engineers from the artisans reflects the underlying threat to the traditional career path.

[126] Aspinall, 'Presidential Address', p. 26.
[127] Aspinall, 'Presidential Address', p. 26.

Facilitation or blockage? How the ‘us’ is created is, of course, central to the form of organisation that the different parties set up, and this too is socially constructed. In the ‘20s and ‘30s artisans and engineers could create a common ‘us’, however, this was evaporating. This period witnesses the transition from ‘us’ being craft workers in the main to ‘us’ being white workers, including both craft and white production workers. Black workers opted for industrial unionism from the start because of the general onslaught by the state and employers. The rise of industrial unionism, as opposed to craft unionism, took place over this period. The question this raises is what happens to ‘occupation’ in an industrial union context? Do workers lose their occupational identity and inter-industry mobility in the process? Traditionally an electrician could work wherever he was needed, if industries demarcate their own occupations will this hamper mobility and how is this to be avoided?

These and other questions will be considered in the final Chapter, Foresight with Hindsight.

CHAPTER 8

THE BIRTH OF TECHNICIANS

'Although technician work has been slowly but surely developing for at least the past sixty years, it is only since World War II that attention has been paid to the need to identify and designate technician jobs.'

L. T. Campbell Pitt, 1970[1]

'There is today a growing agreement that owing to the immense discoveries and applications of science and technology the education of technologists can no longer be met by part-time study, however well related to their industrial experiences it may be organised. Add to these considerations the necessity for ampler conditions required to foster those personal qualities essential to the exercise of executive and management functions in later years, there is compelling reason to transfer the ablest students from part-time courses to others which do not sacrifice an equal contact with industry for several years.'

W.K. Rooney, the Royal Technical College, Salford, 1956[2]

POLITICAL ECONOMY

By the end of World War II, South Africa was poised to grow economically, but a new and expected mounting challenge from the dispossessed black majority, threatened to dislodge whites from their position of privilege and power. The period saw a rise in demand for labour. New unions formed and many more black workers became unionised.

Many militants among the ANC Youth League were leading campaigns of mass action and civil disobedience across the country. The Nationalist government proved too powerful, and through police brutality, the banning of the ANC and PAC and the forced exile or imprisonment of its leaders, the protest movement had been largely smashed.

With the end of the Second World War and counties in Europe showing more stability, South Africa's once vibrant manufacturing industry, began to decline. By 1960 it had lost

[1] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, Vol 20, No 9, September 1970, Supplement, July 1971, p. 282.

[2] Cited by Prof. S.F. Gimkey, Past President of the Institution of Certificated Engineers, South Africa, in the *Journal of the Institution of Certificated Engineers, South Africa*, April 1956, p. 133.

most of its economic opportunities. With its apartheid political policies, the Sharpeville massacre, and the ousting of South Africa from the Commonwealth in 1961, South Africa became an independent republic,[3] and both English and Afrikaners, set about to:

> protect the future of white economic and political domination in South Africa.[4]
> Although many among the English-speaking business community, including mine owners and industrialists, were not happy with the policy of apartheid being enforced by the NP government, they were even unhappier with the socialist leanings of the ANC alliance's Freedom Charter. What concerned them in particular, were the charter' commitment to nationalization of the mines and state regulation of industry and finance, which were the bulwarks of English-speaking business. Under these circumstances and faced with the economic crisis of the early 1960s, they threw their weight behind the NP government.

Between 1963 and 1968, SA experienced phenomenal growth and foreign investment began to flow back into the country.

> While this growth phase, which was built on the ashes of defeat suffered by the black nationalist movement in the early 1960s, had been consolidated by an alliance of convenience between English- and Afrikaans-speaking white business, it is important to recognise that this alliance remained an uneasy accommodation.[5]

At the same time many of the public officials who sat on various Commissions were also part of the Afrikaner Broederbond, and their tasks were outlined by Dr Verwoerd:[6]

> '(T)he Afrikaner Broederbond must gain control over everything that it can lay its hands on in every walk of life in South Africa. Members must help each other gain promotions in Civil Service or any other field of activity in which they work with the view to working themselves up into important administrative positions'

Among the Broeders were policy designers mentioned in this chapter, namely Dr H.O. Mönnig and Dr T.E.W. Schurmann (Malherbe p 678). The Akademie van Wetenskap en Kuns (originally the De Zuid-Afrikaanse Akademie voor Taal, Letteren en Kunst) also played an instrumental role in policy development at this time, and we note that

> Die Akademie was instrumenteel in die erkenning van Afrikaans as amptelike taal; die ontstaan van die FAK….[7]

According to Malherbe the (FAK) was the "show-window" for the Broederbond.[8] By 1973, the Sunday Times newspaper published an article showing that Broeders occupied top administrative positions in the Civil Service, State departments, education departments and higher education.[9]

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[3] The Commonwealth, 2019. South Africa: History, 1961. www.commonwealth.org (Downloaded 3 June 2019).

[4] Mangcu, X; Marcus, G; Shubane, K; Holland, A. (Editors), *Visions of Black Economic Empowerment*, Ch: History and Structure of the South African Economy, Jacana Media, South Africa, 2008, page number???.

[5] Mangcu et al., (Editors), *Visions of Black Economic Empowerment*, Ch: History and Structure of the South African Economy, page number.???

[6] Malherbe, E.G. *Education in South Africa Vol 2 (1923-1975) . 1977.*p 674

[7] http://www.akademie.co.za/oor-ons/, accessed 11 December 2019.

[8] Malherbe EG. *Education in South Africa Vol 2 (1923-1975) . 1977*, p. 680

[9] Malherbe EG. *Education in South Africa Vol 2 (1923-1975) . 1977*, p. 686 Sunday Times, 24 September 1973.

It is against this background the role of the technician became formalised.

PEOPLE AND PLACES

As the times come within listening range, the number of voices that one can hear grows exponentially - as does the challenge of managing this richness of information. For some groups, like the artisans and engineers, there was some (albeit changing) orchestration, but for 'advanced artisans' each voice has its own cadence and unique life contours – together sounding as if they are tuning up for a performance which has not yet begun … And in one way, for the 'advanced artisans' of the fifties and early sixties, this was precisely the case. They did not yet have a shared identity – and yet the jostling had begun, with positioning and propositioning amongst both the powerful and those who aspired to be so. There is not one story there are many.

Who were these people? Well, the first problem that anyone attempting to answer this question is faced with is the fact that they did not have a common name. As the Straszacker Commission reported in 1964:

> In South Africa technicians have always been employed, and the large majority have been trained on the job by their employers for the specific tasks which they were required to perform. Until recently the large majority were not, however, referred to as technicians, but as draughtsmen, survey assistants, laboratory assistants, foremen, technical assistants, and a host of other names, covering all the categories between the artisan and the professional engineer. This is still the position today.[10]

Who then were these draughtsmen, survey assistants, laboratory assistants, foremen, technical assistants and 'engineers'? How did they get to these positions and what were the circumstances surrounding their appointment?

Here are a few vignettes. They are stories of men who were predominantly from the families of first-generation public servants and who themselves began their careers in the public service. They are broadly representative of the 'technicians' of the times as confirmed in the Goode Commission Report. This found that even in the mid-1970s, nearly half of all technicians worked for 'semi-state' organisations, like the railways and the Post Office, with only a quarter in the private sector and another quarter largely dispersed, but presumed to be in 'difficult to survey', smaller organisations.[11]

Heinrich Dreyer was one such technician who was sent by the Post Office to the Free State in the fourth year of his five-year apprenticeship:

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[10] Straszacker Report*, Commission of enquiry into the method of training for university degrees in engineering*, Part I & Part II. Department of Education, Arts and Sciences, South Africa, 1964, para 586, p. 142.

[11] Department of National Education, 1978. *(Goode) Report. Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, B4.6, p. 27.

> In my fourth year I was transferred to the Free State - to Wepener in the south-east Free State. I had never been to the Free State. Then okay, I was there, that was towards the end of the fourth year. And in my fifth year, the qualified technician in charge of the Weppener outstation was transferred away and I was in charge of the section. The section encompassed Hobhouse, Wepener, Zastron and Dewetsdorp – it was quite a large area. All of a sudden in my fifth year I was 'chief cook and bottle washer'! I was in charge. I had two blacks working for me, two 'line boys' and I had trucks and equipment, I had everything.[12]

His advantages vis-à-vis the 'line boys' was not what occupied his mind. It was the superior attitude of his English line supervisors that he called 'a complication':

> But then of course there was a complication – well I call it a complication. All our bosses were English speaking bosses, engineers English speaking. Some were very nice, and some were understandable, others were hard cases. But it was a difficult thing – being Afrikaans and you reported to an English senior technician. Maybe he knew your (views) … because everyone knew political affiliations, I mean Nationalist Party, United Party – in a little town like that, in an environment like that everybody knew what was what. So that was a difficult thing, but we towed the line. There were never any fights or arguments. I knew that some of my senior technicians were from the old world, old style, and their technology wasn't very high ranking, and yet they were promoted already. It was so exciting for me because I could tell them a thing or two about transmission and technology because I had already then, in those days, started working towards my Radio Amateur's examination. I knew my theory and maybe some of my bosses didn't like it very much that I was very theoretical.[13]

Other voices to be heard in this chapter include Bill Bergman, Albert Boshoff and Malcolm Gow. They all started their eminent careers with apprenticeships. They were all born in the 1930s and commenced their apprenticeships after the war. Three other men, whose stories will also be mentioned later – Bill Venter, Roderick Harker and Michael Case – started in the Post Office but, having been born later, their pathways were different.

William (Bill) Bergman was one of the few who did not start in a parastatal. He was born in 1936 and when he finished his schooling, he told his father he wanted to be an engineer. His father replied:

> 'If you want to be an engineer, you have got to start off knowing what an electrician does.' I managed to get an apprenticeship. In those days it was a five-year apprenticeship and I worked for a firm in Bloemfontein as an apprentice and I went to the Technical College at night. … We went to the Technical School to do the trade test and I got my license as a qualified electrician.[14]

Once he passed his trade test, his boss simply announced that he would make him a foreman 'which he did'. At the time Bill was only twenty-one. But when his boss offered to make him a partner, he declined as he had 'greater plans'.

> I wrote to Eskom and I got a job with Eskom in the Drawing Office, in the old Eskom House which was in Rissik Street. ... The Chief Draughtsman was Battison, Peter Battison. I worked under him in a very big drawing office and we worked as part of a design team and we did things like the Wilge Power Station … and then they sent me out to Rosherville Central Workshops to assist the site engineer, while they were building the Rosherville Central Workshops. When I came back to Head Office they asked me if I would take on the job of looking after the drawing office for the Rand and Orange Free State undertaking for the rural electrification – which was all these overhead power

[12] Interview with Heinrich Dreyer, 2 November 2007.
[13] Interview with Heinrich Dreyer, 2 November 2007.
[14] Interview with William Bergman, 21 November 2007

> lines in the Rand and in those days, the Orange Free State. Whilst working I studied and passed my ATC II. I did it because it was my field and I enjoyed it … The majority in the Drawing Office were artisans, the same as me. They had a few graduate engineers with BSc's who they actually put into the Drawing Office to get the background.[15]

He had a close working relationship with the engineer in change:

> Later I took over the Drawing Office for the rural areas, all the electrification, (a *grand opus* undertaking!) I had draughtsmen under me, as well as tracers, and I had to run the Drawing Office and keep the plans in order … I reported to the rural electrification engineer. It was a Mr. Wiley. He was *not* a BSc, but he was a certificated engineer – but brilliant! I had a very good relationship with him because, the only thing I can put it down to was – I did my work! And I did what he wanted. Then there was another engineer called Randolf Forbes. Between Randolf Forbes and I we developed a number of wooden pole systems for Eskom. Him being the engineer, he'd give me all the details and I would draw them up. Of course, sometimes he would say 'do this' and I'd come along and use my experience and say to him, 'no, I really think this is a better way' and we'd discuss it. If you could convince the engineers that your idea was better, they would accept it in those days. It wasn't the case that 'I'm the engineer and you do what I tell you'. Because as the senior draughtsman, he obviously knew I had experience – and I had practical experience. It was very much a give-and-take situation. At Eskom they were very good. They didn't pay well, unfortunately. And at that stage I got married and I needed more money, so I moved on.[16]

Although a rung above the 'line boys' in the Post Office, the women 'tracers' at Eskom, to whom Bill makes passing reference, were 'less equal' than the young white men even though their work was excellent, not only according to Bill but also to his boss, Peter Battison:[17]

> Tracers (usually females) are employed in many organisations to trace drawings onto linen for permanent record. In many cases rough drawings, some of them very rough, are virtually thrown at the tracers 'to knock into shape,' so that prints may be issued to illustrate a tender document whilst in some cases a capable tracer produces that illustrative drawing from scratch.

But it was not then their place to aspire to be 'draughts*men*'. In Battison's view:[18]

> 'Lady tracers, in particular, take pride in their artistic capabilities; they are not prone to boredom arising from repetitive work and are more amenable to standardisation of drafting practices than are draughtsmen. This latter point is of quite considerable importance in the larger organisations.'

Even in the mid-seventies only 3,2 per cent of technicians were women (most of whom actually did do draughting[19] - but presumably not at Eskom.)

Albert Boshoff, born in 1937, joined what was then the South African Airways, Railways and Harbours (SAR&H), after he had finished his Standard 8 at Wonderboom High School in Pretoria.

> I was one of six children and my father wasn't in a position to support us all, so we all got kicked out very early in our lives. He was a Letter Setter with the Government Printing Works. At the age of 15 I applied to the Railways for an apprenticeship and I was accepted as an Aircraft Radiotrician.

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[15] Interview with William Bergman, 21 November 2007.

[16] Interview with William Bergman, 21 November 2007..

[17] Battison, PL 1963, *Drawing Office Organisation,* The Certificated Engineer, September 1963, p. 322

[18] *Ibid*, p. 322.

[19] Department of National Education, (Goode) Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, 1978, paragraph B4.2, p. 26.

> … So, I joined the Airways in 1953 and at that time they went over to Jan Smuts Airport – Oliver Tambo now … As an apprentice, you have to do technical training, it was prescribed in the law. I started with NTC I. I did that year at the Wits Technical College in Johannesburg. I passed that, and then I transferred to Pretoria Technical College. In my second year I did NTC II and in my third year I did N III. Then I thought at that time that N III is very close to matric, with a little supplementary study I could then perhaps enroll and do the examination for matriculation. The Department of Education at that time allowed you to matriculate if you do six subjects, five subjects and one the next year, if you did four-and-two, if you did three-and-three or if you do three-two-and-one matriculation subjects, then they would support you for a matriculation certificate. So, I did additional work on applied mechanics and on mathematics and the first year I passed four subjects for matric. … So, I passed the NTC IV, and then I went to the NTC V. Now ATC II, if you passed the four ATC II subjects, and Afrikaans and Industrial Administration you could get an Engineering Diploma. I did that. I got my Engineering Diploma at that time. I think that was in 1957. … when I got my apprenticeship completed and my diploma, I transferred to a drawing office in SAA – they gave you that avenue of advancement as a draughtsman. You could then become a draughtsman. I did that for a while …[20]

By 1958, 75 per cent of engineer posts in the mining industry were filled by those with the Mine Manager's Certificate of Competency – a qualification earned after the completion of an apprenticeship and further part-time study.[21] According to a 1951 study, the percentage across the remaining sectors of industry was 29 per cent.[22] This was a well-known pathway as Ettershank emphasised when he presented his Presidential Address to the Institution of Mechanical Engineers in 1954:

> It can be stated with confidence that any boy who has a normal educational standard for his age can, through part-time education at a technical college during his apprenticeship, be brought up to either the Advanced Technical Certificate or National Engineering Diploma standard, either in the last year of his apprenticeship or in his first year as a journeyman. From there, the step to gaining a Government Certificate of Competency as an engineer, fit to be in charge of machinery, is a very short one, especially in view of the fact that certain exemption is now being given to holders of Advanced Technical Certificates, Part II.
>
> In the past, boys such as these have been recruited to apprenticeship by industry, and have been technically trained at the technical colleges, after which they have occupied the highest posts in engineering, rendering great service to the country.[23]

All these men came from poor or modest homes and Bill Venter (whose story comes slightly later) was to ponder whether poverty was not an ingredient of his success:

> Looking back on it now with the wisdom of maturity, I wonder whether the development of ambition, self-discipline, resilience and fortitude in one's career-path does not result more readily from deprivation than from abundance, from struggle instead of unbridled privilege in one's formative years.[24]

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[20] Interview with Albert Boshoff, 30 October 2007..

[21] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering*, para 577, p. 139.

[22] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering*, para 590, p. 143.

[23] J. Ettershank, 'Presidential Address: Some Reflections on the Apprenticeship Act and its Implications', in *Journal of the South African Institution of Mechanical Engineers,* July 1954, p. 373.

[24] Bill Venter – Information provided by Grant Rogerson 22 February 2008.

The caveat to this has to be that the routes were open, the jobs expanding and whilst 'ambition, self-discipline, resilience and fortitude' were surely necessary ingredients of the kind of success Bill Venter achieved as the head of the multi-billion rand Altron empire, they were not on their own sufficient. Without the opportunities and quality training received from the Post Office or Eskom or the railways it is unlikely that these poor youngsters would have flourished. Most positions were filled by white artisans. None of those *denied* such assistance, such as the 'line boys' and the 'tracers' were able to celebrate such achievements in maturity.

EDUCATION AND TRAINING LANDSCAPE

At the heart of the notion of 'technician' was the idea of someone between an artisan and an engineer because artisans were *not good enough* and engineers were *too good* – as noted by the Secretary for Labour, J.F. Hannah in 1956:

> The rapid development of industries, and the increasing application of mechanization and even automation, will give rise to an insistent demand for workers who possess more technical knowledge than the artisan, but who need not necessarily have had a university training; in other words, a worker whose status is somewhere between that of the artisan and the professional man – the technicians.[25]

Artisans 'not good enough'

There was a growing body of opinion that the work of a 'technician' was beyond the skills and comprehension of the average artisan. For example, Boyce, who followed D.P.J. Retief as Chief Engineer of the Post Office in 1969, explained to his fellow engineers that the artisan could not do this work:[26]

> The Post Office has for some 40 years been training technical staff of 'technician' level to meet the ever-growing demand for staff who have the ability to apply manual skills and technical knowledge to the increasingly exacting task of installing, commissioning and maintaining the increasingly complex telecommunication equipment. The staff must be trained to a standard well above that which one would expect of craftsmen and they normally would take over where the capabilities of the craftsmen end.

These views were shared by a growing body of engineers onto whose shoulders the work fell if craft workers were not 'advanced' enough. A strong protagonist of this view was Campbell Pitt of the Mechanical Engineers. He felt that:

> The care and maintenance of complex and sophisticated machinery and processes must be under the direct supervision of a technician. An artisan, whose technical qualification is NTC II, and often less, is unqualified even with the experience of many years, to appreciate the needs of such machines and processes. His employment in a technician post is unwarranted from an economic and safety point of view.[27]

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[25] Foreword by J.F. Hannah, Secretary for Labour, *Department of Labour Annual Report,* 1956 (UG No. 54/1957, p. 3):

[26] G.F. Boyce, presented by A F Bennet, 1970, in discussion on paper by L.T. Campbell Pitt, 'Technicians – a Review'*, The South African Mechanical Engineer*, Supplement, July 1971, p. 290.

[27] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 283.

This trend was observable across a wide front.[28] Even the mines were experiencing this phenomenon as W.S. Nel observed in a discussion on the subject in 1970:[29]

> The mines are becoming increasingly mechanised and automated and need growing numbers of technical men with a diversity of skills and disciplines to install, maintain and repair complex equipment. Job content of traditional mine artisans is rapidly changing from craft orientation to technological orientation. / In some areas, urgent needs have already created technicians e.g. turbine technicians, rope testing technicians, instrument technicians. / Most of these have become technicians by virtue of their specialised practical experience and may lack the desired technical educational qualifications.

Engineers too good

Given the rising demands on the engineer and their critical scarcity, the belief grew amongst engineering graduates in particular that they needed to be formally recognised as being a rung above the rest of the engineering team. They believed there was an urgent need to relieve themselves of *their* routine and repetitive duties so that their work could be commensurate with their university training and that their high level of skills could be exploited to the full. To achieve this, it was necessary to upgrade a layer of intermediate workers to perform their less challenging tasks. The Straszacker Commission, appointed in 1957 to consider the university training of engineers, was to make this its first recommendation in its 1964 Report:

> R/1 The Commission CONSIDERS IT IMPERATIVE that graduate engineers should not be employed in such a way that they are not challenged sufficiently intellectually. … They should have time for …study, and work which does not demand their training or talents should be delegated to technicians and other support personnel such as clerks, to relieve them as much as possible of the more routine tasks.
>
> (R/1) To relieve them many more technicians are required (and often also clerical assistants) than are available at present. … [Emphasis in original][30]

Driving this re-organisation of work had both a *cost-cutting* and *productivity* logic, as the Straszacker Commission noted:[31]

> The Commission considers that, while it is necessary for young graduates to become thoroughly conversant with practical engineering functions during post-graduate training*, much of this practical work, at present done by graduates, could possibly be done as well, if not better and more cheaply, by well-trained specialized technicians, thus freeing professional engineers for more demanding intellectual work. [Emphasis added]

This illustrates what Braverman describes as follows:

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[28] In an article in Die Vaderland, 17 June 1963, the Railways announced that they too had begun a programme to train technicians.

[29] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 300.

[30] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering*.

[31] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering,* Finding 16, paragraph 159, page 25. [The general point is repeated in Finding 23 paragraph 184, p. 34.]

> … having become a mass occupation engineering has begun to exhibit, even if faintly, some of the characteristics of other mass employments: rationalization and division of labor, simplification of duties, application of mechanization, a downward drift in relative pay, some unemployment, and some unionization.[32]

The drive for 'technicians'

At the forefront of these changes were 'semi-state' bodies, like the Post Office and Eskom, which led the field in the adoption of complex electrical equipment. In the post-war period, both were engaged in massive expansion and upgrading initiatives.

The Post Office, for example, published the following advertisement in The Star newspaper on 14 November 1963:[33]

POST OFFICE DRIVE FOR TECHNICIANS

The Department of Posts and Telegraphs has launched a recruiting programme or technical staff to help in the massive task of converting telephones from manual to automatic exchange working.

A statement issued by the department in Pretoria today says it expects to invest nearly R270-million on this expansion programme in the next ten years. When the job is finished every telephone subscriber in the country will have direct dialing.

To do this the department needs hundreds of skilled men. It plans to recruit pupil technicians intensively during the next three years.

The work that needed doing was not simply a multiplication of what had gone before. In many cases it involved the installation and commissioning of new sophisticated technology on a huge scale. Here is how Malcolm Gow, who like Heinrich Dreyer was also a Post Office artisan-cum-technician-cum-trainer, recalls the projects with which he was involved:[34]

> (I)n the 1950s we installed microwave systems which were basically an off-shoot off the old radar systems, because the type of equipment used was very similar – travelling wave amplifiers … were used for amplifying signals because radar required specialised system like klystrons, magnetrons … were used. … In the 1950s there was a test system between Jo'burg and Pretoria. It worked from Jeppe Street Post Office to Northcliff, and then to Klapperkop and from there down to the Post Office in Vermeulen Street. This provided people familiarity with newer technology. Then they started expanding vastly on that – using it on major routes down to the Cape, down to Natal, all over the country. And that gave you much greater numbers of circuits that you could use. And we needed that, because in the early 1960s, although the switchboards were semi-automated (certain

[32] Braverman, *Labor and monopoly capital,* p. 243.
[33] The Star, Pretoria Bureau, 14 November 1963.
[34] Interview with Malcolm Gow, 22 January 2007.

> functions still had to be put through by operators), we started with subscriber trunk dialing. In the Western Transvaal where I went, this had only been installed a couple of years before and it was the first system of its kind in South Africa … When that was started it was called the National Trunk Dialing System, and that became known as National Dialing (as it's called even today). And you now could dial anywhere in the country without the use of an operator. That started in the late 1960s. We also had that at Potch and Klerksdorp. At Potch my staff actually did the installation themselves, after hours …they did a very good job.

Likewise, the implementation of Eskom's expansion into the rural areas was creating a major demand for draughtsmen, like Bill Bergman. H.W. Price stressed this point in the discussion on a paper presented by Battison (to whom Bill Bergman reported) to ICMEESA in 1963:[35]

> The Republic is embarking on a vast expansionist programme estimated to cost over a thousand million rand. / By its size, and by the volume of work involved, it is the biggest challenge ever presented to engineers, designers and draughtsmen in our country. / That this challenge is being taken up by them is much in evidence. / Engineers are being fully stretched to meet requirements. Designers and draughtsmen will be required to make tens of thousands of drawings. Ways and means will have to be found to augment engineering personnel.

This expansion was being managed in offices like those of Bill Bergman and Peter Battison, – which were also undergoing radical re-organisation. Peter Battison,[36] in a presentation to ICMEESA on 'Drawing Office Organisation' in 1963, detailed the requirements for: lighting and ventilation;[37] draughting equipment and drawing and print room layout, draughting drawing materials and printed drawing sheets[38] and standard drawing sizes[39] and even pencils.[40] He concluded however that:

> The world-wide shortage of engineering technicians and the ever-increasing scope for employment in new avenues of engineering and scientific development which in themselves make even greater demands upon the older-established engineering skills and crafts, have considerably aggravated the shortage of adequately trained draughtsmen.[41]

But the changes were not restricted to these large parastatals with major public infrastructure programmes. The private sector was expanding on a grand scale too, and was facing similar skill constraints, as the de Villiers Commission reported in 1948:[42]

> In the case of manufacturing industries, though much of the work can be done by operatives, the organization of production is possible only if there is also available a supply of very highly skilled workers, competent to undertake the difficult and delicate work of making and setting machine tools and installing and adjusting automatic machinery. For these workers, prolonged and thorough training is indispensable. In fact, the growing demand by industry for the semi-professional or technician grade is one of the significant trends in industrialized countries. [Para. 1018-1020].

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[35] Price, H.W., 1963, contribution to discussion on Battison, P.L. 1963, *Drawing Office Organisation,* The Certificated Engineer, September 1963, p. 342/3.

[36] In 1963 Mr. H. McLachlan (President of the Certificated Engineers) thanked Mr. Battison for his paper and stated 'Mr Mattison 'having been Chief Draughtsman to the Electricity Supply Commission in the Republic for the past 23 years'. *The Certificated Engineer,* September 1963, p. 341.

[37] *Ibid*, p. 320.

[38] *Ibid,* p. 329.

[39] *Ibid*, p. 330.

[40] *Ibid*, p. 330.

[41] P.L. Battison, *Drawing Office Organisation,* The Certificated Engineer, September 1963, p. 319.

[42] Quoted in Webster, *Cast in a Racial Mould*, p. 64.

These changes all compounded to produce a serious shortfall of this kind of worker. Employers set about trying to address the technician shortfall and initially they tried to expand their traditional sources of such skills, some of which are outlined below.

Ex-servicemen

In the post-war context, ex-servicemen were a major source of potential labour supply for employers. The Post Office was quick off the mark in this respect. In July 1945, in collaboration with the Demobilisation Directorate and the Department of Labour, launched a recruitment campaign with a view to employing about 2 000 ex-servicemen. A team of recruitment officers were sent to military camps in the Union, North Africa and Italy and by 31 March 1946, 1 700 were already signed up.[43] These men were given a standard test devised by the SAT&TA and the Department to establish which amongst those returning could fill more skilled positions.

International recruitment

Another strategy that was widely adopted was international recruitment. The Post Office began a major recruitment drive for British Post Office (BPO) technicians in 1946.[44] Another international foray was undertaken in 1951 when two officers of the Post Office went to Holland where they recruited 184 technicians.[45] This strategy was to continue over a number of years. However, whilst a number of technicians were recruited and successfully integrated into the staff, there were problems. For example, in 1948 the Chief Engineer informed staff that the BPO Authorities could not agree to the recruitment of Radio Technicians owing to the very difficult manpower position in England.[46] This problem was encountered across a wide front, as was noted by the Secretary of Labour, J.F. Hannah:

> Until quite recently the demand for this type of worker in South Africa was small and was satisfied by the importation of suitable persons from overseas by companies which established factories here. Today there is a shortage of this type of labour in industrial countries overseas. South Africa will, to a great extent, have to meet her requirements in this field from her own resources, by training technicians locally. The matter is at present receiving the attention of the Department, Arts and Science.[47]

The private sector was not exempt. According to a SEIFSA report:[48]

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[43] C.F. Stofberg, 'The History of the Post Office with particular reference to its internal and external problems and role of telecommunication development in the South African society between 1945 and 1968', UNISA, Ph.D. thesis, November 1999. p.122.

[44] *Ibid*

[45] Stofberg, 'The History of the Post Office', p. 125.

[46] *Minutes of the Ninety-fourth Meeting of the Central Executive Committee of the SAT&T Association,* held at 803, Groote Kerk Building, Cape Town, on Wednesday, May 26, 1948.

[47] Foreword by J.F. Hannah, Secretary for Labour, *Department of Labour Annual Report 1956 (UG No. 54/1957, p. 3):*

[48] E. Drummond, E, *Organisation and Structure of the Metal and Engineering Industries in the Republic of South Africa,* 1967?, private copy of Mr. Dave Carson, SEIFSA, first paragraph p. 22, remaining text p 30.

> While immigration has been of assistance in meeting the current grave position, the numbers forthcoming from this source are wholly insufficient to meet the expanding requirements of the industries concerned.

Expand the traditional training route

The first and obvious response of employers was to attempt to increase the number of traditional (white) learners undertaking the established path to technician, described in the Straszacker Report as being:[49]

> the Elementary Technical Certificate, followed by the three National Technical Certificates, the two Advanced Technical Certificates, and ultimately, if three additional Advanced Technical Certificate subjects are taken, to the National Engineering Diploma. These courses are usually taken concurrently with the servicing of an apprenticeship. This was the main route for technicians in the past …[50]

The number of students following this route after the war is given below:

T*able 8.1. Number of Advanced Certificate and Diplomas in engineering offered by the Department of Education, Arts and Science since 1948.*

Year	ATC I	ATC II	Diploma	Total
1948	184	173	55	412
1949	226	170	55	451
1950	211	191	93	495
1951	253	165	94	512
1952	189	141	47	377

Source : *Akademie, 1953, Table VII, p. 10.*

Certainly, in the Post Office this route had been followed for years as Boyce noted in Campbell Pitt article.

> The Post Office has for some 40 years been training technical staff of 'technician' level to meet the ever-growing demand for staff who have the ability to apply manual skills and technical knowledge to the increasingly exacting task of installing, commissioning and maintaining the increasingly complex telecommunication equipment.[51]

This was precisely the route that Ken Bird and many others had followed, although in 1959, when Ken completed his National Engineering Diploma (NED) he had only to complete two (not three) subjects in addition to his Advanced Technical Certificate II. Ken Bird did English at Senior Level and Industrial Administration, which according to Malcolm Gow, who followed the same route, were the common choices. In 1958 this qualification or a Government Certificate of Competency

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[49] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering,* para 90 page 12.

[50] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering,* para 467, p. 93.

[51] The South African Mechanical Engineer, 1970, p. 290.

or even the ATC II on its own, was sufficient a qualification for appointment to two thirds of all professional posts![52]

The need to encourage more (white) youngsters to follow this path was acknowledged first by De Villiers Commission and supported by the Ministerial Committee, and so the Minister of Labour duly provided for it in legislation. In the 1951 Apprenticeship Amendment Act, apprentices were permitted to continue their studies beyond the minimum level set but, whilst able to attend classes for one day a week during the first two years of their apprenticeship,[53] they had to study in their own time thereafter, although they could still claim class and examination fees from their employers.[54] This changed in 1963, when, for the diligent and successful; the one-day-a-week option was extended across all five years of the apprenticeship, as the Minister of Labour explained when he introduced the Bill to parliament:

> …where a lad wants to work and obtains a certificate from the Technical College every year as proof of satisfactory progress, he will be permitted to attend classes in his employer's time during his full period of training at full remuneration.[55]

Financial incentives were given as well, to try to encourage more youngsters to follow this route:

> Apart from the basic wages which we are proposing to improve it is our intention too to pay apprentices what may be terms an incentive bonus to encourage them to continue their studies. These bonuses may vary from a minimum of 50 cents per week for an apprentice with a Std. IX certificate and R1.50 for an apprentice with a National Technical Certificate, to as much as R2.50 per week for an apprentice with a National Senior Certificate. Apart from these bonuses a lad who is really interested in his studies, who excels and who obtains a National Diploma, will receive an increase of R4 per week over and above his basic wages.[56]

H.W. Price, commenting on Battison's paper, was one of the traditionalists who favoured the continuation of this apprenticeship-plus model

> … Referring again to Mr. Battison's remarks on the 'trainee scheme for draughtsmen' it must be emphasised that the best results will be obtained when the trainee has had a workshops training. It is undesirable to train a man without such a background. … I am sure that all will agree on the urgent necessity and importance of such a scheme, and I think we should aim high and go for a full workshop apprenticeship and a minimum academical qualification of ATC I.[57]

The Goode Committee, appointed some years later, reported in 1978, found that 'the percentage of technicians who are also artisans is 56 per cent. But this percentage is much higher (up to 82 per cent) in branches with a strong corps of artisans, such as mechanical and electrical (heavy current), and smaller, but never less than 20 per cent in branches with no artisans of their own

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[52] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering,* para 591, p. 143.
[53] Hansard, 1951, 5091.
[54] Hansard, 20 April 1951, 5091.
[55] Hansard, 19 April 1963, 4379.
[56] Hansard, 19 April 1963, 4379.
[57] H.W. Price, contribution to discussion on Campbell-Pitt's paper, 'Technician's - A Review', Supplement to The South African Mechanical Engineer, July 1971, pp. 342-3.

such as civil, metallurgical, chemical and mining'.[58] So, it would appear that this remained a strong avenue for many years.

But still demand outstripped supply – a problem compounded by the declining number of engineering apprenticeships registered between 1946 and 1950 - from 2195 to 1784 (although the Motor Engineering apprenticeships registered rose).[59]

To reverse this worrying trend many employers actively intervened. In 1945 the Department of Posts and Telegraphs increased the maximum age for apprentices from 18 to 19 years in the case of matriculated youths[60] and introduced a general wage increase which assisted recruitment in all ranks.[61] It also participated in various career guidance events at schools and produced its own publication targeted at young people, to encourage more of them to apply. It also expanded its own training capacity. The Post Office already had a large network of training centres in both urban and rural areas. By 1946-47 there were 23 of these schools in various large centres.[62] The biggest of these was the Baragwanath Training Centre which it had acquired in August 1946 after it entered a contract to use 'the property and premises formerly known as the Baragwanath Air Station'.[63] The new facilities focused on engineering training and had accommodation for about 100 students, necessary because many of their new recruits had rural backgrounds:

> A large proportion – 60 or 70 per cent - of these boys come from homes away from the Reef and it is unreasonable to expect parents to agree with equanimity that their sons should be left to fend for themselves in finding suitable accommodation. In any case respectable quarters and feeding are not obtainable in Johannesburg at a price which is within the reach of most apprentices; nor is it likely to be for many years. The inevitable sequence is that these boys are forced to live in whatever accommodation they can find within their means, and this is often available only in undesirable localities. There have been several cases in recent years of moral disaster, which can probably be attributed in the first place to the conditions under which the boys were forced to live.

The Post Office was not alone in the establishment of a major training facility at this time. The South African Railways completed their Esselen Park Training Centre in 1948, in which year '2,207 European staff' attended courses. In addition, '177 coloured catering trainees and 160 native constables' underwent training at their Kroonstad College.[64]

The pressures rose and in 1952 the Post Office established 81 temporary schools in rural areas so that 'candidates could, as far as possible, be trained in their hometowns',[65] at least for the first

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[58] Department of National Education, 1978. (Goode) Report. Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa, Finding B4.20, page 31.

[59] *Official Year Book of the Union*, No. 26-1950, Union of South Africa, p. 312.

[60] *Minutes of Forty-sixth Meeting of the Central Executive Committee of the SAT&T Association,* held at Groote Kerk Gebou, Cape Town, on Wednesday, 13th June 1945.

[61] Stofberg, 'The History of the Post Office', p. 122.

[62] Stofberg, 'The History of the Post Office', p. 122.

[63] Letter from Postmaster-General to The Secretary to the Treasury, Pretoria, on 10 August 1946, Telkom Archives, DPT 1Q7A/30/12194/71, page 1.

[64] Railway Training College, *Report of the General Manager of Railways and Harbours for year ended 31st March 1948,* U.G. 64, 1948. p.19.

[65] Stofberg, 'The History of the Post Office', p. 126.

year, like Heinrich Dreyer. Without exception those interviewed stress that the training provided by the Post Office was excellent. This was thanks to the likes of men like Heinrich Dreyer and Malcolm Gow, erstwhile technicians, who became full-time technician trainers in the Post Office in this period. This is how Heinrich made his transition from 'technician' to 'technician trainer':

> And ja, then I got married there [in Wepener]. My wife was also a teacher. And it worked well. Then I had two subjects that I had to complete for the Engineering Diploma. It was Physics and Electrical Measurements, which I faffed around with but eventually passed. And then a circular or a letter came to us one day asking if there was anyone who would be interested to be posted to Training. And immediately I saw that this was the opening for me, and I moved to Kroonstad to start lecturing.
>
> I was there for nine years and while I was there, I studied for the Teacher's Diploma, which I could also take by correspondence through the Witwatersrand Technical College. And I got the Teacher's Diploma. I was the first guy in the Post Office Training Division who had a Teacher's Diploma. Nobody else had worried about that.[66]

Malcolm Gow, himself the son of an Industrial School instructor, also started as a Telephone and Telegraph Electrician apprentice in Pretoria in 1948, at Oumashoop where there was a training centre. Then at the end of his first year he was transferred to Baragwanath Post Office Engineering Training School where he completed his basic courses.[67] But in those days' trainers were also in short supply and he recalled, echoing the experience of others, like Ken Bird, before him that:

> At the end of my third year I was invited to give lectures on Introductory Carrier / Carrier System courses for two months. I then spent the rest of that year at the Carrier Room at Jeppe Street Post Office in Johannesburg. At the end of that year I was again sent to the Training Centre as a Resident Demonstrator to give practical training to apprentices in their Introductory, Basic and Advanced courses on Carrier Systems. I stayed there for four years. At the beginning of 1953 I completed my apprenticeship, but I was there at the training centre until the end of 1955.[68]

But still the problem did not go away because many apprentices and trainees left the public service once they qualified. As the President of the South African Telephone and Telegraph Association noted to the Association's Conference on Monday 15 October 1956:[69]

> The Department, through its admirable Training Schools, trains men to fill these vitally important positions, but due to the fact that the market for highly trained men is wide open, a considerable number of them resign to take up more highly paid employment, and therefore we have the position that the State, at considerable expense to the tax payer – because it costs the State more than £1,200 per man – is training men for the benefit of Commerce and Industry.

Bill Venter, like Tindi Tinderholm before him, was a case in point. Bill decided to leave the Post Office and work in the private sector for higher wages. He applied to Henley Cables, a subsidiary of Associated Electrical Industrial (AEI), one of Britain's largest technology companies working in South Africa at the time. It was undertaking work for Eskom.

> I applied for and got a job a job to supervise 40 technicians at Henley Cables, a subsidiary of Associated Electrical Industries (AEI) one of Britain's largest technology companies. / On March

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[66] Interview with Heinrich Dreyer, 2 November 2007.

[67] Interview with Mr. Malcolm Gow, 22 January 2007.

[68] Interview with Mr. Malcolm Gow, 22 January 2007.

[69] Nineteenth Association Conference Opening Proceedings, reported in Live Wire, the Journal of the SAT&T Association, December 1956, p. 9.

> 1955, aged 20, Junior Engineer William P. Venter set off for his first job in the private sector. In 1955 through Witwatersrand Technical College finished his National Senior Certificate. Worked there two years as 'Assistant to Site Engineer'. My job was supervising the laying of cables and my salary, at a modest £95 per month, was more than either the Post Office or the laying of bricks would have paid me.[70]

Even the private sector suffered from poaching by non-training firms and encouraged some employers, such as those organised under the SEIFSA umbrella, to introduce incentive financing schemes to offset this behaviour:[71]

> The scheme was also used to finance study bursaries which were made available to apprentices 'who have shown aptitude and diligence in technical instruction, but they were not necessarily confined to such applicants. The scheme was first introduced in 1947, when funds were made available for this purpose by the employer associations comprising the Federation. … Training schemes are also in being or under consideration by the Education and Training Division for intensive training of draughtsmen and foremen.

The shortage of trained technicians remained acute. It was so serious that the Post Office could not man all the exchanges. Alarms were installed in unmanned exchanges, which rang in the event of a problem, and technicians from a central depot would go and repair the fault:[72]

The situation was much the same in Eskom – which, as Battison noted, was facing another problem that aggravated the situation:[73]

> It is difficult to recruit trainees from the ranks of the upper crust of trade apprentices since the financial rewards for his labour, plus overtime so much in evidence at this stage, make it well-nigh impossible for him to consider entering a drawing office as a trainee and thereafter find himself worse off financially for several years.

Clearly the financial incentives on offer were simply not large enough.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

Another strategy was adopted in the Post Office – and given that they were experiencing the shortage most acutely, their innovations are worth noting. It is to this that we now turn.

As was noted in previous chapters, during and after the war, workers such as the emergency workers and Women Technical Assistants were introduced to augment the depleted ranks of

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[70] Bill Venter, Information provided by Grant Rogerson, 22 February 2008.

[71] SEIFSA history, page 73.

[72] Stofberg, C.F. *The History of the Post Office with particular reference to its internal and external problems and role of telecommunication development in the South African society between 1945 and 1968,* UNISA, Ph.D. thesis, November 1999.p. 126. Verbal interview by C. Stofberg with W T B Ridgard, 8/6/1998.

[73] Battison, P.L., 1963, Author's Reply to Discussion, *Drawing Office Organisation,* The Certificated Engineer, page 349.

artisans and to 'releas(e) men for the performance of more advanced technical work'.[74] In the Post Office, this meant that the artisans were being pushed to work on increasingly complex tasks. This led the union, SATTA, in 1945, to propose to management in the Engineering Staff Committee, that these workers be renamed as 'technicians':

> That the following alternations be made in the existing designations for the grades shown:
>
> | ***Existing*** | ***Proposed*** |
> |---|---|
> | Supervising Electrician | Superintending Technician |
> | Supervising Mechanician | Superintending Mechanician |
> | Electrician, Grade I | Senior Technician |
> | Electrician, Grade II | Technician |
> | Electrician Apprentice | Student Technician |
> | Mechanician Apprentice | Student Mechanician (Staff) |
>
> The Staff Side stated that it was considered that the duties performed by electricians should be reflected in the titles of the various grades and should be in keeping with their responsibilities. The existing titles had led to much misunderstanding, both inside and outside the Service, and it was felt that a more appropriate title would be that of "Technician" a term in use in Australia… [75]

But at the time the management or 'official side' was not ready to agree:

> The Official Side, although sympathetic, nevertheless felt that the present designation described more fully the work performed than the suggested term of "Technician" …The mere fact that another Administration was using a different title … did not appear to be justification for a change of designation. The fact that the grades of Telegraph and Telephone Electrician/Mechanician had been admitted to the lower professional division indicated that the Public Service Commission recognised them to be above the grade of artisan.
>
> It was agreed to record the discussion.[76]

However, the reality was that these skilled workers were doing increasingly complex work – a fact which led the management to send out a circular, in 1947, which stated that: 'as a general rule, apprentices should not be considered for appointment to Telegraph and Telephone Electrician/Mechanician (T&TE/M (Mechanician)) grade II unless they are in possession of a Certificate of Competency based on reports of their work and that they have passed the NTC III examination'.[77] It seems that this could not be enforced because of the shortage of candidates.[78] Shortages of skills also presumably stood behind the edict issued by the Chief Engineer in 1946,

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[74] Telkom Archives: 1E1B/30/05296/75, Engineering Staff Committee 'Introduction of a new grade of Senior Woman Technical Assistant and the creation of 60 such posts on the Witwatersrand. 25 April, 1969. Post Office Staff Board from Postmaster General.

[75] Engineering Staff Committee Report: Agenda Item 4: reported in *The Live Wire*, Journal of the South African Telegraph and Telephone Association, July 1945, p. 11

[76] Engineering Staff Committee Report: Agenda Item 4: reported in *The Live Wire*, Journal of the South African Telegraph and Telephone Association, July 1945, p. 11

[77] *Minutes of Eighty-Sixth Meeting of the Central Executive Committee of the SAT&T Association*, held at Groote Kerk Gebou, Cape Town, on Wednesday, December 10 1947 item: 5643.

[78] *Report of the Proceedings of the 24th Meeting of the Departmental Engineering Staff Committee*, held at Cape Town from 17th to 19th August, 1953, Agenda Item No. 4, p. 7. Telkom Archives, DPT 1D1C/ A30/ 2763/77.

that apprentices in their 4th year would not be released for technical classes or allowed time off duty for correspondence classes if they had completed NTC III.[79]

Then in 1949, the tables turned, and the management proposed the name change itself.
At the eighteenth meeting of the Post Office Departmental Engineering Staff Committee held in March 1949 the 'Official Side' tabled the following:[80]

1. It has been generally accepted in the department for a considerable number of years that the T. and T. E./M. is not an artisan but is considerably superior by virtue of the work he is called upon to do and the training he must undergo to equip him for it. Special provision is made for the employment of artisans such carpenters, blacksmiths, etc.*, but the T and T.E./M. is classified in the Professional Division of the Public Service.
2. It is considered that the time has come to get away from the condition that these officers are employed in designated trades and give full recognition to their professional status. Possibly this could be done by the mere abolition of the trade designation T. and T.E./M. and the introduction of the title T. and T. Technician without having it designated. The method of approach has not been decided pending discussion with the South African Telephone and Telegraph Association (SAT&TA).
3. ..
4. Adoption of the proposal would result in the abolition of the apprenticeship system in the Post Office as there cannot be apprentices without a trade in which to apprentice them.
5. The boys would have to have a new designation such as Learner, or Pupil, Technician and they should be appointed on probation to the Lower Branch of the Professional Division in the same way as Technical Assistants in other departments. …

12. In addition to a material increase in pay, other conditions for learners would be improved e.g. leave and travelling concessions.

[* i.e. 'ordinary' artisans]

It did not take the union long to agree. The union minutes on the matter stated:[81]

> 5859. Designations and Apprenticeship System. Consideration was given to proposals outlined in a memorandum from the Chief Engineer … which was read and discussed, the meeting noting letter from Chief Engineer of February 5th giving the scale on which the Pupil would be placed when he commences his training, details of this scale having already been circulated to Branches. The consensus of opinion was that the Departmental proposals were a step in the right direction as it would confer several benefits on youths during their training period. Certain safeguards would, however, have to be taken in respect of the completed training period. The meeting was satisfied that the Pupil in the early stages of his pupilage would receive more money than the present daily rates, would be appointed to the Public Service 4 years earlier than under the present system thereby qualifying for better leave facilities, 1st class travel when on duty in addition to annual railway concession fare when proceeding on holiday, plus a 44-hour week as against 48 hours at present which is the standard hours of attendance for apprentices.

The decision taken at the meeting was 'that the proposal outlined in the memorandum should be pursued with the Postmaster General, the Public Service Commission and other interested bodies

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[79] *Minutes of Seventy-Fifth Meeting of the Central Executive Committee of the SAT&T Association* on Wednesday March 19 1947, item 5504.

[80] *Report of Proceedings of the Eighteenth Meeting of the Post Office Departmental Engineering Staff Committee* held at Pretoria on the 22nd, 23rd, 24th and 25th March 1949, Agenda Item 34, p. 32. Telkom Archives DPT 253 IDC/A30/2757/77.

[81] *Minutes of the One Hundred and Sixth Meeting of the Central Executive Committee of the SAT&T Association* held at 803, Groote Kerk Building, Cape Town, on Wednesday 9 February 1949, records housed in Telkom Archives.

and, if necessary, the whole matter and its implications should be discussed at a special meeting.'[82] This decision was arrived at after the necessary reassurances were given that the Pupil Technicians would be given a completion certificate and would have a contract no less favourable than that of an apprentice. These issues were only finalised in 1952.[83]

Early pilot schemes were run in the early 1950s;[84] one of the first 'apprentice technicians' was William (Bill) Venter. He was born in 1934 and in 1950 was just completing his Standard Eight when his father announced he was to leave school and start what he called 'an apprenticeship' at the Post Office. His father was an Inspector of Works in the Public Works Department and had used his connections to secure a place for his son.[85] He was a traditional Afrikaans patriarch who insisted that Bill follow his wishes in spite of his desire to do a law degree at Stellenbosch University (a dream 'more remote than the moon'). He was just sixteen at the time, so he followed his father's instructions and knuckled down at the Post Office:

> In our fourth year of study we moved to Witwatersrand Technical College on the corner of Eloff and Plein Streets just outside the main Johannesburg railway station. / By then we had qualified as technicians with an NTC III and some of us were offered the opportunity to study towards an Advanced Technical Certificate I and II. Once those had been secured, we would be eligible to attempt the National Engineering Diploma course at the College and thereby qualifying to become Post Office Telecommunications Engineers – Grade IV. / Those were tough years, laying cables by day and studying at night, because the practical work kept us busy until 4:30pm and the evening classes went on beyond 8pm, often ending after 9 pm and leaving me to catch the last tram home. But they laid the foundations for my career in the telecommunications industry, because we were taught every aspect of telecommunications technology as it was then, including telephone-exchange design, management and maintenance. Based on one's perceived aptitude, competence and willingness to work hard, there were six ascending levels of specialisation available in the final two years of study. The more modestly equipped were condemned to live with lines and cables. Those showing moderate enthusiasm and above average ability, qualified for Faults and Exchanges. The Johannesburg Carrier Room, which was the microwave and co-axial cable switching-centre where all South Africa's international telephone calls were processed. We also worked on recently introduced fax link between Johannesburg and London. In my final year, I was put in charge of the Springs Carrier Room, which meant catching a train from Denver station each morning.[86]

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[82] *Report of Proceedings of the Eighteenth Meeting of the Post Office Departmental Engineering Staff Committee* held at Pretoria on the 22nd, 23rd, 24th and 25th March 1949, Agenda Item 34, p. 34. Telkom Archives DPT 253 IDC/A30/2757/77.

[83] 'Pupil Technician Scheme', *Live Wire*, Journal of the SAT&TA, October 1956, p. 21.

[84] Pupil Technician Scheme, *Live Wire*, Journal of the South African Telephone and Telegraph Association, October 1956, page 21.

[85] Bill Venter. Information provided by Grant Rogerson 22 February 2008.

[86] It turns out that Allan Bennett was the superior who sent Bill Venter on his way to the Springs Carrier Room – which was a source of amusement between the men for years thereafter – interview with Allan Bennett 13 November 2007. Information on Bill Venter provided by Grant Rogerson 22 February 2008.

This generation of technicians received training that was the same as that which had previously been given to apprentices. It was considered desirable that entrants should be matriculated – although this was not enforced due to the seriousness of the shortage being experienced.[87]

University bursaries for a select few

A lucky few apprentices were assisted with bursaries to study at universities. The distinction between the work of a 'technician' and an 'engineer' was not yet determined. Indeed, a report by the Akademie[88] estimated that only half (4288) of the 8346 people then employed as engineers had a university degree and many engineers were anyway doing the work of technicians.[89] Albert Boshoff was one of these. As was noted earlier, he had first completed an apprenticeship, and when he completed his diploma, he became a draughtsman. But he did not stop there:

> Up to 1956 in the Railways if you had an apprenticeship and a diploma, they appointed you as an Assistant Engineer. I just missed out on that because they discontinued that at that time. So, I applied for a bursary with the Railways and I was fortunate to get the bursary. Then I studied with the bursary and I kept my service going with the Railways, with the Airways, for four years. I graduated from Pretoria University in 1961 or 2, I'm not too sure, with BSc. Engineering, and I went back to the Airways and I was appointed as an Assistant Engineer then in the Airways. I was first Assistant Electrical Engineer, and then afterwards I got promoted to Group Manager Maintenance which was electrical and mechanical – we did all the maintenance of the aircraft.[90]

Ian McRae[91] was another who benefited in this way. He was subsequently to rise to become Eskom's Chief Executive Officer, 1985 – 1994. He was born in 1929 in Germiston. His father worked at the Victoria Falls Power Company (VSP), which was later to become ESKOM, for 47 years as 'a foreman/charge-hand fitter'.[92] His family, like the others in this group, were too poor to sustain university fees and non-earning for four years:

> On leaving school, I did not know what direction to take, even though a career in power stations was enticing. For some unknown reason, or maybe the influence of school friends, I applied for a BSc degree in civil engineering at the Witwatersrand University. Shortly after I enrolled, I changed to mechanical engineering, a decision I knew was right, and for which I am forever grateful, as it opened a door for the career that followed. After my first year in 1946, which I passed, I realised my parents could not afford to keep me there without considerable hardship. I worried over what

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[87] Report of the Proceedings of the 29th Meeting of the Post Office Departmental Engineering Staff Committee Held at Pretoria on the 26th – 30th August 1957, p. 28, Telkom Archives, DPT 255, 1D1C/30/2768/77.

[88] Akademie vir Wetenskap en Kuns, Verslag in verband met die behoefte aan opgeleide ingineurs in Suid Afrika na aanleiding van die opname deur die Nationale Buro vir opvoedkundige en maatskaplike navorsing i.s. werkgeleenthede vir ingeneurs, ingineursassitsente, en tegnici in die Unie van Suid Afrika,1951, Akademie Archive, NT/22/9. Unpublished, Bloemfontein, p. 10.

[89] De Villiers, 1948, Report of the De Villiers Commission on Technical and Vocational Education. Para 1239.

[90] Interview with Albert Boshoff, 30 October 2007.

[91] My gratitude to Prof. Hu Hanrahan, University of the Witwatersrand, for alerting me to this story.

[92] Ian McRae, *'The Test of Leadership, 50 years in the electricity supply industry of South Africa',* Chief executive of Eskom, 1985 to 1994, EE Publishers (Pty) Ltd, Muldersdrift, South Africa, 2006, p. 19.

> would happen if I failed. This led to a decision to go and serve an apprenticeship as a fitter with VFP in their maintenance department at Rosherville. …
>
> During the fifth year of my apprenticeship, I became quite ill. … On my return to work, I applied for a bursary from the steel industry to continue my studies toward a BSc Mechanical engineering degree at Wits. I failed to win the bursary – it went to one of their staff members. However, as part of my application, I had to obtain a reference from a senior person in Eskom. For some reason, this was passed on to Bill Fenwick, head of operations. Fortunately for me, he thought about what I was trying to do and persuaded Eskom's management to start a bursary scheme for apprentices and other students. I was the first recipient. I returned to Wits and started my second year in 1951. At the time, I still had six months to go to complete my apprenticeship, and no remission was ever given. I had to complete my five years during my holiday periods. This was quite tough, having to go back to the bench during university vacations.[93]

It is interesting to note that even at this early stage, before the education and training of engineers had been standardised, there was no credit given for either the diploma or apprenticeship given by the universities.

A similar bursary scheme was introduced in the metal industry in 1947 as Drummond[94] has recorded:

> Engineering graduates are also in demand, and with a view to encouraging studies at universities in this field, SEIFSA grants bursaries which at present are valued at R700 per annum and are tenable at any South African university. No restrictions are applied to the chosen applicants – successful graduates are not required to take up employment in the metal industries.
>
> Generally speaking, these awards are made **to apprentices** who have shown aptitude and diligence in technical instruction, but they are not necessarily confined to such applicants. The scheme was first introduced in 1947, when funds were made available for this purpose by the employer associations comprising the Federation. With the Establishment of the SEIFSA Technological Fund *[in 1963]*, awards were subsidised from this source, supplemented by donations and employer association contributions. SEIFSA Post-Graduate Bursaries valued at R2,000 per annum for study overseas for a period of two years each are also available in various fields." [*Emphasis added*] [95]

These men were the first to benefit from bursaries, but others like them were later to follow in greater numbers as we shall see.

In spite of these initiatives, the scarcity of technicians did not abate. So, through networks such as those provided by the Akademie,[96] the belief grew that a new kind of person was required – a

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[93] McRae, *'The Test of Leadership'*, pp. 20–22.

[94] Errol Drummond, *Organisation and Structure of the Metal and Engineering Industries in the Republic of South Africa*, SEIFSA, (1967?/1963?), p.73.

[95] Drummond, *Organisation and Structure of the Metal and Engineering Industries*, p. 73.

[96] Retief at the time was a member of the Akademie, as too was de Villiers … As outlined in the introduction to this Section, this move took place at a time when the Department, represented by D.P.J. Retief, was extensively engaged, under the Chairmanship of none other than F.J. de Villiers, in negotiations with overseas suppliers of equipment on the question of local manufacture (Kaplan, 1990, 29). The very same F.J. de Villiers was the chairman of the Commission under review in this Chapter, which had advocated the

person with skills somewhere between those an artisan and an engineer – someone with more theory than the average artisan but less than a university trained engineer.[97] The De Villiers Commission seems to have been the first to address the issue directly, and its findings are discussed below.

1948 – The De Villiers Commission

The De Villiers Commission did not believe that simply expanding existing solutions to meet the demand for technicians was optimal. For instance, they found that the existing programmes were inadequate:

> These advanced technical courses and the national diplomas in engineering and in building have undoubtedly served a very useful purpose and have also helped many a youth along the path to higher professional qualifications. But *they need to be revised, broadened and extended* in order to obtain wider recognition by professional bodies and to promote more effectively the advancement of the individual. The National Engineering Diploma has not been accepted by the Institute of Mechanical Engineers as exemption from the associate membership examination, although exemption may be granted subject for subject.[98]

The problem with the standard programmes was carefully analysed and they concluded that the reason they fell short of what was required was because they did not provide 'a broad and thorough grounding in the fundamental sciences' (para 1246). The reason they did not was attributed to the fact that:

> … practically all these advanced courses are part-time; and the narrowness has been brought about partly by the restrictions involved in part-time study, which have made it impossible to introduce such basic subjects as chemistry, physics and other subjects which are included in the early years of a university course. … There is thus a definite need for curriculum revision and the provision of facilities for full-time courses at this level.[99]

They found also that additional specialist courses had to be designed for the professional examinations of the Institute of Mechanical Engineers (A.M.I. Mech.E.), Institute of Civil Engineers (A.M.I.C.E.), Institute of Electrical Engineers (A.M.I.E.E.) and the Institute of Municipal and County Engineers as the general programmes did not suffice. (para. 1245). As a consequence, they recommended both that the existing courses should be 'suitably modified and added to where necessary to meet modern demands in all fields' and be given 'for full-time and part-time study' (para. 1274) *and* that 'a four years' course should be instituted in association with the technical colleges on what is known as the "co-operative" system, under which suitable candidates – holders of the senior certificate or its equivalent, and meritorious apprentices – would devote part of the time to technical training and the remainder to be spent in the workshops' (para. 1300). This was effectively a call for an alternative to the apprenticeship system as the 1944 Act, (Clause

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recognition of just such a new occupation (Chapter XIII of De Villiers Report). And both men, de Villiers and Retief, were members of the Akademie.

[97] De Villiers, Report of the De Villiers Commission on Technical and Vocational Education, 1948, para 1238.

[98] De Villiers, Report of the De Villiers Commission on Technical and Vocational Education Emphasis in original, para. 1244.)

[99] De Villiers, Report of the De Villiers Commission on Technical and Vocational Education para 1247.

2 of the Act) specifically excluded 'any registered student of a university, university college or technical college who is studying for a degree or diploma approved by the Minister and who works in a designated trade during vacations in order to obtain practical experience.'

The De Villiers Commission was further prompted by research that showed similar initiatives were already well underway internationally. For instance, in their report they refer to developments in America:

> In the U.S.A. it has been shown that the demand for post high school technical training at the semi-professional level far exceeds the demand for training at the professional level, and manufacturing industries have consistently estimated their normal requirements of engineering graduates, after the minimum four-year-courses, at from 2.2 percent. to 3 percent. of their total working forces, as compared with 6 percent. to 8.3 percent. of employees with approximately two years of semi-professional technical training. Data obtained from a recent survey of over a hundred industrial establishments indicate that university-trained men are used to perform "less than university level jobs in more than 40 per cent. of the plants, and in more than two-thirds of those plants such jobs could be filled by persons with vocational-technical (that is semi-professional) training" [Vocational-Technical Training Bulleting, No. 228, Washington, 1944] The average number of technicians as compared with the number of university-trained engineers was found to be 5.2 per engineer.[100]

And they no doubt knew that similar trends were underway in the UK:

> After World War II, the British were concerned with the need to increase industrial productivity and its relationship to technical education and training. Prior to the war certain progressive firms released their apprentices and trainees for college classes, but after the war it became obligatory for all employers of craft apprentices to release them one day a week to attend day classes for the higher national certificate (HNC) and diploma (HND) and trade school and 'City and Guilds' courses. An elite band went on to matriculate to London University and study for the external degree of that body by a combination of self-preparation, correspondence courses and formal part-time or evening classes and laboratory work at provincial centres. British industry highly valued the type of engineer who had worked his passage in this way.[101]

The Commission believed that these findings applied equally well to South Africa, in particular to four groups of workers in the industrial engineering fields where the impact of technological advance was most pronounced. These included 'engineering assistants and science assistants requiring a year or two of pre-employment (specialised) training; limited technicians requiring relatively short training; production and maintenance supervisors requiring industrial background, plus supplementary technical training; and persons in semi-technical jobs which require combinations of technical and other training, such as selling or accounting' (para. 1240/1242). It recommended that

> An early survey by the technical colleges of occupations at the semi-professional level; the explanation of the requirements of vocational training at this level and the provision of both full-time and part-time courses; the adequate equipment of workshops and laboratories for this purpose; and wherever feasible, a minimum period of work experience under approved commercial conditions to be included for diploma or certificate (para. 1273)

They also recommended the modification of the National Diploma in Production Engineering to meet demands of foremanship training (para. 1294) and a four years' course for engineer

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[100] De Villiers, , Report of the De Villiers Commission on Technical and Vocational Education para 1239.

[101] George S. Emmerson, *Engineering Education: A Social History*, New York: Crane, Russak & Company, Inc, 1973, pp. 304-6.

apprentices to be instituted on the 'co-operative' system. Even from these recommendations it can be inferred that a single occupation – 'technician' – had not yet taken shape.

1948 - 1953 – Akademie vir Wetenskap en Kuns

In 1948, the Vice-Chairman of the Fakulteit for Natuurwetenskap en Tegniek (Faculty of the Natural Sciences and Technology) of the Akademie of the Wetenskap en Kuns, Dr T.E.W. Schumann, reflected on the de Villiers Commission , in his annual address to the Faculty.[102] He emphasised the rapid advancement of science and technology since the Second World War, the shortage of scientifically trained people which these developments demanded, and the necessity for young Afrikaners to claim their place and duty in this new environment. Following this presentation, a 'beskrywingspunt' (action item), to look at the position of engineers in South Africa, was assigned to the Afdeling Ingenieurswese to take forward. Two principal issues were to be considered:

(i) Dat ondersoek ingestel moet word na die behoefte aan opgeleide ingeieurs in Suid-Afrika; die mate waarin bestaande inrigtings in ons land daarin voorsien; die wenslikheid, al dan nie, van die oprigting van 'n tweede Afrikaanseingenieurs-fakulteit in Bloemfontein of in Pretoria.
[That an investigation should be instituted as to the need for trained engineers in South Africa; the extent to which existing establishments in our country can provide it; the desirability, or not, of the establishment of a second Afrikaans engineering faculty in Bloemfontein or in Pretoria.]

(ii) Dat ondersoek ingestel moet word na metodes van opleiding in Suid-Afrika met die oog op die aanpassing aan spesifieke behoeftes van die land.
[That investigation should be instituted as to the methods of training in South Africa with a view to adapting such methods to the specific needs of the country.]

The Akademie did not feel it had the authority to examine the first issue, so it approached the Department of Education, Arts and Science to do it, although it did indicate certain principles and directions at the time. It examined the second issue itself, initially concentrating on engineers, and this study was undertaken by a team that included Prof R.L. Straszacker and F.J. de Villiers. It was felt that a second study was required, undertaken by the same team, but with two additions: D.P.J. Retief and Dr C.V. von Abo (so clearly the Post Office was well aware of these developments).

The second report, entitled *Verslag in verband met die Behoefte aan en Opleiding van Semi-professionele Tegnici in Suid-Afrika (Report on the need for and training of semi-professional technicians in South Africa)* was published in 1953.[103] The report cited the De Villiers report[104] in so far as the demand for such workers was concerned, and also undertook an analysis of the nature and extent of the demand for, and current employment of this type of worker. This established that on average there had been 450 students per year studying either ATC I, II or a

[102] This account is taken from the Akademie's Feesalbum, 1909 – 1959, p. 154.
[103] *Verslag in verband met die Behoefte aan en Opleiding van Semi-professionele Tegnici in Suid-Afrika,* Akademie, 1953.
[104] *Ibid,* para. 1259.

Diploma course at the technical colleges between 1948 and 1952.[105] The Report suggested that something in the order of 1500 semi-professionals were needed each year.[106]

The research had found that the average ratio of engineers to semi-professional workers in South Africa was 1:1.8, much lower than the 1:3 ratio found abroad (a conclusion reached after considering the situation in Germany, Switzerland, the USA, France, England and others). The Report concluded that the position of technicians had not yet been appreciated in South Africa and that their training had also not kept up with the rapid developments in industry.[107] It proposed that revised courses should be developed to which each of the following four categories of workers should be eligible:

1. Older workers with many years of practical experience wanting to update themselves;
2. Individuals with an NTC III and some practical experience;
3. Individuals with a Senior Certificate wanting more advanced training but not willing or able to attend a long and expensive university course;
4. Learners that want to follow a pre-university programme.

It also suggested that both full-time and part-time courses should be available and that there must be alignment between university and semi-professional training. The final recommendation was procedural, however:

> In order to put technological training at the semi-professional level on a healthy footing, the Akademie recommends that a Board or a Committee for Advanced Technological Training be established. Such a body must consist of representatives from the Departments (of Education and Labour), the technical colleges and universities and (relevant) professional bodies, and must be tasked to develop recommendations in regard to the institutions in which such advanced training should take place, the admission criteria, courses and curricula, examinations and certificates that will be recognised and how to encourage close co-operation between the training providers and industry.[108]

And all the while, fueling these efforts, was the belief that Afrikaners should 'take their place and perform their duty' in regard to this new 'semi-profession'.[109]

1956 - 63 – Department of Education, Arts and Science

When the Department of Education, Arts and Science received the Akademie report, it was busy finalising the Vocational Education Act, 1955 (Act No 70 of 1955) which strengthened its control over the programmes and finances of technical colleges. This Act had been motivated on the grounds that 'full co-operation between education, commerce, industry and State departments

[105] *Ibid,* Table VII, p. 10.
[106] *Ibid,* p. 17.
[107] *Ibid,* p. 17.
[108] *Ibid,* p. 19.
[109] Akademie Feesalbum, 1909 – 1959, p. 154.

could be more effectively coordinated by the Department'.[110] The steps it took were in line with the De Villiers Commission's recommendation to begin with a study of technician occupations. As Dr. Pittendrigh explains:[111]

> Having decided to transfer control of the technical colleges to the State and having passed Act 70 of 1955 the Department gave attention to the development of technicians' courses in 1956. A questionnaire was drawn up by them and circulated to "industrial concerns in South Africa". This questionnaire attempted to define the engineering team as consisting of professional engineer, engineering technologist and technician. The enquiry was confined to technicians in the fields of civil, electrical and mechanical engineering as well as chemical technicians. The questionnaire made it clear that training of these persons was to be conducted at technical colleges and listed eleven technical colleges as possible venues. It also attempted to quantify the training and employment needs. At the same time the Association [of Technical Colleges] was asked to appoint suitable members of the technical college staffs to attend meetings and prepare courses and syllabi for each study direction. On receipt of the information requested the Department was able to convene a meeting of employers in February 1957 and obtain acceptance of sandwich courses for technicians in electrical and mechanical engineering.

One of the people appointed by the Witwatersrand Technical College to assist with this work was Harry Aspinall, who, according to Tindi Tinderholm became a key driver:

> I'll never forget the big brain behind it was Mr. H. T. Aspinall. Now I knew him already from my younger days, because he was at the Witwatersrand Technical College. …At the time, I attended a lecture at the Technical College where they explained exactly why this came in. *Because even at my time we thought again somebody might be trying to do something quickly that might be affecting some of the old timers negatively.* [E*mphasis added*][112]

Clearly the engineers, and particularly the Certificated Engineers, were watching these developments closely.

Harry Aspinall, born in Lancashire in 1898, was a man whose own apprenticeship had been interrupted by World War I, but who had proceeded to attain a BSc in Mechanical Engineering, a BSc Honours in Electrical Engineering and an MSc (Eng.) from the University of the Witwatersrand. In 1948, he was elected as the President of the South African Institute of Electrical Engineers and in his presidential address spoke of the system of technical training with possible future developments in South Africa. He was also, in 1956, the Chairman of the Transvaal Mechanical and Electrical Engineering Apprenticeship Sub-Committee and so himself straddled the artisan/engineer divide.[113] With the rapid growth of student enrolments for electrical engineering at the Witwatersrand Technical College, John Orr had invited him to help establish a Department of Electrotechnics (later the Department of Electrical Engineering and Mathematics)

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[110] Alan Pittendrigh, *Technikons in South Africa,* Building Industries Federation South Africa, Halfway House Transvaal, 1988, p. 149.

[111] Pittendrigh, *Technikons in South Africa,* pp. 156-7.

[112] Interview Tindi Tinderholm, 15 Oct 2007.

[113] Journal of the Institution of Certificated Engineers, South Africa, April 1956, p. 112.

which he subsequently headed until his first retirement in 1959.[114] Here is how his contribution to technician training is recounted in the history of the Witwatersrand Technikon.[115]

> During his long leave in 1955 Harry Aspinall, in his capacity as Head of the Department made a tour of various technical colleges and universities in Britain. He was most impressed by the training of technicians for the private sector which involved alternating full-time periods in industry and at a college. The periods were each of six months duration and this appeared effective in ensuring integration of college and industrial training. A detailed report of the visit was submitted to the Department of National Education.

Aspinall also presented a paper on this visit to the Institution of Certificated Engineers in which he outlined recent 'sandwich course' developments.[116] In the discussion that followed one engineer commented that the British experience showed that 'the standards of National Certificate courses have been raised to meet professional needs and the requirements, even of the City and Guilds, have become more suitable for the technician than the craftsman *for whom they were originally designed'*[117] *[emphasis added]*. Artisan courses were now being upgraded to stay abreast of scientific and technological developments – but this new category of workers was the beneficiary – artisans themselves being left increasingly behind. However, the new category of worker was not to conquer the science only - as Emmerson noted[118] 'the British engineer ha(d) not lost his respect for experience and exposure to the industrial environment as an essential part of his education. This is well revealed by the wide exploitation of 'sandwich' ('co-operative' and 'integrated') programmes'.

It is clear from H. A. Matthews the Principal Engineer, Training in the South African Post Office, that SAPO was actively involved. In his paper to the SAIEE, entitled 'Technical training in the South African Post Office', he recorded that:

> (D)uring 1956 and 1957 the Department of Education, Arts and Science in conjunction with the Witwatersrand Technical College, the Department of Posts and Telegraphs and other interested bodies, undertook an investigation into the possibility of providing advanced training for a grade of technical worker who would function between the artisan and the engineer. Courses were devised and syllabuses laid down for the training at technical colleges of these specially selected men. The courses provided for electrical and mechanical engineering with telecommunications catered for under electrical engineering.… In 1959 trial-courses were conducted and, after subsequent minor modifications, the scheme was inaugurated in 1960. ... The duration of the pupillage was four years for both the Certificate and Diploma groups...[119]

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[114] J. Lurie, *Technikon Witwatersrand: A History 1925 – 2000,* Technikon Witwatersrand's Division of Marketing and Communication, 2000, p. 89.

[115] J. Lurie, *Technikon Witwatersrand: A History 1925 – 2000,* Technikon Witwatersrand's Division of Marketing and Communication, 2000, p. 129

[116] Aspinall, H., 1956, *Technical College Educational Systems in Britain and South Africa – A Brief Comparison,* in Journal of the Institution of Certificated Engineers, South Africa, April 1956, 113 – 121.

[117] Moylen contribution to discussion on Aspinall paper in 1956, p. 125.

[118] George S. Emmerson, *Engineering Education: A Social History,* Crane, Russak & Company, Inc, New York, 1973, p. 307.

[119] H.A Matthews, 'Technical training in the South African Post Office', *SAIEE Transactions*, July 1975, p. 141.

Armed with the reports of the De Villiers Commission, the Akademie and Aspinall, and the findings of these investigations, the Department called a conference:

> In February 1957, the Department called a conference under the chairmanship of Dr. J.J. Opt'Hof, Secretary of the Department. At the conference, there were delegates which included representatives of industry, government, technical colleges, universities and municipal electrical undertakings. Separate committees for the various disciplines were formed and those of electrical and mechanical engineering made essentially the same recommendations independently. / These were: a three-year sandwich course; a minimum entrance qualification of NTC II; a common first year for electrical and mechanical engineering students; a fourth-year course for students with exceptional ability to acquire professional engineering status; facilities also to be made available for part-time students. The final year was to be approximately of the same standard as that of ATC II but to be of greater depth. The scheme was to prove to be the general model for courses for a number of years with periodic modifications.[120]

The Goode Committee, later reporting on the same event, elaborated on its participants:

> Subsequently the Department of National Education, the Suid-Afrikaanse Akademie, the Professional Engineers Joint Council, later renamed the Federation of Societies of Professional Engineers (FSPE), and the Association of Technical Colleges organized several conferences and published reports dealing with the education and training of technicians. The major industries were represented at these conferences.[121]

Noticeable by their absence are the craft unions – although suggested as an addition by Roux in a hand-written note on a draft of the Akademie paper.[122] They seem to have been excluded – or were they simply distracted by other challenges? Either way their voice was missing. This is significant as this initiative effectively truncated the apprenticeship system – and created a parallel pathway for young, first-time entrants.

This flurry of events produced a new set of courses. According to Dr. Pittendrigh:[123]

> The first technician courses were started at the Witwatersrand Technical College in 1958 and were four-year sandwich courses mainly sponsored by the Chamber of Mines. The GPO and SAR which are major employers of technically trained staff did not initially give support to these courses … (But t)he introduction of the sandwich course system in 1958 heralded a period of healthy expansion of advanced technical courses with new courses being introduced each successive year. …. For the GPO there were courses in Electrical and Mechanical Engineering, Radio Communication and Telegraphy while for the Public Service there were courses in 23 fields for technicians. …

In 1959, Harry Aspinall retired from the Witwatersrand Technical College and joined the Department of Education as an inspector – from which position he assisted with the introduction

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[120] J. Lurie, *Technikon Witwatersrand: A History 1925 – 2000,* Technikon Witwatersrand's Division of Marketing and Communication, 2000, p.129.

[121] Goode Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, para. 2.6.4.

[122] In the copy of the 1953 report, there is a pencil addition, signed off by A.J.A. Roux signalling that they should be included in the proposed Board or Committee.

[123] Alan Pittendrigh, *Technikons in South Africa,* Building Industries Federation South Africa, Halfway House Transvaal, 1988, pp. 156/7.

of new courses. In 1964, he left the Department and joined SEIFSA where he helped establish their Education and Training section discussed below.[124]

In 1964 the technician courses were again revised, and further differentiated from those undertaken by apprentices:

> In 1964 the then Department of Education, Arts and Science decided to differentiate between subjects of the National Technical Diploma (NTD) (originally the National Engineering Diploma (NED) and the subjects of the National Diploma for Technicians (NDT) by adding a T (for Tertiary Education) after the title of each of the NDT subjects.[125]

The overall success of the new alternative sandwich programmes is summarised by Dr. Pittendrigh thus:[126]

> By 1966 a publication on "Post-Standard X Training excluding training at universities and provincial teacher training colleges" was produced … which gives a fairly clear idea of how far advanced technical education had evolved in 1966. The available courses are indicated in Table XX from which can be seen that considerable development took place in post-secondary courses in the technical colleges during the period 1955 – 1967.

The table to which he refers contains a list of some 27 Certificate and Diploma courses available in 1966, amongst which were:[127]

Table 8.2. Courses listed in Information Series No. 10 – 1966.

Area	Qualification	Number of courses	Type of courses
…	…	…	…
Telecommunication	Diploma	2	Sandwich
Telecommunication	Certificate	9	Sandwich
Draughtsmanship	Diploma	5	Sandwich
…	…	…	…
Engineering	Diploma	17	Sandwich
Teacher Training	Diploma	5	Full and Part-time

[* Only a selection of the 27 courses are reproduced here]

Source: *Pittendrigh, Technikons in South Africa. p 157.*

These programmes all followed the same broad approach:[128]

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[124] Lurie, *Technikon Witwatersrand,* p. 90.

[125] H.A. Matthews, 'Technical training in the South African Post Office', *SAIEE Transactions*, July 1975 p. 141.

[126] Pittendrigh, *Technikons in South Africa,* p. 157.

[127] Pittendrigh, Alan, 1988, *Technikons in South Africa,* Building Industries Federation South Africa, Halfway House Transvaal, Table 3.9 p. 159.

[128] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering*, p. 93, paragraph 467.

> … since 1958 … post-Std. X technician training courses have been introduced. These are normally 'sandwich' courses, i.e. courses of study amounting to approximately 18 weeks per annum alternating with periods of actual employment in engineering. The course which leads to a National Diploma for Engineering Technicians Part I, is one which covers four years of sandwich training and is a comparatively new course, which is mainly followed by prospective technicians in mechanical or electrical engineering. Part II will require two more years. The Public Service Commission, in collaboration with the Pretoria Technical College, introduced a three-year sandwich course in 1958, which is followed by a year of full-time practical training, and leads to the National Certificate for Technicians.

The number of students undertaking these programmes rose quickly – and totaled 6613 by 1964, of which 1193 were 'GPO and Agricultural Technical Services' students.[129] So successful were these programmes that the Straszacker Commission sounded a note of caution:[130]

> There is, however, reason to fear that the highly commendable Technician Training Scheme by means of sandwich courses, recently started at some Technical Colleges, is diverting graduates from university to technician training because of the more attractive immediate financial prospects. In many cases it takes an engineering graduate many years to overtake his matriculant contemporary, who became a Technician.

The de-facto recognition of the financial constraints faced by many aspirant engineers was to be later addressed by the promotion of bursary schemes, as is outlined in the next section.

This initiative was given an unexpected boost in the early 1960s. In 1961, the Union of South Africa became the Republic of South Africa and in the same year pictures of the Sharpeville Massacre were blazoned across the world's headlines. In the consequential climate of rising censure, the Minister of Education pronounced that:

THE TRAINING OF SA TECHNICIANS MUST BE ACCELERATED – MIN. JAN DE KLERK
Die Vaderland, 17 June 1963

The threatening attitude of some countries against SA is an important reason why the programme to train technicians must be accelerated because it may lead to a time when we must be completely dependent on our own trained manpower, Minister Jan de Klerk said.

An independent republic must be able to provide for all its needs on all fields, he said. A lot of prospective immigrants from Europe, especially in the field of technicians, hesitate to immigrate to the Republic. The reason for this is the revival of the industries in Europe at that time and maybe also the negative press articles about South Africa in their papers, he said.

Consequently, we must be in a position to depend more and more on our own resources. Maybe it is a blessing in disguise in the sense that it will encourage us to greater heights with regards to our own training schemes.

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[129] Pittendrigh, *Technikons in South Africa,* p. 158.

[130] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering*, par 609, p. 153.

This ‘go it alone’ approach to training complemented the ‘import substitution’ strategies being pursued at the industrial level.

As the Goode Committee was to later note, the introduction of these ‘sandwich’ courses represented a significant shift. The courses were effectively the first time that full-time courses were offered for learners aiming to occupy these intermediate level positions – previously studies at ATC I and II had all been part-time.[131] This shifted the locus of control of this level of training away from industry players to the education community and the state. No equivalent to the statutory apprenticeship committees was established to oversee the six-month practical training component. Instead, non-statutory advisory committees were set up, to be convened by the technical colleges which *consulted* with industry but were not dictated to by them. Industry was ambiguous about this innovation in training. It welcomed the release from the obligation to provide this high-level training (a form of ‘outsourcing’ to the state) but the larger enterprises also bemoaned the loss of control – with the Post Office actually resisting the programme initially. If the views held by Akademie member, Dr. Marais (*that the mines and Eskom, particularly on the Rand, were unsympathetic to Afrikaners and were unlikely to provide them with learning opportunities*) were shared by others, then this move can be seen as the state creating avenues for young Afrikaners to enter training schemes not directly dependent on legal contracts with employers - the ‘British and American capital-controlled enterprises’ which purportedly were reluctant to give ‘their boys a chance’.[132]

1964 – Straszacker Commission and Mönnig reports

Dr. RL. Straszacker was appointed as its chairman and, *inter alia* DPJ. Retief, the Post Office man who was also one of the authors of the 1953 Akademie report on semi-professionals, was appointed as one of its members. At the time of his appointment to the chair of this Commission Dr. Straszacker was the Chairman of the *Fakulteit Natuurwetenskap en Tegniek* of the Akademie, having been a founding member since 1941.[133] The Straszacker Commission tabled its report in 1964. Whilst its central theme pertained to the training of engineers at university, it had a great deal to say about technicians. Indeed its very first recommendation was that in order ‘to relieve them [*engineers*] many more technicians are required … than are available at present’[134] – a point

[131] Goode Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, Section 2.6.3, p. 11.
[132] Letter from D.J.K. Marais to Dr. Loubser, from Akademie Archive, Bloemfontein, 16 June 1949.
[133] Akademie, 1959, p. 158.
[134] Straszacker, *Commission of Enquiry into the method of training for University Degrees in Engineering*, p. 36.

that was repeated at several points in the report.[135] A full sub-chapter of the report[136] was dedicated to the subject of technician training, in which, for the first time, it was even mooted that the ATC II and NED examinations were to be discontinued with the Technicians' Diplomas 'more than making up for the loss'.[137] Other subjects covered were the 'ratio of professional engineers to technicians'; 'technicians with technical qualifications' and 'the supply of technicians in South Africa'.

With regards to technician training the Commission suggested that:

> R/21: In order to ensure optimum utilization of the human capital potential, the Commission SUGGESTS that the courses for technicians be designed to train them to a comparatively high level in specialized fields, rather than to provide a broad training to a lower level. Courses which provide a broad training are much more demanding intellectually and may easily become so demanding as to require university material for their successful completion.[138]

This specialisation was then later given as the reason why technicians could not easily be given credit when seeking to advance to become engineers – as they lacked a broad, scientific base – as has been seen with both Rod Harker and Mike Case who had to take the full four years to attain their degrees. It did however recommend that 'the universities take positive steps to encourage those engineering students who fail, to follow the technician training courses'.[139] This was a matter of considerable tension between the universities and technical colleges. In fact, the Straszacker Report did consider this question under the heading: 'Co-operative Scheme between Universities and Technical Colleges'. It described a scheme that was in operation between the University of the Witwatersrand and the Pretoria Technical College whereby the latter taught first- and second-year university engineering courses to part-time students who had already obtained the National Engineering Diploma. The students then wrote the university examinations and proceeded to the university, full-time, for the final two or three years if they passed the first- or second-year examinations. The Commission concluded that the scheme had failed because 'practically no students made use of it':[140]

> Over the seven years 1951 – 1957, the position was as follows:
>
Enrolments	8.3 p.a.
Failed to pass	2.3 p.a.
Passed first year only	4.1 p.a.
Passed first and second years	1.9 p.a.
Passed, but did not proceed to university	1.5 p.a.
Proceeded to university after passing first year	2.6 p.a.
Proceeded to university after passing second year	1.9 p.a. [141]

[135] Straszacker, *Commission of Enquiry into the method of training for University Degrees in Engineering* see for example F/16, para 159, p.25 and F/23, para 184, p. 34.
[136] Straszacker, *Commission of Enquiry into the method of training for University Degrees in Engineering* Section 8.8, p. 142.
[137] Straszacker, *Commission of Enquiry into the method of training for University Degrees in Engineering* para 592, p. 143.
[138] Straszacker, *Commission of Enquiry into the method of training for University Degrees in Engineering*, p. 145.
[139] *Ibid,* p. 146.
[140] *Ibid,* para 630.
[141] *Ibid,* para. 6.2.9.

The Commission came to the same conclusion for the two similar schemes in operation at the time between the universities and technical colleges in Cape Town and Durban. No attempt was made to explain this conclusion. The Commission advocated first year correspondence courses at the University of South Africa as an alternative.[142]

Aspinall delved a little deeper and, in 1956, commented:

> The scheme represents a step in the right direction but suffers from the disadvantage of the part-time nature of the preliminary training for two years, and the fact that some outstanding students cannot afford to attend a university even for the reduced period.[143]

He later elaborated on this view: 'The scheme as a whole has not been a success in view of the fact that very few students can afford to attend full-time at a university for a period of even two years. Another drawback of the scheme is that no facilities are provided for the man who has completed his apprenticeship and associated studies and wishes to study for an engineering degree. It is interesting to note that a good proportion of the students who graduated in this manner passed their final examinations with distinction'.[144] In this context, he cited the British experience whereby students could undertake part-time courses at about sixty technical colleges and then sit an external engineering degree of the University of London.[145] He even motivated that if the South African universities would not accommodate such a scheme, then they should consider getting college accreditation to enable South African students to sit the London examination.[146]

Dr. A.W. Rowe, the Director of the Witwatersrand Technical College after John Orr, President of the South African Institution of Engineers and once member of the Minister of Labour's 1951 Ministerial Committee concurred with these sentiments:[147]

> (T)he question of a complete part-time training leading to a degree in engineering. Facilities of this type do not exist in this country, apart from the two-year training given by the Pretoria and Cape Technical Colleges, where it must be followed by the third and fourth years in full-time attendance at a university. The latter scheme still has the shortcoming that many apprentices cannot finance the last two years at the university, and it is the common opinion of many that facilities should exist in this country, as they do in Britain, for the obtaining of a degree in engineering by part-time study only. In Britain several technical institutions, with approved courses and suitable engineering laboratories, prepare part-time students for the external B.Sc. (Eng.) of the London University. I think that all of you will agree with me when I express the hope that the same opportunities should be given to our own boys.

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[142] *Ibid,* paras 624 – 626.

[143] Aspinall, 'Presidential Address', p. 19.

[144] H.T. Aspinall, 'Technical College Educational Systems in Britain and South Africa – A Brief Comparison', in *Journal of the Institution of Certificated Engineers*, South Africa, April 1956, p. 121).

[145] Aspinall, 'Technical College Educational Systems in Britain and South Africa', p. 118.

[146] *Ibid,* p. 121.

[147] A.W. Rowe, 'Presidential Address: Present Trends in Apprenticeship Training and Technical Education', in *The Journal of the South African Institution of Engineers,* July 1951, p. 365.

But this was not to be because, as Emmerson noted in Britain in 1957, 'new colleges of advanced technology offered a new qualification, the Dip.Tech, and more flexible criteria for progression to these and university engineering degree courses by-passed the London external degree which consequently declined to the point of extinction.[148] The Straszacker Commission did not pick up on this development but another Akademie man – Dr. Mönnig – did.

Dr. Mönnig was a founding member of the Faculty of Science and Technology of the *Akademie vir Wetenskap en Kuns*, being elected its Vice-Chairperson in 1941-2 and rising to become its Chairperson in 1948/49. He was also a member of the Akademie's overall governing board from 1942 for many years. He was a veterinarian who became the Chairman of the South African Scientific Advisory Council and Scientific Advisor to the Prime Minister. In 1964, he undertook a study tour of eight European countries as well as Canada, USA, Australia and New Zealand to survey the organisation of scientific research in these countries. He delivered his report in July 1964, entitled '*Die Verslag oor 'n Studie van die Organisasie van die Wetenskap'*[149] and included in it a recommendation which Pittendrigh believed set the scene for the change in the government's attitude towards the autonomy of the remaining colleges.[150] It read:

> Our system of technical colleges and universities does not provide a sufficient diversity of training facilities for all students according to their ability, especially in the technological field. The result is that a certain proportion of students who go to universities are not suitable for university training and are not enabled to get the training they should.
>
> Most other countries have a greater variety of training institutions and in New Zealand and Australia it is now intended to establish a number of technological colleges which will provide education at a level between that of the technical colleges and universities. It is considered important that there should be the possibility of transfer between these technological colleges and universities, which train students to the highest level and do research, should not introduce diploma courses, but that this should be the function of technological colleges.
>
> In South Africa it should be considered to raise the four most advanced technical colleges (at Pretoria, Johannesburg, Durban and Cape Town) to the level of such technological colleges.[151]

This recommendation would have been strengthened with the knowledge that full-time technician education had been introduced in the UK after the publication of the Percy Report in 1945, and in the USA in 1944, after the introduction of a scheme for the recognition or accreditation of engineering technicians by the Engineers' Council for Professional Development. The Goode Committee was later to highlight these developments, as well as to report that a conference of EUSEC (Engineering Societies of Western Europe and the USA) and the CEC (Conference of

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[148] G.S. Emmerson, *Engineering Education: A Social History*, Crane, Russak: New York, 1973, p. 305.

[149] Dr. Mönnig, 1964, 'Die Verslag oor 'n Studie van die Organisasie van die Wetenskap', cited by Dr. Alan Pittendrigh, *Technikons in South Africa,* p. 165. His status as a veterinarian and leading member of the Akademie vir Wetenskap en Kuns provided to me by Prof. Kapp on 15 July 2008. The Akademie 75, pp. 148-8 details how the Akademie vir Wetenskap en Kuns, together with Afrikaanse Handelsinstituut and the Economic Institute of the FAK, advised the government to set up the Economic Advisory Board, which was set up in 1959.

[150] Pittendrigh, *Technikons in South Africa,* p. 165.

[151] H.O. (Prof.) Mönnig, *Report on a Study of Scientific Organisation,* Published by Authority, Pretoria, July 1964, p. 27.

Engineering Institutions in the Commonwealth) had been held in 1954 and definitions of 'professional engineer' and 'engineering technician' had been adopted[152] – but no doubt Mönnig knew of them too.

There was also another pressure group in South Africa arguing for the same outcome. That was the Association of Technical Colleges, a body established in 1926 and consisting of the principals and chairmen of college councils.[153] Representatives met with the Minister of Education, Arts and Science on 11 November 1963 and endeavoured to persuade him to raise the status of the remaining colleges.[154]

The compounded effect of these engagements, reports and studies led to the Cabinet deciding in 1964 that the large colleges would retain their autonomy and that a new funding formula would be introduced to support them.[155] Their focus was to be primarily post-matriculation technical education as was outlined in a letter to the colleges on 17 December 1964:

(i) they apply themselves to advanced technical and teachers' training ranging from more or less std. X level to a level somewhat below that of university training; provided that, in relation to university training, greater emphasis be laid on the practical aspect;
(ii) they be permitted to provide for such part-time secondary education, mainly to adults of 18 years and over, as the Department may approve from time to time, but that no full-time secondary education be given; and that
(iii) appropriate legislation be passed to empower the Minister of Education, Arts and Science to ensure that colleges function in a manner which is in the interest of the Country[156]

Various pieces of legislation were duly passed, as is recounted below.

1967-68 – The advent of CATES

The Advanced Technical Education Act No. 40 of 1967 was passed under which the Witwatersrand, Cape, Pretoria and Natal technical colleges became Colleges of Advanced Technical Education (CATE). The newly built colleges at the Vaal Triangle, and that at Port Elizabeth, though still under the administration of the department, were added to this group.[157] In the following year the Indians Advanced Technical Education Act No. 12 of 1968 followed suit – modelled on the 1967 Act but permitting this college to provide full-time secondary education as well.[158]

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[152] Goode Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, Section para 2.1, p. 7.
[153] A.J. van Zyl, *The Optimum use of Manpower through education, training and management*, Pretoria College for Advanced Technical Education, Pretoria, South Africa, 1971 (Second edition 1972), p. 43).
[154] Van Zyl, *The Optimum use of Manpower through education, training and management*, p. 45.
[155] Van Zyl, *The Optimum use of Manpower through education, training and management*, p. 46.
[156] Departmental letter K2/5, 17 December 1964, cited by Pittendrigh, *Technikons in South Africa*, p. 166*)*
[157] Van Zyl, *The Optimum use of Manpower through education, training and management*, p. 46.
[158] Pittendrigh, *Technikons in South Africa,* p. 175.

> The passing of these pieces of legislation ushered in a new type of educational institution in South Africa – which consequentially gave the matriculation certificate elevated status, becoming as it did the 'horizontal barrier' between the secondary education and post-school (university and CATE) system.[159]

Pittendrigh also noted that people without matriculation could be admitted with ministerial approval, under Clause 12(b):

> There are people who have gained experience, without writing theoretical examinations, to such an extent that they can actually be regarded as technicians. If such a person wants to take up further study in his particular line, he will be allowed to do so without having a matriculation certificate. This is therefore an attempt to prevent the exclusion of people who do not have the matriculation certificate but who do have the knowledge and the skill.[160]

But for all that the final statement by the Minister would suggest otherwise. The passing of these Acts drew a horizontal line between secondary and tertiary education that was to be difficult to circumvent for aspirant climbers without a matriculation certificate – a problem that persists to the present day. By 1967 their post-secondary work had grown to 60 per cent from a figure of less than 10 per cent in 1954.[161]

Pittendrigh has summarised the main points made by the Minister when introducing the Bill's second reading:[162]

1. The four remaining technical colleges were the obvious institutions to become "virile" semi-autonomous educational bodies catering for education between secondary and university levels.
2. In such institutions provision would have to be made for stricter control in order that the State might have a hold on these semi-autonomous colleges for advanced technical education to prevent their "falling into their old ways again".
   They should mainly confine themselves to advanced technical and teacher training extending from more or less the Std X level to a level somewhat lower than the university level to that particular field, providing that such training is of a more practical nature than the corresponding university training.
3. That they should also provide such part-time training on the secondary level for adults from the age of 18 years and older as the education department may determine.
4. Provision be made for Afrikaans and English to be used on an equal basis.

One vehicle for coordination, introduced in 1969 by the Association of Technical Colleges was the concept of 'convener' CATEs. Under this arrangement, one of its members was allocated the task to lead the development of a particular set of programmes.[163] To optimise coordination between the CATEs and industry the Department of Education, Arts and Science built on good practices that had been set up by various individual colleges. On 19 December, 1968 it sent out a circular to all CATEs supporting the establishment of consultative committees for each study

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[159] Pittendrigh, *Technikons in South Africa,* p. 183, quoting from Van Wyk de Vries Commission, RP 25 – 1974, para 14.6-8.
[160] *Hansard, 1967, cols 1390-1391.*
[161] Pittendrigh, *Technikons in South Africa,* p. 160.
[162] Pittendrigh, *Technikons in South Africa,* pp. 170-1.
[163] Pittendrigh, *Technikons in South Africa,* p. 177.

direction.[164] S.C.M. Naude, Akademie member, who became the Director of the Witwatersrand College in September 1965 is credited with having instituted such committees some years earlier (he was also responsible for ensuring that the institution became bilingual).[165] These committees were valued by industry, as was reported by I. R. G. Stephen in discussion on the subject:[166]

> Industry itself plays a big part in technician training through a system of Advisory Committees, associated with each of the six Colleges for Advanced Technical Education. These Advisory Committees, one of each general direction of training, are drawn from the ranks of industry, and enjoy official recognition by the Department of Higher Education. Their function is to advise the Colleges on technical aspects of technician training, syllabus content, etc.[167]

These Advisory Committees, unlike the Apprenticeship Committees, were not statutory bodies and their membership was made up of 'industry' and College representatives alone. There were no formally nominated trade union or technician association members. Initially, there was no formal oversight of the workplace component of the training. The role of the colleges was therefore greatly elevated, and that of organised labour downgraded. This was even more so when, following representations from the colleges, section 28 was added which gave their association, the Association of Technical Colleges, statutory status.[168] This organised voice of the provider community continued to play a powerful role as Pittendrigh's account details.

Consequent employer responses

The Post Office swings into action

The reason why the Post Office had not initially supported the programme was explained by Dr. G.F. Boyce in the following way:[169]

> … pupils receive one or two sandwich courses of their vocational training leading to the National Diploma for Technicians … and thereafter at the Post Office Telecommunications College and further practical training on-the-job under the supervision of field training officers. This is not a vote of no confidence … that the latter sandwich courses are held at the Post Office Telecommunication College but because of the specialised equipment and techniques and exceptionally expensive equipment required for the co-ordination of academic and practical training.

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[164] Pittendrigh, *Technikons in South Africa,* p. 176.

[165] J. Lurie, *Technikon Witwatersrand – A History 1925 – 2000,* Fishwicks, South Africa, 2000, p. 111. "*the College is a bilingual institution; therefore letters must appear in both languages; Afrikaans classes must be established; justice must be done to the Afrikaans-speaking part of the population.")*

[165] He was the first appointee to the Directorship after the 1948 National Party election and was the first Afrikaans-speaking Director. Ironically he was also reported to the Akademie vir Wetenskap en Kuns for failing to deliver mechanical arithmetic in Afrikaans. Naude countered by reporting back to the Akademie all the steps he had taken to rectify the situation.

[166] I.R.G. Stephen, contribution to discussion on Campbell Pitt's paper, 'Technician's - A Review'*,* Supplement to The South African Mechanical Engineer, July 1971, pp. 342-3.

[167] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 297.

[168] Pittendrigh, *Technikons in South Africa,* p. 170.

[169] Dr. G.F. Boyce, in discussion on the paper presented by Campbell Pitt, *Technicians – A Review,* p. 290.

This desire to maintain workplace specificity in training was not unique to the Post Office or to South Africa. It was being experienced internationally, as the engineers knew. For instance, the question had been discussed at the first Joint Engineering Conference in London in 1951 where the Institutions of Civil Engineers, Mechanical Engineers and Electrical Engineers had met and to which South African institutions had sent representatives. One of the papers, presented by H.L. Haslegrave addressed this issue:[170]

> Although there has been much discussion, fostered by the professional engineering institutions, of education for technicians, technical colleges have had to await definite pronouncements by industry, defining technicians and their needs. There are difficulties in providing special courses because of the diversity of types and needs and irregular distribution of numbers of students.

But these concerns were managed and the first three-year Telecommunications Certificate programme was introduced in 1958 and the four-year Telecommunications Diploma programme in 1961.[171]

Having ironed out their earlier issues, the Post Office embraced the new approach as the following advertisement, placed in a number of newspapers, illustrates:

POST OFFICE DRIVE FOR TECHNICIANS

The Department of Posts and Telegraphs has launched a recruiting programme for technical staff to help in the massive task of converting telephones from manual to automatic exchange working. …

Full time classes

The men who must have either their senior certificate or a junior certificate with senior mathematics and physics, will be given a full-time crash course starting in January each year, sandwiched between periods of practical training.

These intensive courses are held at technical colleges and at the department central training centre.[172]

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[170] ??? INITIAL?? Haslegrave, 'The Contribution of the British Technical Colleges to Engineering Education', in *Proceedings of the Joint Engineering Conference*, 1951, Arranged by the Institution of Civil Engineers, The Institution of Mechanical Engineers and The Institution of Electrical Engineers, Jointly published by the three Institutions in London, 1951, p. 270.

[171] Straszacker Report, *Commission of enquiry into the method of training for university degrees in engineering. Part I & Part II*, Department of Education, Arts and Sciences, South Africa, 1964, Table 8-5, page 144.

[172] The Star's Pretoria Bureau, 14 November 1963.

It seems that the Post Office was somewhat chagrined to have discovered that it was behind the South African Railway and Harbours Administration whose earlier advertisements had been read by the Chief Engineer of the Post Office and which prompted him to set the above advertisement in motion. In a note to his staff he wrote:[173]

> Newspaper cuttings from 'Die Vaderland' dated 17th July, 1963 in connection with training of technicians in South Africa and the training scheme which is applied by the South African Railway and Harbours Administration, are attached for your information. / It is considered that similar publicity regarding the technical training of recruits for the Department will greatly benefit our annual recruiting drives and it is accordingly recommended that the matter be submitted to the Postmaster-General for consideration. … It is interesting to note that the Railway Administration bears all the costs involved in their training scheme.

Clearly there was a degree of competition between these public agencies for training recruits – but this was a fray that the Post Office had to enter, albeit handicapped by the fact that the South African Police and the South African Railways offered higher initial wages,[174] and in spite of the fact that potential new recruits were often discouraged by the requirement that they accept transfers after they qualified. In 1961 there was an investigation into the high level of resignations of young officials from the Post Office which found that:[175]

> … a large percentage preferred to resign rather than to be transferred. Many came from poor households where the monetary contribution made by the son was very necessary for the housekeeping.

Rod Harker was taken on as an apprentice telephone electrician in 1957 in Pietermaritzburg but was changed to a pupil technician in 1958. Between 1958-1960 he trained as a pupil technician and obtained the National Diploma for Technicians. In 1961, he was appointed as Telecommunications Technician and obtained the National Diploma for Technicians (Advanced). He worked as a Technician on Auto maintenance in Pietermaritzburg for two years.

The programmes were introduced a little later in Cape Town, according to Mike Case:

> I was taken on as a pupil technician in 1960. We were the first in Cape Town of the Pupil Techs. … At the end of '59 the apprentice programme stopped, and then they became technicians or pupil techs depending on where they were. … We then started in 1960, for the first six months we were shown around the place and were being checked and things like that …
>
> And then we went to the old Cape Tech – technical college – T1. Those of us who hit the jackpot in T1, because there were 38 of us in the class and only about a dozen of us passed everything – we could then go on to T2. The rest of the chaps went on a more specialised programme…. We

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[173] Telkom Archives, DPT, ISIA / (30) / 8217 / 72, 9 August, 1963

[174] C.F. Stofberg, 'The History of the Post Office with particular reference to its internal and external problems and role of telecommunication development in the South African society between 1945 and 1968', UNISA, Ph. D thesis, November 1999, p. 129. Note, on page 140 Stofberg notes that in April 1964 an agreement was made between the PO and the Railways in terms of which neither would employ any workers from the other institution. 'This would eliminate the wasteful wrangling between the two … The technicians were badly incensed by this new restriction. They argued that they, because of this, would be bound to the PO for the rest of their lives. The Railways did, in fact, pay more, but it became clear that a PO career would be more profitable in the long run than with the Railways.' Die Volksblad, 21/4/1964.

[175] DPT, 1D6/2781/77, vol. 1. Investigation into training methods and procedures and causes leading to the resignation of young officials, cited in Stofberg, 'The History of the Post Office', p. 129.

> did T2, then we went to work for another six months. It was a very organised programme, you weren't just chucked in. In fact those of us in the general section were either put on auto's as well as carriers. We were exposed to both. We had a month on auto's, a month on carriers, a month on etc., etc. Also, I landed up at Malmesbury for three months on the country carriers. … After that we went back and did our T3.[176]

But, as it happened, neither Rod Harker nor Mike Case ended up as technicians. Both managed to secure bursaries from the Post Office and went on to study at university. Here is Mike Case's story:

> And while I was busy with my T3 – which was at Baragwanath (T3 and T4 was at Baragwanath) – it was a very good course as well – I decided I must make some progress and see about asking for a bursary through the Public Service Commission. Now at that point a very interesting thing developed. At that point, the guy who was Chief Engineer, DPJ. Retief decided he wanted to create a Post Office Bursary Scheme for his technicians. And the Public Service Scheme came back to him and said, 'Oh, we've got a bursary scheme'. He said, 'Yes, but you don't give it to my technicians.'[177]

D.P.J. Retief won the argument and Mike Case was one of the first to benefit.

Rod Harker was another. Between 1963 and 1966 he attended the University of Natal on a Post Office bursary and graduated with a BSc. (Eng.) Electrical, Light Current (Cum Laude) degree. He was promoted to Second Grade Technician while studying. Then after he qualified, he became the Engineer in charge of the Microwave Network for Natal. Later he went back and completed his M.Sc. (Eng.) degree with a thesis on Microwave Testing. His CV announces that this thesis is still used as a standard text at the Departmental Training Colleges in the RSA, Zimbabwe and Zambia.

Noticeably, neither man was given any credit for his technician studies at university. This was contrary to the recommendations of the De Villiers Report and the Akademie Report and calls for an explanation.

Others climb on the band wagon

Eskom welcomed the new training scheme in 1963, according to Battison:[178]

> As an alternative, trainee draughtsmen may be recruited from school-leaving youths of Standards X grading with the requisite aptitude for drawing and design and, for preference, with the National Senior Certificate (Technology) acquired at a Trade School or Technical High School. Subsequent technical training can be provided by means of the recently instituted Technicians' Sandwich Training Course in which the pupil spends approximately five months each year for four years on full-time attendance and instruction at a State Technical college equipped with ample engineering laboratory facilities and the remainder of each year in the drawing office, with part-time classes. The goal in this case is the National Diploma for Engineering Technicians, which, following another year or more of part-time study, will lead to a National Diploma of Technology. It is expected that

[176] Interview with Mike Case, 29 April 2008.

[177] Interview with Mike Case, 29 April 2008.

[178] P.L Battison, Author's Reply to Discussion, 'Drawing Office Organisation'*, The Certificated Engineer*, 1963, p. 349.

this diploma will shortly be considered as being only a little below the standard of study required for a University degree.

SEIFSA, like the Post Office, was initially a little cautious about the new scheme:[179]

> Schedules of training which are currently prescribed and which sometimes are obsolescent will need to be reviewed in the light of technological changes, while there is a growing opinion that an intensive system of training on a "sandwich" or some other workable basis in conjunction with existing technical colleges or such technological schools which are to be developed, will provide a solution.

But SEIFSA came to embrace it as part of the work of a dedicated Education and Training section which they set up, together with sections for Administration and Economics, to strengthen the Association as a whole.[180] As part of their Education and Training endeavours they initiated, in 1963, a fund to support students:[181]

> In 1963, having regard to the need to further training in all its aspects, SEIFSA established a fund known as the SEIFSA Technological Fund. This fund receives contributions from employers, based on the number of their workers, the monies so received being administered by a Board for the promotion of training by various means, including the granting of bursaries, sponsorship of training and the funding of studies. Due to the acute shortage of technicians, that is of those individuals who are neither graduate engineers nor artisans, but who are increasingly essential to modern industry in their intermediary position, it was decided, in conjunction with the Department of Education, Arts and Science, to develop the training of this category of employee, which step incidentally provides an outlet for more advanced employment of persons with suitable qualifications, including artisans, apprentices and other employees in the metal industries who have the necessary background.
>
> A series of technician courses has been instituted at the various technical colleges and at present covers the following spheres: Electrical Engineering (heavy current); Foundry Engineering; Instrumentation and Control; Mechanical Engineering; Production Engineering; Radio and Electronics; Plastics Engineering.
>
> The Technological Fund has provided bursaries to the technical colleges, including hostel accommodation for youths from rural centres. It is believed that this policy will help to meet the essential and growing need for this type of employee who becomes ever more important with technological advancement, not only in the metal industries but in other sectors of the economy.
>
> It is estimated that South Africa's overall needs in this field will require an intake of at least 1,000 persons per annum, when the existing serious shortfall has been met.
>
> Training schemes are also in being or under consideration by the Education and Training Division for intensive training of draughtsmen and foremen.

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[179] E. Drummond, *Organisation and Structure of the Metal and Engineering Industries in the Republic of South Africa,* 1967, private copy of Dave Carson, SEIFSA, first paragraph p. 22, remaining text p. 30.

[180] E. Drummond, *Organisation and Structure of the Metal and Engineering Industries in the Republic of South Africa*, published by SEIFSA, Quarto Press (Pty) Ltd., 1967, p. 37.

[181] E. Drummond, *Organisation and Structure of the Metal and Engineering Industries,* p. 37; p. 73:

In 1964 SEIFSA employed Harry Aspinall to head up their Education and Training division. He outlined their initiatives at a discussion on the issue:[182]

> The emphasis on the need for sound systematic practical training conducted in conjunction with college tuition wherever possible is justified. Under its technician bursary scheme SEIFSA has introduced planned works' training schemes in the fields of mechanical, electrical, foundry engineering, etc. More attention is likely to be paid by employers to the planned practical training of technicians and technician engineers with the introduction by the Federation of the Training Plan on a levy/grant basis.

The levy/grant scheme to which he refers here had become possible with the passing of Amendments to the Industrial Conciliation Act in 1956, as was outlined by C.J. Akton (who was himself to take over as SEIFSA Head of Training when Aspinall retired):[183]

> The SEIFSA Education and Training Plan is in accordance with the Amendment to the Industrial Conciliation Act which provides for: 'An Agreement relating to the training of employees may be declared binding in an area additional to that in respect of which the industrial council concerned is registered, or in respect of any undertaking, industry, trade or occupation in any area; to provide that training schemes arrived at by employers and not related to any agreement may be applied in respect of the undertaking, industry, trade or occupation in which such employers are engaged, in the area in which they are so engaged; and to provide for other incidental matters'. (Preamble to the Act).
>
> The agreement which has been reached by the Metal and Engineering Industries is basically a levy/grant system. / Employers will pay into a central fund a levy of R7.80 per month per artisan employed or per employee engaged in certain categories of work. It is estimated that the fund will collect, through the Industrial Council, 3.2 million rand per annum. / The grant procedure that will be followed is based on well-established categories of labour i.e.; Artisans, Technicians and Supervisory management. Grants are made when the employee obtains a qualification. … The award is made to the employer.
>
> The SEIFSA Education and Training Plan will encourage practical interest in the education and training of employees. It will also enable all firms in the group to assume an appropriate share in the responsibility for the training of personnel.

This financing arrangement had been necessitated because so many employers preferred to recruit directly from the labour market as outlined by Campbell Pitt:[184]

> Unfortunately, there are many pirates who do no training themselves nor do they contribute to it, but selectively entice those trained by others to their employ / Mr. Akton has given details of the Industrial Conciliation Act which enables employer associations to impose a levy for training on their members. This is a partial solution only as it does not include other employers and association who do no training. It would require an act similar to the Industrial Training Act of Britain to include all employers. This Act also provides finance for educational institutions. However, it is an expensive method and possibly too expensive for the Republic without considerable modification.

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[182] H.T. Aspinall, in discussion on a paper presented by L.T. Campbell Pitt, 'Technicians - A Review', in *The South African Mechanical Engineer*, September 1970, p. 294.

[183] C.J. Akton, in discussion on a paper presented by L.T. Campbell Pitt, 'Technicians - A Review', p. 301.

[184] L.T. Campbell Pitt, 'Technicians – A Review', *The South African Mechanical Engineer*, July 1971, p. 311.

The Federation of Civil Engineering Contractors had also introduced a training levy.[185] These funds were so much admired by organised engineers that the FSPE Conference held in 1973 resolved that:

> Resolution 2.1
> The existing Industrial Conciliation Act provides a working basis for the establishing of a training levy on groups of employers in an industry and the Conference recommends that FSPE encourage more groups to introduce such a levy on their members, as already established by SEIFSA and the Federation of Civil Engineering Contractors. The Conference notes further that the Act provides for the levy also on employers who are not members of an organised group in an industry.
>
> Resolution 2.2
> The Conference recommends that FSPE approach the Department of Labour and offer to help with involving other industries in these training levy schemes.[186]

The Implementation Committee established after the Conference made the offer to the Department of Labour as mandated.[187]

A real sign of the pressure that employers were under was their contemplation of employing women as pupil technicians – as illustrated by the Post Office:[188]

> There is no doubt in my mind that we will have to re-evaluate our requirements for filling of male posts to establish whether these posts or a number of them could not perhaps be filled with equal success by female incumbents. It is a fact, for instance, that many technicians and engineers are employed on duties which could be performed equally well by women with the same academic and practical training. Of course, women resign to get married, but do we have to lose their services under such circumstances when it is common knowledge that most women continue working for a year or two after their marriage? In other words, can a Post Office run on business lines afford to follow blindly the rules and practices which have been in force till now, or should it redesign such rules and practices to suit its changed needs in much changed circumstances?
>
> The shift to running on 'business lines' which prompted this question clearly derived from new financial pressures following the privatisation drives at the time.

New drama unfolds

One might naïvely have assumed that at this point the issue of technicians was settled – that they were on their way with bright employment prospects. But such a conclusion fails to take account of the collective reactions of those most directly affected by this 'new boy on the block' – the artisans and the engineers themselves. It is to these reactions that we now turn:

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[185] Department of National Education, (Goode) Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, 1978, paragraph 8.4.2, p. 93.

[186] The Federation of Societies of Professional Engineers, 'Report of the Implementation Committee, established after the Sixth Conference on the Education and Training of Engineers: The Education and Training of Engineering Technicians', report dated 27 June 1975, pp. 2-3.

[187] The Federation of Societies of Professional Engineers, 'Report of the Implementation Committee', report dated 27 June 1975, p. 3.

[188] Note from Deputy Postmaster General, Staff and Posts, 17 October 1968, to the Postmaster General, Telkom Archives, 1E1B/30/5296/75.

Trade unions' view of technicians

There was not a unified response from the craft unions to the advent of 'technicians'.

As has already been shown, the Post Office 'company' union, SATTA (or SATA as it became in 1956[189]) was centrally involved in the elevation of their artisan members to technicians, indeed it had been amongst the first advocates of this new classification. This step was enabled by the broad membership scope of the union, which, until 1956, ranged vertically from temporary workers through to engineers. In 1956 the engineers broke away from the union, giving as one of their reasons that it had become a 'technician's union'.[190] For this union, vertical progression opportunities were materially desirable for their members, and they were happy to support them because those who advanced remained members after their promotion.

This was not the case for horizontally discrete occupational groupings like the artisan unions, or even the pseudo-artisan unions which embraced the upper echelons of (white) operators as well as artisans. Workers who progressed beyond artisan essentially progressed beyond the reach of the union into management. Here is how Ben Nicholson, in the SAEWA, viewed the situation:

> It was indistinct at first, very indistinct, because when people went from NTC III to ATC I they were still employed as artisans – which was the main thing as far as we were concerned. They were treated as (artisans) and were union members with an ATC I. They might have considered themselves better than most, but they were still on the artisan route. … We had many, well quite a number of them …. And then they began, as you say, to stream them.[191]

Some of the technicians began to break away from their craft roots at an early stage. Bill Bergman's experience is illustrative here. When he became a Supervisor at Eskom he joined the Association of Supervisory Electrical Engineers (ASEE) which, according to an account prepared by the SAIEE was formed in 1958[192] but may well have been much earlier as both Bill himself surmised ("*perhaps even with roots back to Britain*"[193]) and which is suggested by a comment made to a meeting of engineers in October 1945:[194]

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[189] In 1956 the union resolved to change its name to the South African Telecommunications Association (SATA), because the Central Executive Committee felt that it was necessary to embrace 'not only the telephone, telegraph or other apparatus fitted in the home, the office or the farm, but also all of the complicated equipment required to give satisfactory service from these instruments', 'Nineteenth Association Conference Opening Proceedings', *Live Wire*, Official Organ of the SATA, December 1956, p. 9.

[190] *Abridged History of the Society for Telkom Engineers*, provided to me by Neil Jooste, President, Society of Telkom Engineers, 12 November 2007, p. 1.

[191] Interview with Ben Nicholson, 15 August 2008.

[192] Document prepared by Mike Crouch and Les James of SAIEE, headed 'The Merger of the SAIETE and the SAIEE and the establishment of the Jack Yelland Bursary Fund' – copy given to me by M. Crouch.

[193] Interview with Bill Bergman, 21 November 2007.

[194] *Engineering Graduates Association (EGA) Bulletin,* Vol. 2, No. 2 October 1945, p.11.

> A step in the right direction, however, and a link in the chain between labour and management, was the recent formation of an association of supervisory engineers. Co-operation between all sections was the first essential for progress.

Either way, it is apparent that a group of artisans broke away from their craft union base and organised as a separate interest group from a fairly early stage. Crankshaw[195] has shown that many white artisans rose to become 'semi-professionals' in the 1960s and beyond.

When I asked Ben to what he attributed the development of 'technicians', he surprisingly absolved business, whom he believed 'was very happy with top quality artisans, which (is what) these people were considered to be – top quality artisans'. Instead he fingered the technical colleges:

> This is where the technical colleges grabbed it, because it was something, they could use to influence people to come to the colleges. At the time, prior to that, colleges had to struggle to keep up with the number of people they required to be sustainable. So, I think you could say that the technical colleges were the harbingers of 'we want superior type people' because we can then get people in to teach.[196]

Engineers' views of technicians

The engineers, through their various societies, were very interested in the question of 'technicians'. Most of the traditional engineering societies had for years permitted those who had come up through the ranks into membership, usually after undertaking some further entry examination[197] – so the question affected them directly. It was the SA Institute of Mechanical Engineers that led the field. It felt that the issue was so important that it proposed to an umbrella body of engineering societies, the Professional Engineers' Joint Committee (PEJC),[198] on 27 October, 1967 that: 'Member societies … provide copies of their Constitutions … to Mr. Campbell Pitt who would prepare a recommendation on the matter'.[199] *That this was around the same time that the Advanced Technical Education Act, 1967 (Act No. 40 of 1967) was passed was surely not accidental.*

Campbell Pitt was a leading figure in the SA Institution of Mechanical Engineers.[200] In 1951, he was elected as one of two Vice-Presidents, and in 1953 he rose to President of the Institution. In his Presidential Address Campbell Pitt was to make the point that:[201]

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[195] O. Crankshaw, 'Changes in the Racial Division of Labour during the Apartheid Era', *Journal of Southern African Studies,* Vol. 22, No. 4, December, 1996, p. 652.
[196] Interview with Ben Nicholson, 15 August 2008.
[197] As detailed in Chapter 10.
[198] Formed on 21 November 1960 – a Committee formed to advance their collective quest for legislation to protect the status of professional engineers – see next Chapter.
[199] Minutes PEJC, ECSA, Item 6.
[200] Information in this paragraph is taken from J. Ralph Draper, *The Engineer's Contribution: A history of the South African Institution of Mechanical Engineers, 1892-1967,* Kelvin House, Johannesburg, Northern Cape Printers, Kimberley, 1967, p. 62 and pp. 238-9.
[201] Quoted in Draper, *The Engineer's Contribution,* p. 238.

> The principal reason for apprenticeship is to train artisans and not to train higher or more technical grades such as technicians and engineers. The material we draw apprentices from is mainly suitable for trade instruction. We are apt to deplore the fact that a much higher percentage of apprentices do not make at least technician grade. This we should have realized 40 years ago. We should have designed our training to create good artisans from the great majority, giving advanced training only to the few.

He made repeated efforts in the PEJC to advance the discussion on 'technicians' but engineers were focused on their own affairs so little progress was made for ten meetings, although the item remained on the agenda and a brief discussion was clearly held on each occasion.

Things began to move up a gear in August 1968, when Campbell Pitt tabled his draft recommendations and it was agreed that these be circulated to the Institutions for consideration.[202] Then, later in the same month, on 23 August, it was decided to form a Committee to consider the matter:

> **Minutes of PEJC, 23 August 1968**
> 5. A memorandum from Mr. Campbell Pitt to the President on this matter was tabled.
>
> Dr. Roux stated that the question of Technicians was a very important matter and he strongly recommended that PEJC establish a Committee to deal with this question. The Department of Higher Education and employers of Technicians should also be consulted and brought into the discussion at an early stage.
>
> Several members spoke in support of this recommendation and it was agreed that a Committee be appointed consisting of Mr. L.T. Campbell Pitt (Convener) and Dr. Loubser, Mr. Jackson, Mr. Loubser and Mr. Goode with the power to co-opt further members as required. Members also agreed that Mr. Aspinall should be co-opted to this Committee.[203]

The members of this committee were all key players in the events that unfolded: Campbell Pitt and Aspinall have already been introduced; Dr. Roux and Dr. Loubser were leading members of the *Akademie vir Wetenskap en Kuns*[204] which, as seen above, had undertaken its own research on the matter in 1953. Loubser was Raymond Loubser, son of Dr. M.M. Loubser.[205]

Finally, in 1970 attention began to be paid to the question. Campbell Pitt's memorandum was published as a paper, headed '*Technicians – A Review*'[206] which was printed and widely circulated. The SAIEE for instance received a notice from the Federation of Societies of

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[202] Minutes of PEJC, ECSA, 12 August 1968.
[203] Minutes of PEJC, ECSA, 23 August 1968.
[204] Dr. A.J.A. Roux was a founder member and first secretary, and then later in 1951-2, the Chairman and Dr. M. M. Loubser was Deputy Chairperson in 1951-3, of the 'Raad van die Fakulteit natuurwetenskap en Tegniek' of the Akademie vir Wetenskap en Kuns, as listed in the *Feesalbum, 1909 – 1959*, In opdrag van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns, Pretoria: J.L. Van Schaik, Bpk, 1959, p. 159.
[205] See introductory note to ECSA history given on ECSA website – www.ecsa.co.za, accessed 12 December 2019.
[206] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 282.

Professional Engineers (FSPE - previously the PEJC) that 'the South African Institution of Mechanical Engineers had arranged for reprints of the above paper to be made available to Institutes at a maximum price of 34 cents per reprint and asking to be advised of the number the Institute would require'.[207]

The South African Institution of Mechanical Engineers then convened a meeting in September 1970 to which it invited all interested parties. Both the paper and the discussion are reproduced in full in the transactions of the Institution and give insight into the concerns and objectives of the engineers. It is clear that there were a great many differences and unresolved issues at this time which can be grouped under the following headings:

1. *What precisely is a 'Technician'?*
2. *How many levels of technicians are there and what should they be called?*
3. *Desired ratio of technicians to engineers?*
4. *How should technicians be educated and trained?*
5. *Who should be trained?*
6. *Should progression pathways to professional engineer be established?*
7. *Should technicians be given professional status? If yes, then what status?*

From the records of subsequent discussions, it is evident that there was a lack of consensus, and at times contestation. The main issues are discussed briefly:

1. *Definition of a technician*

At the beginning of his paper Campbell Pitt reproduced the Straszacker Commission definition for a technician, viz.:

> An *engineering technician* is one who is qualified by specialist technical and practical training to work under the general direction of a professional engineer. Consequently, he will require an education which, whilst not so broad nor as fundamental as that of the professional engineer, includes an adequate knowledge of Mathematics and Applied Science related to his own specialty.[208]

H.T. Aspinall disagreed:

> In the definition of an engineering technician as given in the report of the Straszacker Commission it is stated that the engineering technician is one who is trained to work under the direction of a professional engineer. The definition is somewhat restricted as technicians are also employed in responsible posts in such fields as estimating, servicing, etc.; these technicians act in the capacity of section leadership in large works, branch and sales managers, etc. They have the necessary education and technical knowledge to enable them to make decisions without the necessity for advice from a professional engineer.[209]

2. *How many levels of technicians are there and what should they be called?*

On this issue Campbell Pitt argued that technicians could be classified into three main categories:

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[207] SAIEE, Council Meeting, 2 October 1970, Item 9.2, p. 5.

[208] Straszacker Commission, p. 282.

[209] Straszacker Commission, p. 294.

1. Those with the manual skill of an artisan but with a better technical education. They are the *artisan technicians*.
2. Those with considerable manual skill but with a high level of technical knowledge through education and training. They are *technicians* whose only adjectival description is that of his field.
3. Those who have attained a very high level of technical knowledge and who have widened that knowledge, together with practical training and experience at a high level. They are *technician engineers.*[210]

I.R.G. Stephen, from the mining sector, responded with a general comment which, whilst generally acceptable, did not resolve the issue:

> The need for the technician grade has been forced on industry by the rapid technological development since World War II. There are many technician grades between the artisan and the engineer, and as technology advances the number of grades will increase.[211]

On the detail, there was little agreement. Bullen, from the South African Railways, argued that the boundaries between different ranks were blurred because:

> In practice, it is seldom if ever possible to differentiate between their duties. There is, however, one essential difference in that the technician is doing what he has been trained to do and what is essentially his job, whereas in the case of the graduate, the work is merely the practical extension of his academic training which he must undergo as an engineer-in-training before he can become registered as a professional engineer and aspire to promotion to a designated post.[212]

However, Professor D. W. de Vos, a university man, felt that it was possible to draw more specific distinctions and argued that:

> To try to cram three grades of technician between the artisan – even at Standard 8 level, let alone NTC III level – and the professional engineer at the BSc engineering or matric-plus-four-year-level, hardly appears to be logical. Two grades ought to suffice, viz:
> 1. the undesignated technician with a functional description, e.g. draughtsman, laboratory assistant, survey assistant, etc. at Std 8+2 year's level. The term 'artisan technician' is too restrictive for this group.
> 2. The technician proper, at Std 10 +/- 2 years but preferably Std 8 + 4 years level, with or without an adjectival description such as laboratory technician, survey technician, radio-technician.
>
> If there must be a third grade, he should be designated a '*Senior Technician'* or '*Master Technician'* - but *not* '*Technician Engineer*'. This latter title immediately relegates the holder to the position of a second-class engineer.[213]

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Dr. R. S. Loubser agreed with Prof. de Vos (both Akademie men)

> The use of this term (Technician Engineer) to describe technicians at the level of the National Diploma for technicians or the Higher Diploma is strongly opposed in spite of many overseas examples to the contrary.[214]

3. Ratio of technicians to artisans and engineers?

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[210] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 283.
[211] *Ibid,* p. 297.
[212] *Ibid,* p. 296.
[213] *Ibid,* p. 289.
[214] *Ibid,* p. 296.

This was a matter that Campbell Pitt felt reluctant to make a definitive statement on, because, in his view, it depended on a number of factors – the first being the resolution of the previous question:

> If technicians trained through a technician sandwich educational and practical course and qualified by obtaining a National Diploma for Technicians only are included, then there are at the present time approximately half as many technicians who qualify per annum as graduate engineers from SA universities. If the higher certificates and diplomas are awarded on successful completion of a 'block release' course, this ratio is much greater.[215]

He proceeded to give the numbers of graduates from each kind of programme for the years 1967, 1968 and 1969. He then cited the findings of a British Report of 1966 which showed different ratios for different industrial sectors. He concluded this section of his paper with the following comment:

> The required ratio for South Africa is dependent on many factors which include:
> 1. The levels and numbers required for each industry and service.
> 2. The numbers of high-level technicians who can relieve professional engineers of duties at present undertaken by them such as artisan supervision, routine design, junior management and other duties which require specialist education and training in a narrower field than of the professional engineer.
>
> At the present time, there is some but insufficient appreciation that more better-educated and trained technicians are necessary. It is only by this means, that the shortage causing an imbalance which results in the professional engineer devoting time to work that technicians should be doing so that much of the education and training of man professional engineers is wasted. In fact, they become technicians. In any case a well-qualified technician should be more effective in his narrower but specialised field than the engineer who has wider responsibilities.[216]

J. W. Bullen from the South African Railways, elaborated on this view:

> This is invariably quoted in papers dealing with technicians, but attention must be drawn to the fact that such figures will be meaningless, or even misleading, unless they are properly qualified.
>
> First of all, it is necessary to qualify the engineering side of the ratio. To take all engineers into account is wrong because the upper echelon has little or nothing to do with technicians. The technicians are essentially there as aides to the lower placed engineers. The need to qualify the technician side of the ratio is even more important because of the prevailing uncertainly as to exactly who is a technician and who is not. After all the typist in an engineering office is truly an engineering aide and could logically be called a technician.[217]

Only Boyce, from the Post Office, was precise in his estimation of the desired ratio:

> At present the ratio of technicians to engineers in the Post Office is about 10:1. This figure is not considered ideal but is due 'largely' to a shortage of engineers. A figure of 7:1 is considered more reasonable. This figure seems to be high when compared with the table quoted in the paper, but this may be due to the proportion of work in the Post Office requiring the service of technicians.[218]

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[215] *Ibid,* p. 284.
[216] *Ibid,* p. 285.
[217] *Ibid,* p. 295.
[218] *Ibid.*

4. *How should technicians be educated and trained?*

Campbell Pitt started his presentation by remarking:

> … although technicians are equally important in all fields, lack of proper recognition makes systematic vocation education and training more difficult because vocation education is obtained in an educational institution, whereas training is by the employer and it is important that there should be a maximum co-ordination.[219]

But starting at this end of the telescope – with the technician – and then moving to their required education and training, proved to be too difficult given the wide array of different practitioners under the 'technician' umbrella. The telescope was swung around, and the question was addressed through the education and training lens – much as some engineers were in the process of trying to do with regards to university degrees as shall be seen in the next Chapter. Campbell Pitt even conceded that his tripartite classification of technicians rested on this approach:

> My classification of the first two categories (of technicians) was influenced by the two methods of education and training viz: - one by a Technical College and apprenticeship under the Apprenticeship Act, and the other by a CATE and practical training determined solely by the employer. [220]

His third classification of Technician Engineer was linked to his proposal that a National Higher Diploma be introduced. On the former two, although he strongly states that '(i)t does not mean that the first is junior to the second. It is the route to technician status only that differs.'[221] However, he somewhat contradicted this assertion when he evaluated each route.

The first route, based on apprenticeship, would mean a person commenced with a trade qualification (usually NTC II and trade test) and proceeded to complete a National Technical Certificate III, ATC I (later the NTC IV) or ATC II (or NTC V) and finally, after passing at least six subjects at this level being awarded a National Engineering Diploma or NED[222] – with each subject being completed during a 12 week 'block release' programme. This route was, in his view, inadequate for the following reasons:

1. The Technical College staff are usually insufficiently specialised and sometimes insufficiently qualified for advanced post matriculation tuition.
2. These Colleges lack laboratory equipment for advanced work and often have insufficient for demonstration purposes at lower levels.
3. The full-time study period is short, being only ten weeks per annum.
4. The courses are a continuation of a general course and are not directed towards a course designed for a specialised technician.

> (I)t should be appreciated that the NTC qualifications cover the syllabuses very thinly because of time available for lectures and study.'[223]

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[219] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 282.
[220] *Ibid,* p. 309.
[221] *Ibid,* p. 309.
[222] I*bid,* p. 285
[223] *Ibid,* p. 285.

That these obstacles could have been overcome with concerted effort was not considered at the time. Instead it was juxtaposed to the second route.

In contrast the second route, the four-year National Diploma for Technicians (NDT), in his view was clearly preferable. It was the 'sandwich' system where theory programmes were given during an 18 week block each year for four years – giving extra time for the theory to be more adequately addressed. Furthermore:

> (It) has an entry of Standard 10 and usually requires a maximum four eighteen-week semesters to enable a student to qualify. Moreover, it is at a CATE where teaching staff and laboratory facilities are far superior to those of Technical Colleges. The CATE courses too are designed for a specialist technician at a high level. (p. 285)

In view of these advantages, Campbell Pitt advocated that 'apprentices who pass NTC III should be, as far as possible, sent to a 'sandwich course' rather than continue on a block release course',[224] although he did appreciate the difficulty that some boys faced in finding an employer willing to make a 'sandwich' course opportunity available.[225] He was however particularly opposed to artisans who had 'qualified' by the effluxion of time only, becoming technicians. 'Technicians should be those who have qualified in a grade through education and training and not persons whose working experience enables them to qualify, as in the case for artisans, by the effluxion of time only.'[226]

But whilst there was agreement about the entry level, there was disagreement about the route thereafter. Prof. de Vos argued that as the object of the exercise was to train a large number of technicians:

> The standard of the National Diploma for Technicians would already appear to be too high for this objective. … Only 25 per cent of the present intake of learner technicians, of whom apparently the majority are a cut above NTC III, succeed in obtaining the NDT. … The logical reservoirs for learner technicians are surely the successful NTC III candidates of whom there were 2400 in 1968 and 2800 in 1969, as well as the 8000 boys who passed Std 10 without matriculation exemption in 1968. If 50 per cent of the former and 15 per cent of the latter became learner technicians, the objective of some 1500 technicians per annum, (i.e. three times the 500 engineering graduates) would come within reach. Only 25 per cent of the present intake of learner technicians, of whom apparently the majority are a cut above NTC III, succeed in obtaining the NDT.[227]

He also disagreed with the proposal for a Higher National Diploma, noting that 'such a man will then be lost to the technician ranks'.[228]

With regard to the first two routes, Boyce transcended the 'either-or' approach and elaborated that the Post Office had both:

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[224] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 285.
[225] *Ibid,* p. 285.
[226] *Ibid,* p. 282.
[227] Prof. de Vos, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 289.
[228] *Ibid*, p. 290.

> With regard to the suggestion that technicians may be 'classified', this is to a certain extent already in operation in the Post Office in that there are two courses available - one leading to a Diploma and the other to a Certificate. The Diploma pupils cover a wide field over four years whereas the Certificate pupil is a specialist and completes his course in three years. During the past 10 years approximately 10 per cent of the pupil intake has completed the Diploma course and an average of 160 completed the Certificate course annually. This scheme works well and provides an avenue whereby about 90 per cent of the pupils become useful technicians while the brighter 10 per cent have an opportunity to develop to a higher degree, are more useful and have much better prospects of advancement.[229]

Differences also persisted on the question of the practical training component of the new qualification. Unlike the Apprenticeship Committees, there was no statutory body where employers and trade unions could influence the workplace training standard required. The Advisory Committees existed, it was true, but these advised the *education institutions* and did not set standards for the workplace practice – and excluded the trade union or association voice.

This was where the diversity of work undertaken by 'technicians' in the workplace had to be accommodated so Campbell Pitt argued instead for improved processes:

> The practical training of a technician must largely be geared to production because he is an employee and, because an expensive one, must contribute to production. … [But] (p)ractical training requires as much planning and good tuition as technical education. It should be well supervised and taught by men who, if not trained teachers, appreciate that one of their functions as employees is to train others. A trainee must not be an observer, he must be a worker and part of a work team, as far as possible his work should have training value. … The ideal would be to keep technical education and practical training parallel in standard. It is an ideal that should be the aim although in practice it may not be entirely possible.[230]

So, in essence, he argued that the onus for the practical training fell on the employer with little national guidance. Another speaker, C.J. Cillier, argued that sixty per cent of firms did not know what a technician was or what he should be expected to do.[231] He argued also that the worst man to supervise a young technician was a crafts man and yet engineers were by and large too busy – so concluded that there was a *de facto* vacuum in this area:[232]

> Die gevaarlikste man in die organisasie om hom voor te gee is die ouerige ambagsman of voorman. Onthou hy moes na-ure studeer, nie voltyds soos die tegnikus nie. Hy het nou wel nie verder gekom as s'n NTS 3 nie en hierdie tegnikus is net vol van boek geleerdheid en kan in elk geval niks met sy hande doen nie. In hierdie mense het u 'n groot vyandigheid teen oor die tegnikus. Die Tegnikus vertel sy moeilikhede aan die jonge klomp en die wat nog 'n tegnikus belangstel het laat dit ook maar vaar vir 'n letter werk in die bank of so iets desgelyks.

At this point Aspinall outlined the developments initiated by SEIFSA:

> The emphasis on the need for sound systematic practical training conducted in conjunction with college tuition wherever possible is justified. Under its technician bursary scheme SEIFSA has

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[229] Dr G.F. Boyce, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 290.

[230] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 296.

[231] C.J. Cillier, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 292.

[232] *Ibid,* p. 292.

> introduced planned work's training schemes in the fields of mechanical, electrical, foundry engineering, etc. More attention is likely to be paid by employers to the planned practical training of technicians and technician engineers with the introduction by the Federation of the Training Plan on a levy/grant basis.[233]

Both Dr. Loubser and Stephen felt that the matter would only be settled when industry appointed full-time Training Officers to oversee the practical training of the technician and to act as an essential liaison between the College and the firm.[234] This was, of course, already in place in large organisations such as the Post Office and the South African Railways. Heinrich Dreyer illustrates the point in relation to the former. J.W. Bullen spoke for the Railways in the discussion and emphasised the same points – although he inverted the logical sequence:

> It is absolutely essential for employers to have a clear idea of the duties of the various technician grades. Once this is settled the next step is to work out the course of training in detail. The sandwich course is of four years' duration and the simplest exercise for the employer is to settle the details of the four block release semesters at the CATE.
>
> The difficult part is not so much to work out the various phases of practical training but to supervise and control them at every phase of the four years' training period to ensure each candidate is always fully employed on work of an instructive and progressively more advanced nature. Moreover, as the training progresses and the likes and dislikes and aptitudes of the various candidates becomes better known their training must be directed to their future field of employment in the structural, bridge, foundation and soils, water supply, construction, permanent way, survey or other specialised departments. / The importance of control of every aspect of training cannot be over emphasised and no employer should attempt the training of technicians unless he is in a position to achieve this.[235]

5. *Who should be trained?*

The traditional candidates for training were young white male apprentices or artisans. To expand this source was difficult – although the need to do so was deemed to be so great that a number of measures were considered. One of which was to lower the entry requirements, so there was therefore much discussion about the appropriate entry qualification. Campbell Pitt had argued for either a matriculation entry requirement or an NTC III. Prof. de Vos emphasized the latter:

> In order to train the required numbers of technicians we should aim at qualifications within reach of men with NTC III, and make the courses attractive to them, and not to matriculants who are potential engineers.[236]

Another vehicle for increasing the number of candidates lay in the financial incentives offered, as Mokken noted:

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[233] H.T. Aspinall, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review', *The South African Mechanical Engineer*, July 1971, p. 294.

[234] Dr Loubser and Stephens, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review', *The South African Mechanical Engineer*, July 1971, p. 297.

[235] J.W. Bullen, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review', *The South African Mechanical Engineer*, July 1971.

[236] Prof. de Vos, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review', *The South African Mechanical Engineer*, July 1971, p. 290.

> The dearth of trained men, if not remedied or alleviated could stifle progress and lead to stagnation of operations at a time when just the reverse is desired. … Recruitment of matriculants as metallurgical technicians in industry would require similar stimulus but could meet with fair response where financial considerations, limited learning capacity and the attraction of an immediate career, with opportunities to study on a part-time basis, are pertinent considerations.
>
> The knowledge that college fees are payable by the employer would be an added attraction and the ultimate attainment of corporate or non-corporate membership of a professional institution, with appropriate designation following successful completion of the training course, would complete the social need for status and function.[237]

Yet another pool of potential candidates was that of the failed engineers, which the engineers believed should be actively channeled into technician work.

But the discussion was not restricted to white boys. The critical shortages of candidates stimulated the discussants to consider both white women and black men. Dr. Loubser was most articulate on both of these possibilities. In relation to training black technicians he stated:

> It is strongly supported that the process of homeland training of more grades of Bantu artisans, to be followed by Bantu technicians in that order, be speeded up.[238]

Dr. W. Naude strongly supported this view:

> The suggestion that colleges for technicians training should have high priority in the non-white areas is fully supported. A few colleges already exist, one being the Mmadikote Technical College near Pietersburg, where technicians' training is given to Bantu in Civil Engineering, Agricultural Engineering and Surveying.[239]

This view is consistent with the 'visionaries' about whom John Lazar has written[240] and who favoured 'vertical' and not 'horizontal' apartheid i.e. more economically viable homelands rather than homelands as suppliers of cheap, low skilled labour only.

Dr. Loubser equally strongly proposed training women, to which Campbell Pitt responded at the end of the discussion:

> Dr. Loubser's suggestion of the employment of women technicians is a good one. Commerce and medical fields do so with not only success but could not do without them. I believe they could be equally successful and indispensable in engineering.[241]

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[237] Mokken, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 299.

[238] Dr Loubser, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 296.

[239] Dr W. Naude, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 299.

[240] J. Lazar, *Verwoerd versus the 'Visionaries', The South African Bureau of Racial Affairs (SABRA) and Apartheid, 1948-1961*, as cited in P. Bonner, P. Delius, and D. Posel, *Apartheid's Genesis 1935 – 1962,* Johannesburg: Wits University Press, 1993.

[241] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 310.

As we have already seen, the Post Office too was considering women technicians.

6. *Progression to engineer status.*

The De Villiers' Commission had supported the principle that there should be progression routes, with credit arrangements, from technician to engineer:

> It should be possible for a student who has passed an advanced course at a technical college, and who is desirous of entering a university for a degree course, to obtain full credit for the work he has already completed.[242]

However, not all engineers agreed with this view. But Campbell Pitt himself, like many others in the traditional engineering societies, was firmly amongst those who believed that there should be such routes:

> All persons at all levels and in all vocations, must be provided with opportunities for advancement. A technician is no exception, in fact, it is perhaps more necessary that his status receives the increase such opportunities give.[243]

He had a great deal of support for this view. One of his strongest supporters was H.T. Aspinall who emphasised that such progression routes should be available to all.

> The author mentions the need for higher diploma courses at Colleges for Advanced Technical Education. It is essential that an alternative path to the status of professional engineer be provided for those students usually associated with industry for whom the university path is impracticable.[244]

However, those most closely associated with the university 'degree' lobby group, were strongly opposed. For instance, Prof. de Vos, argued that:

> By trying to suggest an engineering career as the ultimate objective for a learner technician we are baiting the hook for the wrong kind of fish – we are attracting potential engineers to technician training instead of potential technicians, and in this way we are missing our objective: *to train the large number of technicians required.* That is the object of the exercise.

He believed in separate, parallel pathways, as did Bullen:

> Mr. Campbell Pitt has emphasised the fact that no obstacles most be placed in the progression of technicians to higher levels, only hurdles that can be overcome. A man should not progress stage by stage from artisan to artisan technician to technician engineer to professional engineer. Each individual should be assessed and trained for the particular grade to which his intelligence, aptitude, and ability is be suited. Thereafter it is necessary to have properly graded prospects of promotion in each particular grade. This pattern of employment, however, may only be practical in the larger organisations.[245]

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[242] U.G. 65, 1948, paragraph 1249, p. 164)

[243] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 283.

[244] H.T. Aspinall, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 294.

[245] Bullen, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 296.

Whilst this latter view was in the minority in the early years, it was to rise in popularity as will be seen.

However, even amongst the majority, there were differences on how to give the progression objective practical effect. Aspinall supported the schemes whereby an exam could be sat at the end of the first or second year and if successful, then college students should be transferred to university. But the problem that others identified with this view, and which Aspinall himself conceded[246], was articulated by Dr. A.W. Rowe, the Director of the Witwatersrand Technical College, 1951 President of the South African Institution of Engineers and member of the Minister of Labour's 1951 Ministerial Committee noted:[247]

> While giving the fullest recognition to the many advantages to be derived by attendance at a full-time course in engineering at the university, it is both unfair and unnecessary to withhold corresponding part-time facilities from talented young men whose sole shortcoming is on the financial side.
>
> The view has been expressed by opponents of projected developments in this direction in South Africa, that there would be no need for the creation of these facilities if adequate bursaries could be made available for full-time attendance at the universities. This sentiment will meet with universal agreement, but when one considers that the young man concerned will have completed his apprenticeship, and started to earn journeymen's pay – and in some cases will have added to his responsibilities by marriage- it is clear that such bursaries would have to include, not only tuition and books – about £100 per year – but also subsistence on a substantial scale, so that the amount involved would be at least £400 - £500 per annum for four years. It is scarcely likely that the most altruistic Minister of Finance would agree to the creation of many bursaries of this magnitude.
>
> The Witwatersrand Technical College, serving as it does an enormous and rapidly expanding industrial community, is meeting with frequent demands for advanced part-time technical education of quite a comprehensive nature, and it is proceeding to extend its laboratory and teaching facilities so as to offer adequate opportunities for such studies, especially in the field of electrical engineering, where the new standards set by the Institution of Electrical Engineers, London, for its corporate membership, have to be met. The facilities on the mechanical side will be made on an equally comprehensive scale, and full provision will exist for materials testing, hydraulics, and heat-engines laboratory work, on a standard fully comparable with that required for external degree work. It is anticipated that the full range of facilities for part-time study, up to a high standard in mechanical, electrical, and possibly some aspects of civil engineering, will be available by the end of 1952.

Campbell Pitt shared the view that there should be a college-based route to engineer:

> It is very necessary not to lower the professional engineer standard. I suggest in a three-tier system of qualification assessment we accept the NDT for Part I, a Higher NDT for Part II and a thesis or an interview for Part III. This will make it possible for the few of exceptional aptitude and application to study and work to become professional engineers of equal standard to their graduate fellows and they will certainly not be second class. They will be much superior to many BSc (Eng.)

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[246] Aspinall, 'Presidential Address', p. 19.

[247] A.W. Rowe, 'Presidential Address: Present Trends in Apprenticeship Training and Technical Education', in *The Journal of the South African Institution of Engineers,* July 1951, p. 365.

> graduates who are satisfied to do technician work because they will not accept or have not the attributes for full responsibilities of a professional engineer.[248]

Prof de Vos again opposed both views believing that 'the universities and CATEs each have their own functions and 'it is difficult to see how the CATEs can properly fulfil the dual function of training for technician and professional engineering status.'[249] Boyce from the Post Office concurred with Prof. de Vos on this issue. He felt that '(t)he Universities and the CATE appear to have their own functions in the order of things and there appears to be no need for change. However, perhaps some co-ordination could be done to achieve easier inter-changeability without the student suffering unreasonable setbacks.'[250] However, it was precisely this question of co-ordination that presented the most difficulty to the university community. This difficulty had been clearly articulated by the universities to the De Villiers Commission:

> because the university courses for the first, and to a considerable extent, for the second year, were largely of a basic scientific nature, whilst subjects such as applied mathematics, physics and chemistry are not normally included by the technical college students in their course' and were they to be so, recognition would be more easily granted (para. 1250). The Commission felt however that the problem was not so easily remedied as doing so would 'prejudice the primary objective of the course, which is to train these workers as technicians, foremen, etc., who contemplate direct entrance upon productive work immediately on completion of the course' but it was nevertheless suggested 'that every effort (should) be made to include as much of mathematics and science in the curricula as is possible, so as to facilitate the advancement of those students who are capable of carrying their education further with a view to securing a university degree'.[251]

7. *Should technicians be given professional status? If yes, then what status?*

In the 1967/68 Annual Report of the Professional Engineer's Joint Committee it had been noted that:

> 10. TECHNICIANS: The question of Technician Membership of Professional Engineers Institutions was raised in the course of the year, but unfortunately little progress was made. It is hoped however, that the Board will be able to pay more attention to this important matter during the coming year.

It was against this backdrop that Campbell Pitt again put the radical position, referring to the fact that the Mechanical Engineers were already admitting technician members, as shown above.

> A Technician engineer… should be admitted to full professional engineer status by attaining a sufficient and adequate level. His education and training will be different from that of a university-trained professional engineer, but he will fully justify registration as a professional engineer. In fact, this is what has occurred with no detriment to the profession. As professional qualifications increase in standard so must they increase for engineers of both routes to professional level. The

[248] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 310.

[249] Prof. de Vos, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 290.

[250] Boyce, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 291.

[251] De Villiers Commission, para. 1251.

> numbers from the technician route will be a much smaller percentage of those who commenced as technicians than those who commenced as university students.[252]

Mokken supported this view, believing that the possibility of rising to full professional status would act as an additional incentive for young men to take up technician training, together with the other advantages of technician training:

> The knowledge that college fees are payable by the employer would be an added attraction and the ultimate attainment of corporate or non-corporate membership of a professional institution, with appropriate designation following successful completion of the training course, would complete the social need for status and function. In addition, it would provide industry with a man of mature experience, who has specialized skills in a variety of metallurgical tasks, who can control metallurgical operations and carry out his work with a minimum of supervision.[253]

Cillier asked: 'Gaan ons werklik 'n pad oopmaak vir die Tegnikus om 'n professionele Ingenieur te kan word?'[254] And went on to interrogate the proposition that an additional examination should be set. He argued that it would need to be set at the same standard as that for university students but which the universities should not set because they would be too 'academic'. He himself had drafted such an examination to show that it was possible and had tested it with a colleague at a university. He therefore proposed that the law be changed, and CATEs be upgraded to do this themselves.[255] This proposal was not taken further.

Campbell Pitt rose to the challenge of defining how his proposals could be implemented:

> It is very necessary not to lower the professional engineer standard. I suggest in a three-tier system of qualification assessment we accept the NDT for Part I, a Higher NDT for Part II and a thesis or an interview for Part III. This will make it possible for the few of exceptional aptitude and application to study and work to become professional engineers of equal standard to their graduate fellows and they will certainly not be second class. They will be much superior to many BSc (Eng.) graduates who are satisfied to do technician work because they will not accept or have not the attributes for full responsibilities of a professional engineer.
>
> I believe that a College route will enable colleges to attract better students and better staff. The college status will also improve. It will be accepted, as it should, that a pass college diploma is better than a failed BSc.[256]

Many remained silent on this issue in the discussion, presumably because the question was being hotly contested in other forums. Certainly, the views put by Campbell Pitt were not representative of the graduate engineering community.

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[252] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 283.

[253] Mokken, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 299-300.

[254] C.J. Cillier, in discussion on the paper presented by Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 292.

[255] *Ibid*, p. 292.

[256] L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 310.

It was into this often-hostile environment that one of the first aspirant black technicians was to enter in the early 1970s.

Kantilal Ramjee's story – 'Work and Learn'[257]

Kantilal Ramjee was born in 1941 in Middleburg in the Cape. His great-grandparents had immigrated as tradespeople to the Cape from India. His father was a shoemaker, as had been his forebears for many generations. His father's brothers had already broken the tradition, however, the youngest having studied medicine at the University of Cape Town (UCT) and another having undertaken an electronics apprenticeship.

Kantilal's parents had moved to Middleburg when his mother developed asthma and they were forced to go to 'the driest of driest places'.

> I went to a little school in Middleburg – everything was Afrikaans, and apartheid was at its highest then – we couldn't go to the shops or nothing there. Bioscopes, libraries were non-existent for people of colour. Everything was for separate development. We couldn't go into Post Offices, we'd have to go to the back door to buy anything, in a shop we'd have to go to a little window on the side. A lot of my father's customers would do our purchases because we couldn't go into white shops and things like that. No libraries, no bioscopes, no swimming pools! So, I went to a little church school, a Afrikaans 'kerkskool', a 'gedenkskool', where blacks would go. … Now in Middleburg, there were no high schools there and everything was in Afrikaans, so I went to the little kerkskooltjie until Std 5 and my father and his family … didn't want me to become a shoemaker, I had to be better, you know its normal all parents want their kids to be better! … So, they decided to post me off to Port Elizabeth to an English high school. So I went to Port Elizabeth to do my schooling from Standard Six to Standard Nine, the old Southern High School, the old Grey School. … It was a coloured school in Port Elizabeth, a high school. So, I had to do a change from Afrikaans and that, but it was no problem because Indian people are very conversant English speakers. … I finished Standard Nine there, but the family I was staying with, the breadwinner passed on. He had some cancer and my family felt I shouldn't burden them, so I was posted off to Cape Town. Now I had some uncles in Cape Town there, so I stayed with them and I finished my matric and I was all set to do Electrical Engineering at UCT.[258]

His taste for engineering had been whetted by his father:

> My father was a shoemaker, but my father was one of those people who used to tinker in electrical – if anyone wanted a fluorescent light or a bed-switch – and that's how he whetted my appetite. I used to go along with him, carrying his little bag, you know, and I'd help him there, and the interest in radios and all mechanical things came from my dad, you know.

But disaster struck in his matric year – his father died. He urged his mother to move back to Cape Town even though UCT was now out of the question. He realised he would have to 'work and learn' and set about looking for an apprenticeship.

> But now there were problem areas there … because a black apprentice couldn't work under a white journeyman …And the problem was that certain trades, like electronics trades, you know the high-tech trades, were for whites only. So, it was a hang of a thing to get into a radiotrician (apprenticeship) … I wanted to be a radiotrician in those days – TV was non-existent, you know

[257] Interview with Kantilal Ramjee, 3 December 2008.

[258] Interview with Kantilal Ramjee, 3 December 2008.

> what I mean? And then I managed to get an apprenticeship with a very small company, an Indian company.[259]

His view about 'black trades' was verified by Lundall and Kimmie.[260] They found that during this period 27 per cent of Indians were being trained as fitters and turners, 25 per cent as fitters and 20 per cent as boilermakers – with similar patterns for coloured people.[261]

The company where he was indentured was Domescor in Waterkant Street, Cape Town. He was there from July 1966 to January 1969, during which time he completed his trade training. He remembers what challenges the training entailed:

> I started my NTC 1, NTC 2 … when I initially started, we were allowed to go with the whites at Longmarket Street and then Coloured Affairs Department came about. So, they kicked out all the black students from the white college and they put us into Roeland Street in Cape Town. There was a little campus there. But it was minus labs, minus everything. And we didn't even have competent lecturers there … especially in the isolated cases. I was the only … maybe there were two Radiotrician apprentices. And that's how we started there, because of the Coloured Affairs coming out.[262]

The trade test itself was no better:

> Then I did my apprenticeship and I went to Olifantsfontein to do our trades test and *that's* where we hit snags as well. … the examiners in the workshops – Workshop 1 was for electronics – so when they saw me there in the morning in front waiting to do my test, they said, '*Wat soek jy hier? Julle Kapenaars, julle moet daar onder gaan – daar's die plasterers en die plumbers is daar onder.'* I said, *'Nee, Meneer, ek is hier om 'n vaktoets van Radiotricians te doen.*' And he said, '*Hier's seker a fout, hier's seker 'n fout*!' And he's walking up and down! *'Kom aan! Kom aan!'* And you know the attitude and being a young apprentice in a foreign place … (and) at Olifantsfontein they had separate places for whites to cross over the train line and normally a bus picks up the apprentices … but nobody picked us up so we … a whole batch … had to walk through the bush to Olifantsfontein … so it was a strange environment. … Anyway, we survived all that.[263]

Whilst at Domescor he joined the Electrical and Allied Trades Union of South Africa (EATUSA) whose Head Office was also in Waterkant Street. The union was for artisans only, being one of three parallel craft unions – one for whites, one for Indians and coloureds and one for (non-artisanal) Africans. The three unions had a single General Secretary drawn from the white union, the South African Electrical Workers Association (Ben Nicholson's union).

Instead of ending his learning career at this point, Kantilal continued studying and completed his NTC 3, ATC I and ATC II.

> I did that at Roeland Street and then Kastelsvlei came up, in Bellville. … I didn't go to the one in Athlone, but I went to Kastelsvlei. That was the forerunner of Pentek now – you know Peninsula

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[259] Interview with Kantilal Ramjee, 3 December 2008.

[260] P. Lundall and Z. Kimie, 'Apprentice training and artisan employment: changing numbers – but maintaining "job reservation"' in *South African Labour Bulletin*, July/August 1992, Vol. 16 No. 6, p. 45.

[261] Lundall and Kimie, 'Apprentice training and artisan employment', p. 45.

[262] Interview with Kantilal Ramjee, 3 December 2008.

[263] Interview with Kantilal Ramjee, 3 December 2008.

> Technikon? … It was just barracks in a barren area and that is where they put all these poor coloured black students. So that's where I carried on studying.[264]

With these qualifications he was able to successfully apply for a position as a technician at the international company, Phillips SA. Even there he recalls that the wages black technicians were lower than those for whites, and he continued with his trade union membership. He also felt that he was denied promotion because of racism at higher levels:

> Although I was working at Phillips in PE, but because of my colour I couldn't progress up the ranks … I was highly competent, more than my foreman, but he was white. And I was told that Port Elizabeth isn't prepared for black foremen, you know. So, you were always kept back in your career.[265]

But for all that he had happy years at Phillips, particularly because:

> a lot of the technicians were foreigners there. I got on very well with the foreigners because the foreigners, they didn't know about colour and these funny things, they couldn't understand all these things, you know. And the one little story I like to add here, just to tell you. At that stage I was getting married. And my wedding happened to be organised at the Woodstock town hall, in the white area. So, then I had to get a permit to have a wedding there. And then on my permit – and my mom found my permit – here – and on the permit it said that no whites and no bantus could attend my wedding. But irrespective of that all my colleagues at Phillips they came along. They said, 'They can do what they like, they can put us all in jail, they can put you and your wife in jail, but we're all coming!' And they all came to my wedding and they made it very special for me there.[266]

He also recalls getting a great deal of encouragement from a senior technician, Andrew Murray, who invited him into the company's laboratories at lunch time and assisted him with his endless thirst for more knowledge.

In 1969, soon after completing his advanced qualifications, Kantilal applied to the South African Institute of Electronic and Radio Engineers (SAIERE) for membership. On 26 June 1969 he received a reply – which he has kept to this day:[267]

> Dear Sir,
>
> Re: Application for Membership of SAIERE
>
> With reference to your application for membership of the South African Institute of Electronic and Radio Engineers, I have been instructed by Council to notify you that your application has been unsuccessful.
>
> Yours faithfully,
> ND Glass
> National Secretary.

[264] Interview with Kantilal Ramjee, 3 December 2008.

[265] Interview with Kantilal Ramjee, 3 December 2008.

[266] Interview with Kantilal Ramjee, 3 December 2008.

[267] Original letter kindly shown to me by K. Ramjee at interview.

As a fighter he responded:

> No reasons, you know, no reasons! And I thought, 'Bugger this! Sorry for the words. I'm going to go international now. You know I want to improve my technical knowledge internationally. Then I went to the UK, I got myself registered as a Technician Engineer and then I went to the US. I did some exams there, so I became a Certified Electronics Technician. But I thought to myself, 'If I had to leave the country, our ATC's mean nothing in New Zealand, Australia, Canada, so I went for international registration. And I succeeded. There was one advantage there, besides the money – it cost a lot of money to send your subs every year – but I used to get *excellent* journals. And I could network at a very high level internationally. I was always one step ahead of my white brothers.[268]

It was on 25 March 1970 that he was accepted as a member of the Royal Television Society based in London and on 24 February 1972 the International Society of Certificated Electronics Technicians, based in Indianapolis, Indiana, wrote to him saying:

> Congratulations! You have successfully passed the National Electronic Associations Certification examination and now are recognized as a Certificated Electronic Technician.[269]

But he hankered to be part of local engineering community. In 1972 he convened a meeting of black members of his community in the Temple Hall to advocate electronics as a good career for 'non-white' people.[270] But for peer debate he had to look to the established societies. He made headway eventually with the Eastern Province Society of Engineers, which, in spite of the name was a society open to technicians as well as engineers. It had been established in 1929 and unlike the national bodies, embraced all engineering disciplines. They held open meetings which they advertised in the local newspaper. After attending several such meetings, he decided to apply for membership. This is the letter he received from them, dated 5 November, 1975:

> Dear Sir,
>
> In connection with your recent verbal application for membership of our Society, I have to advise that this matter has been receiving the attention of the Council, and we regret that for various reasons we have been unable to reach finality.
>
> Until such time as certain matters can be cleared up, the Council has asked me to indicate to you that you will be most welcome to attend as a guest any of our technical lectures for which you receive our official "Notice of Meeting".
>
> We hope that matters in question will be clarified in due course, but in the meantime, we trust that you will take advantage to the full of this gesture of goodwill.

[268] Interview with Kantilal Ramjee, 3 December 2008.
[269] Original letter kindly shown to me by K. Ramjee at interview.
[270] Journal *'CONTACT'*, No. 4, November 1972. Copy shown me by Ramjee at interview.

Yours sincerely,
N. Bosman
Hon. Secretary

He did not need to be asked twice. He participated enthusiastically and was admitted to membership 'in due course' and moved from member to 'the Secretary, the Treasurer, the VP, and then the black man took the hammer!' – the first black man in the organisation's 55 year history to be elected President in March 1984.[271] On nomination from the Eastern Province Society of Engineers he was able to join the mainstream organisations. The Society also nominated him as a member of the Board of Control for Control for Engineering Technicians and was duly appointed by the Department of Public Works and Land Affairs with effect from 13 November 1987. He was registered as Registered Engineering Technician and Professional Engineering Technologist. (In 2005 the Minister of Public Works appointed him to the ECSA Council.)

Over the years he also continued with his studies:

> I then started with my National Diploma (1982). Although I had 26 subjects in my N diploma that I had studied all the time, then I wanted to go to the technikon, you know, but now to go to the technikon as a black person was a whole … I had to have permission from Coloured Affairs, Indian Affairs … I don't know Bantu Affairs, your affairs, my affairs … eventually I was the first Black guy to go there … and it was quite something special for me.[272]

He got his National Diploma Electrical Engineering at PE Technikon in 1986 and his National Higher Diploma Electrical Engineering at the same institution in 1989 and has continued with other studies since.

His career flew from that point. In July 1981 he moved to the SABC where he became a Senior Electronics Technician and after the 1994 elections, he was able to rise in the ranks to Facilities Manager – although even then white employees contested his promotion!

LADDERS AND LEVERS

The Goode Committee appointed later to reflect on 'the training, use and status of engineering technicians in the Republic of South Africa' (RSA,1978) summarised the changes to the engineering team that took place over the period under review in the following diagrammatic way. For the time before World War II, it illustrated the position as follows: [273]

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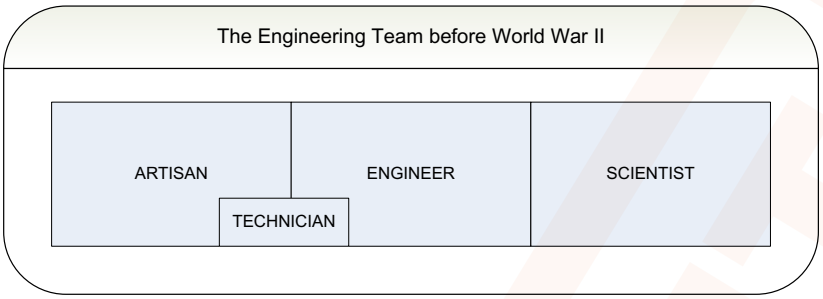
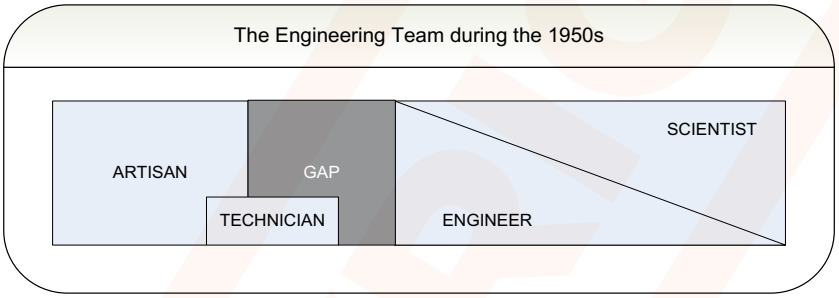
[271] *Eastern Province Herald*, Wednesday, March 14, 1984.

[272] Interview with Kantilal Ramjee, 3 December 2008.

[273] Goode Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, p.6.



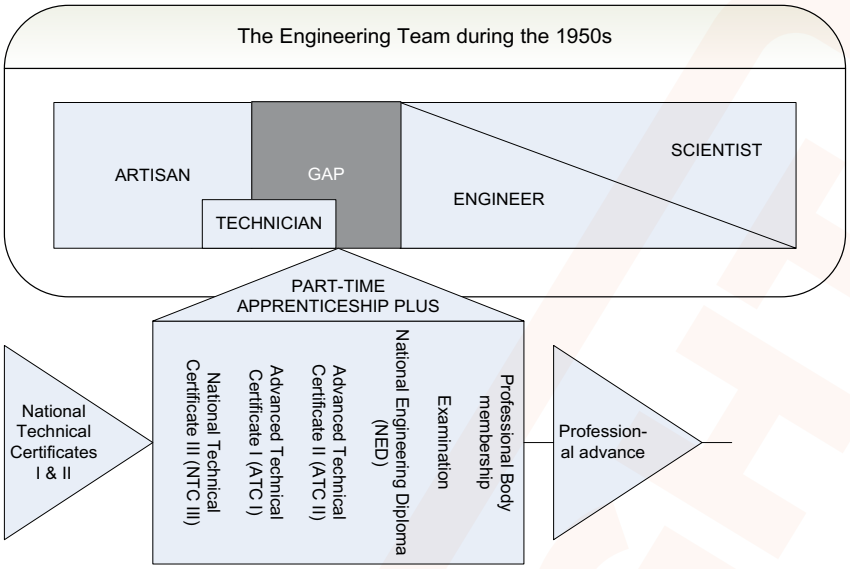
The 'technicians' in this period were, they argued, 'advanced artisans, highly skilled craftsmen or foremen and persons controlling operations, frequently also called "engineers"' (para 2.1). However, after the war, things changed with the rapid rise of increasingly science-based technology in production – and the change resulted in the opening up of a gap between artisan and engineers in the 1950s:



That the gap was constituted primarily by a 'theory' shortfall was generally agreed. However, the filling of this gap with 'sandwich' programmes was not an inevitable development flowing in a pre-determined way out of the science or technology. It was an act of human agency – and it was contested. At the heart of this contestation lay the question of the cost of the *training time required to learn the new knowledge* and who should pay for it. This follows from the focus given to 'part-time' vs. 'full-time' in the debates. As Rowe above indicated, all agreed that full-time training was desirable, but if unaffordable to the majority, should not a part-time route be retained and strengthened?

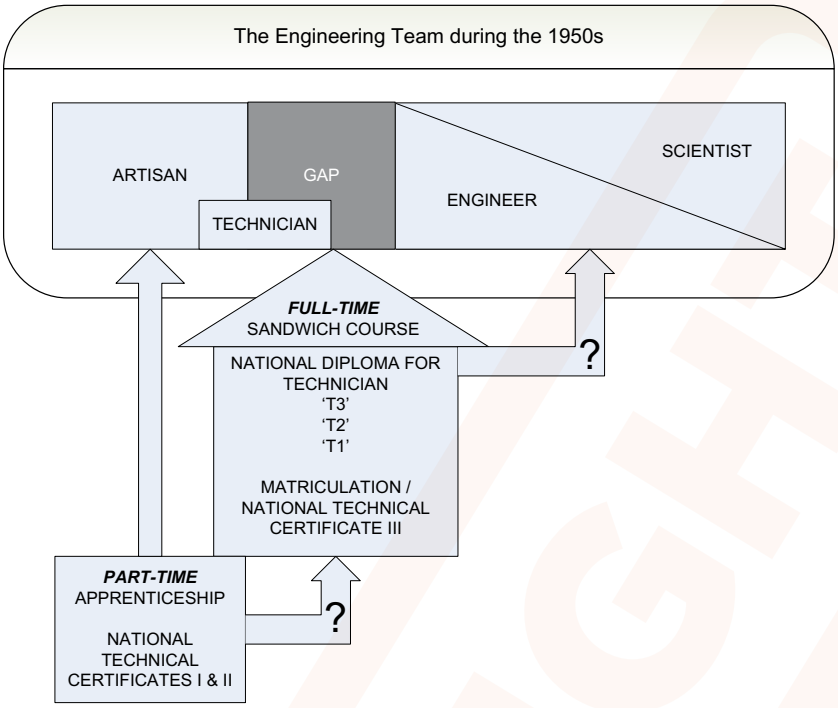
The traditional part-time route needed to be retrained, some argued, because it gave to the financially constrained an avenue for progression. The training undertaken on this route was essentially funded by the employer (although requiring considerable effort and dedication by the worker). But taking place, as it did in or around the apprenticeship contract, it was accompanied by employment and income security. The advocates of this route conceded that the programmes needed to be broadened and updated to respond to the changing times, but, they argued, it should not be replaced. This is captured in the diagram below:[274]

[274] Goode Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, p.6.



On the other extreme were those who argued that the time constraint implicit in the above approach (12-week block release) was simply too restrictive, and that the depth and complexity of the theory to be learnt required full-time learning over a longer period. Their solution was the 'sandwich' with 18 weeks at college at a single stretch, with the remainder of the year in the workplace – but ungoverned by a statutory contract (except in workplaces such as the Post Office where the union ensured that such contracts were negotiated), no wage setting machinery, nor oversight structures similar to the apprenticeship committees. The labour market actors, employers and unions, were at best afforded 'advisory' status – with the unions ill-defined in this young occupational space. For the employers, this flexibility provided opportunities for cost-cutting but for workers the same flexibility translated into increased costs (potentially course fees, lower wages, reduced employment security etc.) and fewer opportunities because relatively fewer employers were willing to fund 18 weeks of training not interspersed with productive work. This is illustrated in the diagram below:[275]

[275] Goode Report, *Committee of Enquiry into the training, use and status of engineering technicians in the Republic of South Africa*, p.6.



Between the two 'hard' positions was a third option, seldom defined as such, but explored by people like Aspinall, who argued that a part-time version of option two, similar to that available to apprentices, should be constructed. But the precise nature of the programmes in the '*question mark'* transitions was poorly defined. The bursary option for full-time study was problematic at system level, as Rowe explained – but the alternative to it – some form of part-time or correspondence study – also had many challenges.

Injected into this discussion was the separation of CATEs from other technical colleges – a systemic shift which rendered intermediate, blended solutions more difficult at the implementation level. Increasingly technical colleges became associated with artisans and CATES with technicians – each with separate cohorts of learners, managed under different legislative regimes and governance arrangements. In this environment the first progression route, such as envisaged by the 1951 and 1963 Apprenticeship Amendments Acts, became principally associated with technical colleges, whilst the second was associated with CATES.

Overriding these considerations was the fact that organisational alliances were in flux at this time. Some craft unions organised the technicians and others did not; some engineer institutes had technician members and others did not, and whilst there was a growing body of stand-alone technician associations they did not as yet have a home, being neither allied with one another nor with craft or engineering bodies. The field was open … but the ground was not flat - technicians aspired up and the engineers had a special interest in this new occupation. This 'magnetic pull' was fueled by the energy and focus which the engineers brought to bear on the question. For instance, at the onset of the engineer's discussion, recounted at some length above, the Chairperson, Prof. D.W. de Vos, stated:

> The profession is indeed indebted to Mr. Campbell Pitt for his most valuable and thought-provoking paper. / I support most of his views expressed therein and suggest that, with a few modifications, it be submitted to FSPE in the form of an interim report and by FSPE to the Department of Higher Education and the Prime Minister's Scientific Advisory Council.[276]

As will be seen in the next section, these were not just words – they heralded action, action both in relation to the Department of Higher Education and also in relation to the Prime Minister's Scientific Advisory Council, which seems to have been a point of leverage for the Akademie, judging by the impact of the Prime Minister's Advisor with regard to the advent of the CATEs. The absence of any reference to the Department of Labour is noteworthy too – the link with the artisans was a fading priority for the engineers, particularly for those of Dr. de Vos's persuasion.

However, the resolution of these matters was far from settled – nor was the outcome inevitable. Contests and divisions were to mark the road that the various interest groups had yet to travel – and, ironically, resolution was to rest as much on the engineers' own contests as those pertaining to technicians exclusively – as Stan Bridgens' story will show in the next chapter.

[276]L.T. Campbell Pitt, 'Technicians – A Review'*, The South African Mechanical Engineer*, July 1971, p. 289.

CHAPTER 9
ENGINEERS - 1968

'Baie kritici is van mening dat dit in hierdie wetgewing inderdaad nie oor die beskerming van die publiek gaan nie, maar oor die beskerming van die geregistreerde ingenieur teen kompetiesie.'
Akademie 75, 147/8.

'Should the Bill recognise vested rights? My personal view is that a Bill which does not do so, stands no chance whatsoever of ever getting on the Statute Book.'
Mr JH van den Heever, Government Attorney, 1946.[1]

PEOPLE AND PLACES

Stan Bridgens was *livid*, he was *distraught* when, in 1969, he applied for registration as a professional engineer and was refused!

At the time, he had been working in the Electricity Department of the Johannesburg Municipality for over a decade and had both a mechanical and electrical engineering Technician's Diploma (1964) – which he had attained 'with many, many distinctions' as well as a Government Certificate of Competency. He had held the positions of Assistant Field Engineer and then Field Engineer in the Northern Area and when he passed his Government Certificate of Competency exam, he was promoted to the position of Distribution Engineer (a position that legally required the 'ticket'):

> In those days a Distribution Engineer was accountable for a third of the city and I had the Northern and Eastern areas and you would be responsible for the planning, the construction and the maintenance of the distribution system. I was responsible for a large part of Johannesburg and had a staff – in those days it was considered a lot – of 250 people, earning a reasonable salary. My father – an artisan was very proud to see what I'd achieved. I got married and we had 3 kids. When appointed I became one of the youngest Distribution Engineers in the organisation. I was the 'Young Turk' who was aggressively ambitious and achieved a lot of in a short time, but also because I had the support of the other engineers who were there. ... At that stage, my progression in the Electricity Department was better than most degreed persons and I thought I was doing well until 1969 when this new Act came out and I applied for registration and I failed. I was livid! I was absolutely distraught! And I challenged the system and reasoning, I made the point 'I know of people who are juniors in my work situation, who are less competent and not as well qualified, with less experience.' And I went on and on and on. 'And they have been accepted. Why?' I wanted to know why. Another anomaly was that if you were earning your living as a consultant but did not have the required qualifications like a degree, such persons were registered.[2]

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[1] J.H. Van der Heever, 'Have Engineers a Legal Status?' *EASA Bulletin*, Vol 3, No. 1 July 1946. p. 15.
[2] Interview with Stan Bridgens, 25 Oct 2007.

Stan also tells the story of his friend Bob Bloemberg who was refused registration too:

> Bob Bloemberg was a very, very good engineer in his field, he was a Test Engineer. He and I were both refused registration. Bob and I used to commiserate with each other, 'It's unbelievable that they won't accept us.' I learnt a tremendous amount from Bob Bloemberg about testing and cables and oil testing and in fact the whole spectrum of distribution equipment. He used to teach other registered engineers about his specialised field. His point was 'I'm teaching a lot of other B.Sc.'s who know very little about it!' He was a specialist as opposed to me a generalist. But that didn't stop us. He and I eventually became quite close because I was then appointed to manage the new workshops in Reuven and Bob was also situated there and had set up many specialised test benches – a marvellous legacy. So, it was that we became very close friends being the two senior men at the workshop site in Reuven. …
>
> Bob was becoming more embittered as time went by and it appeared to be outside of the work situation and the professional engineer's issue. I used to make it a regular point once a week to have lunch with him and talk with him about this and that – learn from him, and so on. But the regret is that I didn't realise, that he was contemplating committing suicide – which is what he did. He just shot himself at home. I thought at the time that a large part of Bob's problem was that he was not made a Professional Engineer.[3]

What was this momentous 'registration' event that in 1969 changed the course of Stan and Bob's lives, and made Bill Bergman feel undervalued when he too was refused registration as an engineer? I knew that my father had been registered – evidenced by a certificate curled amongst the rest I had found in the cardboard cylinder – as too had Allan Bennett who proudly showed me his registration certificate displayed on his bedroom wall. What differentiated these men I wondered, especially as none had had university degrees at the time?

EDUCATION AND TRAINING LANDSCAPE

A number of engineering qualifications existed in this period. The predominant engineering specialisations were civil; electrical; mechanical; agricultural; mining; industrial; chemical and metallurgical.

The description below indicates the main routes followed by students to qualify in these disciplines of engineering before 1969.[4]

BSc Engineering

In South Africa school was compulsory until age 16. The majority of engineering students spent five years at high school, and obtained the matriculation exemption certificate in Std X.

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[3] Interview with Stan Bridgens, 25 Oct 2007.

[4] *Commission of Enquiry into the Method for Training for University Degrees in Engineering,* (hereafter the Straszacker Report) , Department of Higher Education, 1964, Part I and Part II, p. 93.

Thereafter they proceeded to university for four-year or five-year courses leading to a baccalaureate in engineering.[5] Mathematics was a prerequisite for entry.[6]

National Engineering Diploma

A comparatively small number of pupils entered technical colleges after Std. V and then after five or more years of study wrote the National Senior Certificate examinations in subjects that qualified them for matriculation exemption, after which they might proceed to university. Up until 1958, the majority of pupils followed technical vocational courses which led to the Elementary Technical Certificate, followed by three National Technical Certificates (NTC), and two Advanced Technical Certificates (ATC), and ultimately if three Advanced Technical Certificate subjects were taken, to the National Engineering Diploma. These courses were usually taken concurrently with the serving of an apprenticeship.[7]

National Diploma for Engineering Technicians Part I and Part II

After 1958, organised standard technician training was introduced. These were normally "sandwich" courses in which study of approximately 18 weeks per year alternated with actual employment in engineering, over a period of four years. This course led to the qualification National Diploma for Engineering Technicians and was followed mainly by engineers in mechanical or electrical engineering. An extended Part II required an additional two years of study.[8]

National Certificate for Technicians

The Public Service Commission, in collaboration with Pretoria Technical College, introduced a three-year sandwich course in 1958, which was followed by National Certificate for Technicians with a year of full-time practical training and led to a National Certificate for Technicians.[9]

University exemption

At any stage a student who had obtained a matriculation exemption certificate from a technical college, might proceed to university, but normally no credit for subjects passed was received (with the exception of drawing courses). Students normally commenced studies at university from first year.[10]

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[5] Straszacker Report, para 466, p. 93.
[6] *Ibid*, para 606 ii, p. 153.
[7] *Ibid*, para 467, p. 93.
[8] *Ibid,* para 467, p. 93.
[9] *Ibid*, para 467, p. 93.
[10] *Ibid,* para 468, p. 93.

Government Certificate of Competency

Certain fields of employment required a Government Certificate of Competency which was issued under the control of the Government Mining Engineer. Generally, this applied to mine managers, mine surveyors, assayers, mine supervisors or persons in charge of mechanical and electrical plants with a capacity in excess of 500 horsepower.[11]

Advanced Degrees

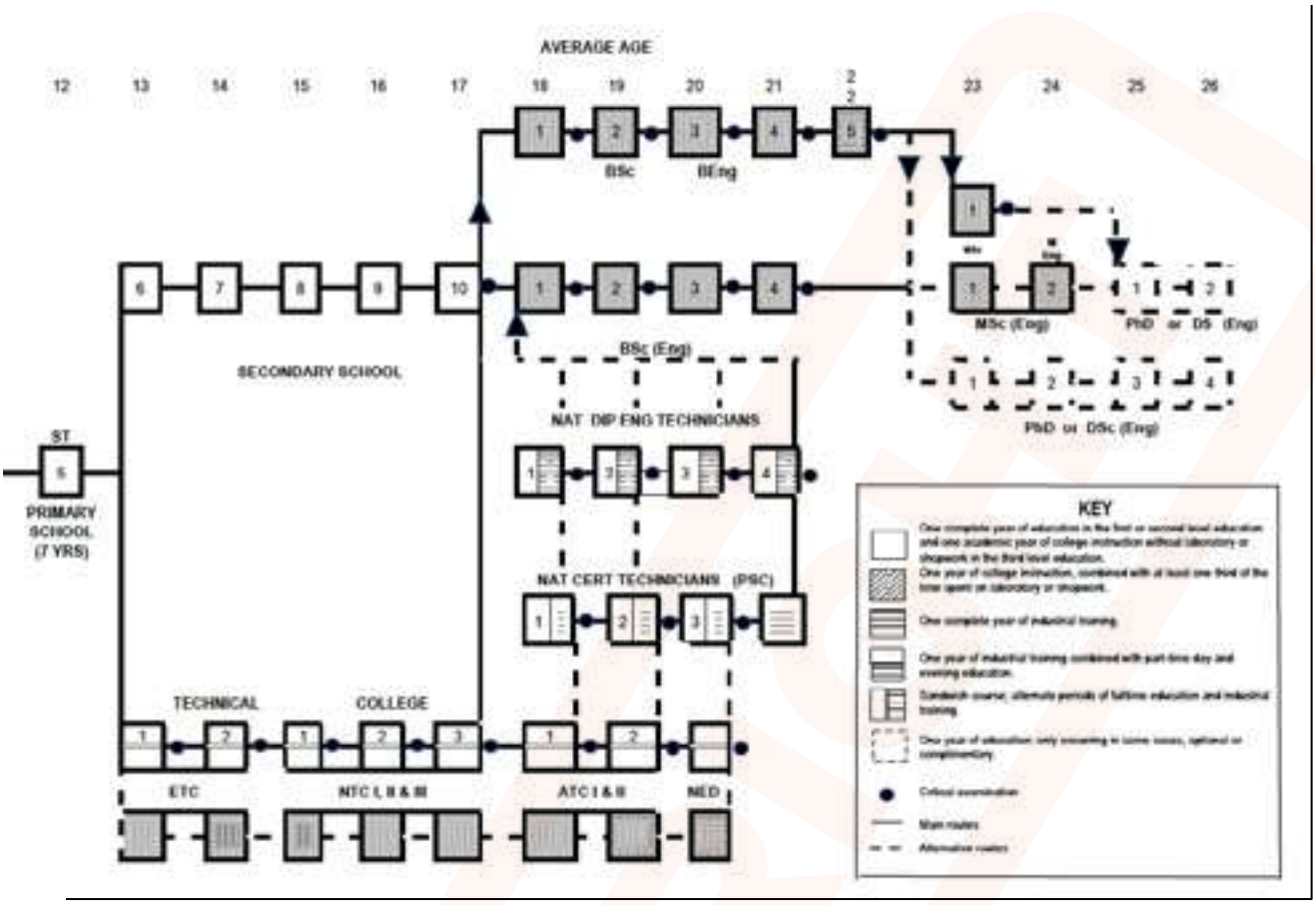
Master's degrees could be obtained through full-time or part-time study with the submission of a thesis.

A PhD could be obtained through supervised research at universities. A DSc (Eng.) could be obtained on submission of publications based on original unsupervised research work that made a substantial contribution to knowledge of engineering.

The diagram below (Fig 1) indicates the articulation path that allowed students to move between various qualifications prior to 1969.

Fig 10.1. A block diagram of formal education in engineering in the Republic of South Africa.

[11] *Ibid*, para 469, p. 93.



Source: *Adapted from Straszacker Report, p. 94.*

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

My search for an answer to what differentiated Stan and Bob's registration, led me to exploring two parallel series of events.

The first began with the attendance by representatives of the SA Institution of Mechanical Engineers, the SA Institution of Civil Engineers and the SA Institute of Electrical Engineers to the Conference of Engineering Institutions of the British Commonwealth in London in 1954. Following this, the three institutions set up a liaison committee in 1955 to study the affairs of the Conference. This led to the first Conference on Engineering Education and Training, held in February 1956 at the University of the Witwatersrand. The success of this conference contributed to the Union Government's decision to appoint a Commission of Inquiry into the Method of Training for University Degrees in Engineering – the so-called **Straszacker Commission**, appointed on 13 December 1957. It produced a two-part report on 27 November 1964 and a third part in June 1969; all were to have significant influences on the events that unfolded.

The second event was the passing of the Professional Engineers' Act (No. 81) in 1968.

The energy that fuelled both sets of events came from the rising demand for, and scarcity of engineers at the time. A retrospective look at this matter was the subject of the Presidential

Address of A.A. Middlecote to the SAIEE in which he identified a particularly acute crisis in 1952,[12] just as the country was launching into its post-War boom. He used as a proxy measure for economic growth, the logarithmic curve of the annual consumption of electrical energy and argued that the curve was a good guide to the need for engineers, although due regard had to be taken of the overlay of political events.[13] He illustrated the 1952 crisis through a series of five curves. The first showed the growth of membership of the SAIEE itself, about which he commented:

> This curve shows how after a healthy start membership dropped owing to the 1921 strike (and first post-World War I depression) …; recovered slightly in the mid-twenties; dropped again owing to the 1930 world depression; recovered from 1934 to 1944 though the war tended to slow down the rate of increase of membership somewhat; increased this rate until 1952 … and finally diminished this rate of increase thereafter. To members of the Institute this post-1952 decrease in recruitment is unsatisfactory, the rate of increase being only about half of what it should be.

The second curve showed the cumulative total of electrical engineering graduates from South African universities. Here again he found that whilst the growth was comparable to that of the energy consumption curve until 1952, thereafter it had shown 'a suppression'. The third graph showed the mean curve of graduates per year – which also showed a drop after 1952. The final two graphs showed the cumulative total of electrical engineers in the General Post Office, SA Railways and Harbours (SAR&H) and the Johannesburg Electricity Department. Here again the situation appeared reasonable until 1952 when there was not only a drop in the annual rate of increase, but also a distinct 'wobble' indicative of instability caused by excessive turnover of staff. He commented thus on his findings:[14]

> This indication of the shortage of professional engineers is all the more serious since it affects those services vital to sound industrial development – communication, transport, and energy. Further it must be realized that such a shortage of defined engineers tends to restrict the advancement of many professional engineers to top management – an essential reward necessary to generate professional status. This is not only a disservice to the profession but also a loss to the country because of this loss of potential top management.

Middlecote himself believed that the problem was not purely a quantitative one. He concluded his Presidential Address with the following:

> I believe … that the shortage of entrants to the engineering profession has been caused by insufficiently high status being attached to it. School-leaving children and even university students believe it has no entry to top management – a natural criterion to apply to any profession. … It is obvious that not only from industry's point of view but also from the national point of view the true professional status of the engineer must be established.

Many other engineers agreed with him. Against the backdrop of a critical quantitative shortage, the engineers received an increasingly sympathetic ear to their calls for improved status. The question as to *how* this was to be achieved was not yet settled, although the strategy that had been adopted in the 1930s, that resulted in the supply of engineers keeping pace with growth, confirmed by Middlecote above, namely the triad of pathways of university graduates, certificates of competency or internal progression from artisan up, was not being favourably

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[12] A.A. Middlecote, 'The development of the electrical industry and the engineer'*, The Transactions of the SA Institute of Electrical Engineers*, April 1968, p. 74.
[13] *Ibid,* p. 83 and p. 84.
[14] *Ibid,* p. 84.

considered. The question is 'why not?' when the need was so great. The answer must be inferred from the accounts of the two series of events, referenced above, that follow.

The Straszacker Commission

'The engineer' was a necessary part of the economic growth unfolding after the war, but he (seldom she) was not only a neutral means to a desirable end but also a player as well as sometimes a pawn on the political stage of the time. As is always the case, these roles were indivisible. Nowhere was this more evident than in the appointment, terms of reference, composition and consequential analysis of the influential Commission of Enquiry into the Method of Training for University Degrees in Engineering which was to provide the underpinning rationale for the approach adopted in the legislation that was to follow. It was appointed by the Governor-General on the initiative of the Minister of Education on 13 December 1957. Its terms of reference were:

> to investigate and report on the method of training for University Degrees in Engineering with special reference to:
> (a) Subject requirements;
> (b) Theoretical and practical content and duration of the training;
> (c) The facilities required to provide the proposed training effectively.[15]

Of importance to this study is the fact that the focus was exclusively placed on the universities even though some 30 – 40% of 'engineers' at the time did not hold degrees[16]. Why was this so? This is difficult to explain as there is little reference in the literature, so I turned to circumstantial evidence for clues.

Dr R.L. Straszacker was appointed to chair the Commission. He was a founding member of the *Ingenieursafdeling* of the *Akademie vir Wetenskap en Kuns* in 1941 and had risen to the position of the '*afdeling's*' deputy-chairman in 1951-2. He had risen to the *Akademie's* central Council in October 1956.[17] He was himself a graduate of the University of the Witwatersrand, where he obtained a BSc in Mechanical Engineering and to which he returned after completing a Masters and Doctorate Degree in Germany to become a lecturer – a position he held until 1941 when he left to join the new Stellenbosch University's Faculty of Natural and Technical Science, established in 1942. Initially he was a lecturer but in 1944 was appointed professor. He remained a professor at this institution until, in July 1962, he was appointed as the Chairman of the Electricity Supply Commission (Eskom).[18]

Prof D.W. de Vos was appointed as Vice-Chairperson of the Commission. He was then a professor in the Faculty of Civil Engineering at the University of Pretoria,[19] a faculty which the

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[15] Straszacker Report, cover.
[16] Straszacker Report, para 188, p. 35
[17] *Feesalbum 1909-1959, In opdrage van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, JL van Schalk, BPK Pretoria 1959, p.158-9.
[18] Taken from profile in *The Symphony of Power,* originated by Allen J. Morgan, Chris van Rensburg Publications (Pty) Ltd, 2000, p.128.
[19] Select Committee Report. S.C. 4-1968.

Akademie had again helped to establish in 1956.[20] He, too, was a member of the *Akademie*.[21] Daniel Pieter Johannes Retief was another Commissioner, and he was both a university graduate and a member of the *Akademie*. He was at the time the Chief Engineer of S.A. Post Office.

Of the English-speaking members of the Commission the most noteworthy was Prof. G. R. Bozzoli.[22] He graduated in electrical engineering from the University of the Witwatersrand in 1933. For two years he worked as an engineer with the African Broadcasting Company, now the SABC, before being appointed a junior lecturer in electrical engineering at the University of the Witwatersrand. In 1948 the degree of DSc (Eng.) was conferred on him. Dr. Straszacker and he, born within one year of one another (Bozzoli in 1911 and Straszacker in 1910), would have graduated at approximately the same time (1932/3). They worked together from 1936 to 1941, so were acquainted prior to the Commission. From 1946 to 1962 Professor Bozzoli was a member of the Council of the SAIEE and its President in 1955, and he may have brought a slightly different emphasis to the discussion on the registration of engineers. Nevertheless the men would have concurred surely on the need for university training for engineers – certainly there was no differing minority report to the Straszacker Commission Report. The two travelled together for two months to Europe, the UK and the USA on Commission work[23] - where they no doubt had time to extensively debate the matters of the Commission and meet many like-minded colleagues who were undertaking similar initiatives abroad.

The Straszacker Commission's Report

The Commission's Report set out a thoroughly systematic methodology to address its mandate.[24] It set out

- to determine what the engineer was called upon to do at work, by undertaking wide-ranging surveys of the views of past graduates and employers;
- to draw on survey and other data and the experience of the Commissioners to frame conclusions about future requirements and necessary personal attributes to function as an engineer;
- to assess the extent to which young graduate engineers from South African universities comply with professional requirements and to evaluate relevant courses;
- to establish the past, present and future supply (actual and potential) and demand for engineering graduates with baccalaureates and higher degrees; and
- to recommend the content of engineering courses for all branches both undergraduate and post-graduate, including practical aspects before, during and after attendance at university and the institutional requirements that would need to be in place for these programmes to be delivered.

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[20] Straszacker Report, para 530, p.116.
[21] Select Committee Report. S.C. 4-1968,para 123, p. 40.
[22] SAIEE Council Meeting, 1 August 1969, Kelvin House, Jhb. item 5.
[23] Straszacker Report, Paragraph 15, p.2.
[24] *Ibid,* para 9, pp. 1-2.

This ambitious methodology was then diligently executed – with its first (Part I) and second (Part II) reports delivered in 1964. Part III was only delivered in June 1969 and so was not directly relevant to the passing of the Act in 1968.

Its early surveys and reflections produced analyses embodied in a grid. Along one axis were the different functions of an engineer, classified under six headings (paired into three groups) and along the other axis the branches of engineering were identified. The groups of functions identified were: (1) Theoretical engineering (consisting of Research and Design); (2) Practical engineering (Construction and Production) and (3) Management (Sales and Administrative). The main branches of engineering classified were civil, mechanical, electrical, mining, metallurgical and chemical – although one of its recommendations was that Industrial Engineering should be established as a new branch given the rise of this dimension of work in the industrialization taking place.[25]

Following their analysis of the 2395 replies from graduate engineers, they reached a number of conclusions, amongst which were:

- *Finding 13:*[26] With little variation among branches, engineering graduates spend on average about 30% of their time on administrative functions including executive, personnel and policy matters.
- *Finding 14:*[27] About half the engineers in any branch tend to specialize in one of the six types of functions (i.e. spend more than 50% of their time on it);
- Finding 16:[28] Based on two outcomes viz. that theoretical engineering functions decrease from about 45% to 35% over an engineer's career[29] and that the more practical engineering functions (including installation, operation and maintenance) decrease from about 40% to about 15% over the same working lifespan[30] '(t)he Commission considers that, while it is necessary for young graduates to become thoroughly conversant with practical engineering functions during post-graduate training, much of this practical work, at present done by graduates, could possibly be done as well, if not better and more cheaply, by well-trained technicians, thus freeing professional engineers for more demanding intellectual work.'
- *Findings 17 and 18:*[31] While the practical engineering functions take up less time with years after graduation, the time devoted to management functions increases considerably from about 15% at the beginning to about 50% towards the time of retirement. And so, the Commission accordingly finds that it is clearly necessary for the majority of engineering graduates to be conditioned to accept and be prepared to fulfil managerial functions to an increasing extent. 'They might as well learn to like it.'
- *Finding 19:*[32] Looking at those with doctorates and master's degrees, the Commission found they were far more specialised and very few specialised in the more practical engineering functions with the proportion specialising in research decreasing from half to one fifth later in life and those in more theoretical engineering functions from 60% to 30%.

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[25] Straszacker Report, Finding 28, para 404, p. 68.
[26] *Ibid,* p. 22.
[27] *Ibid,* p. 22.
[28] *Ibid,* p. 25.
[29] *Ibid,* para 157.
[30] *Ibid,* para 158.
[31] *Ibid,* p. 25.
[32] Straszacker Report, p. 28.

- *Finding 20:*[33] 'It is the Commission's view that the needs of the country require that every man (and woman, for that matter) who possesses considerable intellectual capacity should be trained to the limit of that capacity in the field best suited to his (or her) inclination, personality and talents. It is, therefore, considered imperative that our talented manpower should not be wasted because economic considerations force highly trained engineers to move from the more theoretical fields in which they were trained to the more lucrative but, to them, possibly less congenial work in management.'
- *Finding 22:*[34] 'Bearing in mind the terrific rate at which science and technology are expanding, with the knowledge available doubling itself every 15 years or so, the position revealed (that the average time devoted to research was less than 10%, excluding the 6% specialising in research or teaching) cannot be regarded with equanimity.'
- *Finding 23:*[35] The Commission is satisfied that too many engineers in this country are overloaded with work and is of the opinion that a considerable proportion of this work could be done quite satisfactorily under professional engineering guidance by trained and specialized technicians and, on the administrative side, by clerks.

Against these findings the Commission went on to make its first Recommendation:[36]

> The Commission CONSIDERS IT IMPERATIVE that graduate engineers should not be employed in such a way that they are not challenged sufficiently intellectually. The Commission CONSIDERS that their work should necessitate study to a much greater extent than is reflected by the data presented in this section. They should have time for such study, and work which does not demand their training or talents should be delegated to technicians and other support personnel such as clerks, to relieve them as much as possible of the more routine tasks.

This recommendation strains somewhat against the finding that young graduates in general spent 40 per cent of their time doing practical work and later in their careers this translated into managerial work (not research); the assessment by 18 per cent of older graduates of the deficiencies in young graduate engineers viz. that they have had inadequate training to apply knowledge to practical problems and by 11 per cent that they received inadequate practical training.[37] It also undervalues the 'ten per cent of the engineers (who) specialize (i.e. who spend more than 50% of their time) doing practical engineering functions, i.e. construction and installation or production, operation and maintenance.'[38] It also underplayed the results of two surveys conducted by the National Bureau of Educational and Social Research that found that an engineering degree was the basic qualification considered necessary for 80 per cent of the professional engineering posts in the country (leaving 20 per cent where it was not so), except in the mining industry where in 75 per cent of the cases a Certificate of Competency was considered a suitable alternative.[39] The picture was even less stark in its second survey, which considered all posts for which a University **or** Technical College qualification are required. This found that of the 6 005 filled posts, 3 952 posts required only a Government Certificate of Competency, the NED or the ATC II, i.e. 66 per cent of the professional posts.[40] These findings are all systematically noted but not accepted by the Commission. It proceeded

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[33] *Ibid,* p. 28,
[34] *Ibid,* p. 34.
[35] *Ibid,* p. 34.
[36] *Ibid,* Recommendation 1, p. 34.
[37] *Ibid,* p. 80.
[38] *Ibid,* para 237, p. 43.
[39] *Ibid,* para 577, p. 139.
[40] *Ibid,* para 591, p. 143.

instead to recommend a more all-round training in basic science and basic engineering subjects.[41] This in spite of their own observation that in Germany, a reference point for the Afrikaans members of the Commission, 'on the whole, proportionately more non-graduate engineers specialize in operation, production and maintenance than graduates[42] and the view of employers of engineers in industry and consulting practices who estimated that a qualification between the National Engineering Diploma and a degree would have sufficed for some 30 – 40 per cent of the employees (not necessarily graduates) classed by them as "engineers".[43]

Taken together, these findings could surely have supported an alternative conclusion, namely that *there was indeed a place for non-graduated 'more practical' engineers in industry alongside more theoretically trained people* – who could indeed have risen through the ranks and incrementally expanded their broad conceptual base. That this conclusion was not reached, and instead the Commission chose to draw a *hard* line between 'engineer' and 'technician', to reserve the title of 'engineer' for the former and to characterise the work of an engineer as requiring more theory and less practice (although more management) – motivated principally on *Finding 22* and unmoderated by *Finding 20* or by the fact that employers were employing many non-graduated engineers, suggests that sectional interest (universities) influenced its conclusion that only a university degree or its equivalent (*corporate* membership of an institution being its measure at the time) would suffice:[44]

> The Commission considers an engineering degree or corporate membership of the Institutions of Civil, Mechanical, Electrical, Structural, Municipal and Chemical Engineers or the Institute of Metallurgists (by examination) as professional engineering qualifications at present, but it does not regard the Government Certificate of Competency, the National Engineering or Technicians' Diploma, or the Advanced Technical Certificate as a qualification for professional status.

Stan Bridgens, after acknowledging the importance of research and design during that period in a fast-changing world, gave his personal impression that in practice:

> you can't absorb all of these guys doing only research and design, much as you want them, there is not so much design or research work for these graduates in the real world – and research work costs money and companies think carefully about projects that do not generate money… so there are a set of dynamics that make highly degreed engineers do a lot of ordinary engineering the same as the guys who come up through the ranks. And there are a whole wad of them out there keeping the economy going, just in terms of the ordinary day-to-day needs Not to be too sophisticated, to provide for the needs of the country, basic water, essential services and generally low to medium technology engineering to provide basic needs – like clean water sewage, shelter and clothing and so on…[45]

At the same time, it [the Commission] recommended less theory and more specialisation for technicians – hence widening the gap between the two and making the transition from the one to the other more difficult. Its Recommendation 21[46] makes this most clearly:

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[41] *Ibid,* para 450, p. 80.
[42] Straszacker Report, para 164, p. 28.
[43] *Ibid,* para 188, p. 35.
[44] *Ibid,* para 588, p. 142.
[45] Interview with Stan Bridgens, 25 October 2007.
[46] Straszacker Report, p. 145.

Recommendation 21:

> In order to ensure optimum utilization of the human potential, the Commission SUGGESTS that the courses for technicians be designed to train them to a comparatively high level in specialized fields, rather than to provide a broad training to a lower level. Courses which provide a broad training are much more demanding intellectually and may easily become so demanding as to require university material for their successful completion.

The Commission saw progression from artisan as being a legitimate way to fill technician posts[47] but not progression from technician to engineer. No attention was paid, for instance, to a matter that greatly concerned the Technical Colleges, namely that no credit was given for learning done at college when students transferred to a university:[48]

> At any stage after obtaining the matriculation exemption certificate, a student from a technical college may proceed to university, but normally no credit, apart from that for class attendance in some of the drawing courses, is received for successfully negotiated examinations at technical colleges, and students commence university studies in the first year. The number of students proceeding to university from technical colleges is small.

Neither did they show any interest in trying to establish why programmes that had been tried to bridge the divide had failed – such as the recounted experience of the partnership between University of the Witwatersrand and the Pretoria Technical College,[49] although they did recommend that problems encountered by men on military service, of which after Sharpeville in 1961 there were a growing number, be studied further.[50]

The men of the Commission were aware that many youngsters from poorer homes, like Ken and Allen and indeed Stan too, went to technical college instead of university because they could not afford either the university course fees, or the time spent not earning an income:[51]

> There is, however, reason to fear that the highly commendable Technician Training Scheme by means of sandwich courses, recently started at some Technical Colleges, is diverting graduates from university to technician training because of the more attractive immediate financial prospects. In many cases it takes an engineering graduate many years to overtake his matriculants contemporary, who became a technician.

The Commission did not recommend easier transfer between college and university; rather it recommended that bursaries be made available on 'a far more adequate scale than heretofore'[52] and that there be more adequate career guidance at schools.[53]

It did accept that not all prospective engineers could study full-time and proposed that the universities conduct evening classes. However, the Commission was not generally in favour of correspondence classes because of the need for laboratory work. It did propose, however, that certain introductory mathematics and applied mathematics courses be available through the University of South Africa to those exploring engineering as a career and those on military

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[47] *Ibid,* para 90, p. 12 and para 307, p. 52.
[48] *Ibid,* para 468, p. 93.
[49] *Ibid,* para 627, p. 157.
[50] *Ibid*, Recommendation 34, p. 158.
[51] *Ibid,* para 609, p. 153.
[52] *Ibid,* Recommendation 27 (a), p. 153.
[53] *Ibid,* Recommendation 27 (c), p. 153.

service.[54] But on one point it was quite clear: 'The Commission is therefore strongly OPPOSED to any lowering of standards in order to improve the position in regard to numbers of graduates'[55] – standards which it believed could only be set at university.

Another factor which in the minds of the Commissioners hardened the line between engineers and technicians was the belief that 'ability' was genetically inscribed at birth. There was no possibility that a person's 'ability' might advance with maturity and experience, or indeed with opportunity (like Stan Bridgens who had to leave school before he matriculated).[56]

> (The professional engineer) is faced with a great intellectual challenge, involving, to some extent, "planning for survival in a society wracked by an explosion of science almost too vast for our human institutions to absorb." …. It requires ability to see "the wood as well as the trees." It requires imagination, foresight, initiative, adaptability, resourcefulness, responsibility, intellectual curiosity and intellectual integrity.
>
> In any population, the manpower with the broad outlook and diverse abilities required to meet these demands is very limited. It is therefore, of vital importance that no potential engineering talent should either be lost or wasted. Properly qualified and able professional engineers should be exploited to the full: they should give all their time to work which only they can do well, and they should be relieved of the more routine duties which are intellectually less demanding and which can be done by specialized aides less liberally endowed than themselves, but who, if well-trained in specializations suited to their particular talents, can do valuable and satisfying work. The available pool of such people is greater than that for professional engineers.

In the Commissioners' view this subdivision of humanity – between those more and those less liberally intellectually endowed - was reliably executed by the matriculation examination system, a view they shared with the Transvaal Education Department:[57]

> The Education Bureau of the Transvaal Education Department … estimated that 20% of the school population was capable of obtaining the Matriculation Exemption Certificate. This amounts to 18% of the births 18 years before matriculation.
>
> … the number of matriculants has remained practically constant at 17-18% of the corresponding births for five years 1958-1962 despite the fact that the number of those who obtained Secondary School Leaving Certificates increased from 30% to 39% during that time. This appears to confirm the Transvaal Education Department's estimate.

However further research reduced this figure to 14%.[58] And 'if the retention rate (of university graduates to freshmen) stabilizes at 50%, this will mean that engineering baccalaureates will increase to a maximum of about 0.7% of the births (Whites), 22 years before graduation.'[59]

These assumptions and calculations enabled the Commission to conclude that 'there is probably some untapped potential among the girls, but little, if any among the boys'[60] although they again nuanced their findings a little:[61]

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[54] Straszacker Report, Recommendations 30, 31 and 32, pp. 155-6.
[55] *Ibid*, Recommendation 45, p. 164.
[56] *Ibid,* paras 79 and 80, p. 10.
[57] *Ibid,* paras 481 and 482, p. 102.
[58] *Ibid,* Finding 46, p. 108.
[59] *Ibid,* Finding 58, p. 118.
[60] Straszacker Report, para 438, p. 102.
[61] *Ibid,* Finding 47, para 508.

> The evidence available to the Commission seems to indicate that the loss of university potential, measured in terms of matriculants who do not proceed to university at all.
> (a) is probably very low for men who come from English medium, dual or parallel medium or foreign language medium schools, being in the order of only about 10%.
> (b) Is probably more marked for men from Afrikaans medium schools, i.e. in the order of 25%;
> (c) Is still more pronounced in the case of women viz of the order of 40% but it must be remembered that in this case a large number of women enter teachers' training colleges, so that the actual loss is probably much less.

The Commission made up of white men only, adopted the political and social frame of the times. Its own finding that 'during 1951 – 1954 the intelligence quotients of freshmen in engineering were higher than those in any other faculty, being exceeded only by those of female students'[62] did not lead them to the obvious conclusion. Instead they recommended that 'women be actively encouraged to go in for teaching, medicine and pure science and that conditions, particularly in teaching, be directed towards attracting middle-aged married women in great numbers' because 'these are more natural fields for them and such steps should make it possible for more men to enter engineering'.[63] The Commission did address the issue of training black engineers – but its recommendations in this regard were similarly constrained. It did recommend that active steps be taken to increase the number of qualified maths and science teachers at black high-schools; that more 'non-White' technicians be trained 'for service in their own areas' and that black graduates from technical colleges be assisted to move across to 'open' universities (without credit).[64] But, as to be expected, its principal focus was on ways to increase the number of young Afrikaans graduates[65] - consistent no doubt with the aims of the *Akademie* and the government of the day.

Yet perversely, this same logic, namely that 'theory' carries more weight did not flow to its logical conclusion, namely that scientists were supreme.

After further argument, the Commission put forward its second recommendation that the Government Service be provided with the best engineering talent the country can provide – being where the talent can best be used. It then went on to note that there was a rapidly expanding use of private consultants in the public sector to meet the rising demands and that, particularly at local municipality level, people were not in a position to judge whether the consultants used were properly qualified. Its third Resolution[66] was that

> The Commission accordingly SUGGESTS that serious consideration be given as soon as possible to the establishment of a statutory authority for the registration of professional consulting engineers, if not all professional engineers.

Assuming that these views would have had a powerful influence on the government, the balance of power was indeed weighted against those who sought to replicate the career paths of pre-war years. It must be concluded that there was no INTEREST in pursuing this route – even though, as the Commission itself found, extensive overlaps between the work of

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[62] *Ibid,* Finding 54, para 525, p. 115.
[63] *Ibid,* Recommendation 42 and para 652, p. 161.
[64] *Ibid,* paras 653 to 657, pp. 161 – 162.
[65] *Ibid,* see for example p. 112 and 113 and Recommendation 19 on p. 137.
[66] *Ibid,* Recommendation 3, p. 43.

engineers and technicians could have been formulated into a linear route of progression – but there was no interest to do so. It must therefore be concluded that the vested interest of the parties played a part in 'closing the inlet pipe' – and in influencing the roll-out of events in the second drama.

The forces that framed the 1968 Professional Engineers' Act

This story picks up during the Second World War. There were three initiatives underway: the traditional engineering societies who had formed a 'Status of Engineers Joint Committee' in 1935, which had faltered during the early war years but had resumed meeting in 1945;[67] the English speaking graduates at the University of the Witwatersrand had begun organising their Engineering Graduates Association (EGA) in 1941 and in 1945 expanded their scope to have national coverage under the Engineering Association of South Africa (EASA); the *Akademie vir Wetenskap en Kuns*, after establishing the second Faculty at Stellenbosch University, had launched its own *Ingenieursafdeling* in 1944 (hereafter the Akademie).

Initially the strength of the traditional societies must have seemed insurmountable, especially after May 1945, when their ranks were bolstered by the Chemical, Metallurgical and Mining Societies of South Africa" which applied to join, and was accepted by, their "Status of Engineers Joint Committee".[68] However, whilst significantly smaller in membership, the determined graduates' association resumed their concentrated and energetic efforts to achieve their desired outcome. But it was not destined to be a matter that could be quickly settled; indeed, it took over two decades.

There were initially two alternative views as to how these challenges should be met. The first view was that represented by the older engineering Societies and the other by the 'young upstarts' in EASA and the *Akademie*. It transpires that both were pressurising the government to see things their way. That the pendulum was swinging in favour of EASA and the *Akademie* can be seen by the composition of the Commission, and in the response of the Minister of Commerce and Industries to the pressures to intervene. He appointed a 'One Man Commission', in the person of Dr F.J. de Villiers, to resolve the matter. Dr de Villiers was not only a senior government official; he was also a Council member of the *Akademie* from 1955 to 1958, and its national Chairman from 1958 to 1961, and he had served consistently on the *Ingenieursafdeling* from 1948 where he also held various offices.[69] He was not what could be considered a neutral arbiter in the matter, but he was careful. His mandate appears to have been to mediate the differences – and he was still at his task five years later! The arguments behind their respective positions are considered below:

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[67] Dr. M.R. Gericke, 'Period 1890 to 1968: History of Legislation for the Registration of Professional Engineers in the Republic of South Africa', https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December, 2019.

[68] The South African Institution of Mechanical Engineers, *'A Century of Mechanical Engineering, 1892 – 1992'*, Johannesburg, 1993, p. 21.

[69] *Feesalbum, 1909 – 1959*, *In opdrag van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*, J.L. Van Schaik, Pretoria, 1959, pp. 158-159.

The role of the older engineering Institutions, excluding SAICE

The bulk of the traditional engineering societies, unlike EASA and the *Akademie*, were largely controlled by the older generation who believed, as Bozzoli put it:[70]

> The adolescent engineer is inclined to think that he can attain professional status and a general increase in salary by regulation rather than by real ability and hard work.

The council members of these societies were initially strongly opposed to compulsory registration for the following reasons:[71]

> We feel that statutory compulsion kills initiative and sense of responsibility because legislation is regulatory rather than creative. Unionism, if it could be achieved by legislation will not enhance the professional reputation of the engineer but would tend to degrade rather than upgrade. … We do not want to be regimented but wish to have freedom to develop, to instil initiative and cultivate responsibility.
>
> The argument that the public and properly qualified engineers must be protected from unqualified persons practising as engineers is fallacious for the simple reason that the public as individuals do not employ engineers except in a very few isolated instances. The great majority of engineers are employed in the engineering departments of the government service, public utility organisations, municipalities and local authorities, which are headed by engineers of standing, to carry out engineering work on behalf of the public. Similarly, private enterprise, such as the mining houses and industry generally, employs engineers of repute who are likewise capable of deciding what qualifications are required of the men who carry out the work for which they, ultimately, are responsible.

These were the views of four of the five key engineering institutes of the day – the South African Institute of Electrical Engineers, the South African Institution of Mechanical Engineers, the Institution of Certificated Engineers South Africa and the Chemical, Metallurgical and Mining Society of South Africa. The South African Institution of Civil Engineers (SAICE) held itself apart. This branch of engineering was older, with established sub-branches and it did not permit 'lower ranking' college graduates to join unlike the other organisations.[72] This difference was reflected in the outcome of a membership ballot held in December 1951, on the question of the registration of individual engineers. In a 55 per cent poll, 382 voted in favour and 53 were against the principle – and so they were drawn into discussion with EASA and the *Akademie*.[73] However, the majority of the Societies, formed themselves into a Liaison Committee to oppose the Bill. The liaison committee prepared a Memorandum to present their

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[70] Engineering Council of South Africa Archives (hereafter ECSA Archives), Annexure F of Dr. M.R. Gericke's history, Annexure 'A' in the Submission by The South African Institute of Electrical Engineers, the South African Institution of Mechanical Engineers, the Institution of Certificated Engineers, South Africa and the Chemical, Metallurgical and Mining Society of South Africa, attached to the Minutes of a meeting held on 4 July, 1955 in connection with the draft Bill for the registration of professional engineers prepared by the South African Institution of Civil Engineers.

[71] Ibid.

[72] In their presentation to the Select Committee on 8 May 1968 the Association of Colleges of Advanced Technical Education said '*Daardie manne wat die ingenieursdiploma gekry het, kon lidmaatskap van die ingenieursinstitute kry. .. Die siviele ingenieurs is ietwat eksklusiewe mense en gevolglik wou hulle institute nie hierdie mense toelaat nie*.' Select Committee (S.C.) Report, 4-1968, Paragraph 182, p. 62.

[73] Dr M.R. Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa Period 1890 to 1968*, https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

views to Dr de Villiers, the appointed mediator. Members of the committee met with him on the morning of 4 July 1955 to argue their case.[74] Their memorandum stated:

1. Registration is likely to result in registration and control of the individual engineer, which would serve no useful purpose and only be irksome to engineers and their employers and, further, might be open to bureaucratic abuse by lending itself to the imposition of restrictive measures inimical to the engineering development of the country which is already suffering from a shortage of engineers.
2. While agreeing that the engineer is invariably underpaid considering his responsibility to the community, we fail to see how the fact of being forced to be registered is going to enhance his status and so, as most of the protagonists of registration hope and expect, increase his salary. In fact, the cost of registration, judging by the document produced by the Civils, is likely to be an appreciable item of additional taxation which the engineer will have the honour of carrying all by himself. There is more than a possibility that registration would force the Engineering Societies out of existence as it is doubtful whether the majority of young engineers will be able to afford both registration and Society membership; what then as regards presentation of papers, dissemination and interchange of technical knowledge and all the other work done by the Societies?
3. We do not appreciate the necessity for laymen to take part in the control of the engineering profession, regardless of the status of the laymen. Do the Civils have any laymen members of the general public serving on their Council?
4. Experience since 1890 has shown that it is impossible even without outside interference, to produce the requisite legislation in the form acceptable to the whole engineering profession.
5. We are afraid of starting something which will almost certainly get out of control as far as we in the profession are concerned. Experience has shown that the Bill when it reaches the Statute Book could and most probably would be something very different from what its authors intended.
6. The draft Bill produced by the Civils means in fact the registration of all engineers, mechanical, electrical, mining and any other in spite of the fact that a substantial and decisive majority of our members do not want individual registration of the engineer.

These men clearly favoured independence from government – which had fallen into the hands of the Nationalist Party since 1948. They also sought to protect the established Societies and Institutes. Their view was, if they were forced to accept some form of legislation then:

> As an alternative, but only if legislation of some form is to be imposed upon us, then that conferring statutory recognition of the Institutions as autonomous bodies with complete control of their affairs vested, as it now is, in the Institution themselves is the only type that should be considered since such legislation properly designed and enacted will not interfere with the freedom and legitimate scope of work of the individual engineer nor with the engineering work of the country but it would enable the properly qualified engineer to acquire a title accepted, recognised and protected by the general public through its accredited representatives, the Government.

In the discussion that took place on this Memorandum with Dr de Villiers, 'it was pointed out that the South African societies were not affiliated in any way with the British institutions, and

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[74] ECSA Archives, Annexure F of Dr. M.R. Gericke's history, Annexure 'A' in the Submission by The South African Institute of Electrical Engineers, the South African Institution of Mechanical Engineers, the Institution of Certificated Engineers, South Africa and the Chemical, Metallurgical and Mining Society of South Africa, attached to the Minutes of a meeting held on 4 July, 1955 in connection with the draft Bill for the registration of professional engineers prepared by the South African Institution of Civil Engineers.

that the kind of statutory recognition desired would be similar to that conferred by Charter in the United Kingdom.'[75] Their reference was to the UK not to the Nationalist Party.

Matters which may have influenced their concern were the recent bitter battles that had been fought at the English-speaking universities, where the liberals and the left-wing activists had resisted the introduction of the 'University Apartheid Bill' – the Extension of University Education Act of 1959. This established separate ethnic university colleges for 'non-white' students and prohibited blacks from registering at the 'white' universities, except with ministerial permission. This has been graphically recounted by Bruce Murray:[76]

> In 1959 the Nationalist Government, after a decade in power, finally passed legislation through Parliament to impose apartheid on South Africa's university system. The legislation was carried in the face of a major campaign of protest mounted by the English-speaking universities of South Africa, led by Wits and UCT as the country's two 'open universities', by Fort Hare, and by NUSAS, which co-ordinated student protest both domestically and internationally. Various liberal organisations, notably the Women's League for the Defence of the Constitution, or Black Sash as it was known by its emblem, and the South African Institute of Race Relations, joined in the campaign to arouse public opposition to the government's proposals for university apartheid, and in Parliament the Opposition put up a dogged resistance to the legislation first introduced in 1957.

This policy, however brutal, had little immediate practical effect on engineers. Murray recorded that in 1945, Wits had 156 black students (87 of whom were in the Medical School which had led the movement for access to black students in 1943)[77]

> For the faculties of Engineering and Dentistry, the University thought it 'inadvisable' to admit black ex-volunteers. As Glyn Thomas informed the Secretary for Education, it was 'practically impossible' to arrange vacation practical work for blacks in engineering and there was 'no likelihood of their obtaining appropriate employment after graduation'; in all, an engineering training would do nothing to 're-establish the non-European ex-volunteer in civil life'.

This in the context of a massive programme of ex-volunteer training provided at Wits – where 500 engineering degrees were awarded to ex-volunteers between March 1947 and 1956.[78] The self-interested nature of the argument is evident as[79]

> Except in the mining industry, there were no legal barriers preventing black access to the professions; the denial of training facilities was the main instrument for keeping blacks out of certain professions.

But again the focus must shift away from the racially excluded and the crude and cruel apartheid means used for their exclusion, to a consideration of the subtler forms of restriction that were evolving to prevent those coming up through the ranks from rising to the status of 'professional engineer'.

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[75] *Ibid,* p. 2.

[76] Bruce K. Murray, *Wits, The 'Open' Years: A History of the University of the Witwatersrand, Johannesburg 1939 – 1959,* Johannesburg: Witwatersrand University Press, 1997, p. 289.

[77] *Ibid,* p. 43.

[78] *Ibid,* p. 82.

[79] *Ibid,* p. 47.

On the question of entry qualifications for engineering, it was the view of this alliance grouping that:[80]

> (their) constitutions were … adequate for present conditions and the societies were not perturbed about the standard set. The general trend was to enhance the qualifications for admission to corporate membership. These were at present based upon the need of a technical qualification with the addition of approved practical training and responsible experience. The constitutions of several of the societies represented had been revised within the last five years, and in each case the qualifications had become more rigid. If, however, further changes were found to be necessary they could be brought about. The opinion was held that individual registration would tend to peg down qualifications to a certain level, and there would not be the same tendency for them to rise.

This view stands in clear contrast to that of the graduates who were insisting that a university-based degree should be a minimum requirement for registration. It could also be argued to strain a little against the logic of the presentation made to the SAIEE, namely that the scientific basis of electrical engineering in particular required formal scientific preparation – but clearly the political considerations of the day overrode this.

Two interesting points warrant emphasis here. First, the Institution of Certificated Engineers South Africa was still in this alliance, being signatories to the above memorandum, and secondly, whilst the SAICE was not, its position was precarious. This was evidenced when a ballot of Council as opposed to membership views was canvassed. SAICE, with difficulty, had persuaded the other member societies of Associated Scientific and Technical Societies (AS&TS) to undertake a ballot in 1953, in the face of persisting disagreement. This was also in response to EASA's clandestine canvassing, in early 1950, of *all* engineers whom it could find on the question of individual registration. This canvassing indicated overwhelming support. The traditional societies were furious that this had been done without their consent. The 1953 ballot was a compromise. The older societies agreed to it on condition that they would first conduct secret ballots of their *Council* members and inform individual members of their Council's views in a covering letter sent with the ballot paper. The four societies referenced above all reported to their members that 'The Council is firmly opposed to registration of any type' whilst the SAICE Council reported in the same letter 'A secret postal ballot of Council members was taken and of 23 members of Council, 10 have voted in favour of registration and 10 voted against. Three members did not vote'.[81] They were split down the middle at the highest level of their Institution – a position which led them to lead a process of reconciliation, which will be recounted after the views of the EASA and *Akademie* are outlined.

And as to the outcome of the vote, SAICE members again voted in favour of registration, although by a smaller margin, and all the others voted strongly although not unanimously

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[80] ECSA Archives, Annexure F of Dr. M.R. Gericke's history, Minutes of meeting held in Kelvin House, Johannesburg, on Monday 4 July, 1955, in connection with the draft Bill for the registration of professional engineers prepared by the South African Institution of Civil Engineers, p. 2.

[81] ECSA Archives, Annexure D of Dr. M.R. Gericke's history, The South African Institution of Mechanical Engineers, letter to all Corporate Members of the South African Institution of Civil Engineers, the South African Institution of Mechanical Engineers, the South African Institute of Electrical Engineers, the Institution of Certificated Engineers South Africa and the South African Chemical Institute, dated 8 May 1953.

against. Dr de Villiers, the One-Man Commission, for whom the ballot had essentially been undertaken, 'indicated that he felt that the statement issued at the time of the ballot could have unduly influenced the members' views. He was therefore doubtful whether the ballot could serve the purpose for which it was intended.'[82] He was not to be so easily detracted from his *Akademie* leaning!

The role of the EASA, the Akademie and SAICE

EASA was formed just after the war. The Engineering Graduates Association (EGA) moved from being an association based essentially at the University of the Witwatersrand to a national organisation. With its expanded scope, it set about achieving its objective of 'obtaining professional registration and recognition of the professional status of the engineer'.[83] But it was pitted against the united force of the older societies. How was it, with its much smaller collective membership base, to take on the challenge of well-established organisations working collectively? J Dommisse, a National Council member of EASA noted years later, when the matter had been settled that:[84]

> Whereas the older Institutions all turned their attention to registration from time to time, this was but one aspect – and more often regarded as a less urgent aspect – of their overall activities. To EASA, registration was the over-riding consideration and never a Council meeting was held where the subject was not raised and discussed. … EASA frequently had to endure strong rebuffs but it kept coming back for more.

There were initially several attempts to woo the societies to its point of view. But it was unable to persuade them that a national body, rather than the individual societies, should be the registering agency. There were also differences on what the registration criteria should be. The official accounts are a little shy on this point, although the fact there were disagreements is not disputed. This is how Dr MR Gericke recounts the events:[85]

> During June 1946 EASA deliberated the attempts of the "Status of Engineers Joint Committee" to draft an acceptable Bill for the registration of engineers but decided that "… co-operation was out of the question as the Bill would be determined by the individual Councils of the Societies."

EASA sought to strengthen its position and turned to the *Akademie vir Wetenskap en Kuns*. This is how the mechanical engineers reported it:

> On 25th October 1945 the "Engineers' Association of South Africa (EASA) was formed and took part in the proceedings. EASA then invited the "*Tak Witwatersrand Ingenieursafdeling van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*" to become part of the negotiations.

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[82] Dr. M.R. Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

[83] J. Dommisse, 'The Professional Engineers' Act, 1968', *EASA Bulletin,* Vol. 25, No. 4. July/August 1968, p. 73.

[84] *Ibid,* p. 74.

[85] Dr. M.R. Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

Dr Gericke concurs albeit that he asserts the engagement happened a year later:[86]

> During October 1946 EASA decided to invite the "*TAK Witwatersrand Ingeniersafdeling van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*" to discuss matters of common interest. The first meeting took place on 27 May 1947 … The members of the *Akademie* agreed to explore all ways and means to enlist the support of their *Akademie* engineering colleagues in obtaining the status of the engineers as envisaged by EASA.

The enthusiasm with which the *Akademie* responded to this invitation is not difficult to explain. At the time, there were very few Afrikaans speaking engineers: Samuel Pauw, in a study published in 1945, reports that in 1939 only 4.7 per cent of engineers were 'Afrikaners' and only 3.5 Afrikaners out of 1000 'blanke mans' (white men) were engineers in the towns.[87] Furthermore, as Giliomee has claimed, the climate was one in which there was a rising openness amongst the younger generation of Afrikaners to co-operate with the English because they 'were idealistic and had the prospect of entering a profession'.[88] For them the alliance must have held the promise of accelerating their advance by by-passing the 'English' Societies. For the EASA, no doubt reading the broader political climate, this alliance would have held political, if not numerical, promise in their struggles against the traditional societies.

One of the men for whom alliance was clearly a priority was D.P.J. Retief – the same man who had signed Ken Bird's Competitive Exam Certificate[89] in the Post Office in his capacity as Chief Engineer. Retief was a member of both the EASA – particularly active in the Pretoria area it seems, where he is recorded as having made presentations[90] - and in the *Akademie.*[91] He was also a member of the Straszacker Commission. His efforts, and those of others, were successful in driving the EASA process forward:

> In the meantime, the Pretoria members of EASA were clamouring increasingly to know what action was being taken in regard to the EASA Bill on the status of engineers and an "Action Committee" … was appointed by EASA. The Committee was instructed to draft a Bill for the registration of individual engineers and industrial scientists following the lines of the "Medical and Dental Act". It was also stipulated that the minimum qualification had to be a university degree, although initially all engineers would have to be considered for registration. The draft Bill was prepared and tabled at an EASA Council meeting on 14 November 1947. *[Emphasis added]*[92]

This draft was widely distributed and discussed. Early efforts to secure the concurrence of the other engineering institutes failed. Their united view was that:

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[86] Dr. M.R. Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

[87] Samuel Pauw, *Die beroepslewe van die Afrikaner in die stad,* Stellenbosch: Pro Ecclesia, 1945, p. 236.

[88] Giliomee, *The Afrikaners,* pp. 406-7.

[89] Copy in personal possession of the author.

[90] 'Activities of Pretoria Branch of EASA during the Quarter ending December 31, 1945', in *EASA Bulletin*, Vol. 2, No. 3. January 1946. Mr. Retief and Mr. Oldfield addressed the meeting on 'Membership' and 'Status'.

[91] D.P.J. Retief is listed as a representative from the *Akademie* in the list of people who participated in the Joint Registration Committee, see *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 20 June 2008.

[92] Unknown reference

> they could not see their way clear to collaborate with EASA on the principle of individual registration. EASA then realised that these member societies of AS&TS were supporting the concept of society registration and EASA and the *Akademie* would have to proceed on their own in an endeavour to obtain individual registration as they, on their part, were completely opposed to society registration.[93]

The *Akademie* appears to have supported EASA on all fundamental points as J. Dommisse was able to boast in his editorial to the EASA Bulletin in 1968:[94]

> The Professional Engineers' Act as it stands today is to a very large extent founded on and follows the format of the original draft act formulated by EASA and published in March 1951. This original draft act formed the basis upon which discussions and deliberations were entered into with the South African Institution of Civil Engineers and the *Suid-Afrikaanse Akademie vir Wetenskap en Kuns* in 1953 and culminated in the joint publication by the three bodies of an amended draft act in July, 1955.

The influence of men like DPJ Retief must have assisted in securing this cooperation.

Having received the Memorandum outlined above, and having met its proponents on the morning of 4 July 1955, Dr de Villiers convened a meeting with the opposing faction on the afternoon of the same day. In the discussions that ensued EASA, the *Akademie* and SAICE outlined their position. On the question of Society Registration, they were completely opposed because:

(a) In Society Registration, no central body will have any say in who the society must register and who not.
(b) The Government will have no say in the registration of engineers.
(c) The society may have other aims not even remotely connected with registration.
(d) The society does not necessarily represent the majority of engineers and therefore a large number would be forced to become members in spite of (c). *[Emphasis added]*

The tensions bristle off the page here. Clearly there were high levels of distrust. The reference to a hidden agenda suggests that the *Akademie* feared the continuing influence of the English societies. It would seem most likely that the explicit reference to Government's interest was tabled by the *Akademie*, but it was a point EASA had clearly resolved to live with in the interests of its overriding goal of securing individual registration on the basis of a graduate qualification.

Dr Loubser from the *Akademie* spoke at the meeting with Dr de Villiers, where he put the position of the *Akademie* as follows:[95]

> The Akademie Council had decided that the improvement of the status of its members was very much its concern and therefore interested itself in the question of registration of professions. At a well-attended meeting of members, where registration was debated, a vote taken was overwhelmingly in favour of individual registration. The Akademie, however, decided not to draw up a draft Bill but instead co-operated with EASA and the Institute of Civil Engineers towards this end. A sub-committee of the Akademie, consisting of engineers, chemists and

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[93] Unknown reference.

[94] Dommisse, J. 1968, 'The Professional Engineers' Act', *EASA Bulletin,* Vol. 25, No. 4. July/August 1968, p. 74.

[95] ECSA Archives, Annexure G of Dr. Gericke's history, Minutes of Meeting held in Kelvin House, Johannesburg on Monday 4 July, 1955, between representatives of the SA Institute of Civil Engineers, Die SA Akademie vir Wetenskap en Kuns, the Engineers' Association (SA) and Dr. F.J. de Villiers, p. 2.

> other scientists eventually accepted the draft Bill but nevertheless expressed the view that some form of umbrella legislation was still the ideal to aim at.

(Given that Dr de Villiers was also a member of the *Akademie*, it must be assumed that they received a very sympathetic hearing.)

Dr Gericke's historical account outlines some differences within this alliance: the *Akademie* wanted to widen the Bill to consider other scientists; the Civils had proposed that it apply only to civil engineers initially and specifically wished to exclude the Certificated Engineers; the EASA wanted it to apply to all engineers, including Certificated Engineers, from the start, but they were all prepared to compromise to advance the Bill and so the alliance held.[96]

There were two camps. The lines were drawn. How were they to be resolved?

'The Civils' were split at Council level and were no doubt reluctant to drive a more damaging wedge within their ranks. The Government was hesitant to proceed without the concurrence of all parties, but the political sway of the *Akademie* was no doubt very influential. As for the EASA, the first prize was still legislation that covered all engineers. Dr de Villiers set aside the 4 July 1955 to address the task. As seen above in the morning he met with the Societies and heard their views. He received the Memorandum which is outlined above. After listening carefully Dr de Villiers put it to the Societies:[97]

> he would welcome a meeting of representatives of the opposing views regarding the Bill of the South African Institution of Civil Engineers at which he would take the Chair. He urged that serious thought be given to reaching a compromise. He would be pleased to participate at any stage in negotiations in an effort to secure a course of action agreeable to all. He had no desire to disturb those established institutions from which the country benefited, but rather to advance and promote their well-being. In particular he did not wish to hurry matters; the subject under discussion had been before him since 1950 and he was prepared to wait for a crystallisation of mature opinion.

In the afternoon of 4 July 1955, he met the opposing side, but the outcome was not as envisaged in the morning:[98]

> It was unanimously decided by the representatives that further efforts should be made to bridge any gaps between the two groups and an effort should also be made to get all engineers together. Towards this end a meeting should be arranged between the different groups and at a later stage another meeting can be held when Dr de Villiers can also be invited to be present.

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[96] Dr. M.R. Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

[97] ECSA Archives, Annexure F of Dr. Gericke's history, Minutes of a meeting held on 4 July, 1955 in connection with the draft Bill for the registration of professional engineers prepared by the South African Institute of Civil Engineers, p. 4.

[98] ECSA Archives, Annexure G of Dr. Gericke's history, Minutes of Meeting held in Kelvin House, Johannesburg on Monday 4 July, 1955, between representatives of the SA Institute of Civil Engineers, Die SA Akademie vir Wetenskap en Kuns, the Engineers' Association (SA) and Dr FJ de Villiers.

The engineers clearly wanted to sort out the matter themselves, appreciating the sensitivity to government's direct involvement by the societies (and indeed in the SAICE camp too if the inferences drawn from Prof Jennings's presentation below are correct).

Dr Gericke records the flurry of meetings that took place following the two historic meetings with Dr de Villiers on 4 July 1955, but it took a year before a Joint Registration Committee was formed between the two camps. The Institution of Certificated Mechanical and Electrical Engineers SA was a party to these discussions alongside all the other interested parties. The Joint Registration Committee met frequently between 7 August 1956 and 17 July 1959 to resolve their differences. Their mandate was to start *ab initio* to find a way through the deadlock.[99] Midway through the process, by 7 May 1957 they had reached agreement on some points:[100]

(i) Legal recognition of the qualifications of the professional engineer.
(ii) The establishment of a code of ethics and legal machinery for its enforcement.
(iii) All practicing professional engineers should come compulsorily under a single control for (i) and (ii).

The blockage became the reservation of work for the professional engineer. On this question 'there was a wide divergence of views which the Joint Registration Committee could not resolve'. The problem was both defining a 'horizontal' and well as a 'vertical' fence: horizontally the question of where precisely the qualification baseline should be drawn was still an issue, although 'all of them were of the opinion that the status of the professional engineer should conform to recognised standards of technical qualifications and practical experience'; and vertically the division between the work of the various engineering branches was still quite unclear as had been underlined by the Societies in their discussion with Dr de Villiers back in 1955:[101]

> In this connection, it is necessary to state that it is impossible to draft a Bill that will apply only to a particular branch of engineering because the various branches of engineering such as civil, mechanical, electrical mining and chemical, are so inter-related that they cannot be separated into water-tight compartments. … (T)here is no way of defining civil engineering as distinct from any other branch of engineering and any attempt to do so will merely create artificial barriers which will retard all engineering work and still further aggravate the present serious shortage of engineers to the detriment of the economy and progress of South Africa, our country.

Before resolving a way out of these problems, reference was made to the international community of engineers at the Commonwealth Engineering Institutions Conference which was held in Australia in March 1958 – illustrating the pull towards this community still. Here they received a strong go-ahead to advance the unification of the profession as a whole – and they

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[99] Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

[100] Ibid, p. 12.

[101] ECSA Archives, Annexure F of Dr. Gericke's history, Minutes of meeting held in Kelvin House, Johannesburg, on Monday 4 July, 1955, in connection with the draft Bill for the registration of professional engineers prepared by the South African Institution of Civil Engineers, p. 2.

were urged to address this before working on the details of registration.[102] It was clearly a trend that was taking place in other English-speaking countries worldwide:[103]

> The whole question of unification or some other form of closer association between the professional engineers in South Africa received considerable attention after the return of the South African delegates to the Commonwealth Conference of Engineering Institutions held in Australia in 1958. These delegates had been impressed by the excellent public recognition accorded the large 'single' Institutions in Australia, Canada, India and New Zealand.

Under the leadership of the SAICE, SAIEE and SAIME a National Conference was called to discuss the proposed establishment of the Professional Engineers' Joint Council of South Africa (PEJC). It was at the Conference that Prof. Jennings made his presentation, discussed below.

The 'Conference' became a series of meetings to consider the proposed Constitution of the PEJC and it was at the final meeting of the 'Conference' that the Institution of Certificated Mechanical and Electrical Engineers, South Africa (ICMEESA), was excluded.

The PEJC and the exclusion of the Institution of Certificated Mechanical and Electrical Engineers, South Africa

The minutes of the meeting held on 21 November 1960 at which the PEJC was established also record the process whereby ICMEESA's was excluded (albeit that they were present at the meeting):

> The Chairman advised that the main object of the meeting was to reach agreement on the foundation membership of the PEJC. …(T)he Chairman re-iterated that the PEJC would be another voluntary Association of professional engineers which would have certain functions and powers to deal with matters of common interest. He stressed its voluntary nature – the PEJC could not be forced on any group and would have no legal foundation but rest entirely on a voluntary and moral background. He therefore considered it necessary that the participating Institutions be mutually acceptable to each other and consequent in the formation of the initial PEJC the aim should be unanimity in the question of mutual acceptance between Member Societies.

A ballot was held, and the Secretary reported the result:[104]

> Gentlemen,
>
> We beg to report that we have examined nine ballot papers and the result of our scrutiny is that the following societies are unanimous in their mutual acceptance as initial Member Societies of the Professional Engineers Joint Council of South Africa:
>
> - The South African Institution of Civil Engineers

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[102] Dr. M.R. Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa, Period 1890 to 1968,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

[103] ECSA Archives, Annexure J of Dr Gericke's history, The Professional Engineers' Joint Council of South Africa, Annexure, p. 1.

[104] ECSA Archives, Annexure I of Dr Gericke's history, National Conference, Proposed Establishment of the Professional Engineers' Joint Council of South Africa, Minutes of the Third Meeting held in Kelvin House, Johannesburg, on Monday, 21 November, 1960, p. 2.

- The South African Institution of Mechanical Engineers
- The South African Institute of Electrical Engineers
- Afdeling Ingenieurswese van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns
- The Engineers' Association (South Africa).

The Eastern Province Society of Engineers, the Natal Institute of Engineers as provincial bodies did not make it, neither did the South African Institute of Mining and Metallurgy which was absent with an apology. So, the only national institution that was present but excluded was ICMEESA.

At a later meeting with the Minister of Public Works on 11 December 1967 the PEJC gave reasons for this exclusion:[105]

> … (this body) could not be considered professional in character by internationally accepted standards. These bodies were therefore not members of PEJC as PEJC was of the opinion that the standards of the engineering profession in the Republic of South Africa should not be lower than the internationally accepted standards. Mr. Gericke furthermore stated that this concept was one of the main purposes of the Bill and seeing that the Bill would provide for registration of the individual, not professional bodies – who in their own spheres of activities are fulfilling very important functions – should not be unduly concerned about this legislation. The Minister indicated that he shared the views expressed.

ICMEESA was furious. It believed that its exclusion was based on the self-interest of the other organisations and not because of their concern for the public. ICMEESA's views are described in more detail later in its presentation to the Select Committee that was appointed to hear representations on the proposed Professional Engineers' Bill.

The point that the law would obstruct those from humble bases from progressing was repeated a number of times in the presentation and discussion:[106]

> (Mr. Drewett) Perhaps this is one of the points that I personally and our Institution are concerned about, that this certificate [of competency] permits a way for people with relatively low school education to progress, and by a stint of hard part-time study to gain a qualification which will enable them to go a long way in engineering. There is no specified standard of education. The examination is one on which the candidate stands or falls. He needs an apprenticeship or a degree, and in terms of experience, nine years where he has neither of those: two years where he has a degree; two years additional to his apprenticeship where he is an electrician, etc., and a longer period for other apprenticeships. But the point is that he does not have to achieve any particular standard in either a technical college or an ordinary school.

But it seems that like the Straszacker committee before them, neither the Select Committee nor the PEJC, were moved by these arguments. For these men, the level of the Certificate of Competency was simply too low. When asked by a member of the Select Committee to explain the exclusion of ICMEESA, Prof De Vos, the Vice-Chairman of the Straszacker Commission (and *Akademie* member) and a member of PEJC explained:[107]

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[105] ECSA Archives, Annexure H of Dr Gericke's history, Notes on meeting with the Minister of Public Works, the Honourable W.A. Mare on 11 December 1967, p. 1.

[106] ECSA Archives, Annexure L of Dr Gericke's history, Drewett, representing the Institution of Certificated Mechanical and Electrical Engineers, South Africa examined by the Select Committee on Tuesday, 7 May 1968, Report of the Select Committee on the Professional Engineers' Bill, S.C. 4-1968 – Original Evidence, p. 31, Paragraph 88.

[107] Select Committee Report. S.C. 4-1968, Prof. de Vos, para 108, p. 36.

> The argument was that the certificate of competency was not considered to be an adequate qualification for professional status.

This goes to the heart of the matter – the EASA, *Akademie* and the Civils group were determined to exclude all but graduated engineers from registration. An educational cordon was drawn around the group from which other routes to practice were excluded.

To this Mr Low, representing the ICMEESA, recounted the following which explains why they, unlike other societies, were unable to 'bend' to find a compromise:[108]

> I was directly and personally involved in all the negotiations that led to the formation of the PEJC. At the final meeting in Johannesburg of the National Conference there were certain institutions excluded, the Certificated and the Institute of Mining and Metallurgy, and the Eastern Province, etc. The reason for the exclusion was that the education required by the Institution for its corporate membership, that is for its associate members and true members, was considered inadequate in the case of the certificated engineers and in the case of the Institute of Mining and Metallurgy. The Institute of Mining and Metallurgy had an easy way out. They simply went home and altered their constitution; that was that and they were accepted. The certificated engineers have no easy way out, because the law would have to be altered before you can really alter their constitution. You either have to abrogate or abandon the Institution altogether and make the members join other institutions, according to how they would be graded, or you must prevail upon the Government to alter the requirements for a certificate. All these things were attempted, but the department's reply simply was that it was satisfactory as it was; so they were not prepared to alter it.

This may well be indicative of 'boundary protection' between state departments – such as discussed by Posel in relation to influx control measures[109] - but it did not help the certificated engineers. The PEJC offered them affiliated membership but they were affronted: 'of course we refused to accept it. That is the offer we got, that we could come in as an affiliated member without any voting power, and we refused.'[110]

Strategies and power: SAICE and the state

At its first meeting the PEJC elected Prof JEB Jennings from SAICE as Chairperson and Mr Roux from the *Akademie* as Vice-President, signalling where the balance of power had come to rest. Its Board of Management consisted of representatives from the five constituent member societies (whose membership in 1961 was about 4 000[111]). Interestingly for this account, DPJ Retief was elected as an Alternate Member to the Board of Management and became a regular PEJC attendee.[112]

The immediate purpose in establishing the PEJC was to secure a united front in the drive for legislation, but it was considered to have broader purposes as outlined by Prof. Jennings in a presentation to 'the Conference' in 1962. He identified the need for three inter-related but

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[108] S.C. 4-1968, para 110, p. 30.

[109] D. Posel, *The Making of Apartheid 1948 – 1961*, Oxford: Clarendon Press, 1991, Chapter 1.

[110] S.C. 4-1968, para 108, p. 36.

[111] ECSA Archives, Annexure J of Dr Gericke's history, The Professional Engineers' Joint Council of South Africa, p. 1.

[112] ECSA Archives, Annexure I of Dr Gericke's history, National Conference, proposed establishment of the Professional Engineers' Joint Council of South Africa, Minutes of the Third Meeting held in Kelvin House, Johannesburg, on Monday 21 November 1960.

discrete formations: 'the first being the existing institutions which should deal mainly with the educational functions; the second is a unity organization, such as the Professional Engineers' Joint Council concerned with promotion of the profession as a whole; the third is a statutory council dealing only with standards for acceptance as professional engineers and with the Code of Ethics and its enforcement.'[113] Within this trilogy, the PEJC's function was centrally to promote the profession, which Prof. Jennings unpacked as follows:

> In terms of the South African situation, these appear to be as follows:
> (1) Development and conservation of natural resources.
> (2) More effective utilization of manpower.
> (3) Recruitment to the profession.
> (4) General standards of engineering education provided by the teaching institutions.
> (5) General standards of education and training required for admission as a professional engineer.
> (6) Professional ethics.
> (7) General overall watch to ensure that professional engineering is used to its maximum for the service of the country as a whole.
> … The questions border on politics in the widest sense and when engineers enter this field they must accept that the rules of the game may be considerably different from those they are accustomed to in their ordinary technical lives.

Prof Jennings' list of functions for a voluntary body such as the PEJC correlated quite closely to that which was finally accepted, which might be summarised as being to act as a joint lobby and pressure group for the profession:[114]

> To speak for professional engineers in matters relating to the conservation and development of national resources, the education and training of engineers, legislation affecting engineers, engineering research, codes of professional practice and establishing relations with State and other employers regarding the proper utilisation of engineers.

Behind the euphemistic phrase 'proper utilisation of engineers' stood an energetic discussion on engineers' wages – which all were concerned to raise. Prof Jennings cautioned engineers:

> Another aspect which deserves attention is remuneration, but this must be approached with the greatest circumspection otherwise an undue emphasis may interfere with that more precious thing – the fiduciary relationship (earlier referred to as a position of trust ... which commonly carries with it some judicial or quasi-judicial function). This might be severely damaged if professional engineers ever embark on anything which in any way even remotely, resembles Unionism.

And yet, in spite of this caution, he proceeded to spend a significant proportion of his presentation on this issue and concluded that '(h)igher salaries for engineers are very important in our society and will have two important effects: first, the professional engineer will be less employed on work which can be undertaken by technicians and we will have a greater output of proper development work; second, it will eventually draw more recruits into the

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[113] ECSA Archives, Annexure L of Dr Gericke's history, Prof. J.E.B. Jennings, 'Registration of the Professional Engineer and its relationship to the Economic Development of South Africa', *EASA Bulletin*, November 1962, pp. 159-160.

[114] ECSA Archives, Annexure J of Dr Gericke's history, The Professional Engineers' Joint Council of South Africa, p. 3.

profession.'[115] The first discussant on the paper also 'dwelt largely on the question of the inadequacy of an engineer's emoluments in relation to the magnitude and importance of the work undertaken and the responsibility involved.'

Standing apart from this more political function of the PEJC, stood two other functions that needed to be executed by two separate agencies in Prof Jennings's view: the institutes (and now EASA) were to 'promote the science and art of their particular specialization (most importantly done through the) presentation and discussion of technical papers, the promotion of research and the dissemination of research results which are of interest to their group'[116] and finally 'what may broadly (be) described as disciplinary or supervisory, and will deal with recognition of educational and training standards and with the Code of Ethics and its enforcement'[117] Here he stressed:

> Observation of experience, both in South Africa and overseas, leads me to the view that this function cannot be carried out satisfactorily by any voluntary body. There must be legal force behind the body when they are faced with the problems of granting or refusing recognition of the examinations of any University, Technical College or other examining authority. Further, a legal compulsion is essential when it comes to enforcing ethical behaviour. Strong though the moral compulsion exerted by the voluntary Institution may be, it remains only at a moral level. When great and difficult situations arise the voluntary Code of Ethics may very easily be thrown out of the window.

And so he favoured the establishment of a statutory body for registration purposes, but he urged engineers to stand together on this question given the dangers feared by the other institutions, namely: causing engineers to lose control of their profession; putting too much power over the profession in the hands of the government through nominated members; throttling the profession by insisting on restrictions, such as the refusal to admit persons trained overseas and regulating behaviour and practice too rigidly by the introduction of set scales of fees, decision on who would do particular types of work etc.[118] No doubt herein lies the justification for the SAICE's position in the process leading up to this point – the fear that were engineers not to proceed together government might take over the process completely[119]. Which was no idle fear according to Jennings:

> This is not a bogey but a real risk and if anyone has any doubts it is useful to remember the circumstances which applied at the time of the passing of the Mines and Works Act, establishing the Engineering Certificates of Competency. A major engineering disaster in this country could result in the passing of an Engineer Registration Act with very little consultation with the overall body of engineers in South Africa.

The profession supported his conceptual frame and much of the detailed allocation of functions to three bodies. They also agreed that the test question was the composition of the final Registering Council – their fervent aim was to ensure that it should consist of a majority of representatives elected from the member societies (both from their membership and their

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[115] ECSA Archives, Annexure L of Dr Gericke's history, Prof. J.E.B. Jennings, 'Registration of the Professional Engineer and its relationship to the Economic Development of South Africa', *EASA Bulletin*, November 1962, pp. 159-160.
[116] *Ibid,* p. 164.
[117] *Ibid,* p. 166.
[118] *Ibid,* p. 168
[119] *Ibid,* p. 167.

Councils) and not be nominated by the Minister. Furthermore, they hoped the Registering Council would have wide-ranging functions:[120]

(a) It should set standards of education and experience for admission as a professional engineer to the Register. In consultation with the Institutions and with the PEJC it should provide for the reviewing of these standards from time to time in accordance with engineering progress.

(b) It should maintain a register of all professional engineers in the Republic and all persons practising professional engineering should be required to be registered with the Council.

(c) It should write and publicise a Code of Ethics and it should have the power of a Lower Court of Law in the enforcement of the Code.

(d) It should have no other functions of any type, educational, social or otherwise. [Emphasis added].

It was on the basis of this understanding that agreement was eventually reached with the traditional societies – excluding the ICMEESA.

Two observations of the arguments can be made at this point: firstly, gone is any sense of helping those 'on the lower ranks' to advance; secondly, whilst there is repeated reference to engineers working 'for the public good' and for the necessity of qualification thresholds to protect public safety, nevertheless this is viewed as an 'own affair' for the engineers, with only the Minister standing proxy for the public. Certainly, the engineer was becoming ever more clearly allied with 'management' as the following extract, again from the Straszacker Commission Report, illustrates:[121]

> A shift is now taking place in the functions of engineers of various branches from installation and maintenance to production. This entails a move from the control of plant to a control of some process in which financial, economic and human aspects start playing an ever-increasing role, so that finally the engineer has to carry more administrative and managerial responsibilities. This change is due to the increased tempo of industrialization at present occurring in the Republic, which makes it all the more imperative that these new requirements should be taken into account in the training of the professional engineer.

The march towards 1968

There were a series of meetings convened by the PEJC to address outstanding issues on the legislation and whilst progress was made, two problems persisted: the definition of a professional engineer and the reservation of work.[122] A small breakthrough was made in April 1964 when the SAICE representative suggested that 'consulting engineers in private practice should be required to register within six months of the promotion of the legislation, and that other engineers would not be forced by law to register for a period of at least five years after promulgation, and then only on the recommendation of the registering council'. This led to another draft that was agreed by PEJC in June 1964. The role to be played by the state was again highlighted when the draft was discussed with the Registrars of Medical, Accountants

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[120] ECSA Archives, Annexure P of Dr Gericke's history, 'The Professional Engineers' Joint Council, Report to Member Societies on the Present Position of the Question of Registration of Professional Engineers in the Republic of South Africa', p.4.

[121] Straszacker Report, para 134, p. 16.

[122] Gericke, *History of Legislation for the Registration of Professional Engineers in the Republic of South Africa,* https://www.ecsa.co.za/about/pdfs/Period_1890_to_1968.pdf, accessed 19 December 2019.

and Architects. They recommended that it should be redrafted in such a way that only major principles were stated, to avoid undue interference both by the state and the public in the domestic affairs of the council.[123] The PEJC then approached the Minister of Economic Affairs, Dr Diederichs and asked him to sponsor the Bill. At this point the Minister argued that there was no further need for the One-Man Commission (Dr FJ de Villiers) and that the PEJC should liaise with him directly. A copy of the proposed legislation, including comments from the societies, was forwarded to the Minister in May 1965. All was going well, but delays occurred over which Minister should sponsor the legislation. Cabinet agreed in August 1967 that this should be the Minister of Public Works. This to-ing and fro-ing led to further delays and developments which Dr Gericke has traced in his history in scrupulous detail – the most significant of which was an attempt by government to radically restructure the proposed Council. The PEJC met in October 1967 and resolved that:[124]

> The reduction of council to only nine members … was totally unacceptable and the meeting requested the representatives of PEJC to advise Mr. Pool (the government lawyer) that:
>
> (a) It was essential that all branches of engineering should be represented on the Council;
> (b) All professional societies should have a voice in the Council;
> (c) A substantial number of members of the council should be elected;
> (d) All universities with engineering faculties had a right to be represented;
> (e) It was accepted that the Minister would himself select and appoint certain members of the council.

Further jockeying took place until finally on 24 November 1967 the parties and the Minister of Public Works, Mr Maree, all agreed to the draft before them. The Bill was taken to Cabinet, which agreed to present it to parliament early in the 1968 session, with a First Reading of the Bill followed by its reference to a Select Committee for public hearings. The Bill was sent to the State Law Advisors which resulted in a final glitch: Prof Jennings strongly objected to the wide powers granted to the Minister, which he feared would lead to the Minister interfering in the domestic affairs of the council. Prof. Jennings submitted his resignation to PEJC, and his central objections were outlined in his letter of resignation.[125] These were that the Minister might set 'the fees chargeable by a Professional Engineer for his professional services in the absence of a special agreement'. He clearly wished the profession to be able to negotiate its own rates. This it appears was raised at a meeting in January 1968, and the government agreed to add the words 'and approved' but Prof Jennings feared these two words would evaporate in the process of finalisation, and indeed he was proved correct. In the Act clause 7(1)(k) read that the 'Council shall have the power:

> 7 (1) (k) to recommend to the Minister the minimum fees which shall be chargeable by the professional engineer for his professional services.

Prof Jennings also objected to the other functions allocated to the Registering Council which in his view rightly belonged to the Institutions:

> The Registering Council should not take over functions which truly belong to the Professional Institutions, i.e. the Registering Council should not pursue any objectives aimed at improvement of the science and art … The education functions of the Institutions relate to the advance of

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[123] *Ibid*, p. 17.

[124] *Ibid,* p. 22.

[125] ECSA Archives, PEJC file, Letter of resignation from Prof. Jennings to the President of the South African Institution of Civil Engineers, 22 March, 1968. The following extracts are taken from this letter and Act 81 of 1968.

> knowledge and these should not be objectives of the Registering Council which should confine itself to standards and the maintaining of standards.

But here too he lost as the Act gave to the Council the power:

> 7(1)(o) to encourage research into matters relating to the engineering profession and to give advice or render assistance to any educational institution, professional engineer' institute or examining body in regard to educational facilities for and the training and education of prospective engineers.

Prof Jennings was overruled by the other PEJC members who were no doubt weary of delays by this time and impatient to see progress. Without his consent, the Bill was sent on its way. For all his careful strategising, it seems that he (and those that had been persuaded by the 'Civils' to compromise) was outmanoeuvred by the state in the end. The final Act even required the Institutes to register according to requirements that the Minister would finally determine. This provision was later used to force all the Institutes (save SAICE that was already requiring degrees for membership) to raise their entry requirements in order to be recognised as a professional engineers' institute for the purpose of the Act as Jennings had anticipated would happen:[126]

> The fact that the professional Institutions nominate members to the council implies that the standards of these professional Institutions will be subject to the jurisdiction of the Council, i.e. in return for nominating a member to the Council the Institution would be surrendering portion of its right to determine its own standards.

This had another insidious effect, as Jennings noted:

> The majority of the Council are nominated by various professional Institutions and appointed by the Minister. This may be an insidious principle since it ties the Institutions to the Council and any disagreement that might later arise may be weakened because it could be argued that the Institutions are in any case represented on the Council.

His letter of resignation ended with the frustrated exclamation that[127]

> I regret that I find myself in disagreement with the proposed Bill for the Registration of Engineers for which I have worked so hard in the past. I believe this Bill is a bad one and that it will result in an Act not so much for the registration of engineers as for the control of the engineering profession. This is something we should avoid at all costs. We do not desire or need registration that badly. [emphasis in original]

Too late – the Bill was on its way! The Nationalist Party supported by EASA and the *Akademie* had held sway.

On 1 March 1968, the Minister of Public Works introduced the Professional Engineers' Bill for its First Reading in Parliament. As planned, a Select Committee was appointed to consider comments on the Bill, and its proceedings were recorded *verbatim* in the Report of the Select Committee on the Professional Engineers' Bill.[128] This Report gives great insight into the position of the ICMEESA and the Association of Colleges for Advanced Technical Education – both of which expressed concern about those whose advance to engineer status was not through the university route. These two presentations are considered below.

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[126] *Ibid.*

[127] ECSA Archives, PEJC file, Letter of resignation from Prof. Jennings to the President of the South African Institution of Civil Engineers, 22 March, 1968.

[128] ECSA Archives, Annexure L of Dr Gericke's history.

Last minute petitions … and minor concessions

- *Institution of Certificated Mechanical and Electrical Engineers, S.A. (Tuesday, 7 May, 1968, Select Committee hearings)*

> *'Ons veg nie alleen vir die mense wat nou daar is nie, maar ook vir die toekoms*[129]*'*
> [We are not only fighting for people that are there now, but also for the future]

ICMEESA began its presentation with a complaint – it had not been consulted at any point by any person or organisation '*ten spyte van die ongetwyfelde belangrike funksie van Gediplomeerde Ingenieurs in Ingenieurswese in ons land'* (in spite of the unquestionably important function of the Certificated Engineers in engineering matters in our country)[130] and in spite of the fact that 'Certificated Engineers constituted over 40 per cent of all engineers in South Africa in 1959'![131] It proceeded to table a Memorandum which outlined its reasons for opposing the Bill:[132]

1. The Bill is vague in the extreme and would, if enacted, not contribute to the common good, and is likely to be unworkable because of its vagueness and because all its essential provisions would be established only after enactment and then by regulations to be promulgated from time to time.
2. It aims to place entire control of the whole profession in the hands of the Minister acting on the recommendation of a small group of nominated (*not elected*) members of a Council.
3. According to our interpretation: -
   (i) It aims to create for a particular group of engineers, whose field of activity is only a part of engineering practice in this country, a selective and superior position on essentially academic qualifications.
   (ii) It establishes a qualification barrier, which would operate to the detriment of, and aggravate the shortage of, those categories of engineers on whom the country's economy largely depends.
4. It is designed to promote the interests of a specific group of engineers without regard to the whole engineering hierarchy and imposes restrictions on engineering practice which a rapidly developing economy cannot afford.
5. It makes provision for Association registration, in addition to individual registration of engineers.
6. The present high status enjoyed by Certificated Engineers, who comprise about 40 per cent of all practising mechanical and electrical engineers, is ignored in the Bill which denies them and their Institution representation and voting power on the SA Council for Professional Engineers.
7. Potential Certificated Engineers will, as a result of the provisions of the Bill, be discouraged from taking up engineering due to the barrier set up in the Bill to progression of the Certificated Engineer to the higher engineering posts.

Career pathing from the lower rungs to the pinnacle of 'engineer' were to be obstructed by the Bill in its view – with deleterious effects for both individuals and the country. This allegation was discussed in the Select Committee and when challenged to elaborate the ICMEESA representative motivated the point thus:[133]

> The engineering hierarchy has been described as comprising essentially: -

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[129] Select Committee Report, S.C. 4-1968, para 83, p. 30.
[130] Ibid, para 52, p. 19.
[131] Ibid, para 52, p. 20.
[132] Ibid, para 52, p. 20.
[133] Select Committee Report, S.C. 4-1968, para 2.02, p. 21.

1. The engineer and scientist.
2. The practical engineer.
3. The technician.
4. The artisan and the craftsman

(Dr. A.J. van Zyl in his book "Meer Tegniese Onderwys")

> The Bill contemplates only the first named category, whose field of activity, although important, is far from all-embracing in engineering practise. The provisions relating to the reservation of work, to the composition of the Council, to the examinations for qualification-all these lead to the suspicion that the Bill is designed to create protection for those who have had been privileged to attend a full-time university course, but have subsequently gained limited *practical experience.* Its aim appears to be the elimination or limitation of open competition. Since no facilities for part-time degrees in engineering exist in the Republic and are not even contemplated in the Straszacker report, the Bill establishes a new barrier o the advancement of those categories of engineers and technicians who have no university degree. A large and valuable class of engineering personnel is, therefore, adversely affected. The rapid development of the economy of the Republic vitally requires that all its resource of technical manpower be encouraged to develop skill and ingenuity without inhibition by unrealistic barriers.

They were talking in earnest. In questioning, it transpired that 56 per cent of its membership had no other qualification than the Certificate of Competency![134]

They were also deeply concerned that the Professional Engineers' Bill would effectively replace the legislation under which their members were employed:[135]

> It will be of great value to this Institution if it could be enlightened on the following points:
> (a) if legislation for the registration of professional engineers is introduced, will it allow for the registration of certificated engineers;
> (b) if not, what will be the position of certificated engineers in relation to the registered professional engineers?; and
> (c) will the two departments concerned, i.e. the Department of Mines and the Department of Labour continue to prescribe the certificate of competency for appointment of engineers on the mines and in factories, or will the qualification of registered professional engineers take its place – in other words, is it the intention that the existence of the Certificate of Competency is to be discontinued?

This touched on a sensitive matter – the boundary between the responsibilities of Ministers – and so it was resolved that the two would co-exist – with a Certificate of Competency being required for whomever the other Acts decreed.[136] This clearly strengthened the hand of the Institution in the debate but only in so far as their members worked in areas covered by the other Acts:[137]

> If a man is now doing work in a factory and is in charge of plant and he then at some time in the future decides to put up his plates and becomes a consultant with wider scope, he might not be allowed to do so because he really does not have the background. He can do it today. So, in that sense the scope will be narrowed.

ICMEESA further questioned whether others, who were listed as societies to have guaranteed representation on the Council, had as legitimate a claim as it did. It is interesting here that they listed two bodies in particular: the *Akademie* and the South African Institute of Agricultural

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[134] *Ibid,* para 56, p. 23.
[135] *Ibid,* para 77, pp. 28-29 and further delved into in para 148, pp. 45-46.
[136] *Ibid,* para 99, p. 34.
[137] *Ibid,* para 161, p. 51.

Engineers. These were clearly politically sensitive to the state, nevertheless Low, the ICMEESA representative, put the point strongly. In relation to the 'farmers', he declared:[138]

> I have never heard of this institution until the Bill came to light. It is completely unknown and, with respect, nondescript. Has any of us ever attended one of their meetings? Do we know who controls them and what goes on there? But I have a notion that this institution was formed because in the Straszacker Commission agricultural engineering is classed as one of the major divisions of engineer, and that therefore on the basis of that it claims to have the right to exist.

Although the inclusion of this body was defended on the grounds that it represented a discipline in engineering, and the Straszacker Report had argued this was an important segment of engineering and needed bolstering in the national interest,[139] the importance of the Nationalist Party's own dependence on the agricultural constituency politically must surely have been a factor.[140] But on even more overt political grounds, Low bravely stated:[141]

> We are on dangerous ground here, but as a member of the Akademie I can say that the Akademie is not purely an engineering institution. It does not generally control or guide a specific body of men in engineering. I have every sympathy with and I am a great believer in the Akademie and support it, but I feel that by virtue of its membership I think they are entitled to entrenched representation – I do not dispute that – but I think that if they are entitled to it, then an organisation like this should also have some representation. After all, the Akademie membership is also small, and it is not completely autonomous. It has the Akademieraad which controls it, whereas the other institutions are entirely autonomous.

On this point, he was asked by the Select Committee 'To what extent does the *"ingenieursafdeling van die SA Akademie vir Wetenskap en Kuns*" play a part in the engineering world?' To which Low replied:

> They play a very big part. They are a very respected body. People like Dr. Straszacker and Dr. Roux, and no doubt Prof. De Vos and myself and many other people, belong to it, and they co-operate with the mechanical and with the electrical engineers, and they co-operate with EASA. It is tremendously interlocked. It cannot be clearly divided and put on separate pedestals. But that it is an extremely influential body, in undisputed. [...But] (i)n the engineering world I would say it is a secondary organisation because of its diffusion of membership. It is primarily a scientific body and not necessarily an engineering body.

'The point you make is that if they are entitled to representation, your body is also entitled?' the Select Committee asked. The answer was clear: 'We think so'. In the final Act not the institution itself (as was the case for the others) but:

> 3. (1) (f) (ii) One person selected by the Minister from among persons who are holders of certificates of competency issued in terms of the regulations made in terms of the Factories, Machinery and Building Work Act, 1941 (Act No. 22 of 1941), or the Mines and Works Act, 1956);[142]

was included on the Council - somewhat of an insult to the Institution which was thereby legally excluded from the nomination of its own representative, whilst both the SA Institute of

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[138] *Ibid,* para 116, p. 38.

[139] *Ibid,* para 173, p. 55

[140] Straszacker Report, Table 7-25, p. 136.

[141] Select Committee Report, S.C. 4-1968, extracts from paras 121 to 125, pp. 39-40.

[142] Professional Engineers Act, No. 81 of 1968, Clause 3. (1) (f) (ii).

Agricultural Engineers and the *Suid-Afrikaanse Akademie vir Wetenskap en Kuns* were given the legal right to do so!

LADDERS AND LEVERS

The resolution on professional registration of engineers had implications for the career ladders of artisans and technicians.

Technicians to Engineers

Association of Colleges for Advanced Technical Education[143]

> If we cut off the bridge and there is no possibility for a man who has become a technician to become an engineer, then you cut off his idea of aiming at heaven, and when a man forgets to aim at heaven he dies.

The Association of Colleges of Advanced Technical Education consisted of only four constituent colleges in 1968, following the promulgation of Act 40 of 1967 on 1 January 1968. These colleges provided education at a post-matriculation level in terms of the new law – and central amongst their student body were trainee technicians. They felt strongly that there should be an 'open door' for technicians to advance to engineers – '*die oopdeur-beginsel'* (the open-door principle). This was their first central point – and the reason for their claiming representation for each of their colleges on the Council in order to be able to protect the principle.[144] Much of their presentation then focused on how this might be achieved practically. They favoured a system, then being introduced in England, whereby people could progress linearly from technician to engineer through a two-part programme.[145] They were bitterly opposed to any suggestion that a technician should have to start from the beginning alongside new matriculants to study to become engineers:[146]

> (Dr. R. McClelland.) … I think it should be provided somewhere in this Bill that the universities must not expect these men to waste time by going back and start from the matriculation standard and joining first-year students. They have done four years as technicians and they have covered a large part of the degree curriculum. They have done four years of training in industry; they are producing factors, not just kids out of a high school or somebody with only a year's army training behind them. … We hope that this Bill will require the universities to start these men on the third-year course. … The number of men who make use of this may be very small, but if you close the door then you get discontent and then your men will fall away.

He later went on to quantify this proposition:[147]

> I do not anticipate that more than a maximum of about 10 per cent will be transferred to the universities later on. The other 90 per cent must become technicians; … I am only pleading for this top 10 per cent of technicians. They should be transferred to universities. We cannot lose them.

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[143] Select Committee hearing, S.C. 4-1968.

[144] Select Committee hearing, S.C. 4-1968, para 182, p. 61 and para 206, p. 69.

[145] *Ibid*, paragraph 182, p. 63. This system is a direct descendent of the Higher National Certificate and Higher National Diploma system outlined in Chapter 8.

[146] *Ibid,* para 182, p. 65.

[147] *Ibid*, para 213, p. 71.

That the 51 per cent of the students at university engineering faculties who *failed* were being encouraged to study at College created no sense of 'reciprocity'.

He repeatedly asserted that a system based on practical progression had worked well in the past. Indeed he claimed such engineers had been the backbone of industry and furthermore:[148]

> Ek het ongelukkig nie presies die syfers nie, maar daar is soveel van hulle dat ek geneë is om te sê dat seker die helfte van die besturende direkteure wat ingenieurs is, deur die tegniese kolleges gegaan het.
>
> (*Unfortunately I do not have the precise figures, but there are so many of them that I am inclined to say that certainly a half of the managing directors that are engineers came through the technical colleges.)*

Somewhat unlike the Certificated Engineers, the Association of Colleges of Advanced Technical Education did not question the need for a degree-pegged qualification for engineers, nor did they question the need to register practitioners. On the former they accepted that there had been a rising level of complexity in industry requiring ever higher standards of preparation:

> Die punt wat ek wil maak, is dat die nywerheid so ingewikkeld en kompleks geword het dat ons nie meer kan volstaan met net 'n ingenieur bo en 'n geskoolde vakman en 'n paar operateurs en ongeskoolde mense onder nie.
>
> (*The point I want to make is that industry has become so entwined and complex that we cannot just have an engineer at the top, a qualified tradesman and a few operators and unskilled people underneath.)*

And on the question of registration, they felt that:[149]

> Our fight is for everybody. We feel that the man on top must be protected to a certain extent, but we are not worried so much about his protection; we are worried about the protection of the public. If an engineer puts up a bridge which is going to fall down, we must be able to get at him somehow. That is the only way to protect the public. I think he must be registered so that you can un-register him when things go wrong. It will be a very good lesson to others as well. But on the other hand, that registration must not kill off the bright young man who has studied in a practical manner.

But neither the complexity of industry nor the protection of the public necessitated the closing of the 'open door', they argued.

For this constituency, the outcome with regards to representation was a little better than for the Certificated Engineers. The Act gave them representation both on the Council and on the Education Advisory Committee – although in both cases it would be the Minister and not the Association that would select the representative - from their Executive Committee in the case of the Council and from the staff of the colleges for the Education Advisory Committee.[150] With regards to the qualification required for registration, as will be seen, the regulation passed on

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[148] *Ibid*, para 182, p. 63 and para 179, p. 60.

[149] *Ibid*, para 182, p. 66.

[150] Professional Engineers Act, No. 81 of 1968, clauses 3(1)(f)(iii) and 12 (1)(a)(ii).

this matter on 14 March 1969 stipulated only BSc degrees.[151] It seems that 'their' representatives were unable to keep the door as open as they had hoped.

That both the ICMEESA and the Association of Colleges of Advanced Technical Education were to be second class members of the South African Council of Professional Engineers (SACPE) was made clear in the Act, which stipulated that 'their' representatives 'shall not be elected president or vice-president of the council or preside at any meeting thereof.'[152]

Other representations to the Select Committee dealt largely with concerns that the work reserved for professional engineers would inhibit the members of other societies from doing their work i.e. with the 'vertical' divisions between different engineering branches; such as that from the Central Council of the Land Surveyors of SA and the Topographical and Engineering Surveyors, SA. The Federated Chamber of Industries of South Africa, the umbrella body of the employers, also sent in a memorandum which seems to have made little difference to the finalisation of the Bill.

THE PROFESSIONAL ENGINEERS' ACT, 1968 (ACT 81, 1968)

Closing the inlet to the pipeline

The Federation of Societies of Professional Engineers,
Annual Report for the Year 1969/1970

The Professional Engineers' Act, 1968 (Act 81, 1968) was duly passed and in the process ushered in the statutory registration of engineers for the first time in South Africa. The contestations were over, and the casualties suffered - who could be registered and who could not, was settled.

> There is no purpose statement in the Act itself, but the responsible Minister, the Minister of Public Works, B. Coetzee, spelled it out at a ceremonial occasion:[153] (to) protect the public by ensuring that engineers are properly qualified; protect the public in its dealings with the engineer by the administration of a Code of Professional Conduct; protect and control the profession and to safeguard the engineer against unfair competition by unqualified persons and undercutting of fees; and improve the image and enhance the status of the profession by assuring the professional competence of the members.

The Act set out the composition of the South African Council of Professional Engineers (SACPE) in Section 3:

- 6 would be nominated by the six professional engineering institutes (agriculture, chemical, civil, electrical, mechanical and mining and metallurgy);
- 3 would be nominated, one each, by the *Akademie*, EASA and the South African Association of Consulting Engineers;

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[151] G.G. No. 2298, R. 380, First Schedule, Examinations recognised by the Council, Pretoria 14 March 1969.

[152] Professional Engineers Act, No. 81 of 1968, Clause 6 (5).

[153] A M Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991*, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.

- 1 each from each university with a faculty of engineering;
- 2 state employees;
- 2 appointed by the Minister to safeguard the public interest, of whom 1 would have legal expertise;
- 1 selected by the Minister from those with Certificates of Competency;
- 1 selected by the Minister from the executive committee of the Association of Colleges for Advanced Technical Education.

It also set out its functions in Section 7,[154] which are summarised below:

a – f properly conducts the administration of the Council
g Prescribe the procedure, standards and fees for registration and retention of registration of both engineers and engineers in training'
h Consider and decide on applications for registration
i Keep a register of all those so registered
j to recommend to the Minister the criteria for registration of professional engineers' institutes in order that they could be represented on the Council
k to recommend to the Minister the minimum fees which 'shall be chargeable by a professional engineer for his professional services'
l to recommend to the Minister the kinds of work to be reserved for professional engineers;
m Determine the method of enquiry into allegations of improper conduct of professional engineers;
n Take the necessary steps to protect the public in their dealings with professional engineers and to maintain the integrity, enhance the state and improve the standards of professional qualifications of engineers;
o Encourage research
p Publish any publication relating to the engineering profession;
q. Advise the Minister on all matters relating to the engineering profession;
r. Do such other things as might be needed under the Act.

At first glance the right of the institutes to nominate their own representatives might seem to echo the early demand of the traditional societies, but there is a new adjective inserted into the Act – 'professional' which put something of a sting in the tail. Only 'professional' institutes were to be permitted to nominate members, and in order to be considered 'professional' the societies had to submit themselves to a registration process. The registration of institutes was the Minister's own prerogative under the Act, although he was required to take into account the advice of the Council[155].

So keen were the interested parties to see the council appointed, and its work commence, that they established a Shadow Council to prepare draft recommendations for the Minister's consideration. One of the first matters they considered was this question, on which they observed that:[156]

> … note had to be taken that the constitutions of the SA Institute of Electrical Engineers and the SA Institution of Mechanical Engineers did not fully meet with the proposed education requirements for registration in that their diploma qualifications were not of the standard required. A period of two years needed to be granted to permit them to comply with the requirements.

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[154] Professional Engineer's Act, No. 81 of 1968. Section 7(1) of the Government Gazette Extraordinary, 5 July 1968, No. 2119.

[155] Professional Engineer's Act, 1968, No. 81 of 1968, Section 7(3)(a).

[156] Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991*, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.

The 'requirements' were duly proposed and so thoroughly did they prepare, and so familiar with the issues were the men that were appointed to the first Council – including De Vos, Gericke, Campbell Pitt, Roux, Goode, Jennings, Van Zyl, Retief, and Loubser - that their advice was accepted by the first Council at its first meeting on 14 February 1969 and handed over to the Minister there and then. Exactly a month later – on 14 March 1969 - the Minister published a Regulation entitled:[157] 'Requirements with which an Association of Engineers shall comply in order to qualify for recognition as a professional Engineers' Institute in terms of Section 7(3)(a)(i) of the Professional Engineers' Act No. 81 of 1968, of which Rule 4.3 stated:

> At least two-thirds of the corporate members shall … comply with the requirements for registration as professional engineers ...: provided that if an association proves … that it was founded before 14 February 1969, all persons who were corporate members of the said association immediately prior to the aforesaid date shall, for the purposes of the rule, be deemed to comply with the requirements thereof.

The SAIEE and the SAIME had no choice in the matter.

THE MINUTES OF THE SAIEE COUNCIL OF 6 JUNE 1969

Council meeting - 6th June 1969, Kelvin House, Jhb. p. 6, item 7.7

Chair: C.F. Boyce (President), Present were 14 Council members (including H.T.Aspinall).

Constitution and By-Laws Committee

In order to conform with the Rules for the recognition of institutes as professional bodies the constitutions of such institutes must be amended within two years of initial recognition. This Institute's present qualifications, other than a degree, must be suspended from April, 1971, unless these are acceptable to the Registering Council as being in its opinion as equivalent to a degree. … A number of minor alternations were made to the documents but there were two major alternations which he wished to draw the attention of Council Members.

Section 2.5 – Graduate – of the Constitution to be amended to read as follows:

"A candidate for election as a Graduate shall be in possession of an approved university degree in electrical engineering or other qualifications recognised by Council as being equivalent to such degree".

Clause 2.7.1. (Member) to be amended to read as follows:

"He shall be in possession of an approved university degree in electrical engineering or other qualifications recognised by Council as being equivalent to such degree."

The final approved amendments to the Constitution were slightly less explicit – allowing for students to be working towards or associates to have attained 'one of the educational qualifications approved by Council' but the effect was the same.[158] The Institutes had lost the

[157] Government Gazette, R. 381, 14 March 1969, p. 16.

[158] SAIEE Constitution and By-Laws Committee, 18 July 1969, 2.15 p.m. Item 3.2, p. 2 indicates the change of wording and SAIEE, Council Meeting, 7 November 1969, Kelvin House, Item 5.7, p. 2 records the resolution on the matter.

right to determine such matters themselves. Vivien Nel was one of the youngsters who had earlier walked into a wall that this created:

> On the engineering side, I did a national diploma at the old College of Advanced Technical Education in Eloff Street, next to the station - one of the old CATES. …Anyway, what happened was I got a National Diploma and I applied to the Institute of Electrical Engineers and found that they had changed their rules – in the year before until December, you could get in, they would accept you as a member. As from January you couldn't! … And I found out and I said, 'But this is silly, last year it was acceptable, this year it isn't! It was a very sharp cut off – I was a bit annoyed about it! Ah well, toughies to them![159]

There was also a practical problem with this regulation as it effectively disenfranchised those who had embarked on their studies prior to the deadline date, but who had not yet qualified by that date. This was a matter of heated debate and the Annual Report of the Federation of Societies of Professional Engineers for the Year 1969/1970 recounts it as follows under the heading 'The Pipeline Problem':[160]

> This problem was carefully considered by a Federation sub-committee and a solution is being reached. SACPE's Executive Committee proposed an amendment to the Regulations in terms of which the aforementioned aspirants would be admitted to corporate membership when they obtain the qualifications required on 14th February, 1969. There is good reason to believe that the amendment will be approved which will <u>not only solve the problem by closing the inlet to the pipeline but will also enable societies to comply with the stipulations that two thirds of the corporate members must be in possession of all qualifications required for registration</u> …while fulfilling their obligation to persons who had embarked on courses of study in engineering prior to the 14th of February, 1969. [Emphasis added]

The Shadow Council also prepared advice on a range of other matters which were submitted to the Minister and also published on 14 March 1969. This Regulation (Regulation 2298 N. R. 380) dealt with a wide range of implementation matters:

Chapter A:	Definitions;
Chapter B:	Meetings and procedure at meetings of the Council and advisory committees
Chapter C:	Remuneration and allowances of members of the Council and advisory committees.
Chapter D:	Register of professional engineers and engineers in training.
Chapter E:	Code of professional conduct
Chapter F:	Conduct constituting improper conduct.
Chapter G:	Punishments which may be imposed in respect of improper conduct.
Chapter H:	Recognition of educational institutions as examining bodies.
Chapter J:	Prescribed and recognised examinations.
Chapter K:	General.

Registration

Registration was the key vehicle whereby the purposes of the Act were to be achieved. Initially it was only compulsory for engineers in private practice to register; those in the employ of the state were exempted as the state could not afford the risk of having insufficient staff to execute its obligations under other laws. But nevertheless, an elaborate and fairly water-tight schema was designed – clearly anticipating wider application in future.

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[159] Interview with Vivien Nel, 1 July 2008.

[160] Annual Report of the Federation of Societies of Professional Engineers for the Year 1969/1970.

Registration required essentially two conditions to be met: the attainment of a B.Sc. (Eng.) on the theoretical side and the assessment of experience to ascertain that it was based on work that was 'of satisfactory variety and standard' over a period of not less than three years[161] - on the practical side. Neither of these requirements was self-evident (*which* degrees were to be recognised from *which institutions?* And *what* work would be considered *satisfactory?*). So the Act made provision for two statutory advisory committees - the Education Advisory Committee on the one hand and a series of Professional Advisory Committees (PAC) [one each for each recognised branch of engineering] on the other – committees which were statutorily required to assist the Council with their work.

Once registered it was envisaged that certain categories of work would be reserved for professional engineers. Even the Shadow Council realised that defining such work was a near impossible task, as Kruger notes in his account:[162]

> It was also clearly emerging that a concise definition of the kinds of work reserved was not possible and that the Registration Committee and the various Advisory Committees would need certain guidelines in interpreting these aspects. Rules and regulations were drafted regarding procedure and these were submitted to all concerned at the first meeting of any new Council …
>
> In preparation for the first meeting of the *de jure* Council on 14 February 1969, draft regulations were circulated to all members. The most significant of these was the regulation for the kinds of work reserved for professional engineers ... In the main this regulation attempted to set out, for all the recognised disciplines, the work of an engineering nature as being that which involved the various aspects or tasks normally undertaken but which also required the skilled application of the principles of mathematics and the attendant sciences which could only be acquired by having followed and passed the necessary examinations prescribed. This particular regulation was to be discussed almost ad infinitum by not only the Council and various committees but by other bodies as well. Those particularly versed in law held the opinion that the regulation was vague and therefore not able to be applied and perhaps even self-contradictory. However, none of these could submit an acceptable alternative and the regulation served its purpose for the life of the Council. … Very wisely, perhaps, the Council never considered it necessary to use this regulation in formulating any charges. However, it can be stated with confidence that this regulation succeeded in advancing the perception of what was required of the professional engineer and his status was thereby enhanced.

This is how the matter was regulated on 8 August 1969[163] - with clear exemptions for those who had expressed their fears in the Select Committee process:

> .. the kinds of work reserved for professional engineers in connection with projects, undertakings or services of an agricultural, chemical, civil, electrical, mechanical, mining or metallurgical engineering nature … are those –
>
> (a) which involve investigating, advising, reporting, evaluating, measuring, planning, designing, specifying, laying out, directing, constructing, commissioning, inspecting or testing of a degree or standard requiring the skilled application of the principles of mathematics, the basic physical sciences (such as physics, mechanics, chemistry and geology) and the basic engineering sciences (such as applied mechanics, thermodynamics, electro-technology and material sciences) for their development and attainment; and

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[161] Professional Engineer's Act, 1968, No. 81 of 1968, Section 18 (2)(c).

[162] Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991*, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.

[163] Government Gazette 2500, R. 3063, 8 August 1969

(b) in respect of which the knowledge of the principles aforesaid can only be acquired by having followed the curriculum which is from time to time determined for one or other of the examinations prescribed in terms of section 19 or recognised … provided that -
    (i) nothing herein contained shall prevent any person from practising his profession as an architect, quantity surveyor, land surveyor who is registered in terms of the [relevant Act], town planner, chemist, physicist, metallurgist or geologist on condition that such person shall not style or hold himself out as a professional engineer unless he is so registered in terms of the Act;
    (ii) subject to his exercising direction and control and subject further to his assuming unconditional responsibility therefore, a professional engineer may be assisted by a person or persons not registered as professional engineers in drawing up plans, specifications or estimates in connection with the projects, undertakings or services aforesaid;
    (iii) nothing herein contained shall be construed to include the execution, supervision or operation of the projects, undertakings or services aforesaid by a contractor, foreman, superintendent, inspector or technician, provided that the said execution, supervision or operation is done under the direction of a professional engineer; and
    (iv) nothing herein contained shall be construed as derogating from the force and effect of the regulations made in terms of the Factories, Machinery and Building Work Act, 1941 (Act 22 of 1941), or the Mines and Works Act, 1956 (Act 27 of 1956).

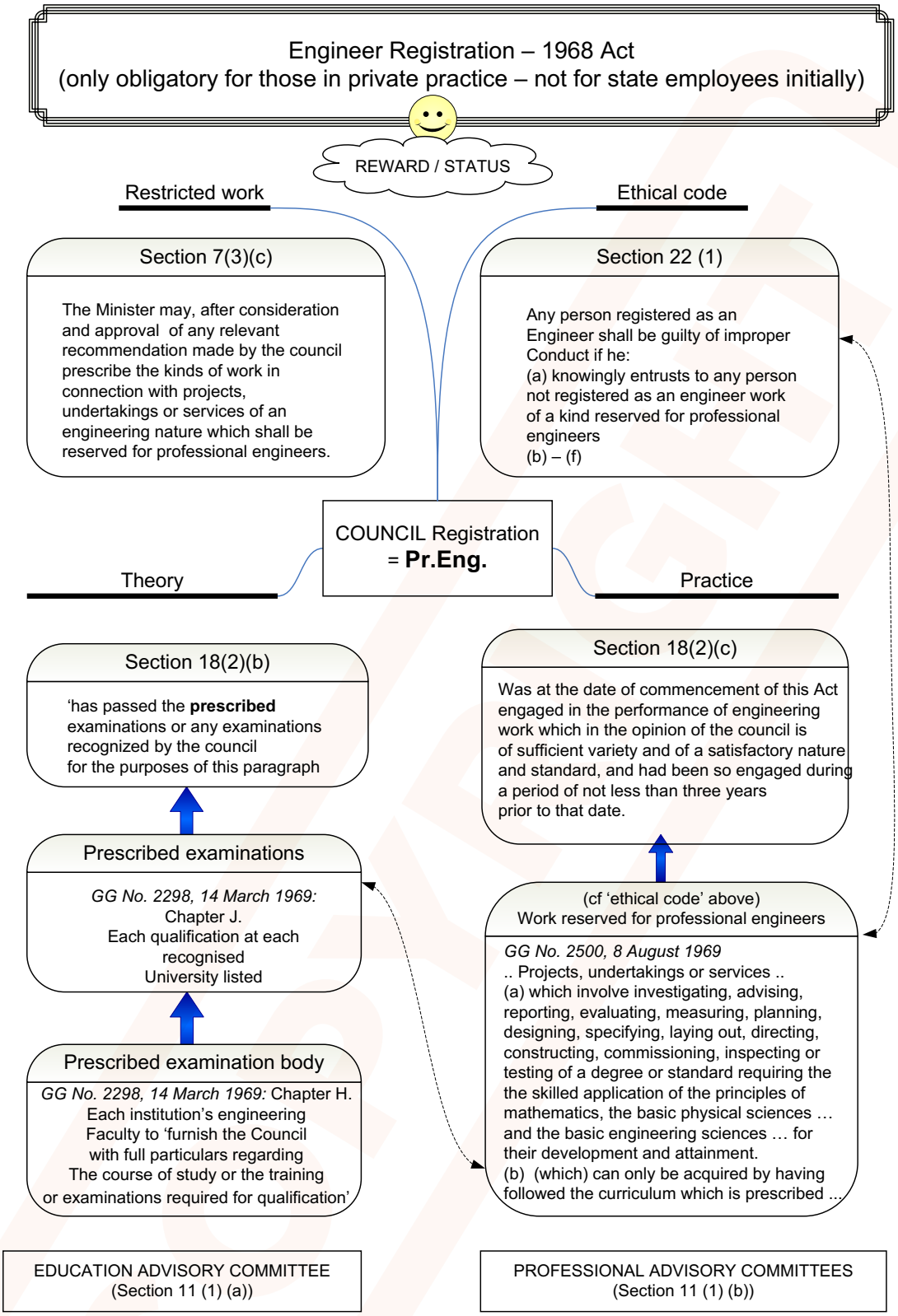
Registered engineers were to be bound by a 'code of conduct' which, if breached, could lead to de-registration. The first Code of Conduct was included as Chapter E to the Regulation published on 14 March 1969 and spoke both to the expected standards of behaviour between engineers themselves as well as between engineers and the public. The Code had seventeen 'musts' including:[164]

(a) He shall, in his responsibility to his employer or client and to the profession, have full regard to the public interest.
(b) He shall order his conduct so as to uphold the dignity, standing and reputation of the profession.
(c) He shall discharge his duties to his employer or client in an efficient and competent manner and with complete fidelity.
(d) He shall no undertake work of an engineering nature for the execution of which his training and experience have not rendered him competent.

Failure to comply with these edicts could lead to a reprimand, a fine, suspension or permanent disqualification for registration.[165]

An overview of the first generation of rules and procedures for the registration of professional engineers is given below.

[164] GG. 2298, Regulation No. R. 380, Chapter E, 14 March 1969, p. 5.
[165] GG. 2298, Regulation No. R. 380, Chapter G, 14 March 1969, p. 5.


Engineer Registration – 1968 Act
(only obligatory for those in private practice – not for state employees initially)
REWARD / STATUS
Restricted work
Ethical code
Section 7(3)(c)
The Minister may, after consideration and approval of any relevant recommendation made by the council prescribe the kinds of work in connection with projects, undertakings or services of an engineering nature which shall be reserved for professional engineers.
Section 22 (1)
Any person registered as an Engineer shall be guilty of improper Conduct if he:
(a) knowingly entrusts to any person not registered as an engineer work of a kind reserved for professional engineers
(b) – (f)
COUNCIL Registration
= Pr.Eng.
Theory
Practice
Section 18(2)(b)
'has passed the prescribed examinations or any examinations recognized by the council for the purposes of this paragraph
Section 18(2)(c)
Was at the date of commencement of this Act engaged in the performance of engineering work which in the opinion of the council is of sufficient variety and of a satisfactory nature and standard, and had been so engaged during a period of not less than three years prior to that date.
Prescribed examinations
GG No. 2298, 14 March 1969:
Chapter J.
Each qualification at each recognised University listed
(cf 'ethical code' above)
Work reserved for professional engineers
GG No. 2500, 8 August 1969
.. Projects, undertakings or services ..
(a) which involve investigating, advising, reporting, evaluating, measuring, planning, designing, specifying, laying out, directing, constructing, commissioning, inspecting or testing of a degree or standard requiring the the skilled application of the principles of mathematics, the basic physical sciences … and the basic engineering sciences … for their development and attainment.
(b) (which) can only be acquired by having followed the curriculum which is prescribed ...
Prescribed examination body
GG No. 2298, 14 March 1969: Chapter H.
Each institution's engineering Faculty to 'furnish the Council with full particulars regarding The course of study or the training or examinations required for qualification'
EDUCATION ADVISORY COMMITTEE
(Section 11 (1) (a))
PROFESSIONAL ADVISORY COMMITTEES
(Section 11 (1) (b))

This system took considerable time and effort to operationalise but with the determination of the actors, rapid progress was made, as was recounted in the Annual Report of the Federation of Societies of Professional Engineers, The FSPE was essentially a reconfigured PEJC, but named in conformity with the language of the Act and finally permitted the membership of the Institution of Certificated Mechanical and Electrical Engineers of SA (which required an Amendment to the main Act, which was passed on 2 June 1972[166]). Its 1969/1970 Annual Report stated that 'the Council received some 9600 applications for registration by the end of June 1970. Of these about 3830 engineers were registered. Some 150 applications could not be accepted on the information submitted and the remainder were in process of examination by Registration Committees, which meet weekly.' By 1 May 1970, the Gericke Commission reported to the SAIEE Council[167] that SACPE had received 9,430 applications for registration as Professional Engineers, 3,412 of which had been registered up to 21 April 1970, 2,245 had been referred back to the applicants for further information, 309 had not been approved, 150 still had to be ratified and the remainder had not yet been placed before the respective committees.

The procedure outlined above was the way forward, but what of the 'past'? The Act addressed this question with the inclusion of Section 18(4), the so-called 'grandfather clause', which is compared with Section 18(2) below:

Section 18 sub-section 2	**Section 18 sub-section 4 (the 'grandfather' clause)**
(a) At least 21 years old	(a) (i) Not less than 50 years old
(b) Has passed the prescribed examinations (which was a BSc as specified in regulation)	(a) (iii) Has passed such examinations (if any) as the council may determine
(c) At the date the Act started, the person was engaged in engineering work of a sufficient variety and of a satisfactory nature and standard and had been so engaged for not less than three years.	(a) (ii) Has had not less than twenty-five years practical experience in work of a kind … which in the opinion of the council is of sufficient variety and of a satisfactory nature and standard.
(d) Has, during a period of not less than three years, performed such work outlined above.	
(e) Is ordinarily resident in the Republic	(b) is ordinarily resident in the Republic and at the time of application was doing the work specified.

Post-1968, just as the career path "from sweeper to engineer" seemed to have been finally and completely broken, at least as far as the final ascent to the 'pinnacle' of engineer was concerned, a small ray of hope dawned. SACPE, which had 'succeeded in registering what is

[166] Professional Engineers' Amendment Act, 1972, No. 52 of 1972, section 2(b).

[167] Report of the Commission of Inquiry into the Training of White persons as teachers (Gericke Commission),1968, RP 29/1969, Item 8, p. 4.

one of the highest, if not the highest, proportion of professionally qualified engineers in any country in the world in a comparatively short time'[168] began to reflect on

> (T)he large number of applications which could not be accepted for registration. As some of these were submitted by outstanding technicians, the Council felt that an alternative route to registration for such applicants should be provided.[169]

It therefore created one – prompted by men like Stan Bridgens. It used the powers it had under Section 19 of the 1968 Act to devise a parallel path from technician to engineer. It argued that, whilst the four-year B.Sc. route was by far the preferred route:

> The Council, however, thoroughly appreciates that in exceptional cases there may be persons who can and wish to qualify as Professional Engineers, but for some reason or the other have not followed the recommended route. The Council has for this reason introduced a three-tier examination, which makes it possible to qualify for registration via a route other than through degree studies – a longer and more difficult route.[170]

The alternative route addressed the academic requirement for registration, on the assumption that the candidates for this route would be based in industry already and in the main already met the experience requirements. The route consisted of the following:

2.1 Part I:

2.1.1 The standard of the examination shall approximate that of the second-year examination of a recognised four-year degree course in engineering at a South African university;

2.1.2 The Council may request any request any educational institution to conduct the examination or part thereof on its behalf or may itself conduct any examinations or part thereof.

2.2 Part II:

2.2.1 A person who complies with the requirements of Part I of the examination, and who has been successful at an examination following a course of instruction approved by the Council, shall be considered to have complied with the requirements of Part II of the examination. / The standard of the examination shall approximate that of the third-year examination of a recognised four-year degree course in engineering at a South African university.

2.2.2 Persons entering upon a course of study for Part II of the examinations, shall be designated "Candidates".

2.2.3 (*Same wording as for 2.1.2 above)*

2.3 Part III:

2.3.1 The standard of Part III of the examination shall be equivalent to that of the final year of a recognised four-year degree course in engineering at a South African university. Approximately the same time shall be involved in mastering the contents.

2.3.2 Advanced Candidates: Persons who have been accepted by the Council as candidates preparing for Part III of the examination shall be designated "Advanced Candidates".

2.3.3 Applications for recognition as an Advanced Candidate must be accompanied by the following:

(a) A report by the applicant on the courses followed by him and the examinations passed in order to comply with the requirements of Parts I and I of the examination.

(b) A report by his employer(s) on the engineering word done by him;

(c) A report by the Professional Engineer(s) …. Under whose guidance or with whom he has performed engineering work;

(d) A statement on the courses the applicant has already taken and proposes to take in order to prepare for Part III of the examination.

2.3.4 The Council shall appoint a panel of examiners to conduct the examination. The examiners shall on the information submitted with the application either:

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[168] SACPE 1980-81, Annual Report, p. 3.

[169] SACPE 1972-3, Annual Report, p. 7.

[170] *The Professional Engineer*, Vol 5 No1 January/March 1976, p.19.

(a) accept the applicant as an Advanced Candidate and prescribe the period and course of study before the examination, or
(b) reject the applicant as an Advanced Candidate if he has not yet complied with the requirements of Part II of the examination;
(c) call upon the applicant to appear before them for a preliminary examination. If the examiners are satisfied with the standard attained by the applicant in the preliminary or any subsequent examination, they may waive any further requirement and pass him. If they find that he has not attained the standard of Part II they may reject his application as an Advanced Candidate or if they find that he has not attained the standard of Part III of the examination they may prescribe further study for a period determined by them and a further examination in those areas of knowledge in which they consider the Advanced Candidate to be deficient.

2.3.5 The Council may request any educational institution to conduct the examination or a part thereof on its behalf.[171]

Although the Council did not envisage routinely conducting examinations itself for Parts I and II, in the face of having refused some 4600 applicants, it decided to conduct a once-off Part II examination in November 1973 'for people who feel they are on a par with this standard in spite of not having written the necessary examinations.'[172]

> By June 30, 1973, a total of 100 candidates had applied to write the November examination, for which no lectures will be given, although syllabuses have been made available to eligible candidates. … Twenty advanced candidates at Part III level had been examined by June 30, only one being successful.[173]
>
> Close on 120 candidates were admitted (in the end) whilst only 37 actually sat for the examination. Three candidates passed all the papers for which they entered and a further 24 passed in one or more of the papers.[174]

By 1975 additional requirements had been set out for candidates and more emphasis laid on its 'exceptional' character:

> Irrespective of the recommended degree studies, the Council has created an alternative route for exceptional cases where persons:
> (i) are 25 years of age and older;
> (ii) are in possession of qualifications considered equal to Part 2 of the Council's examination; and
> (iii) have performed at least five years of acceptable engineering work.[175]

By 1976 some experience had been gained and a list of examinations recognised by the Council was published:

> **Part I** (Standard equivalent to approximately second year B.Sc. Eng.)
> The Council does not conduct examinations for Part I, but recognises the following typical qualifications for exemption from Part I, or admission to the study for Part II:
> - National Diploma for Technicians (SA) with Mathematics T4
> - Certificate of Competence (SA) …
>
> **Part II** (Standard equivalent to third year B.Sc.Eng.)
> The Council also does not conduct examinations for exemption from Part II, or admission to the study for Part III:

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[171] *The Professional Engineer*, Vol 5 No 1 January/March 1976, p. 19.
[172] SACPE 1972-3 Annual Report, p. 7.
[173] SACPE 1972-3 Annual Report, p. 7.
[174] SACPE 1973-4 Annual Report, p. 7.
[175] SACPE 1974-5 Annual Report, p. 3.

- The proposed Advanced National Diploma in either Mechanical or Electrical Engineering (SA) (provided that it would be introduced in conformity with the submissions made to the Council.) …
- Approved candidates who comply with the requirements for Part I and who wish to study for Part II, can either obtain one of the proposed SA Advanced National Diplomas or follow and pass the prescribed third year B.Sc.Eng. courses for non-degree purposes at a University of their choice as occasional or ad hoc students. All the subjects need not be passed simultaneously.

Part III (Standard equivalent to fourth year B.Sc. Eng.)

- Route 1: Approved "Advanced Candidates" enrol at the University of their choice as occasional- or ad hoc students, attend the classes in the prescribed fourth year B.Sc. Eng. subjects and take the University examinations in them for non-degree purposes. The "Advanced Candidate" need not pass all the subjects simultaneously.
- Route 2: This route basically entails studying for the prescribed fourth year B.Sc.Eng. University subjects, piecemeal, under the guidance of approved tutors, without the physical attendance of classes but with the writing of examinations therein. "Advance Candidates" who are older than 25 years and who can furnish reasons acceptable to the Council why they cannot attend classes, may be admitted to this route. / The Universities as such are not involved with this route, but University lecturers are appointed in their individual capacities as examiners of the Council.
- Route 3: This route is only accessible in exceptional cases for an "Advanced Candidate" who is older than 25 years and who satisfies the panel of examiners:
  (a) that his knowledge of and insight in the principles and application of the engineering subjects related to his main field are at least on part II level;
  (b) that he has continued his studies and that his knowledge of and insight in one sub-branch of his branch of engineering is more advanced and at least on the level of part III; and
  (c) that he could have qualified as an "Advanced Candidate" at least five years previously.

  Subject to the above requirements and in order to enable the "Advanced Candidate" to comply with the requirements for Part III, the panel of examiners may require him to undertake a design or research project which he must execute and on which he must submit a report, both under the supervision of a Professional Engineer nominated by the panel of examiners.[176]

It was to this path that people like Stan Bridgens turned when his application for registration as an engineer was refused. His story is told below.

The SACPE Annual Report for 1979-80 confirms Stan's final outcome:

> Fourteen candidates studied for Part III. Two withdrew and five still have to complete all the required subjects. Seven candidates fulfilled all the requirements for Part III. They are **SC Bridgens**, DB de Preez, FF Kruger, C Lilley, KP Maré, HF Niemand, LJ Sawers. / Two persons were required to do the Council's Part III oral examinations but both failed.[177] [*emphasis added]*

The numbers of those who rose through this route remained low. One cannot help concluding that this was due to the difficulty others faced in securing the kind of bursary that Stan received. This can be inferred from a presentation made by BJ Phillips, the President of the South African Civil Engineering Technicians of South Africa to the 8th Conference on Engineering Education in 1977. He reported that their standing committee for Study, Education and Training had sent out a questionnaire to all their members to establish their training and aspirations. The survey found that

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[176] *The Professional Engineer*, Vol 5 No 1 January/March 1976, p. 19.

[177] SACPE Annual Report 1979-80, p. 9.

> 83% of the returns confirmed their wish to carry out further studies and 92% would welcome increased responsibility, whilst 70% wish to specialise. … That then is the outline picture, and it must therefore be accepted that the average Civil Engineering Technician is tremendously keen to raise himself out of his present rut: the spirit is there, let us give it the substance. As Huxley once said: facts do not cease to exist because they are ignored.[178]

EVALUATION AND IMPACT

So why were Ken and Allan registered and Stan and Bob not?

It was their age. Ken Bird and Allen Bennett were over fifty and so were able to be registered under the 'grandfather clause' – and Ken Bird's name appears as number 5.2.9 on the record of the meeting of the Registration Committee of SACPE, held in room 116 Central Block of the University of the Witwatersrand on 4 August 1969 as having been registered 'in terms of Section 18(4)(b).[179] Chairing the panel that adjudicated his application was Prof JEB Jennings and, on the panel, was DPJ Retief! But no doubt out of sensitivity to their state, the certificates that he and Allan received did not signal the Section under which they had been issued.

Stan Bridgens was refused because he was too young and so his application had to be considered under sub-section (2) – but he did not have a degree so he could not be registered. However, the Act did have one small 'loophole' – the small print on clause 18, sub-clause 2(b) stated: 'has passed the prescribed examinations or *any examinations recognized by the council for the purposes of this paragraph' (emphasis added).*

Today Stan laughs at his experience on how he found a way through to gain his qualification through the labyrinth of routes:

> But 1969 came and went with the promulgation of the regulations and then my fun started with SACPE. And so, due to our representations and arguments, they said 'Okay, we'll give you all a once off examination.' There were six subjects ... The test would be held at the Witwatersrand Technikon but would be set by SACPE. 'If you pass all those tests you can become a Professional Engineer.' So, you can imagine! A hundred and twenty-one of us wrote these exams and not only electrical, there were other disciplines as well. But I think there were mostly Electrical. There was a class of us, and we all wrote these six subjects. So, we all prepared for this, there was no tuition. It was an open book exam – all the exams were open book exams. And we had to prepare for this, and we had to pay our money. … There was ONE guy who managed to pass all the exams – all six exams. And he was an elderly chap, older than all of us (all my friends and me particularly) and he was a well experienced guy in the fraternity. And he was also in the academic field. The rest of us didn't do so well in the exam. Most of them didn't pass any exam ... I passed, of the six, I passed four. I failed two. But the trouble was that there was now no recourse to now re-write those subjects. It was a once off exam that you either passed or failed.
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> It was 1973. As I said, I had passed these exams, and one I passed very well. I got the results of these six tests. One of them was Design … I don't know what they thought, but I passed that one quite well. But I failed two. Eventually I thought 'Sod it, how do I get around this?' And I got a letter from the Engineering Council saying, 'Due to your lack of appropriate experience' (or something like that) 'we can't give you registration *still*.' I said to them that I had more

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[178] B.J. Phillips, *Viewpoint,* 'Presentation to the FSPE 8th Conference on Engineering Education', 1977, University of Natal, Durban 7 – 9 September 1977, p. 38.

[179] ECSA Archives, South African Council for Professional Engineers, SACPE Register 1968/69.

experience than most other people and really the issue was on the academic side. I said to them, 'Why are you going on about the experience when the academic side is the issue. You actually set an *exam*.' I actually took them to task, with letters going backwards and forwards. Eventually they said to me, 'Alright, we will allow you to write the university exams, but you are not allowed to come and interfere with the university programme. You must appoint a mentor that liaises with the university and you then write.' One of my friends, a very clever guy, he was a BSc graduate and was doing a post-grad degree of some sort and had contact with university lecturers. I asked him, 'Will you be my mentor?' And he said 'Yes, he'll be my mentor.' He got me information about what the university syllabus was and what I needed to study to write the university exams.

Well, it started off with me having to do all four years. I said that's nonsense. … Eventually they said to me you've got to do the third-year subjects at university which you hadn't passed in the once-off exam and that was two or three subjects I had to do. … (and) where I had passed the subjects, I would have to do fourth year. … I had fourth year subjects to do, and some third-year subjects. So, I thought, 'How the hell am I going to do this? I'm a Distribution Engineer, I've got quite a responsible job – there's no chance.' I said to them, 'This is impossible, I can't do this.' I was writing a letter saying to them 'You are making this extremely impossible. It's just not going to happen. You've won!'

I was going to throw up my hands in defeat. Then what happened I thought, 'Nah, don't do that! After struggling now for so many years – because now it was way past the once-off exam in 1973, it was a year or two after, mid-1975.' I thought, 'Nay, I can't do this, I must give it a last shot because the family priorities came to bear.' … I went to my current employer – and remember I was a Distribution Engineer, I had three or four engineers doing the Planning, Construction and Maintenance and a large staff. But I went to them and said, 'For me to finish this course I need to take a year off. I need a year off; can you make arrangements that I can just take a year?' Now I had some leave, but I didn't have a year's leave, I had three or four months leave, and if I can even convert my sick leave I'll take that leave, but I need you to give me unpaid leave and still retain my job' (because I couldn't afford to give my job up). I had a whole plan of what I needed from them. They had a look at it and said, 'It's impossible we can't do this.' I can remember having an interview with old Ted Scholes and Ronny Lee – and I didn't realise it at the time, but Ronny Lee had a very similar path to myself – but he did go to university, but he'd served an apprenticeship and he eventually got to university. But he recognised a lot of his profile when I put this whole plan out and the background and why I needed a year off. And eventually old Ted Scholes, who was my boss at the time, or one above that, he said to me, 'We can't give you a year off. I can't even afford it. Now what we are going to do is give you a bursary for the year. But it's on one condition, that you are available for major breakdowns.' I said, 'It's only a pleasure.' And in the end, they didn't call me for breakdowns, but I was there if they needed me. And I still had a lot of contact with the workforce.

It was a marvellous bursary. I didn't lose any of my privileges, I didn't lose my leave, and I got my pay. When I went to university, I got full pay. And the professors there … like Jan Reynders, who was a professor there … I had to do some third-year subjects – it was a bit of a mishmash, but I essentially did fourth year. And the big thing was that they exempted me from Design, which meant that I had six weeks that I could do other things at university. They had obviously seen the Design I'd done, and they thought 'How could a guy do all this in this time?' But it was all there, it was marvellous. It was all in the templates, it was a bit of a fiddle, but under the circumstances it had to be done.

Anyway, I then spent this marvellous year at university. And there again, I didn't make the best use of it. And I think it was because I was too worried about failing. I could have spent that time doing much more in developing myself – the facilities that were there – but I was so focused, thinking I've got to pass this bloody exam! And of course, it was high pressure. I mean the guy I linked up with at university, my teammate in the project failed. He failed. And he had to re-do the year. And it was things like that that made me think, 'This is my last chance.' I'd already said, 'This is the last shot I'm having at this!' So, I passed, and I passed very well again. And then I finally I became a registered Professional Engineer – it was 1978, somewhere there. … I did very well, a couple of distinctions – I'm very proud of my university results. But I knew the effort that I put in.

> So, then I went back, and you know a strange thing happened. As a Distribution Engineer, I now became so critical of various things in the job and I was challenging the establishment. So, guys like Barnie, Wessel Barnard, who was the City Engineer, and Ted Scholes, who was my boss who put me on this course, and Neville Maizley and Heinie van Oppel, all BSc engineers, all big boys in the fraternity, I was now challenging them. 'I'm not happy with this, I'm not happy with that!' I was this fresh boy with all this fancy new electronic technology that I'd learnt. I made a bloody nuisance of myself, quite honestly.
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> You know, in principle, I couldn't complain about what they were trying to achieve, it was to try and elevate the status of engineers by making them like doctors and lawyers and so on. I couldn't complain about that. I was complaining because they didn't include me! And many others like me.[180]

How many others were there? The SACPE Annual Report for 1974 – 1975 reported that 28,000 application forms had been despatched; 15,000 applications had been received; 9,690 had been registered under different Sections of the Act, 600 were under consideration and 4,600 applications had been refused.[181] Stan Bridgens was not alone!

POLITICAL ECONOMY

Until 1959, a tiny number of black individuals, drawn mainly from Lovedale, Fort Hare and King William's Town in the Eastern Cape, Adams College at Amanzimtoti in Natal, and St Peter's in Rosettenville Johannesburg,[182] had entered 'white' universities,[183] most to study medicine and very few enrolled in engineering.

But even this number more or less dried up after the passing of the Extension of the University Education Act in 1959. This Act drew racist cordons around the existing universities and whilst expanding the number of universities, it maintained the racist divisions. As Reddy[184] has usefully summarised: The University of the North was established for Sotho, Venda and Tsonga speakers; the University of Zululand was established for Zulu speakers; the University of Fort Hare was restricted to Xhosa speakers; the University of Western Cape was for Coloureds and the University of Durban-Westville was for Indians. The period between 1976 and 1990 saw the establishment of several universities in the homelands to train administrators and service deliverers for the homelands. In 1976 the Medical University of South Africa opened in the homeland Bophuthatswana. Universities opened in the Bantustans of Transkei (1977); Bophuthatswana (1979); Venda (1983) and QwaQwa (1983). In 1983 Vista university campuses, for blacks, opened in the urban areas. Although this dramatically increased the number of university students, and graduates – as Reddy records 'enrolments at black universities rose by almost 400% between 1960 and 1965, doubled over the next 5

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[180] Interview with Stan Bridgens, 25 October 2007.

[181] SACPE Annual Report, 1974 – 1975, Registration, p. 4.

[182] St. Peter's in Rosettenville was the same place where the NUMSA RDG programme was run – although we were in the conference facility not in the school.

[183] B. Murray, *Wits, The 'Open' Years: A History of the University of the Witwatersrand, Johannesburg 1939 – 1959,* Johannesburg: Witwatersrand University Press, 1997, p. 53.

[184] V. Reddy, 'Life Histories of Black South African Scientists: Academic Success in an Unequal Society', PhD Thesis, University of Durban-Westville, 2000, p. 18.

years and increased more than 100% between 1970 and 1976' – the majority of these students registered to study the humanities or education and very few studied in the scientific and technical fields.[185] This was due, in large measure to the unavailability of such courses at these institutions. For instance, *The Professional Engineer*, the journal of FSPE, noted in an article in 1977:

> At present, there are no Black universities which teach engineering, and most Black students who wish to enter the profession must take a first course in science at a Black university, before enrolling for a course in engineering at a White university. Unfortunately, they can be given little credit for their first degree, and accordingly attempts are being made to introduce courses at the Black universities which will enable the student to gain credit for at least the whole of the first year of an engineering course at a White university.[186]

In 1974 the Department of Bantu Affairs reported that 'four are being trained at Wits, who have already obtained their B.Sc. degrees at homeland universities.'[187] It seems that as the years passed some credit was given for this homeland study, but, as Jacob Maroga – whose story follows in due course – acerbically remarked:

> I don't know if you know, but up until then you couldn't go to a white university as a first-year student in engineering! You had to go to a black university to do a pre-engineering year or do a B.Sc. before you get allowed. And what that did, it actually frustrated people because what actually happens if you have done some first-year studies and you go to Wits, you do some first-year subjects and some second-year subjects – and your curriculum just gets *mixed up*. And the subject that you did in the university that you come from and Wits University is just totally different. So, the grounding, you never get a stable grounding to move with everybody. So, guys just spent many years trying to finish and it just never worked.[188]

Entry to 'white' universities and technikons was also controlled by the Minister himself. The 1959 Act prescribed that black students should gain Ministerial permission before accessing white universities. The vehicle was extensively used to exclude black students in the seventies. From 1981, in the context of the 'total strategy', it was less frequently used as Badat has shown. The requirement was finally abandoned in 1984:

> Whereas in 1981, 1 126 (92 per cent) of coloured applicants and 924 (88 per cent) of Indian applicants received permission to enrol, only 667 (48 per cent) of African applicants were allowed entrance. In 1983 the rejection rate of Africans became even greater: only 954 applicants (37 per cent) were approved, while the consent rates for coloureds and Indians were 92 per cent (1 255) and 79 per cent (1 323) respectively.[189]

The result of these policies, as Nkomo (1990) found, was that in 1965 0 per cent of engineers were black and in 1985 the percentage had risen to 0.1 per cent.[190]

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[185] Reddy, 'Life Histories of Black South African Scientists', p. 19.

[186] *The Professional Engineer*, Vol 6 No 1 January 1977, p. 37.

[187] FSPE Implementation Committee meeting with Mr Nienaber, Chief Planner, Technical Education, Department of Bantu Affairs held on 5th September 1974 reported in the Report of the Implementation Committee of the Sixth Conference on the Education and Training of Engineers: The Education and Training of Engineering Technicians, held 8 – 10 1973, Report dated 27/6/1975, p. 4.

[188] Interview with Jacob Maroga, 5 December, 2008.

[189] South African Institute of Race Relations, (1975 – 1988/9), *A Survey of Race Relations in South Africa',* SAIRR, Johannesburg cited by S Badat in 'The expansion of black tertiary education 1977-90: reform and contradiction' in Unterhalter et al., 'Apartheid Education and Popular Struggles', Johannesburg: Ravan Press, 1991, p. 82.

[190] National Manpower Commission 1987, quoted in M. Nkomo, Mokubung, 'Foreign Policy and Scholarship Programmes for Black South Africans: Philanthropy, Realism, or Winning Hearts and

In the main, the majority of aspirant black engineers were forced to leave the country and study abroad, some on European, British or American scholarships, and others on programmes arranged for political exiles in Eastern Bloc countries supporting the fight against apartheid. Ms. Lyndall Shope-Mafole fell into the latter group. She studied telecommunications engineering in Cuba and attained a Master of Science at the Jose Antonio Echeverria Higher Institute of Technology[191] - from which base she subsequently rose to become the Director General of the Department of Communications in post-apartheid, democratic South Africa.

But the pressure for local opportunities was building both from the students themselves as well as from employers. The tide was beginning to turn. Below the experiences of a handful of individuals who underwent engineering training as a consequence of the opening up of these avenues will be recounted and the organisational 'homes' they built or were drawn to once they qualified, will be traced. It will also explore the alliances they forged, or did not forge, on the way. The next Chapter will then explore the responses to these shifts from the traditional engineering community.

Smunda Mokoena's story[192]

Smunda Mokoena was brought up by his mother. His father was a farm labourer who died in 1958, the year that Smunda was born. His mother later remarried, and the new family moved to Grootvlei, a mining compound near Springfield Collieries. He completed his matriculation at Mampoi High School, QwaQwa – a homeland school. He did exceptionally well, particularly in science, a fact which he attributes to his teacher Mr Makume whom he has since identified as being the person who has had the biggest influence on his career.[193] This teacher prepared him to successfully compete in the Science Olympiad (a competition initially launched by the *Akademie vir Wetenskap en Kuns* to encourage young Afrikaners) – which success led to his spending time in London:

> I must say that that trip was the defining moment of my life ... Because I was from Grootvlei, a little mining area, very remote, and then we went to London, staying there at the University of London!

When he returned, he secured a bursary from Anglo Vaal and began his studies in electrical engineering at the University of the Witwatersrand – but not immediately. He had to wait two years before he secured the required ministerial permission to study at a 'white' university. Whilst he waited, he began a science degree at the University of the North. And even though

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Minds?' in M. Nkomo, M. (ed.), *Pedagogy of Domination: Toward a Democratic Education in South Africa,* Africa World Press, Inc., Trenton, New Jersey, 1990, p. 233 as cited in Reddy, 'Life Histories of Black South African Scientists', p. 17.

[191] http://www.whoswhosa.co.za/Pages/profilefull.aspx?IndID=3510, accessed on Monday 3 November 2008. When the ANC was unbanned she returned to South Africa and played a role in the ANC's policy discussions. She also helped Nhlanhla Tshabalala, introduced above, to study abroad on an ANC-USA programme. In 2004 she was appointed as the Director General of the Department of Communications in democratic South Africa.

[192] Interview with Smunda Mokoena, 28 August 2008

[193] http://www.engineeringnews.co.za/article.php?a_id=110291 accessed on 4 November 2008.

he completed two years of a science degree he had to start his engineering course from scratch when the permission finally came.

Partly because of his political involvement at Wits, he failed one of his subjects in the second year. Anglo Vaal funded him to repeat the one semester subject and then invited him to use the remaining six months of that year to join their apprenticeship programme.

> The reason I'm mentioning this year is because this was the year that I found very eye opening … what they did, during that six months that I was not studying, I worked as an apprentice. I went to their workshops; I swept the floor … (laughs) and worked on some products. But I was put throughout that period through the training centres, … there was one in the Klerksdorp area, and there was one in the Free State, … next to Welkom

With these new insights Smunda decided to leave Wits and complete his degree in Durban in 1986 at his own expense. He later studied further, attaining an MBA from De Montfort University, in the UK in 1996. In 2004 he became the CEO of the National Energy Regulator of South Africa (NERSA).

Malose Chaba's story[194]

Malose Chaba was born on November 14, 1959[195] in a town that was then called Potgietersrus, now called Makopane, in the homeland of Lebowa. His father died whilst he was in his first year at school, and so he was brought up by his mother who had had no schooling herself. Whilst his father was alive his mother cared fulltime for her family of seven children, but after he died, she was forced to look for paid work – which she found in a food processing factory in Elliot, a nearby town. As Malose, the last but one of the seven, recalls, 'We were extremely poor.'

Schooling was not something that was taken for granted in the Chaba household. The first two girls got very little, but as the years passed, so schooling became more available and the younger children were able to take advantage of it. Malose was bright and excelled at mathematics and science – so his three sisters and brother who were already working when he started his secondary schooling, paid for him to complete his matric. Given his grades in science it was taken for granted that he would become a doctor – but he came to prefer a different route:

> I decided I'm not going to be a doctor. I'd made up my mind that I'm going to do electronics – not civil, not anything. And that came from my brother-in-law. The man who married my sister, the first nurse, she was here in Jo'burg and got married to a gentleman that worked for Sharpe Electronics as one of the technicians and I was so fascinated by this, I said, 'I want to do this.'

Ironically there was another factor at play:

> I also got a bursary from the then Lebowa government, to do civil engineering. And I said, 'I'm not interested.' Because from Form III I was one of the top students in the then homeland and you automatically got a bursary to go to university and because it was science you did civil engineering. I didn't apply for it, it just arrived.

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[194] Interview with Malose Chaba, 19 September 2008.

[195] http://www.engineeringnews.co.za/article.php?a_id=94363 accessed on 4 November 2008.

But he was quite determined to pursue his interest in electronics. His brother, who by then was himself a technician, suggested that he attend a private college, associated with the company where *he* then worked, AECI. The college offered a six-month practical electronics course – so that is where he went. On completion of the course he secured 'semi-skilled' work in one of AECI's laboratories. He hoped that his path from there would be into a technician programme – so he had to find a sponsoring company. He applied to as many firms as he could – although he did not apply to AECI. Siemens replied to his application and offered him a place. By this time, he was working in the laboratory at AECI, and showed them the offer. At the urging of his supervisor, they matched it – so he decided to accept AECI's offer. The training required him to undertake a standard 'sandwich' technikon programme. Malose – who has since become a senior player in the construction industry - picks up the story in this way:

> And that was my first time to encounter an engineering construction company being late! Because when we got there (to Mangusothu Technikon), there was a temporary college that could only take one semester. And then we went to do what they called a pre-technician's course for six months then move into a T1 ….it was compulsory for us, for some reason we don't know. Probably because the standard was too high for our matric, so we all had to do this six-month course before you do T1. But because they were building the college, they only had a temporary facility. So, we did the six months, finished. The building wasn't ready! And it wasn't going to be ready for a while. And there was a company called Stocks, I still remember it. So, when I went back, which was December 1981, I already knew we were not going to go back in the next six months. We had to wait for this college to be finished.
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> When my results came out, which were fantastic, my boss said, 'Why wait here, why don't you go to university?' I said, 'Oh, can I go to university?' And he said, 'Well, why not? What are you going to do?' He was an engineer from Eastern Europe, so he didn't understand this apartheid; I think that was his problem! (chuckles). He said, 'If you are good enough, you should be able to do it.' I said, 'Of course I'll do it.' So he got me a curriculum of Wits University Electrical Engineering. And there it was, electronics, I said, 'Fantastic.' .. I applied, now, for a bursary from the same company. My first application was turned down without an interview. And he was not happy. And he went back … and I was granted an interview and it was approved. In 1982, January, I enrolled at Wits to do my first degree in electrical engineering.

The man who helped him at AECI was Bob Plichta, whom he was later to name as 'the person who had the biggest influence on (his) career'.[196]

But he was not yet on his way. In order to study at the University of the Witwatersrand he needed the permission of the Minister.

> I'd applied and I went to enrol, and I couldn't enrol because I didn't have this permit. And I had a week to register …. So, I said, 'Where is this place? Where is this Minister?' They gave me the address, I got into a train, and went to Pretoria and walked into this Minister's office. It was funny, because now in retrospect, there wasn't this security that we have today. I walked straight upstairs into the Minister's office, and the PA … I said, 'Here's my name. I'm looking for this certificate.' 'Sorry the Minister is in Cape Town; I can't help you. He's not here.' I said, 'Well, when is he coming back?' She said she didn't know. I said I need this thing, because the university is opening this week. And I think I'd already lost two days; I think it was Wednesday. So that day, or Thursday or Friday … then the university starts the following Monday. She said, 'Sorry, I can't help you.' But I said, 'I can't go. Can't you check if it's there? Has it been approved?' And she said I'm being cheeky! But she decided to do it and she said, 'Yes, we've got it.' I said, 'Okay, give it to me.' She said, 'No, we posted it to you.' I said, 'Where did you post it?' She checked my address. She had posted it to my village (laughs). Now, in those days, you need to understand the system. The system did not recognise me as a person living in Jo'burg. I gave two addresses – my postal address that was here in Jo'burg and my home

[196] http://www.engineeringnews.co.za/article.php?a_id=94363 accessed on 4 November 2008.

> address. And that was the one they recognised, because it was in the homeland. This other one was Jo'burg which was nonsense as far as they were concerned. So, they posted it there. I said, 'I'm not going to go there because there is a train to Potgietersrus which takes a day and a day to come back. And even if I go there, I may not find it and even if I find it, it will be too late. Why don't you just give me a copy and I'll bring it back. There were no photocopies then. I said, 'I'll bring it back, what can I do with it?' I said, 'I just want to use it for that day, the university is going to keep a copy, and you can have the original back.' She was alone, and so she probably thought I was going to beat her up or something … so she gave it to me.

He completed his Electrical Engineering degree in four straight years – 1982 to 1985. He recalls that he was one of a small group of black engineering students (unlike their predecessors who had been lone individuals) which began to have its own identity. He was the only one of the group who was not on the Anglo American Cadet Scheme at that stage – 'all my classmates were on the Cadet Scheme - I was the only one who came out of 'non-Anglo'. And it is to this scheme that we now turn.

The creation and organisation of black engineers

The Cadets from Soweto

In the late 1970s Anglo American launched their Undergraduate Cadet Scheme 'to produce an elite generation of black management leaders'.[197] Apparently earlier efforts to achieve this goal had failed, which Richard Reese, a personnel manager at Anglo at the time explained as follows:[198]

> As I recall, when I was with Anglo American I was part of a team which went annually to universities in South Africa, recruiting for the group. This was in the 1970s, around 1974 +.
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> We were consistently unable to recruit black graduates of anything near the right quality, and their areas of study hardly brushed the disciplines of science, engineering, accounting/finance and the like. / This was the intended outcome of Verwoerd's Bantu Education law of the early 50's. It worked well and devastated black opportunities. / I recall reading up the apartheid law, setting it out on the floor in bits of summary paper, to see if there was a way to introduce black people into the workplace without the race distinctions. As everybody knew, there were no loopholes. You either went with the system or against it.

John Drysdale, Head of HR for Anglo at the time, located the Cadet Scheme initiative in the context of decolonisation in Africa:

> It was a matter of enlightened self-interest. Anglo management had earlier experienced the impact of 'localisation' programmes elsewhere in Africa, where expatriates were replaced by citizens as soon as they were trained and deemed ready. In South Africa we were looking at a very different dispensation and one which required a more representative workforce at all levels of the organization. We had a number of manpower plans backed by wide-ranging bursary schemes and although we combed the school leaving population, we were unsuccessful in attracting black matriculants with the requisite levels of maths and science and an interest in the mining industry. It was clear that a new approach was needed. The self-interest came in

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[197] The Cadets from Soweto, TIME Magazine, Monday, June 09, 1980 accessed on 29 October 2008 from http://www.time.com/time/magazine/article/0,9171,952662-2,00.html

[198] Email from Richard Reese to author on 19 October 2008.

> with the focus of the Cadet Scheme which was on engineering and accountancy and the skills needed for career development in Anglo American. [199]

Some criticised the scheme as not being about broad educational reform, but instead favouring 'a tiny black superclass'.[200] Nicholas Oppenheimer, son of the Chairman Harry Oppenheimer, confirmed this view when he was quoted as saying that 'In South Africa you have to produce a privileged few. You can't wave a magic wand and uplift everybody.' [201]

However, ironically, the Cadet scheme had its roots in a more egalitarian tradition: The 1959 Extension of University Act had been fiercely opposed at the time by the left-leaning student body, the National Union of South African Students (NUSAS) and a contingent of university lecturers across the land. David Adler, the son of socialist Lithuanian immigrants was Vice-Chairman of NUSAS at the time and he, and thousands of others fought the new Bill. When the Act was promulgated in spite of the opposition, David together with fellow students Anne Welsh, Neville Ruben and Etienne Marais, who was a Professor of History at the University, resolved to express their anger by establishing a dedicated institution, called the South African Council for Higher Education (SACHED) to assist black students to attain University of London degrees by correspondence.[202] David acquired it as part of his NUSAS portfolio of responsibilities. He recalls:

> There was quite a lot of discussion [at the time around the question]: Are we producing people who were going to be revolutionaries or are we producing students on an academic basis? … Anyway Anne Welsh (the moving force behind the initiative) was the kind of person who said, 'Let's build people rather than get them immediately loaded with guns and stuff'. So that's how SACHED was started.

With its initial focus on assisting students to attain University of London degrees, SACHED became principally a correspondence college. It later established its own correspondence college, Turret College, to assist students to prepare for higher education study. The focus on distance learning meant that engineering degrees, with their need for laboratories, were not offered. SACHED was supported financially by a number of churches, foreign donors and, for some programmes, by the Anglo American Chairman's Fund. Bill Wilson, then Deputy Chairman of Anglo American, chaired the SACHED Board for a time.

After completing his Bachelor of Arts degree and undertaking teacher training David began his career as a teacher. After five years teaching, he was invited to head up Turret College. When Turret College later merged with SACHED, David took over as Director of the merged institution. Under his direction SACHED launched an initiative called People's College – a learning support insert into the widely read newspaper, *The Sowetan*. As David recalled People's College was very popular – and students were seen working from it under trees. At this time David also got involved in a scheme run with the Education Information Centre (EIC) – similar to a programme run by the South African Institute of Race Relations which assisted Oupa Mopake (who shall be introduced shortly) to matriculate:

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[199] Email correspondence from John Drysdale to author on Monday 10 November 2008.
[200] The Cadets from Soweto, TIME Magazine, Monday, Jun. 09, 1980 accessed on 29 October 2008 from http://www.time.com/time/magazine/article/0,9171,952662-2,00.html
[201] The Cadets from Soweto, TIME Magazine, Monday, Jun. 09, 1980 accessed on 29 October 2008 from http://www.time.com/time/magazine/article/0,9171,952662-2,00.html
[202] Interview with David Adler, 17 October 2008.

> The EIC, the Education Information Centre, gave information about bursaries and about jobs and stuff like that. … They also ran courses. They … used to run a big summer school and … we ran it at the Cathedral and there were about a thousand people in that room. And I can remember … I used to do the study skills part of that and the only way you can handle it with a thousand kids is to hand out materials for them to work on. And we were busy in the morning and we were doing study skills and I got a note saying 'Sorry Sir, we do apologize. We have to go and riot in the streets.' (He laughed). I said, 'Fine, I'll see you tomorrow.' And he came the next morning and carried on. Extraordinary stuff!

However, it was the success of the People's College that David believes 'is what got us all banned.' He and many others were issued banning orders by the Nationalist government at the same time as 17 organizations and two newspapers, *The World* and the *Weekend World* were also banned – the day was 19 October 1977 and became known as 'black Friday'.[203]

This turn of events forced David to give up his SACHED work. He needed a new source of income and chanced to discuss this issue with Anglo American people with whom he had previously worked on the SACHED Board:

> It took a bit of time, because one has to get used to being banned, but I went to see Dennis Etheridge who was Chief of the Gold Division at Anglo American and we talked and talked. … They didn't have a programme in mind. They were more interested in me because I'd had the SACHED experience with Etheridge and Anglo etc. etc. So, as we started talking we got to the idea of what to do about Anglo-American in the future. And Dennis Etheridge and John Drysdale – it *has* to do with personality – they were thinkers in Anglo, together will a guy call Bill Wilson ... They were a kind of a group in the Anglo sense, the 'liberal' grouping. So, I said, 'Why don't we think of something where you start introducing black people into Anglo American?' And they took a swallow and said, 'But you are banned.' And I said, 'Ja, but I'll only go in one-by-one.' …
>
> (So) I got employed on a short-term contract to make a recommendation and two things struck me while going around. The one was they were really thinking more about the soft side of Anglo, in other words HR or … IR, that sort of stuff. But …my first thought was: 'What's the guts of this organisation?' So I came to the conclusion that the guts were in the accounting / finance section and engineering. The second thing that stuck me was that, firstly, there was a kind of cultural chasm about how black people thought about Anglo American and how Anglo American thought about black people. One of the things I was always told 'You know, blacks will never be engineers because they didn't play with Meccano sets when they were young' and that sort of stuff. And then there was a lot of stuff about 3-D perception – 'Blacks can't see in 3D, so how can they draw?' and stuff like that.

After careful consultation and research, David, supported by Richard Reese who was notionally David's boss but who prefers to think of himself as a 'co-conspirator', proposed that they embark on a highly structured programme. They called it the Anglo American Undergraduate Cadet Scheme. It was founded on a partnership with the University of the Witwatersrand under the leadership of Prof Nabarro, in the Vice Chancellor's office, who was in turn supported by Phillida Wentzel.[204] Prof. Hanrahan, in the Electrical Engineering Department, was involved on the electrical engineering side of the scheme.

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[203] Keynote Address by Minister of Arts and Culture, Dr. Z. Pallo Jordan at Sanef/Dac Gala Dinner to Commemorate 1977 Press Bannings and Celebrate Media Freedom, Vodaworld, Midrand, 12 October 2007, http://www.dac.gov.za/speeches/minister/Speech12October2007.html, accessed 11 November 2007.

[204] The Cadets from Soweto, TIME Magazine, Monday, Jun. 09, 1980 accessed on 29 October 2008 from http://www.time.com/time/magazine/article/0,9171,952662-2,00.html

This is how Richard Reese recalls the early proposal, tabled by David Adler:[205]

> (David) proposed taking on black matriculants with good potential, giving them a year of bridging in terms of education, personal development and then putting them into the areas of Wits which interested us, i.e. engineering and commerce. It was intricate and ever-changing as David worked this way and that to create something with the hope of success. It did become that success, as several of its Cadets … today occupy high posts - but not in Anglo!! Actually, to be fair, Nicky Oppenheimer once said that if they went elsewhere it would not be a bad thing - it was a national contribution to a very difficult situation created by apartheid. So, Anglo wanted the graduates, but it was ok if they eventually went on elsewhere.

The scheme was highly ambitious – and very expensive. Not only did Anglo fund the students' fees, it also paid them a basic wage and provided them with accommodation. Since black students were not permitted to live in the white residences, it built Glyn Thomas House at Baragwanath Hospital in Soweto and later used facilities at St. Barnabas School in Western Coloured Township for students.[206] As a Time Magazine article, headed 'Cadets of Soweto', described the Scheme at the time:

> The company …committed more than $3.5 million to carrying out a plan that (would) train just twelve black students a year for the next five years. …
>
> Anglo American's nationwide talent search turned up 4,000 black applicants for an irresistible opportunity: one year of intense general preparation, followed by four years of engineering or three years of commerce at the level of Johannesburg's University of the Witwatersrand. In addition to free room and board, the cadets were to receive the standard management trainee's starting monthly salary of $393—four times more than the average black miner's wages. After a numbing battery of exams and interviews the golden twelve were finally chosen. The group, ranging in age from 16 to 22, comprised two women, four students from rural tribal homelands and six street-smart residents of urban ghettos
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> Their curriculum was custom designed by six professional educators. …(The) cadets attend classes in a university building leased by Anglo American. Their university instruction has so far ranged from game theory to designing cranes and reconstructing automobiles. In parallel training at Anglo American, the cadets have been exposed to mine operations, gold and currency trading and group projects. [207]

Anglo also spent time on bridging the cultural divide – from both sides – recruits as well as mentors. The recruits were given 'business etiquette' lessons (if you are taken out for a business meal or a drink what do you do; assertiveness training without being overpowering, how to understand when to say things and when not to say things and so on) and the mentors were trained by specially appointed staff 'as they had no idea of how to mentor young black people – it was a new experience for them'.[208] David believes that the mentoring was crucial to the success of the Scheme:

> The Cadets had to be seen as *managers* and that is why we had to bring in as mentors *very senior* people in the organisation. They weren't some kind of clerk. They were mentored by very senior people who had to see this as a *succession* thing. … They had to have the ability to push

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[205] Email from Richard Reese to author on 19 October 2008.

[206] Interview with Pat Sullivan, Senior Administrator on Cadet Scheme, 27 November 2008.

[207] The Cadets from Soweto, TIME Magazine, Monday, Jun. 09, 1980 accessed on 29 October 2008 from http://www.time.com/time/magazine/article/0,9171,952662-2,00.html

[208] Interview with Pat Sullivan, Senior Administrator, Cadet Scheme, 27 November 2008

> people around in the organisation as well, so they could open up things. So, they'd go to a mine and nobody would question them, stuff like that. … The most important thing was that the mentor had to make the final choice (of *his* cadet). We didn't make the choice for that mentor.

In 1979 permission still had to be sought from the Minister for these students to study at the University of the Witwatersrand, and Jacob Maroga, a successful participant of the first intake whose story follows below, recalled:[209]

> We knew that the Oppenheimer family had to intervene with the Minister to say, 'Let these guys through!' So, we got special (treatment) … they had to get the Minister to actually approve that!

Given that this requirement for Ministerial permission was dropped in 1984, it must be assumed that this high-level intervention on behalf of a number of black applicants (as opposed to single individuals) helped to scrap the rule. It was also the case, according to Jacob Maroga, that by their third year they moved to live in the university residences – so that restriction was effectively lifted as well.

In subsequent years the number of participants rose, and Anglo encouraged its own subsidiaries and other affiliated companies – like Mondi Paper, Samancor … the whole AMIC stable - to join.[210] The Scheme also spread to other provinces when the University of Natal, Durban, as well as the University of Cape Town joined the scheme and offered pre-university years. After a few years between forty and fifty scholars were drawn in annually.[211] Many judged the scheme to have been highly successful. According to Prof. Hanrahan at the University of the Witwatersrand.

> Anglo American … produced a success rate better than the whole student body. There were about twenty or thirty a year and now they are out there! ... I think that was really an important watershed.[212]

Jacob Maroga agrees. He had this to say about the Scheme in 2008 as CEO of South Africa's state-owned electricity generating company Eskom:

> In my view, looking back, it was … one of the biggest catalysts for the growth of black engineers and as I walk in this building there are lots of people who came through the Cadet scheme and doing good things. And I think, generally in industry, there are lots of people (who went through the Scheme). So, I think it was a good programme. I mean, like anything else, there were a few criticisms, because of the money we were getting and the attention we were getting – you know, the sort of 'fat cats' if you like. But its intention was (good) … look, maybe the cost of the programme was difficult, but I think the return in terms of changing the attitudes [was important] … I think also because it was not just about bringing (in) black engineers. It was about changing the mindset around black … you know, you can have *good* black engineers … because it was important just to get that. I think it was a good investment.

Some were more cynical. The 1980 Time Magazine article began with the sentence: '*As racial tensions rise; a white capitalist grooms a black elite'.*[213] But in closing the same article the

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[209] Interview with Jacob Maroga, 5 December, 2008.

[210] Interview with Pat Sullivan, Senior Administrator Cadet Scheme, 27 November 2008.

[211] Interview with Pat Sullivan, Senior Administrator Cadet Scheme, 27 November 2008.

[212] Interview Hu Hanrahan, 5 February, 2008.

[213] TIME Magazine, Monday, Jun. 09, 1980
http://www.time.com/time/magazine/article/0,9171,952662-2,00.html accessed on 29 October 2008.

architects of the scheme were quoted as defending it 'as a prototype that may be applied to a new black generation'.[214]

It lasted until 1988, when the additional year was scrapped, and it became a more standard bursary scheme.[215] The wall was crumbling. Anglo was later to cite the Scheme to the post-1994 Truth and Reconciliation Commission in mitigation of the role it had played under apartheid.

Jacob Maroga's story

Jacob Maroga was born in 1960 and grew up in Limpopo, not far from Polokwane, in Sakukuneland.

> My father was a trained teacher and my mother was a trained nurse, so education was important and the village we were in was quite progressive or enlightened in the sense that… there was a very solid school, church, and a lots of people who in educational terms had been successful.[216]

His schooling was very successful and, as with Malose above, it was assumed that he would study medicine, 'But medicine just didn't grab me. I wanted to do something different. Engineering! I read a lot about engineering, but I had not met an engineer before, before I made the decision.'

> So it just so happened that as we began to think of our careers beyond matric Anglo came with this Cadet Scheme. So things happened together. They put an advert out in the papers and I think to the schools. It was in 1978, the year I finished Matric. We were the first.

Getting into the Scheme was far from straightforward:

> It started with psychometrics, then you'd get pre-selected and you'd go into the national Head Office and then there's assessment centres, interviews … you know … it had a *big* financial incentive … they were going to give us R300 a month and tuition and accommodation paid! It was just out of this world. … So that was a big thing, and also, while I was at varsity I was able to help some of my siblings as well.

Twelve cadets were selected for the first intake – six to study engineering and six to study commerce. The first year was mainly spent at university, although during the vacations time was spent on the mines:

> Look I think the idea … was a superb idea, I think the idea was: 'Why do black students fail, or don't do well in engineering?' I think that was the first question that they asked themselves. Then things came, they'd say, 'Look, of course, their education is not up to scratch, that's the first thing; the second thing, this thing of going to the black university first before you go to the white university was problematic; the other thing was just exposure to technical things that allow you to … you know, it doesn't help when someone is exposed to engineering things and you're not ... so the idea of that first year was one, if there are any deficiencies in your education, let's try and correct them – for instance, one of my deficiencies was my spoken English was not that good, so I had to … there was intervention. Then to expose us to the world of engineering, the practical world of engineering through the mentors at Anglo who did give us some assignments about things …

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[214] The Cadets from Soweto, TIME Magazine, Monday, Jun. 09, 1980 accessed on 29 October 2008 from http://www.time.com/time/magazine/article/0,9171,952662-2,00.html

[215] Interview with Pat Sullivan, Senior Administrator Cadet Scheme, 27 November 2008.

[216] Interview with Jacob Maroga, 5 December 2008.

Jacob Maroga's mentor was Bruce Jackson, the Chief Electrical Engineer at Anglo.

> [The mentorship] was a very formal process of engagement because we'd meet every Friday, sometimes you'd have a personal relationship, they'd take you to their house and … they took personal pride in it.

Jacob remembered different components of that first year:

> There was a lot of content work, common content work, specific content work, general life orientation … you know … in a very elementary form. Then some work at Wits, formal lectures: physics, maths, chemistry, experiments and all of that …some projects at Wits as well. So, I think for me it was a very *generous* programme. Really, for that first year, you felt ready for the next year. Then we went to the first year and we went together … and I mean some of the friendships that were formed then are still very strong today. … I think going through university, I mean coming in as a group and then as the intake gets bigger there was sort of a sense of critical mass. I mean the guys that were there before us, you'd find there would be one guy in second year … I'm talking black people … the other one in fourth year, there was no critical mass. There was a feeling of isolation. So, as people come in there was beginning to be a critical mass of people …

Getting to work, after the 'high' of the Cadet scheme was a challenge. Jacob Maroga recalls

> Well, I went to the mines for two years, because that was the contract. I went to Western Deep Levels. Good experience! One of the deepest mines in the world, big from an engineering point of view – but that is where we started seeing the issues of transformation - because Head Office had a different mentality in terms of race relations. Go to the mine, you get stuck! You know, I can remember going there, even our pay slips – the white students got different pay slips and their pay system was different from us. … You see the hierarchy in the mines – it was sort of an apartheid hierarchy! There are blacks, and then there's the highest level they can go, and from there it's white. So, the personnel system worked in this way: black workers – white officials. Now if you come, you cannot easily be categorized whether you are a black worker or a white official. Your life actually becomes complex. The system actually gets confused. They didn't know whether you get your pay from the white officials or from the black … things like medicals, you go for a medical … if you are a black worker there is a set way in which you go through the medicals … you go to the hostel and there's a medical clinic and then as a mass … there are five of you when the doctor comes you are all naked … Now if you say, 'No, I'm not going to do this' so which process are you going to use? And people have to intervene – some senior manager had to intervene to try and have a special way. And the system was *very* confused, you know, because you didn't fit in this category! You know, it was quite hilarious at some point! (Laughs).
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> I can remember, even during the vac work – some of the mines were clear: black toilets, white toilets … and there was the quality of the whole thing … so somebody came up with the idea … I don't know if you remember at some point in South Africa, there were strictly black hotels and white hotels. Then there was a dispensation where, I think it came up when black foreigners came in, dignitaries, they had a problem, so they had to have a special dispensation. So that dispensation was you could have a hotel declared as an 'international' hotel – so it can allow black and white. That thinking … so somebody said, 'Okay, we can have a 'black' toilet, a 'white' toilet, and an 'international' toilet! (laughs)

It was experiences like this that led some of the newly qualified black engineers to band together to give one another support, particularly those who tried to become consultants. This period saw the emergence of the South African Black Technical and Allied Careers Organisation (SABTACO); and relationships develop with qualified black engineers and the SACPE/ ECSA and the Society of Post Office Engineers, as well as the birth of the Post and Telecommunications Workers, Association (POTWA).

CHAPTER 10

TECHNOLOGISTS – 1980

Among the resolutions taken at the Federation of Societies of Professional Engineers (FSPE) Conference of 1973, was that the FSPE, as a matter of urgency, approach Government, at the highest level with a strong recommendation that a commission of enquiry be appointed to investigate and report on the education, training, the utilization and status of the engineering technician in the Republic of South Africa.[1]

At a similar time, two new government acts changed the engineering horizon and gave rise to a new, additional engineering qualification, namely that of the engineering technologist:

1. By 1979 the Professional Engineers' Act 1968 (Act No. 81 of 1968) was amended so as to provide for the establishment, under the SA Council of Professional Engineers of Boards of Control (BOC) for the registration of engineering technicians and engineering technologists. This led to the establishment of the Interim Committee for the Registration of Engineering Technicians (ICRET) establishing their Board of Control for Engineering Technicians (BOCET) in July 1983, and an Interim Committee for the Registration of Technologists and Engineers (ICRTE), establishing their Board of Control for Professional Technologists (Engineering), (BOCNOL) in 1986.

2. The purpose of the second act, Advanced Technical Education Amendment Act, 1979 (No. 42 of 1979) was to amend the Advanced Technical Education Act, 1967, in order to provide for the establishment of technikons; to substitute "technikons" for the "college for advanced technical education"; and to provide for other incidental matters.[2]

It is these amendments to engineering qualifications that took place around 1979/1980 that will be explored in this chapter.

PEOPLE AND PLACES

In this chapter we bring together some of the individuals that we have met in other chapters, and also introduce new ones. This account is considerably enriched by the contribution of Prof Hu Hanrahan, who was a participant in the events that unfolded, even though he was not a technologist himself. He is briefly introduced below.

[1] Goode Report pg. 1.

[2] Republic of South Africa Government Gazette (1979). *No 43 of 1979: Advanced Technical Education Amendment Act, 1979.* Vol 167, Cape Town, 9 May 1979.

Hu Hanrahan

Hu Hanrahan was born in 1940 in Germiston. His father had matriculated in about 1931, in the Depression years. He got a job at the Rand Refinery, the gold refinery at Germiston. He went the night school route gaining his Assayers Certificate. He worked as an Assayer all his working life and rose to be the Chief Assayer of the Refinery.

> *And I think in those years, along with everybody else, nobody was terribly well off! But I think my parents were particularly keen on me and my sisters getting a good schooling.*[3]

So young Hu was sent to the private Christian Brothers College (CBC) in Boksburg which was difficult for a young English boy:

> *You'd had the 1948 elections when the Nationalists got in, and they were of course very threatening to the English speakers! Of course, in 1952, when they got in again, …well, then they were in forever – until 1994! But for a young, English-speaking kid, it was a bit scary to go to school in Boksburg because you used to have these thugs from the Afrikaans high school who'd want to come and beat you up on the way to the train station.*

He matriculated well from CBC, but before the end of his final year he remembers:

> *Towards the end of school, we had these people come around from various industries trying to recruit people to come and work for them. … You see it was a private school. They weren't subject to all the regulations of the government schools. They couldn't get into the government schools. So, they used to do the rounds of the private schools. I don't know quite how it happened, but I ended up being interviewed by a person called Artie Hoffmeyer who was the Personnel Manager for Rand Mines. They were offering bursaries. I ended up getting a bursary to do electrical engineering from them.*

As he later reflected: 'Well, if I'd had to rely on my parents, I'd just have had to look for a job. So, the bursary made all the difference!'

Hu Hanrahan began his studies in electrical engineering when he registered for a BSc (Eng.) at the University of the Witwatersrand in 1959. After graduating he was encouraged to register for an MSc – which Rand Mines agreed to support. Here is how Hu describes his career after he completed his MSc (Eng.) degree:

> *By that time, I'd actually been doing some teaching for the Department and GR Bozzoli, who at that time was Head of the Department, he later became Vice-Chancellor – he was one of the most marvelous mentors. He had this policy of growing his own staff. He'd get hold of people that he considered to be promising and then – I suppose largely by a process of osmosis – he'd develop them. I think the younger members of staff learnt more sitting around the Common Room table, drinking tea or coffee with him! And he was buddies with Pinkie Hill, who was the Chief Engineer of Rand Mines, and he said to Pinkie 'Won't you release this guy from his obligations?' And Rand Mines agreed. So, I then joined Wits.*

It was from this position, as university lecturer, that not only did Hu complete a PhD in 1969 but he was also rapidly promoted up the Engineering Faculty hierarchy - from Lecturer (1965-9) to Senior Lecturer (1969-70) to Professor of Electronics (1970-76) to Deputy Dean, Faculty of Engineering (1978), to Dean of Graduate Studies (1979) to Head of the Electrical Engineering Department (1985 – 1990). In 2006 he was made Professor Emeritus.

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[3] Interview with Hu Hanrahan, 18 October 2006.

> *In addition to his academic studies he also undertook consulting work in industry which qualified him to be registered as a Professional Engineer in 1970, making him one of the first generation of registered engineers, the scale of which is recorded in the FSPE Annual Report for 1969/70:*[4]
>
> *Although in terms of the Act only consulting engineers engaged in private practice and performing work reserved for professional engineers were required to register before 14th March, 1970, the Council received some 9600 applications for registration by the end of June, 1970. Of these about 3830 engineers were registered. Some 150 applications could not be accepted on the information submitted and the remainder were in process of examination by Registration Committees which meet weekly.*

By 1980 Hu had become a Member of the SAIEE and had been nominated to its Council. From this auspicious base he was elected to the Council of SACPE where he became a member of the Education Advisory Committee which became involved in assessing qualifications of immigrating engineers. His enormous contribution to the unfolding system began from this point:

> *I think where it started to firm up was in about 1980. SACPE started the accreditation process for university engineering degrees and I got involved in accreditation teams.*

Whilst the graduate engineers were knuckling down to make the registration system work – and work for them – there were thousands of 'engineers' who were unable to register, people who, unlike Stan Bridgens, were unable or unwilling to clamber over the registration hurdles. Many of them felt very aggrieved as the Goode Committee was to report:

> *Many see registration as having brought to the professional engineer considerable privileges, with a loss of standing to many others previously closely associated with them, who do not qualify for registration under the present Act …'*[5]

Amongst the most impatient were those who considered themselves part of the skilled engineering team but who did not have engineering degrees and so were 'unregistrable' – the technicians and the certificated engineers in particular. Thomas Cooper, or Tom Cooper as he was widely known, was one of the most impatient and others, like Vivien Nel, or Viv Nel, shared his frustration. They were both technicians who had come up through the South African Broadcasting Corporation (SABC), which, like the Post Office, no longer offered 'apprenticeships'

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[4] FSPE Annual Report 1969/70 attached to SAIEE Council Meeting minutes for 2 October 1970, SAIEE records.

[5] Goode Report, 9.1, p. 98. Not only did engineers enjoy rising status following registration, it would seem that they also enjoyed rising financial rewards, as recounted by Kruger, in his history: With ever-increasing numbers of persons becoming registered, pressure began to be applied by professional engineers on employers to grant them recognition in the form of enhanced salaries. In general, employers accepted that for those who recently became qualified an advance was justified. However, in the public service the Commission for Administration was persuaded to increase salaries across the board not from the date of registration but from a prior date when the person was considered to have met all the requirements.' The word 'pressure' stands proxy for a wide-ranging series of meetings held with employer bodies including the Mining Houses, SASOL, CSIR, Government Departments and others and, as Kruger records, 'Many points were raised [at these meetings] but two significant ones were the salary scales for professional engineers and the training of engineers in training.' https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.

but offered instead 'technical assistant training' (their term for technician training at the time) albeit on far less favourable terms.

Tom Cooper

Born in 1935, Tom left school in standard 7 for economic reasons. He attended Cape Technical College as a private student where he completed his NTC I, II and III before gaining practical experience at the SABC. In 1956 he qualified as a Radiotrician. In 1968, Tom returned to South Africa after his first stint in Europe having been recruited by the Munitions Production Board (this was later Armscor).

> *At that time the South African Institute of Electronic and Radio Engineers (SAIERE) was already in existence. … My feeling is that SAIERE must have come into existence round about 1961.*[6] *'Who were these people?' Actually, they were mostly engineers! I've looked at their qualifications – they were university people. There were some technicians but the majority of the "main manne" were engineers.*
>
> *Anyway, when I returned to SA in 1968, I heard of this organisation and I spoke to some people and decided to seek membership. The Institute was accepting technicians as members. So that group had recognised the existence of technicians and encouraged them to become members. But the repercussion was that the SAIERE was never recognised by SACPE because it was not an association of engineers. That and the fact that SACPE refused to recognise electronics as a separate field of engineering, and ECSA still does not. Electronics was part of electrical engineering and was represented by the SAIEE. It was also almost the cause of their demise when the Institute realised they were not going to get recognition. In 1969 I left South Africa again – I was transferred overseas by The Munitions Production Board to Rome and then to Glasgow. I was away for about three years and came back in '72. The Institute had gone dormant. I spoke to one or two of the local members who told me that the majority of engineer members had lost interest the moment SACPE refused to recognise the institute.*[7]

It was at this point that Tom's leadership skills began to come to the fore:

> *When I came back, and the Institute had fallen apart, I said, 'Where are the members? Where are the ones that used to keep it operational?' I managed to track some of them down and suggested that we resurrect the Institute. With their help I located some of the members, like Roger Fink and Doug Pitchford. They in turn helped me to locate the Institute records. Having obtained these records, I had access to addresses and telephone numbers. I started to sell the resurrection concept on the basis of the institute retaining its name but becoming essentially a technician institute. It was well received, and we kick started it with Doug Pitchford as the initial president. He was not elected, he just assumed office and the members were happy with that.*
>
> *I took over the reins of organising meetings arranging lectures and visits to places of technical interest. One of the more memorable was a visit to the flight simulator at Jan Smuts Airport where we actually participated in a training session and experienced a midair engine power loss exercise. It was very real.*

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[6] This is how Tom Cooper arrived at this conclusion: 'Here is an early copy of their journal, "REI News" it's Volume 4, and Volume 4 is dated December 1966. That means four years – assuming one volume a year – that takes it back to 1962, and I doubt that they would have produced the journal as soon as they were established.'

[7] Interview with Tom Cooper, 29 July 2008.

At times we had up to forty people at lectures - this I achieved by actually phoning the members the day before a meeting and reminding them. Most of the meetings were held at the Pretoria College for Advanced Technical Education which was very supportive of our efforts to provide a home for engineering technicians. Many of the lecturers became members of the Institute. In due course I re-established the institute journal with the help of Doug Pitchford who had connections with the printing industry. Being the editor of the journal was no mean task, but I learnt fast. I researched and wrote much of the content myself. It was rather a primitive process at the time. 'Letraset' headlines, typing, cut and paste with glue and assemble the pages. Then off to the printers for setting and printing.

In due course I was recognised by the members and elected president of the SAIERE. The membership of the institute had recovered significantly but now it was essentially a technician association.

Vivien Nel

He was commonly called Viv Nel. Like so many characters that we have met so far, economic circumstances also prevented him from going to university. He joined the SABC as a trainee technician, and completed his NTC I, II and III, as well as ATC I and II with a focus on electronics at the Witwatersrand College of Advanced Technical education (CATE), on a part-time basis. Then he completed his National Technical Diploma (NTD). He wrote exams at the end of 1961 and his diploma was issued on 1 January 1962. He applied to the Institute of Electrical Engineers, and they had changed their rules on 1 January 1962, and he could not be registered.

SAIERE was not the only organisation that recruited technicians. The South African Institute of Electrical Technician Engineers (SAIETE) was another. It had formed when SAIEE changed its constitution and no longer permitted technician members, like Viv Nel, to join. The establishment of such bodies had been recommended by the FSPE Conference on the Education and Training of Engineering Technicians and the Implementation Committee established thereafter reported that 'A technician society for electrical engineering technicians' viz the SA Institute of Electrical Technician Engineers, has been formed. The SA Institute of Civil Engineering Technicians had also been formed. The SA Institution of Mechanical Engineers had a non-corporate grade for technicians. To date no other society has advised in this regard.'[8] This is how SAIEE has subsequently recalled the history:

The South African Institute of Electrical Technician Engineers (SAIETE) was founded on 16 January 1973 and was incorporated with the Association of Supervisory Electrical Engineers (ASEE) which had been founded in 1958. / The SAIETE looked after the welfare of the electrical technician community at the time when the SAIEE constitution required BSc qualifications for membership.[9]

[8] Resolution 5.1, Report of the Implementation Committee, The Federation of Societies of Professional Engineers, 27/6/1975, following the Sixth Conference on the Education and Training of Engineers: The Education and Training of Engineering Technicians, Johannesburg, 8,9,10 1973, p. 6.

[9] Mike Crouch, (undated), 'SAIEE: The Merger of the SAIETE and the SAIEE and the establishment of the Jack Yelland Bursary Fund', Document prepared by Mike Crouch, the CEO of SAIEE.

Viv Nel commented that ASEE had been mainly for supervisors at Eskom – which given that Bill Bergman recalls joining ASEE whilst working there, seems likely. Viv joined the SAIETE and was later to become its President:

> *I joined SAIETE as a member somewhere along the line, I thought this looks interesting, you know it was listed in one of the magazines – there's the odd article … let me join and see. I joined that and somehow or other the next thing I ended up on the damn thing … on one of their committees. Ja, that's how it started.*[10]

Time for SAIETE activities was a challenge because the technicians had less latitude at work than did the engineers, as Viv Nel observed:

> *Ja, you see, that's another thing that's discriminatory, I suppose, because in the structure of companies the engineer, as a rule, tend to work their way to the top. So, they might have more time available to do these things. The guys down the bottom they don't have as much time, so you find … 'I'd like to help but I just don't have the time.' Ja, so that's how it works. And then a lot of the work that we did was done after hours, after work – all our meetings at SAIETE were after work – we'd sit there until 11 o'clock at night and a lot of work was done on weekends. You know a lot of people won't do that – especially when the younger guys have just got married and have got families and they are not interested in that! So, you find the guys tend to be a bit grey!*

Given these constraints, it made sense for the technician organisations to collaborate, which those in SAIERE started doing – as Tom Cooper recounts:

> *At this time, we were having well attended meetings with fairly high caliber talks and lectures. So was the other Institute … the South African Institute of Electrical Technician Engineers (SAIETE). We had attended some of their meetings and lectures and they had come to some of ours – and in the end I decided that two separate organisations was a waste of effort. It was self-evident that SACPE and all of the others were not going to recognise electronics as a separate field of engineering. I consulted our council and persuaded them to support my proposal. Eventually I got together with Viv Nel to discuss possible amalgamation. He conveyed the suggestion to his council. They agreed to talk. I put it to them that I felt it would be best if we simply closed the South African Institute of Electronic and Radio Engineers – it's not going to be recognised as such and thus has no long-term purpose. SAITE, because it was electrical, had tacit recognition by the South African Institute of Electrical Engineers. There was at least acknowledgement of them being there. Finally, the decision was made that SAIERE unify with SAIETE and that as a single organisation we would tackle the matter of recognition. Our joint long-term aim was now not just recognition by SAIEE but unification with it. But this was not to be for many years.*

Both Tom Cooper and Viv Nel stressed that SAIERE and SAIETE were not trade unions – they were 'learned societies' like the engineers – although the difference between these two forms of organisation was not as stark as it might appear at first glance. Tom Cooper put it this way:

> *While it may have been sort-of trade union type activity, in that we were fighting for the recognition of the technicians as a collective block, we also wanted the title of Technician to be recognised on an individual basis. Thus, it was actually the engineering profession we were challenging and not the employers. The employers would hire and allocate whatever title they wished. Frankly, today they are still allocating some weird ones. However non-recognition as part of the professional engineering team did hold technician wages down...*

This dichotomy between employers and the engineering establishment rather underplayed the fact that one of the goals of recognition was *'financial recompense' as* Tom was all too aware –

[10] Interview with Viv Nel, 1 July 2008.

and as will be shown below, the employers appreciated as well. But for now, the technicians had their hands full with the engineering establishment:

> *There was a tremendous amount of anti; they tried to scupper us quite a few times. The main argument put forward by the engineering old guard was that there is no need for recognition and registration of people other than engineers. Their argument being 'only the engineers are taking responsibility'. We countered this by saying, 'Fellows come on! Engineers may design something, but who's installing maintaining and repairing it? If you do, then you are functioning as a technician and not an engineer'. This was a difficult argument to counter. I recall that the Civil Engineering Institute was one of the first to openly accept this premise when I had occasion to challenge them at one of their AGMs.*[11]

This was an argument with which Viv Nel strongly concurred in his understated way:

> *I can understand the way things went, but it seemed a bit silly to me to say you've got the engineer, and he's the be-all and end-all and nobody else counts, and you say, 'That's fine'. Okay maybe he designs the thing, but who builds it? There are more people in the team there's not just one guy.*[12]

For all their energy and work, they initially made limited progress as they did not as yet have clear support from any of the powerful members of the FSPE Council. However, this did not stop them objecting when SAIERE became aware that FSPE were considering investigating the possibility of registering persons other than engineers. SAIERE wrote to the FSPE to say they opposed this process going ahead without the participation of technician institutes. Feelings ran high. The letter seems to have had the desired effect, as Tom recalls: 'that's when the Certificated Engineers joined the fray and together, we launched the crusade that brought us together in common cause. Events unfolded from there.

EDUCATION AND TRAINING LANDSCAPE

The FSPE Conference

In 1973, The Federation of Societies of Professional Engineers (FSPE) resolved to dedicate the theme of its Sixth Conference on the Education and Training of Engineers in Johannesburg to 'The Education and Training of Engineering Technicians'[13] – and, no doubt, prompted by the letter from SAIERE, the technicians were invited. The Conference was held from 8 to 10 August 1973 and was attended by 272 delegates consisting of technicians, persons involved in technician education and senior members of engineering organisations.[14] At this important Conference a number of resolutions were adopted and in order to ensure that they were actioned, an Implementation Committee was appointed.[15]

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[11] Interview with Tom Cooper, 29 July 2008.
[12] Interview with Viv Nel, 1 July 2008.
[13] Goode Report, Section 1.1, p. 1.
[14] Goode Report, Section 7.3.3, p. 55.
[15] Goode Report, Chapter 1, Section 1.1, p. 1.

The 'Registration' resolution

One of the most important resolutions adopted was that which endorsed the desirability of registration of technicians. The Conference recommended that FSPE, in collaboration with the technicians, should take action to realise this objective.[16] FSPE appointed an *ad hoc* Committee to investigate the matter and recommended the registration of technologists, engineering technicians and holders of certificates of competency.[17] This led to FSPE issuing a questionnaire to which members of the Council submitted replies.[18] The outcome was broad support for the registration of certificated engineers, technologists and technicians alongside the professional engineers. With this mandate, FSPE, driven by ICMEESA (which had been accepted as a member of FSPE after the Act permitted their participation on SACPE's council, but their members were still not automatically accepted for registration as professional engineers) called a formal meeting with the technicians. This was in 1976.

From the perspective of the technicians this was a turning point:

> *It all started back in 1976. The Federation of Societies of Professional Engineers (FSPE) through the Institution of Certificated Mechanical & Electrical Engineers (ICMEESA) invited all engineering technician bodies together to discuss amendments to the Professional Engineers Act. Some meetings later this resulted in eleven institutes forming the Interim Committee for Registration Technicians (ICRET). Its mandate was simply to bring about changes to the Professional Engineers Act to allow for registration of engineering technicians. At this time the certificated engineers withdrew and handed over coordinating responsibilities to the technicians themselves.*[19]

Why did ICMEESA take so active a role? Tom Cooper explained:

> *SACPE wasn't recognising them (ICMEESA) for professional registration. Despite our best efforts we just did not seem to be getting anywhere by ourselves due to lack of real backers. But when they came along, they constituted a range of significantly influential individuals many of whom were actually registered professional engineers. They sympathised with us that the lack of recognition by the profession was incongruous and cited on their part the fact that the certificated engineers by their very name had been statutorily recognised long before the so-called professional engineers.*

The journey from that first meeting to the time when the final proposed draft amendment to the Professional Engineers' Act was far from smooth. A technicians' pamphlet later described it as 'a stormy path of disagreement, vested interest, personal interest and hidden agendas'[20]. Hu Hanrahan, confirmed that there were some engineers who felt very strongly on the issue ('over our dead bodies'), but the matter was finally settled:

> *… the institutes found each other through their representatives who had eventually welded themselves into formidable teams. By 1978 the proposed amendments to the Act, namely, to form*

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[16] Goode Report, p. 103.
[17] EAC meeting - 24 January 1975, pages A75/39 and A75/40, cited in Kruger, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.
[18] Council meeting - 29 August 1975, pages R75/106 to R75/118, cited in Kruger, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.
[19] ASARAT NEWS, March 1995, pamphlet, personal copy from Viv Nel, pp. 1-2.
[20] ASARAT NEWS, March 1995, pamphlet, personal copy from Viv Nel, pp. 1-2.

a Board of Control for Engineering Technicians (BOCET) was published. No details of operation on the process of registration was known, so much work still had to be done.[21]

The 'Commission of Enquiry' resolution

Another important resolution adopted at the Conference was:

> *The Conference resolves that the Federation of Societies of Professional Engineers be requested, as a matter of urgency, to approach the Government at the highest level with a strong recommendation that a commission of enquiry be appointed to investigate and report on the education, training, the utilization and status of the engineering technician in the Republic of South Africa.*[22]

This led the FSPE Implementation Committee to initiate a meeting with the Minister of National Education who responded by appointing a Committee, instead of a Commission, in January 1974.[23] In Hu Hanrahan's words, 'This Committee was to do for technicians what the Straszacker Commission had done for the graduate engineers', by which he meant, it is presumed, that it described the nature of the cordon that would enclose this new occupation - 'the technician'.

The Goode Committee

The terms of reference of the Committee were:

> to inquire into and report on the training, use and status of engineering technicians in the Republic of South Africa, with due regard to the following:
> (a) Admission requirements;
> (b) Duration of courses;
> (c) The structures and contents of courses in broad outline;
> (d) Examining; and
> (e) The award of certificates and diplomas and the recognition thereof by industry and others.[24]

R.C.J. Goode, an engineer and a member of the PEJC Committee that was established in 1968 to work with Campbell Pitt on his memorandum on technicians, was appointed to chair the Committee.[25] He was joined by Dr R.S. Loubser who had also served on the PEJC Committee. Amongst the other notable members of the Committee were E. Dalton, from ICMEESA, H.A. Matthews from the Post Office, Dr A.J. van Zyl from the Association of Colleges for Advanced Technical Education (who was replaced by Dr Pittendrigh on his retirement) and Prof C.J. Rallis (the engineer who had strategically advanced the work of EASA in the early days). Mr Z.F. Joubert, a technician, was also a member of the Committee.

The Goode Committee undertook its work with great diligence – so much so that at one point, according to Tom Cooper, it was referred to as the *Good Night* Committee 'because no one

[21] ASARAT NEWS, March 1995, pamphlet, personal copy from Viv Nel, pp. 1-2.
[22] Goode Report, Chapter 1, Section 1.1, p. 1.
[23] Goode Report, Chapter 10, Section 10.1, p. 111
[24] Goode Report, Chapter 1, Section 1.2, p. 2.
[25] Goode Report, Chapter 10, Section 10.1, p. 111.

thought anything was ever going to come out!' But its report was finalised on 15 February 1978 and proved to be worth waiting for.

It had begun by reviewing the situation internationally. It studied the situation in the UK, the USA, Canada, Germany and Switzerland and found that:

> *The engineering team consists essentially of the engineer, technologist, technician and artisan, but with no internationally accepted and clearly distinguishable level of education or activity between each.*[26]

The position in South Africa was similar:

> *[The Straszacker definition of an engineering technician] is a general description of the technician's role in the engineering team rather than a test whether he is functioning as a technician, especially in branches with no recognized artisan group to indicate the lower level, for example, civil and chemical engineering. … Your Committee is also aware of several instances where craftsmen and operators have been called technicians in order to improve recruitment, with little concern as to whether their knowledge of mathematics and applied science is adequate; but there are no guidelines for the adequacy of such knowledge, neither is a standard available as to whether such a technician has the 'ability to work out the details of a task', or the 'competence to instruct or to supervise skilled craftsmen'. There is thus a need to establish standards of competence.*[27]

The Committee therefore interpreted its mandate as being the creation of such a test or standard for technicians in South Africa.

What is a technician?

The Committee began by looking at the broad boundaries surrounding the work of a technician. All agreed that the work fell somewhere between that of an artisan and an engineer, so they set out to define the boundaries between an artisan and technician on the one hand and a technician and engineer on the other.

With regards to the boundary between an artisan and a technician, they developed the following comparative table:

The typical difference between artisans and technicians can be summarized as follows:[28]

Table 10.1. The difference between an artisan and a technician.

	Artisan	**Technician**
	Makes things	**Makes things work**
Theoretical knowledge: relevant mathematics, science and engineering principles	Elementary	Greater in extent and of more depth

[26] Goode Report, Chapter 2, Finding B2.1, p. 9.
[27] Goode Report, para 3.2.1, p. 18.
[28] Goode Report, para 3.2.2, p. 19.

Training and experience	For a specific job in a particular trade	For a cluster of jobs over a broader field
Manual skills	Expert in one, occupying most significant amount of time	Familiar with most related skills and usually not concerned therewith for a significant amount of time
Mental skills	Minor requirement	Engaged in these to a greater or lesser degree most of the time

Source: *Goode Report, para 3.2.2, p. 19*

And concluded that

> *It would thus appear that the major differences between the artisan, craftsman, or, to a larger extent, the operator, and the technician are to be found in their education and training. Thereby the technician is enabled to be familiar with a broader field so that he can spend more time on technical work rather than on manual and routine work. I'm assuming the latter but if it's on a different page perhaps we need a reference!*

This emphasis on 'their education and training' confirmed the emphasis that Tom Cooper had laid on the additional qualifications that the technicians had acquired and for which they sought recognition and compensation.

On the upper boundary, the Committee drew on the work of an American researcher, Prof J.C. Mehrhof who had developed a somewhat similar table to distinguish an engineer and a technologist (the term then being used for a 'senior-technician'):[29]

Specifically, the engineer and the engineering technologist tend to differ in the following respects:

Table 10.2. The difference between an engineer and an engineering technologist.

Characteristic	Engineer	Technologist
Understanding of the concepts and principles of the fundamental sciences	Thorough	Understanding
Use of the concepts and principles of the fundamental sciences in producing new design	Frequent	Seldom
Adaptation of tested designs and current state of the art to produce new products	Occasional	Frequent
Manual skills in laboratory and manufacturing techniques	Limited accent	Heavy accent
Training in mathematics	Applied and theoretical, including differential equations	Applied with introduction to calculus
Degree of specialization at the undergraduate level	Minimal	Heavy

[29] Goode Report, para 3.3.4, p. 23.

Preparation for graduate study	Accented	Not emphasized
Expected time before productivity is attained	Long	Short
Concern for social consequences of work	Extreme	Normal

Their conclusion regarding the nature of this boundary was:

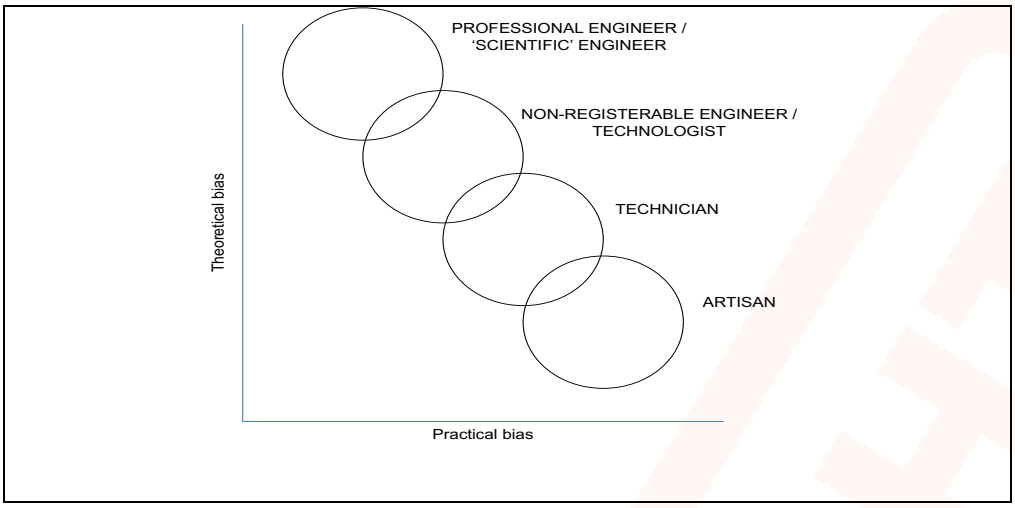
> *It is evident, both overseas and in South Africa that in the training of the undergraduate engineer greater emphasis is being placed on scientific background and creative ability. Thus, more of the routine of production, the maintenance of equipment and the fault finding are being handed over to the more practically trained engineer and senior technician. The technician group, the group between the artisan and the professional engineer, has thus expanded greatly as its highly trained members move up to take over duties relinquished by the professional engineer. / In the middle ranks too, there is a greater demand for adequately trained technicians as more complicated and expensive equipment is provided to control processes and to conserve operative manpower.*[30]

In neither case was an absolutely clear boundary found. But they did concur with the international evidence that in the space between the artisan and the engineer lay two, not one, occupations. They also accepted the term then in use internationally, namely 'technologist' for the person 'adjacent to the engineer' whilst 'engineering technician' was the preferred term for the occupation ahead of the artisan. They produced a diagram, which was widely used in presentations thereafter, to illustrate these relationships on a two-dimensional grid:

Figure 10.1. Future Job Clusters[31]

[30] Goode Report, Chapter 10, p. 111.

[31] Goode Report, Fig. 2.4 Future Job Clusters, p. 9.



Source: *Goode Report, Fig. 2.4 Future Job Clusters, p. 9.*

They followed this conceptual work with a survey of tasks then being undertaken in the two occupations - the technician and the technologist – in each of the principal engineering branches viz. civil; mining; mechanical; electrical; metallurgical; chemical, industrial and agriculture.

They also interrogated future trends in each field and discovered enormous diversity. For example:

Telecommunications:

> *In telecommunications the work of the technician and the technologist includes the responsibility for the installation and maintenance of automatic telephone exchanges; electronic equipment for radio, carrier and microwave circuits; telegraph equipment and automatic telegraph exchanges; radio stations; subscribers' lines; switchboards and private exchanges; overhead and underground telephone lines; and the repair and overhauling of equipment. …*
>
> *Future trends: The electro-mechanical switching systems and equipment of yesteryear are being replaced by the much faster electronic switching systems. / The whole of telecommunications is involved in the exploitation of computerized control, with micro- and mini processors being the order of the day. / More so than any of the established fields of electronics, telecommunication is moving forward in leaps and bounds and in the future the field will extend far beyond transmitting information from person to person as is done today but will embrace inter alia communication from machine to machine.*[32]

Chemical engineering:

> *Chemical process industries vary from company to company but in a typical large organisation this covers 'process plant operation' and 'analytical services'. The maintenance and construction aspects generally follow the normal pattern for the mechanical, electrical and civil fields. The types of technicians employed are generally those whose qualifications include 'plant operation' or the more science oriented 'analytical chemistry', the latter being in the majority...*

[32] Goode Report, para 5.4, p. 38.

> *Future trends: The chemical industry is expanding rapidly in South Africa (for example, Sasol Two and new fertilizer industries) and this is likely to be the future pattern where expansion of the chemical industry, coupled with much diversification of products and services, is taking place, increasing the need for technicians.*[33]

They also mapped the frequency of the occurrence of technicians in each branch and found that 'about half of the technicians were in electrical engineering due to the extensive programme organised by SAPO.[34] So dominant was the position of telecommunications that a classification system based on specialisation might have been possible, but it was not to be. The Committee wanted a standard that applied across all branches, so they sought another basis for categorising this work.

Finding commonalities across all branches was a challenge, although they did find some similarities when it came to the non-technical tasks, referred to as 'interdisciplinary tasks' such as communication and administration, but even here the tasks were executed in the context of their technical functions, not as stand-alone activities.[35] However, they did find that, in the main, technicians' work was 'rather more task-oriented than discipline-oriented, as a result of which in many instances their work not only overlaps the different engineering branches but also cuts across into the sciences and commerce disciplines.[36] This made vertical divisions between branches difficult.

But these observations took the Committee no closer to the establishment of a 'standard', so they turned to the only 'objective' measure they had – educational qualifications and time-based indentureship in firms, which are considered sequentially below.

Definition of a technician and technologist

After due consideration the Goode Committee reframed the Straszacker definition and submitted the following, which was intended to signal a more precise standard or test:

> *Your Committee recommends that the name 'Engineering Technician' be confined to the person doing work in the engineering sector at a level above that of the artisan or operator, whose standard of education is above NTC 3 level, and who also has completed at least a year of suitable practical experience. Normally, for more than 40% of his time he should be engaged in intellectual work rather than in tasks requiring manual skills or in the supervision of such work. The upper level of the field of the technician is where the level of the technologist is reached (see 3.3).*[37]

This definition then begged the next question: What is a technologist? And the answer they formulated was:

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[33] Goode Report, para 5.7, p. 40.
[34] Goode Report, para 10.3, p. 112.
[35] Goode Report, para 5.1.1, p. 32.
[36] Goode Report, para 5.1.1, p. 32.
[37] Goode Report, Recommendation: A3.1, p. 20.

The technologist should be distinguished from the technician in that he can operate in a broader field, has a greater depth of knowledge, can be more intellectual in his approach and possesses a high technical educational qualification such as the proposed Diploma in Technology.[38]

So, at the nub of both of these definitions was the qualification at a specified institution not a definition of the work performed. The standard they developed was similar in character to that which had been developed for the professional engineer i.e. the BSc. The qualification was in effect used to interpret the term 'intellectual work' or at least the 'knowledge parameters' for the work that could be performed.

The education of a technician

The Committee noted that the need for higher levels of education and training for technicians had already effectively been recognised with the introduction of the sandwich courses for technicians, introduced in 1958. These had been the first full-time courses (as compared to the part-time ATC courses) for intermediate-level skilled workers in the country. However, this new route had complemented the 'apprentice' route and did not replace it. These two streams were compared by the Committee:

Prior to 1972 a clear distinction was made between apprentice education and technician education. Apprentices followed 11 weeks block-release, part-time or correspondence courses leading to certificates NTC 1 to NTC 5 and the National Technical Diploma (NTD). All examinations were external, and no course marks applied. Trainee technicians attended 20-week sandwich courses leading to a National Diploma for Technicians (NDT), in which all examinations were external, and a course mark out of 40 applied to all subjects. The major differences between the two streams were (a) separate subjects, syllabuses and examinations for each of the two streams; (b) the inclusion of extensive laboratory work for the NDT students but not for the NTD courses and (c) a Standard 10 Certificate with mathematics and science as passed subjects, as admission requirement for the NDT stream.[39]

It noted that the co-existence of these two streams had caused the CATEs some difficulty as it meant supporting and staffing two streams. Many of the 'N' courses had not been revised since 1951 and so were more out-of-date than the newer sandwich courses. The Education Department set out to investigate amalgamating the two streams 'in the hope that not only would it reduce the number of similar subjects and examination papers but also teaching costs, if students in both streams could sit in the same classes. It would also facilitate transfer between certificate and NDT courses'.[40] The Department convened a meeting of employers to consider the issue:

When the Department called a meeting of employers it became clear that the majority would not be prepared to release their apprentices to attend semester courses. The courses already planned as semesters were then 'adapted' to trimesters by offering 4 subjects per trimester instead of 6 per semester and changing the 4 semester course into a 6 trimester course having roughly the same total duration, viz. 6 x 13 = 78 weeks, as against the old system of 4 x 20 = 80 weeks.[41]

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[38] Goode Report, Recommendation: A3.2, p. 22.
[39] Goode Report, para 7.3.2, p. 54.
[40] Goode Report, Section 7.3.3, p. 55.
[41] Goode Report, Section 7.3.3, p.55.

But the details were ropey, and the CATEs preferred the semester system. The matter was again raised at the FSPE Conference in 1973 where the CATE position was supported, albeit by a 'majority' and not unanimously:

> *Resolution 3.1 stated that 'the majority of the delegates preferred the semester system for diploma students while retaining the trimester system for certificate courses'. The conference resolved that the Department of National Education be requested to investigate the possibility of returning to the semester system for Diploma Technicians.*[42]

The matter was referred to the Goode Committee for adjudication. The Goode Committee finally recommended that:

> *A7.6 Integration of apprentice and technician courses should be discontinued.*[43]

The rationale for this recommendation was:

> *The ex-apprentice has considerable practical knowledge and manual skills but may be lacking in the basic sciences. He will need careful presentation of these subjects if he is to progress in a common stream. The trainee diploma technician, starting with senior certificate mathematics and science, needs to concentrate more on the technology based on the sciences he already knows. It is thus clear that there is a case to be made for two streams of education, one for the artisan and the other for the technician if both are to benefit, that is the proposed N-stream and the T-stream.*[44]

There were also pragmatic considerations such as:

> *The more efficient use of teaching staff has not been achieved, generally NDT and Certificate students cannot be accommodated in the same classes, the course structure and subject content do not make for a smooth bridge between NTC 3 level and T-courses, trimester calendars have seriously upset the smooth running of other courses on a semester (20 week) basis in CATES, and a serious fall-off in attendance of part-time post-NTC 3 students has taken place as there are no longer clear-cut short-term goals for part-time students.*[45]

But what of the employers' resistance to the semester system?

> *In the questionnaire D (conducted on behalf of the Committee), 77% of employer organizations representing 93% of the annual intake of advanced apprentices were in favour of the trimester for advanced apprentices. In the case of NDT technicians 33% of employer organizations representing 59% of the annual technician intake were in favour of the trimester.*

The conclusion that training employers preferred the trimester system would seem to be clear cut. But no, the Committee continued their analysis of the returns:

> *With the exclusion of one major employer this would change to 31.4% of employers, representing 40% of the annual intake, and should that employer decide in favour of semesters this would change to 29.8% of employers, representing only 27% of the technician intake as being in favour of the trimester. If, however one considers the employers in the private sector, then the same questionnaire shows clearly their overwhelming preference for the semester system, namely 82% of the annual intake of technicians.*

The 'one major employer' was probably the Post Office, which employed the majority of electrical technicians at the time and electrical technicians collectively constituted 49 per cent of all

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[42] Goode Report, para 7.3.3, p. 55.

[43] Goode Report, Recommendation A7.6, p. 58.

[44] Goode Report, para 7.4.3, pp. 57-8.

[45] Goode Report, para 7.4.4, p. 58.

technicians countrywide. Furthermore only 25 per cent of technicians were being trained in the private sector, so the 82 per cent figure needs to be seen in context – as only 20.5 per cent of the total.[46] It would seem that the evidence was not as decisive as the conclusion the Committee reached suggested:

> *On balance, your Committee finds that the trimester system, and particularly the integration of courses, has not been a success, though it is admitted that improved course arrangements could rectify some of the difficulties.*[47]

And

> *The surveys show there is sufficient support from employers and college lecturers to justify a reversion of NDT courses to semesters.*[48]

This massaging of the results of the questionnaire in favour of CATEs and against employers suggests a desired rather than a proven result (as shall be seen shortly it was the CATE-based programme that was proposed as the benchmark for technician registration). It, together with the consequent recommendation and the failure to explore possible 'improved course arrangements' in the Report (which were extensively undertaken in relation to the diploma route) was to have major implications for career pathing opportunities. But employer resistance to the semester system persisted, evidenced both in the rising number of students unable to secure industry placements and in studies that were repeatedly referenced on the subject.[49]

In acknowledgement of the fact that many employers continued to favour technicians who, like Tom Cooper, also had trade papers, and that between 30 per cent to 35 per cent of young technicians (56 per cent overall, although as high as 82 per cent in branches with a strong corps of artisans) were also qualified artisans, they refrained from recommending the complete demise of the 'apprentice' route. Indeed, they recommended it continue *and* that bridges be designed between the two routes to enable apprentices to transfer to the semester system and *vice-versa*. The bridge between the two routes was not however developed as a systemic feature – it was left up to individual CATES to address:

> *An entry transfer course should continue to be provided at a CATE where necessary in order to equip persons holding a Senior Certificate or NTC 3 without mathematics or a physical science for admission to NDT courses. Such a course cannot be formalized and should be at the discretion of the CATE concerned, but CATES should prepare for an increased demand.*[50]
>
> *It is recommended that transfer courses be arranged by the CATES for N-stream students at NTC 4, NTC 5 and NTC 6 levels who wish to transfer to the T-stream and vice-versa.*[51]

The benchmark qualification recommended for technicians was:

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[46] Goode Report, Table 5.1 p. 34.
[47] Goode Report, 7.4.4. ,pp. 58-59.
[48] Goode Report, Finding B7.10, p. 59.
[49] See for example R.K. Dutkiewicz, December 1990, 'Engineering Education in South Africa', TECHNO. EAC 91.2.21, Item 2.9, 91/19 – 91/31.
[50] Goode Report, Recommendation A7.17, p. 63.
[51] Goode Report, Recommendation A7.27, p 68.

Recommendation A7.22: It is recommended that in future a restructured 3-year sandwich course (3 semesters of study at a CATE with appropriate in-service training) be introduced and that it led to a National Diploma award.

For technologists, they recommended a general Higher National Diploma or more specialist Advanced National Diploma be earned by students completing an additional 'sandwich' year[52] – a recommendation based on recent innovations in the Post Office:

> *A Higher National Diploma (Telecom: Electrical) and an Advanced National Diploma (Telecom: Electrical) were recently introduced specifically for the needs of the Department of Posts and Telecommunications (SAPO).*[53]

The Post Office innovations on which this recommendation was built were ones with which Rod Harker was personally engaged, himself having been a senior engineer there at the time:

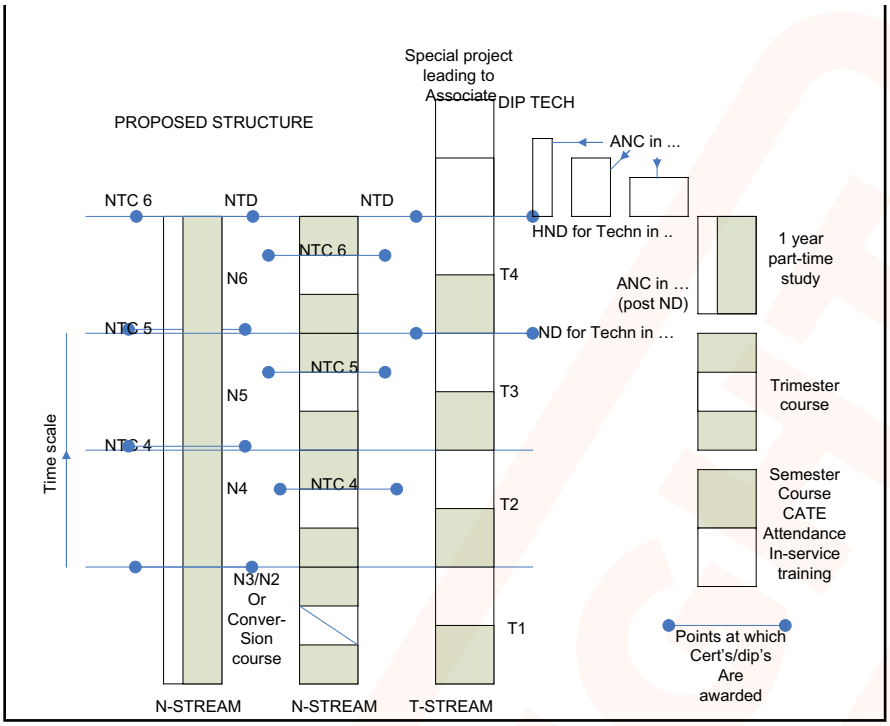
> *In the late '70s the Post Office together with the Pretoria Technical College and the DoE introduced the Technologists. It set the syllabus and set the exam papers and marked them for all the Post Office oriented subjects.*[54]

This also illustrates the collaborative relationship that existed between the Post Office and the Department of National Education.

Beyond this basic technologist qualification, they proposed the introduction of a Diploma in Technology (Dip.Tech.), which would include a further programme of two semesters, but of theory only (in more general or more specialist fields), with a final award of 'associate' for those completing an assessed thesis. These proposals were summarised diagrammatically as follows:

Fig 2. Course Structure for Apprentices and Technicians who hold a Senior Certificate prior to enrolling for the N-Stream or T-Stream courses.[55]

[52] Goode Committee, Recommendations A7.32, p. 69 and Recommendation A.36, p. 70.
[53] Goode Report, para 7.3.1 (c), p. 54.
[54] Personal email correspondence, 18 November 2006.
[55] Goode Report, Figure 7.1, p. 65.



Source: *Goode Report, Figure 7.1, p. 65.*

Viv Nel was later to comment acerbically:

> *(They) are forever changing the engineering qualifications. I know the others change as well, but the engineering qualifications change, and the thing that I still find that upsets me – if you do a BSc, if you did it in 1940 or you do one now, it's a BSc, everybody's happy. The syllabus is nowhere near the same, it has changed dramatically over the years. With technicians and technologists, every time they change the syllabus, they change the name of the diploma!*

Unfortunately, Viv Nel was not on the Goode Committee to make this point!

The practical training of technicians

A separate chapter of the Report was devoted to a discussion of the practical training component of the sandwich system. In contrast to the practical training of apprentices, which was highly structured, overseen by the statutory Apprenticeship Committees, trade tested and separately certificated, the practical training of technicians was far less formal. Indeed, the Committee found that in some 25 per cent of the cases reported by employers 'the training was entirely incidental'.[56] But this was not the case for all the employers and least of all for the larger employers, such as the Post Office.

The Post Office had closed its Baragwaneth Training Centre and built a new dedicated training facility at Olifantsfontein in 1971:

> *The Post Office has its own training college and hostel at Olifantsfontein, about 26 km south of Pretoria. The college can take 600 students, of whom 450 can be accommodated in the hostel.*

[56] Goode Report, para 6.6.1, p. 46.

Several fully equipped laboratories and demonstration rooms are used – the former for basic theoretical training and the latter for practical training.[57]

Mr. Matthews, then Principal Engineer, Training, detailed the facilities of this new centre, no doubt the envy of cash-strapped public colleges at the time:

The training complex consists of classrooms, demonstration rooms, equipment rooms, laboratories and workshops. / Classrooms have been standardised to conform with modern educational requirements and are equipped with slide projectors and screens which are sited behind the movable centre panel of the chalk boards. Overhead projectors together with specially inclined screens are also provided. / Training laboratories and demonstration rooms are provided with various types of trainers and telecommunications equipment in use in South Africa. / A separate block houses fully equipped workshops for the practical training of pupil technicians in workshop practice.[58]

In addition to this central facility, the Post Office had seven regional training centres situated in Cape Town, Port Elizabeth, Pretoria, Johannesburg, Bloemfontein, Pietermaritzburg and Windhoek, which each had equipped training complexes.[59]

Whilst only a limited number could be accommodated at the colleges at any one time, students were rotated between the educational centres and different workstations for practical training and work experience so many more were undergoing training – as the following figures testify:

Table 10.3. Post Office Learner technicians, draughtsmen, electricians and mechanics[60]

Year	1972	1973	1974	1975	1976
Total	3207	3279	3496	3800	3961

Heinrich Dreyer, whose rise to technician and subsequently to educator was outlined in Chapter 7, moved from Baragwaneth to Olifantsfontein as a lecturer. He was later promoted to become its principal and then again to Head Office to steer all the Post Office engineering technical training – his office was in Koedoe Arcade in Pretoria. Time and again the recipients of this training emphasised the excellent quality of the training provided, including Allan Bennett, Bill Venter, Mike Case, Mike Crouch, ABJ Tinderholm, Malcolm Gow and Ken Bird.

The way in which the Committee proposed replicating this kind of model across the system was through persuasion rather than compulsion – with central authority to lie with CATES rather than industry, as was the case with apprenticeships:

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[57] *Kommunikasie/Communication*, A reference book on, and compiled in collaboration with the Department of Posts and Telecommunications, Johannesburg: Erudita Publications (Pty) Ltd, 1978, caption to photograph of facility on p. 249.

[58] H.A. Matthews, 'Technical training in the South African Post Office', *The transactions of the SA Institute of Electrical Engineers,* July 1975, p. 152.

[59] Matthews, 'Technical training in the South African Post Office', p. 153.

[60] *Kommunikasie/Communication*, caption to photograph of facility, Staff 1972 – 1976, pp. 264-5.

Recommendation A6.1: Alternating college and industry periods: To obtain the full benefit of interaction between theory and practice, sandwich course programmes with alternating CATE and industry periods are recommended, but with flexibility to suit employers.

Recommendation A6.2: Planned practical training: It is strongly recommended that all employers introduce one or other form of planned practical training for technicians.

Recommendation A6.4: ITP Committees: Industrial training programmes (ITP committees consisting of representatives from industry and the CATE) should be established by CATES together with industry. They should assist with the establishment and updating of industrial training programmes.

Recommendation A6.5: CATE authority to test students: CATES should be given authority to satisfy themselves (for example, by testing students immediately after or during each industrial training period) that the students have had the prescribed practical training to meet the requirements to qualify as technicians.

Recommendation A6.6: CATE staff to visit students at work-face: Provision should be made for CATE staff to visit students at the work-face, to maintain contact with them, and to confirm that the teaching programme ties in with the employers' requirements' this will improve liaison between lecturers and lower levels of management so that they each know what the other is doing.

The shift from industry responsibility to CATE responsibility is worth emphasising as it not only signaled a shift in authority, it also signaled a widening of the space between technicians and artisans, as the apprenticeship system was industry controlled.

Registration

The Committee supported the registration of technicians and technologists to enhance their status and to support the recruitment of these much needed workers:

Recommendation A8.10:
Since registration has brought status to the professional engineer, serious consideration should be given to two further levels of registration, first for the technologist who is the holder of the Dip Tech, and secondly for the diploma technician.[61]

For registration purposes the Committee clearly favoured the CATE-route:

Recommendation A9.2:
Since the bulk of technicians and technologists are trained in CATE type institution, qualifications for registration should be based on CATE awards, or their equivalent.[62]

…although they did not preclude those with National Technical Diplomas. With regards to qualifying periods in industry they recommended three years for technicians with a National Technical Diploma (the apprentice route), two years for technicians with National Diplomas and one year for technologists with Higher National Diplomas or a Dip.Tech.[63]

And for final recognition, they proposed that the following terms could be written after the names of those registered.

[61] Goode Report, Recommendation A8.10, p. 128.
[62] Goode Report, Recommendation A9.2, p. 105.
[63] Goode Report, Figure 9.11, p. 108.

Recommendation A9.4:[64]
Provided 2 groups, the technologist and the diploma technician, become adequately recognized in the engineering sector, it is recommended that they be offered registration as:
Professional Engineering Technologist Pr Tech
Registered Engineering Technician R. Tech

The Committee did not address the post-registration questions of restriction of work or code of ethical practice. These were tasks that others had to develop later.

Registration of the 'unregistrables'

The 'non-registrables' get organised!

By the time the Goode Report was published in 1978 the South African Council of Professional Engineers (SACPE) had already drafted proposed amendments to the Professional Engineers Act to provide for the establishment of Boards of Control to register practitioners of 'new' professions in the engineering field. These two sets of proposals must have landed on the Minister of Public Work's desk at almost the same time, for he passed the Amendment to the Professional Engineers' Act a year later in 1979.[65]NEED THE NUMBER OF THE ACT The passage of this Act through parliament seems to have been relatively smooth – employers only seem to have woken up to its full implication in 1990, as will be shown in due course!

The Amendment Act, *inter alia,* included Section 30A, (1) which gave SACPE, 'the council', the right to make a recommendation to the Minister to establish a board of control if the council:

> *has received an application in writing from anybody of persons which in the opinion of the council is representative of persons exercising any profession …for the establishment of a board of control in respect of such profession;*
>
> *is satisfied that it is in the public interest that a board of control be established … to promote high standards of education, training and conduct in relation to any such profession; and*
> *is satisfied that the majority of the persons exercising any such profession is in favour of the establishment of a board of control in respect of such profession.*

If the Minister was satisfied with the motivation, then the Amendment Act gave him the right to regulate such Boards of Control into being. The Act envisaged that the new boards of control would function similarly to the parent council, with a governing Board, an Education Advisory Committees and 'other committees', such as Registration Committees whose task it would be to register applicants against set criteria. And whilst the Boards would be relatively autonomous, they were legally required to 'report to the council (i.e. SACPE) on any matter affecting the profession or professions in respect of which such board of control has been established, and on any matter referred to it by the council'.[66]

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[64] Goode Committee Report, p. 131.
[65] Professional Engineers' Amendment Act, 1979, R. 1327, GG No. 6520, 22 June 1979.
[66] Professional Engineers' Amendment Act, 1979, Section 30A,(5).

Whilst the Amendment Act was being considered in parliament there was some concern that too many Boards of Control might be established. At SACPE's instigation, a Parliamentary Commission of Inquiry eventually tabled a report in Parliament accepting that not more than four such Boards would be established.[67] With this understanding the Amendment Act was passed.[68] The FSPE began implementing the proposal before the Amendment Act was even published. In an account provided by the technologists:

> *On 5 February 1979, the convening and first meeting of the Interim Committee for Establishing Boards of Control for "Non-Professional Engineers" (ICBOC) took place in Johannesburg under the auspices of the Federation of Societies of Professional Engineers (FSPE). The first Chairman and Secretary was Professor GPR von Willich of the SA Institution of Civil Engineers, and D.P. du Plooy of the Aeronautical Society of South Africa, respectively. The members of this Committee were nominated mostly by the various technical societies in existence at that time.*[69]

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

The technicians, who had been meeting since 1976, were the first out of the starting blocks. They established their Interim Committee for the Registration of Engineering Technicians (ICRET) but it took seven years of hard evening work by the technicians to reach the point where the regulation that established their Board of Control for Engineering Technicians (BOCET) was published. This was on 8 July 1983.[70] The technologists were next to follow with the regulation establishing their Board of Control for Professional Technologists (Engineering), (BOCNOL), being published on 23 November 1984. The third and final Board of Control for Registered Certificated Engineers (BOC Reg. Cert. Eng.) was established on 12 December 1986.[71] Some of the texture of these developments is given below.

Technicians: From ICRET to ASRET

A shift began to take place as technicians organised to secure recognition – their principal identities as radio or *electrical or aerospace* specialists began to dim as their sense of being, first and foremost, *technicians,* grew. This common identity was formed around the shared experience of having completed 'more courses' than the 'common artisan' or of having undertaken more responsible or complex work. A sense that this shift was neither automatic nor easy can be gleaned from Tom Cooper's recollection of some of the early meetings of ICRET:

> *My greatest challenge to progress in ICRET was the number of times I had to say, 'Gentlemen, gentlemen, I promise you, you will all be registered! Please believe me'. I had to remind them of*

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[67] A.M. Kruger, 'Period 1968 to 1991: The History of the South African Council for Professional Engineers 1968 – 1991', footnote (83) Council meeting - 7 March 1980, p. R80/136, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed June 2008.

[68] Kruger, 'The History of the South African Council for Professional Engineers 1968 – 1991', footnote (84) Act 24 of 1979 - Insertion of Section 30A, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed June 2008.

[69] History of the Institute (IPET), Institution of Professional Engineering Technologists, http://www.ipet.co.za/history.htm, Accessed 23 June 2008.

[70] GG 8800, No. R.1500, 8 July 1983.

[71] No. R 2607, GG 10546, 12 December 1986.

this repeatedly. The calm would then come, and it helped tremendously. People, quite understandably, were unconsciously tending to look to their own or their organisation's fears and concerns during the debates. They did it without realising that this was the very thing that was holding back progress toward the implementation of registration of engineering technicians.[72]

This shift was an important part of the construction of this new occupation itself – previously there had been a dispersed array of individual occupations only.

But these were not the only divisions that had to be managed. Amongst the technicians were people who were better educated that the 'common technician' and who commonly undertook even more responsible and complex work. They too sought discrete recognition – as Tom Cooper again recalled:

During that work in ICRET we recognised that there were people functioning at a competency level above that of a technician – sort of 'super-technicians'. So, we agreed to introduce the grade 'Master Technician'. We borrowed this idea directly from the German concept of 'master artisan'. The master artisans that they have in Germany were probably technicians anyway. It was very likely that if such persons were to have sought registration in SA, they would have been eligible for registration as engineering technicians. I realised at the time that this arrangement was only to be of a temporary nature which in the end proved to be so with the introduction of the grade of Engineering Technologist. This being an engineering practitioner functioning at an operational and responsibility level in excess of that of the Engineering Technician

Compounding the situation at the time was the fact that there was no Bachelor of Technology qualification – only the old ATC II.

Around these two emerging identities – of Technician and Master Technician - the architecture of an organisation had to be built. ICRET set out to do so – and it set to work with alacrity. Tom Cooper was elected as Chairman six months after ICRET was started and from this office he drove the work programme tirelessly: we had 'to get the qualifications sorted out, to assess all the qualifications to decide how they fitted in, what the areas were – civil engineering and all that sort of thing - …'.[73] This was a titanic task and he did much of it himself:

With the Interim Committee, I helped write the Regulation, or to put it in another way, I wrote the Regulation but I did it in conjunction with a very experienced engineering consultant, Mr. George Pool, who had been part and parcel of drawing up the SACPE Act. He helped me write the Regulation for the Board of Control. It was an enormous task. I took it on because, at the time, I was probably the only one that had the broad knowledge of where we were coming from, where we had been, where we were going, how we were going to get there. I was also fortunate that I had the permission of my employers to pursue this task at any time provided that my employment responsibilities were not affected.

Under the definitions section of the Board of Control for Engineering Technicians (BOCET) regulation, the term 'the Affiliation' was introduced, defined to mean 'the Affiliation of Societies Representing Engineering Technicians' (ASRET). ICRET, as an interim committee, did not meet the requirement, so it disbanded[74] and ASRET was formed, modelled on the 'learned society'

[72] Interview with Tom Cooper, DATE??
[73] Interview with Tom Cooper, DATE??
[74] ASARAT NEWS, March 1995, pamphlet, personal copy from Viv Nel, p. 2.

model of the older societies. The first function of ASRET was to nominate the majority of members onto the BOCET council. As a subsequently published technicians' pamphlet was to recount:

> *In 1980 ICRET called a meeting to establish a permanent organisation to represent engineering technicians. A unanimous vote by 20 societies resulted in the forming of the Association of Societies Representing Engineering Technicians (ASRET). Its first task was to conduct a referendum among engineering technicians to establish if they wanted registration. Some 9 000 voting cards were sent out and 96% of the 3 000 odd cards returned were in favour of registration.*[75]

The 20 member societies of ASRET are listed below. They each had a representative on the ASRET Council:

- Association for Registered and Licensed Aircraft Technicians
- The Eastern Province Society of Engineers
- S.A. Association for Non-Destructive Testing
- S.A. Association of Clinical Engineering Technicians
- S.A. Institute for Production Engineering
- S.A. Institute of Civil Engineering Technicians
- S.A. Institute of Draughtsmen
- S.A. Institute of Electronic and Radio Engineers (SAIERE)
- S.A. Institute of Electrical Technician Engineers (SAIETE)
- S.A. Institute of Civil Service Engineering Technicians
- S.A. Institute of Measurement and Control
- S.A. Institute of Mechanical Engineers
- S.A. Institute of Mining and Metallurgy
- S.A. Institute of Refrigeration and Air-Conditioning
- S.A. Institute of Welding
- The South African Irrigation Institute
- Society of Engineering Technicians and Technologists
- Institute of Materials Technicians (Civil Engineering)[76]
- SA Institute of Engineering Technicians in Agriculture
- Institute of Lighting Engineers of SA.[77]

I asked Tom Cooper why SATA, The South African Telecommunications Association from the Post Office, did not join, knowing as I did, that they had a large technician membership. Tom Cooper explained as follows:

> *SATA was not considered an engineering association as such. We touched sides with them … but they didn't come on board or they didn't fit. We had a lot of Post Office people working with us to achieve recognition. In particular I recall Heinrich Dreyer who was a very positive supporter for the introduction of registration and "Shorty Matthews" as he was fondly known by all. He was a strong 'believer' right from the very beginning and was a significant participant on the ICRET. He had also served on the Goode Committee. SATA was essentially a trade union and not a technical society. Their purpose and aims were different to those of ASRET. There were also a few other organisations that couldn't come on board because they were not technicians' institutes as such. I do recall that I had established, with the help of the ICRET committee, a list of organisations and*

[75] ASARAT NEWS, March 1995, pamphlet, personal copy from Viv Nel, p. 2.

[76] ASRET pamphlet entitled 'The Engineering Technician: Registration', undated, personal copy from Mr. Tom Cooper, p. 3 and 4.

[77] Institutes Recognised by BOCET for purposes of discount, from Tom Cooper, 30 August 2008.

bodies in South Africa that could possibly participate in the function of ASRET. They were all contacted and asked to consider if they were relevant to ASRET.

The Societies were not there as trade unions. They were not set up to challenge the trade unions. That was a completely separate issue. This was for mutual benefit, education – the technical societies – for running courses, for lectures, for visits to Pelindaba and the Post Office and so on. Their interests were primarily of a 'technical' nature rather than anything else. We made it a point at the time, of saying: 'Look, we are not here to fight for employment or salary increases.'

Later on, we did provide a service regarding salaries in so far as we used conduct salary surveys among the registered technicians. We then published the results of what the salaries were at the various ages. But that was essentially a service for member societies. The engineers were doing the same exercise for their organisations. We did not see this activity as a trade union function.[78]

One difference between a trade union and a 'technical society' could be seen as 'tactic' – the former led with wage demands whilst the latter led with qualification recognition, and the updating of knowledge, knowing though that wages would or *should* follow suit. The artisan unions, based on the apprenticeship system, straddled the divide.

Technologists: From ICRET to ICRTE to SAARET

ICRET had recognised the occupation 'Master Technician' but for some of the more highly trained people, this was too closely aligned to the technicians. They wanted an independent identity, as Tom Cooper recalls:

Subsequent to adoption of the interim title 'Master' by ICRET the 'technologist' group said, 'No, we want to go for something else.' In due course a new body was formed namely the Interim Committee for the Registration of Technologists (Engineering). There were now two bodies.

To this end some of the ICRET members split off and created a separate interim body under FSPE, called ICRTE[79] - the Interim Committee for the Registration of Technologists and Engineers although ICRTE was soon itself replaced by a more permanent structure:

The South African Association of Registrable Engineers and Technologists (SAARET) was formed in September 1981 and replaced ICRTE which was disbanded in November of the same year. John Galgut was elected as the first President of the new body. Apart from the recruitment of members for the Association, its main function at that time was to prepare the documentation for the establishment of the Board of Control for the Registration of Professional Technologists (Engineering).[80]

Why did these men feel 'different' from the technicians? Straszacker had dodged the difference and resolved not to use the term 'technologist',[81] but the Goode Committee had paid careful attention to it and resolved that this category of professional did indeed exist and argued strongly for its recognition: Recommendation A3.2 stated:[82]

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[78] Interview with Tom Cooper, 29 July 2008.

[79] ASARAT NEWS, March 1995, pamphlet, personal copy from Viv Nel, p. 2.

[80] Institution of Professional Engineering Technologists, History of the Institute (IPET), http://www.ipet.co.za/history.htm, accessed on 23 June 2008.

[81] Straszacker Report, para 66, p. 8.

[82] Goode Committee, Recommendation A3.2, p. 22.

Distinction between Technician and Technologist:
The technologist should be distinguished from the technician in that he can operate in a broader field, has a greater depth of knowledge, can be more intellectual in his approach and possess a high technical educational qualification such as the proposed Diploma in Technology.

The Goode Committee motivated this recommendation as follows:[83]

> *(Y)our Committee is of the opinion that, speaking generally, the senior technician, technologist or non-registerable engineer in the group has, either through education or experience, gained a greater breadth and depth of knowledge and wider range of skills, and is capable of doing more varied work, with a greater ability to design, develop and cost projects, than the average technician. He can accept greater responsibility, be of more assistance to the professional engineer, and he can work independently.*

- as Tom Cooper's earlier example from Trix Electronics illustrated. Bill Bergman, the Eskom draughtsman introduced earlier, was later also registered as a technologist. He explained to me that the range of work he was doing at the time included design, supervision, commissioning and signing off the jobs.

Employers, including most in the public sector, were however reluctant to accept this division, although again it was the Post Office that led the field in recognising the 'technologist', just as it had been the first to recognise 'technicians', as Tom Cooper recalled:

> *The Post Office was certainly the first organisation not only to recognise technicians but also the technologist. I seem to recall that they were the first employer to actually appoint persons with the title Technologist. Other Government departments would not accept technologists, they said, 'No! There is no such thing as a technologist!' DO WE NEED TO REFERENCE AGAIN?*

Certificated Engineers: ICMEESA follows suit

The position of the Certificated Engineers was different to the previous two groups in that they had been organised for decades and already had a legal status of their own. They had also taken an active part in the debates that had led up to the passing of the Professional Engineers' Act in 1968 – as was recounted in Chapter 9. Tindy Tinderholm, an active member of ICMEESA, had been actively involved in those debates and recalls the acrimony of those times:

> *there was a very, very heavy conflict of interest … the one group, with BSc's were trying to keep the other group out (the old timers) and the old timers could see no way of allowing these new Turks to come in and have more-or-less a take-over of the engineering profession with their lack of knowledge and lack of experience obviously.*[84]

But after the graduates won the day, the certificated engineers were made to feel anxious about their positions. Tindy himself felt it: [85]

> *Registration came to a lot of us as a very big surprise. It came, to say it in my own words, it came as virtually a 'monster'. It looked to me, that all my aspirations that I had as a young man … There was no registration as a Pr Eng. in the air even. This went on for years that we had to fight. We*

[83] Goode Committee, para 3.3.3, p. 21 – 22.
[84] Interview with Tindy Tinderholm, 15 October 2007.
[85] Interview with Tindy Tinderholm, 15 October 2007.

knew that we if we became a Certificated Engineer, our way was open. That was almost the way to heaven. Suddenly now, a couple of years later, now I am an engineer, I qualified in 1960, and I've been practicing as an engineer and suddenly I realise that my career might be in jeopardy. I've got no BSc! These guys are trying to push through rules – and I don't even remember all the rules although I remember some of the rules were that we would have been prevented from practicing in any senior position without a BSc degree. …

We were all so concerned about, let us say, (let me put it this way) almost fighting for survival to make sure that the other people don't get their way and get us out of our professional jobs, for which we had also worked very hard. And that was the scare we had for many years. This was really a scare – it was not easy. I was in jobs where I was the manager and I had people with BSc's working for me, under me, and I had no BSc, so you can imagine! My scare was that I had two or three guys under me with BSc degrees, I'm the boss. Now if this thing goes through then these guys could say, 'No Sorry, I've got a BSc. I want to be the boss. You can come and work under me.' These were all things that were creating turmoil in your mind.

Whilst the reservation of work regulation was passed in August 1969,[86] Kruger notes in his history that:[87]

> *Very wisely, perhaps, the Council never considered it necessary to use this regulation in formulating any charges. However, it can be stated with confidence that this regulation succeeded in advancing the perception of what was required of the professional engineer and his status was thereby enhanced.*

The enhancement of one sector of the profession, clearly threatened another. The fear that it might have been so used was clearly in the air. It seems anxiety drove Certificated Engineers to embrace registration – although their Board of Control could not quality control their qualifications – as these were set by the Commission of Examiners under a separate statute over which they had no authority.

Like Tom Cooper, Tindy took up the challenge and set to work:

> *You know, if you take our case, when we started the Pr. Cert. Eng. through SACPE, again I was one of the people that wrote the Constitution – the first Constitution. And then it was revised, and revised and revised, about ten times – until everyone in the country in all our branches had had their input and was happy and saw 'my interest is served'. Then we submitted it to the governmental legal advisors through SACPE. They would come back and say 'No, No, you've got to dot the 'i' here and cross the 't' there and so on. And this word we think is ambiguous …' And that takes about six months to come back. So, after all is said and done, eventually our Constitution was accepted …. I think we waited for about two years for ours to be approved.*[88]

Tinderholm was one of the founding members of the BOC for Registered Certificated Engineers and was appointed the Chairman of the Registration Committee that oversaw the registration of certificated engineers – a role he continued to perform for some twelve years.

The call of the market

[86] Regulation R3063 of 8 August 1969.

[87] Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991*, p. 34, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.

[88] Interview with Tindy Tinderholm, 15 October 2007.

Standing behind this social movement lay the call of the market. There was a sharp spike in the demand for technicians in the period just before the establishment of the Boards of Control, which surely strengthened the muscle of those seeking registration. The shortage was quantified in a report prepared by the National Training Board:

> *Van 1 229 in 1977 het die tekort aan tegniese mannekrag skerp toegeneem tot 7 435 in 1981. Die skerp toename in aanvraag het veral vanaf 1979 plaasgevind. Van die toename van 4 099 in hierdie periode het 2 611 in die rigtings Telekommunikasie en Ander Tegnici plaasgevind. In die geval van ingenieurs tegnici het die skerp toename in die tekort tussen 1977 en 1979 plaasgevind. ... die tekort vir 1981 van alle tegnici 10,7%. Dit is hoër as die totale tekort aan professionele en tegniese mannekrag wat op 7,8% te staan gekom het.*[89]

> [*From an initial 1 229 in 1977, the shortage of technical manpower increased sharply to 7 435 in 1981. The sharp increase in demand has occurred from 1979. Of the increase of 4 099 during this period, 2 611 were in the direction of telecommunications and other technology. In the case of engineering technicians, the sharp increase in the shortage between 1977 and 1979 occurred. ... The shortage for 1981 of all technicians 10.7 per cent. It is higher than the total shortage of professional and technical manpower which stands at 7.8 per cent.]*

From these figures it is also evident why the Post Office, the central employer of telecommunication technicians, took such a keen interest in these developments.

Boards of Control established

As the table below summarises, all the Boards of Control were dominated by nominees from the peer community of practitioners. This was certainly no accident.

Table 10.4. Membership of Boards of Control[90]

Boards of Control (BOC)	No.	Membership			
		Provider representatives	**Experienced people (total), of whom:**	**SACPE**	**Organisational representatives**
			(x) in the employ of state		
			(y) professional engineers		
Technicians	21	1	4	1	15 (ASRET)
			(2)		
			-		
Technologists	14	1	4	1	8 (SAARET)
			(2)		
			(2)		
			3		4

[89] ECSA Archive, TEG. E. 85/69, Document G in ECSA file, 'Verslag en aanbevelings aan sy edele die Minister van Mannekrag deur die Nationale Opleidingsraad oor die finansierings van Technikonopleiding en verdere opleiding van ambagsmanne', February 1985, p. 7.

[90] Table constructed from the relevant sections of the different regulations

Certificated Engineers	11	1	(1) (2)	1	(ICMEESA) 2 (SAIMENA)

As with the SACPE council, it is interesting to note that 'employers' had no formal place on these Boards, although some representatives may have also been employers. These bodies consisted of qualified engineering people and educational providers, with the former in the majority. They were clearly 'peer' bodies, more akin to trade unions or employer organisations in that they represented predominantly a 'single interest' group – having been established, *inter alia*, to protect the broader public interest.

Establishment challenges

Defining the composition and functions of these Boards in a regulation was one thing, getting people to do the work on a voluntary basis was quite another.

Technicians in BOCET

Setting up the Board of Control for Engineering Technicians took an enormous amount of work, the bulk of which, Tom Cooper executed personally:

> *ASRET was these Institutes and they were the ones that were recognised eventually with the Board of Control, and when the Board of Control was established it was from these Institutes that I recruited all the volunteers. I had to find 120 people in all to start up the Board of Control and that I did myself, whilst at the same time doing my work at Armscor. SACPE had formally requested Armscor that I be permitted to devote some of my attention to the task at hand. This was agreed provided that it did not affect service delivery. I had to find these people, identify them, and write to them. Using the Engineer's model, I set up a different assessment committee for each branch of engineering. This naturally culminated with quite a few committees. We had Electrical, Mechanical, Civil etc. In addition, I established one for Agriculture. This was because the group consisted of people from a variety of engineering backgrounds in the public service. The Institute of Engineering Technicians in Agriculture being a public service orientated organisation was strong and had significant influence.*[91]

The account of these events on ECSA's website notes:

> *The first meeting of the Board of Control for Engineering Technicians was held on 14 November 1983 at Kelvin House and was opened by Mr. J. Rademeyer, Deputy Director of the Department of Community Development. Mr. Tom Cooper was unanimously elected chairman with Mr. E. Smit as vice-chairman. Thereafter Minister Pierre Cronjé delivered an opening address to the well-attended meeting and proposed that Mr. T. Cooper and Mr. E. Smit be registered as Engineering Technicians. / The main function of the meeting was the appointment of the several advisory committees to assist the Board in its task.*[92]

[91] Interview with Tom Cooper, 29 July 2008.

[92] A.M. Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991*, https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 9 December 2019.

Technologists in BOCNOL

The work to establish a dedicated Board of Control for Technologists was greatly assisted by that previously done by the technicians. Their regulation was published on 23 November 1984[93] and followed a similar format. Again, the regulation referred to an 'Association' whose main task was to nominate members onto the Board itself and on to various sub-committees, including its Education Advisory Committee. SAARET, unlike ASRET, consisted of individual members and was not a federation of associations. When the regulation was passed however, its scope was restricted to technologists, and excluded engineers, so SAARET changed its name but left the acronym the same: it became the South African Association of Registrable Engineering Technologists.[94]

The new SAARET completed its work in 1984 and the Board of Control began its operations in 1985 by considering applications for registration as Professional Technologists (Engineering). Guthrie Head was the Chairman of the Board of Control from its inception until dissolution in 1990.[95]

Viv Nel became a member of BOCNOL by chance:

> *when the Board of Control for Engineering Technologists was up and running, the Chief Engineer at the SABC, Douglas Mills, approached me and said, 'Listen, we need somebody to be on the technologist's board because they know nothing about broadcasting – so he volunteered me. I said, 'I'll go as long as you'll pay me and don't make me take leave.' And that's how I got on to that one, which was interesting because Dougy Mills could have nominated somebody from SAIEE because he was Chairman or President of that at some stage if I'm not mistaken.*[96]

Certificated Engineers in BOC Reg.Cert.Eng.

The third group to establish a Board of Control were the Certificated Engineers. Their regulation was published on 12 December 1986[97] and the first meeting of the Steering Committee was held on 16 July 1987 with LR Robinson as President of the Council acting as Chairman. The first meeting of the Board was held on 18 November 1987.[98] ABJ Tinderholm was one of the founding members of this BOC, representing ICMEESA along with Mr Griffiths, Mr Schiel and Mr Dalton.[99]

The Boards central functions

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[93] GG. No 9507, No. R. 2542 and 2543, 23 November 1984, pp. 23-41.

[94] Institution of Professional Engineering Technologists, History of the Institute (IPET), http://www.ipet.co.za/history.htm, accessed 23 June 2008.

[95] Institution of Professional Engineering Technologists, History of the Institute (IPET) http://www.ipet.co.za/history.htm, accessed 23 June 2008.

[96] Interview with Viv Nel, 1 July 2008.

[97] Board of Control for Registered Certificated Engineers, No. R. 2607, GG 10546, 12 December 1986.

[98] ECSA history, p. 60, www.ecsa.co.za, accessed June 2008.

[99] ECSA archive, CERT.B 87/1, p. 2., Board of Control for Registered Certificated Engineers, Minutes of meeting held 18 November 1987. It is interesting to note that two of the men, Schiel and Dalton were also registered professional engineers.

The central function of the three Boards was the registration of technicians, technologists and certificated engineers respectively, and the oversight of their ethical conduct after registration.[100] The former function essentially constituted the 'cordon' which separated the insiders from the outsiders. There was inevitably contestation about the precise place where such a cordon should be drawn and so central to the function of the Boards was the resolution of these contestations. This was achieved by the establishment of committees whose members were drawn from the central interest groups concerned (with the interests of those that had already been excluded clearly not being 'at the table' at all). The same logic was applied to the second core function. A number of these committees were established under each Board, although there were three central ones: the Education Advisory Committee; the Registration Committee and the Legal Matters Committee.[101] There was also an 'Information Committee' whose task it was to ensure that information on the Boards' activities was known by those registered. These are all considered in more depth below.

Registration

To be registered as a technician, technologist or certificated engineer an applicant had to provide evidence that they had a recognised educational qualification and had completed work experience 'of sufficient variety and of a satisfactory nature and standard',[102] just like the engineers. This was now the 'standard' that the Goode Committee had set out to establish. Like the engineers too, students were able to register as a technician- or technologist-in-training whilst engaged in meeting these minimum requirements.

Each Board of Control was legally required to establish two committees to implement these registration prescriptions: an Education Advisory Committee and a Registration Committee, each of which is considered below.

Education Advisory Committee

The Education Advisory Committee's (EAC) job was to identify and list the benchmark educational qualifications required for registration as well as recognised local and international alternatives. It also had to ensure that those providing these qualifications in South Africa did so to an acceptable standard. Where programmes did not receive the approval of the EAC, graduates from these

[100] In each Regulation these functions were given in Chapter II, section 5.
[101] See for example the first meeting of the Board of Control for Registered Certificated Engineers, 18 November 1987, CERT. B. 87/1, item 7, where the different committees are listed: Board of Control, Executive Committee, Management Committee, Registration Committee, Advisory Committees, Legal Maters Committee, Committee of Preliminary Investigation, Committee of Investigation, Information Committee, Education Advisory Committee.
[102] Section 18(2)(c), Professional Engineers' Act, Act 81 of 1968.

programmes could not register, consequently educational institutions submitted themselves to the accreditation processes of the EACs.

Given the influence of the EAC's decisions on engineering faculties countrywide, their composition and terms of reference were formally detailed in the Regulations. Whilst they were called a 'sub-committee' of the BOC, they had a quasi-autonomous nature with the Minister, not the BOC, appointing its members (albeit not the Minister of National Education[103] but the Minister responsible for the Professional Engineers' Act, which was initially the Minister of Public Works then the Minister of Community Development and then later still the Communications and Public Works[104]).

The balance between the providers and the organised engineering practitioners on the EACs was more equal than on the Board itself – signaling the importance given to the providers' voice in these matters. The summary below, extracted from the respective regulations, illustrates the point:

Table 10.5. Composition of EACs (as spelt out in the relevant BOC Regulation)

Board of Control	Technikons	Tech. Colleges	People concerned with practical training nominated by organisations	Engineering organisation	BOC	SACPE
BOCET	4	2	3 ASRET	5 ASRET	1	
BOCNOL	2	-	2 SAARET	4 SAARET	1	1
BOC Reg. Cert. Eng.	2	1	1 DG Labour* 1 DG Mineral &Energy 1 DG Transport	2 ICMEE 1 SAIMENA	1	1

* These were the Departments under which the Commission of Examiners were appointed for the Certificate of Competency examination.

The provider representatives to the EAC were nominated by their own organisations. For the CATES (whose name was changed to Technikons in 1979[105]), their representatives were nominated by the executive committee of the Committee of Technikon Principals.[106] The technical

[103] The Education Laws Amendment Act, 1973 (Act No 69 of 1973) had changed the name of the Department of Education Arts and Science to the Department of National Education.

[104] Professional Engineers' Amendment Act, 1985 (Act No.13 of 1985).

[105] Advanced Technical Education Amendment Act 1979 (Act No 43 of 1979), with the debate on the name recounted by Pittendrigh, *Technikons in South Africa,* pp. 192-4.

[106] See Section 7.2.1 in Regulation 1499, GG 8800 of 8 July 1983; section 6.2.1 in Regulation R. 2543 of GG 9507, 23 November 1984 and section 6.2(a) in Regulation 2607 in GG 10546 of 12 December 1986.

colleges' representatives were nominated by the executive committee of the Association of Technical Colleges, which was established by legislation in 1981.[107]

In passing it can be noted that the technologists' EAC excluded the technical colleges completely and in both of the other two EACs they were given half the number of representatives as the technikons. This 'second-class status' both reflected and strengthened the view that the 'apprentice route' to these occupations was less desirable and less prestigious. It consequently also widened the chasm that became increasingly difficult to navigate for those beginning their careers 'lower down' the ladder – a phenomenon that was not restricted to engineering.[108]

However, Tom Cooper recalls that he fought for recognition of technical college qualifications. He was aided by Heinrich Dreyer and others from the technikons and colleges who helped him to prepare a comparison of standards with technikon qualifications. Eventually the National N Diploma was fully recognised by the technicians committee as an acceptable qualification for registration, but it was coupled to a requirement for five years practical experience as against two years for the technikons. The technicians had tramped the hard route and knew the road. They paved the way for the artisan to cross the divide.

The EACs undertook site visits to the various providers to assess the acceptability of their programmes and the competency of the staff who delivered them. Where programmes were considered to be of an acceptable standard they were entered onto a list which was published periodically for the information of the public-at-large.

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[107] See Section 7.2.2 in Regulation 1499, GG 8800 of 8 July 1983 and section 6.2(b) in Regulation 2607 in GG 10546 of 12 December 1986.

[108] The status differential between the technikons and technical colleges was not confined to engineering. The same tendency was being replicated in the offices of the Department of National Education at the time as Pittendrigh reported:

> 'It should be noted that the Technical Colleges Act, 1981 (Act No 104 of 1981) was passed by Parliament at this time. This Act was based on the original form of Act 40 of 1967 and the Director-General reported that:
>
> > Under this Act the 42 existing technical institutes will become technical colleges and, together with the 29 existing technical colleges, will be declared State-aided institutions. In this way all these institutions will acquire greater autonomy and administrative freedom. (RP 28/1982 p30
>
> This step is of interest as through it all decisions initially taken in 1954 leading to the Vocational Education Act, 1955 (At No 70 of 1955), had moved through a complete circle. This decision was taken as a result of a Departmental Committee (the Naudé appointed on 2 December 1977 to investigate and report on and make recommendations regarding a national post-school educational system (excluding universities). Although the Committee considered and discussed the technikons its recommendations only dealt with the technical institutes and technical colleges. The result is that there is now a post-school educational sector consisting of technical colleges and a tertiary sector consisting of technikons and universities. – Pittendrigh, *Technikons in South Africa,* p. 201.

The failure of the Naudé committee to consolidate the tertiary level N4 – N6 programmes offered at technical colleges into a more integrated tertiary sector was yet another lost opportunity to bolster a dual system – one of 'progression from below' and the other a 'direct entry from school' route into skilled work occupations. The drift towards a single entry route to technician was growing stronger.

Given that many of the technikon programmes they evaluated were of the 'sandwich' type, they also inspected how the institutions managed their relationships with industry. In general, students were required to prepare written reports indicating the precise nature of the training they had received and in some cases the lecturers themselves visited the workplaces to ensure that the training was appropriate.[109] Only where the programme did not incorporate such practical training did the registration committee require a separate 'training report'. For instance, in an Information Brochure prepared by the BOCNOL it stated that:

> *If your academic qualification included a requirement for compulsory practical training, then no details need be given. / In all other cases, details of the last three years of training must be supplied with a separate typewritten report from each employer.*[110]

Certification Council for Technikon Education (SERTEC)

One challenge that the technician and technologist's EACs had to face was the passing of the Certification Council for Technikon Education Act, 1986 (Act No 88 of 1986), which established the Certification Council for Technikons, commonly known as SERTEC. Originally the National Department had set national examinations for all technikon students but from 1972 more responsibility for these examinations was passed to the technikons and in 1988 they became solely responsible. In anticipation of this change, SERTEC was established to ensure comparability of standards across the various institutions

SERTEC's functions were: 'to prescribe norms and standards for:

a. the conduct of examinations;
b. the standards to be attained by candidates in examinations;
c. the subject matter to be taught in technikons; and
d. any other conditions it deems necessary'.[111]

These functions clearly overlapped with the functions of the EACs in the engineering field, but as the relevant section of the SERTEC Act was only promulgated on 18 January 1991, the intervening years were used by the parties to research and negotiate a collaboration arrangement.

The partnership was struck at the highest level. The SERTEC council was appointed by the Minister of National Education in terms of section 4 of the Act. The council consisted of a Chairperson, an Executive Director, four technikon rectors nominated by the Committee of Technikon Principals and six other members appointed by the Minister on the grounds of their expertise. It became the norm that the engineers were appointed under this last category. Initially it was LR Robinson, then President of SACPE. When he retired, he was replaced by Dr RS

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[109] See discussion of these issues in Goode Report, Chapter 6, pp. 44–51.

[110] Board of Control for Professional Technologists (Engineering), 'Information Brochure for Persons applying for registration', TECHNO. REG. 86/17, p. 2.

[111] Section 9, Certification Council for Technikon Education Act, 1986 (Act No 88 of 1986).

Loubser, and on his retirement TS Cooper was appointed from the 1 December 1993.[112] He was subsequently elected vice chairman of the council, a post he held until the demise of SERTEC. The engineering council was also invited to nominate representatives to join their accreditation teams who visited the technikons to undertake on-site quality inspections. Whilst the EACs continued to undertake parallel visits, every effort was made to ensure that these occurred simultaneously and that consistent assessments were made.[113]

Registration Committee

The criteria that were used to assess the work experience of applicants flowed from the broad definitions of each occupation, which had initially been proposed by the Straszacker Commission, some were subsequently amended by the Goode Committee and then were periodically updated by the Boards of Control. The detailed work was done for the Boards by their Registration Committees whose function it was to 'decide upon the experience and level of responsibility over the suggested required period'[114] required for registration and then to consider applicants from individuals against the criteria set. The approach adopted by each of the Boards is considered below:

- *Engineering Technicians and Master Technicians*

The guidelines that BOCET produced to interpret 'appropriate work experience' evolved over the years. Their starting point was the Goode Committee's definition of a technician which included the phrase: 'normally, for more than 40% of his time he should be engaged in intellectual work rather than in tasks requiring manual skills or in the supervision of such work'.[115] The question however was, what did this mean in practice? In 1984[116] their definitions included work that would later be attributed to technologists,[117] but by 1987 when the technologist was well established, the technician functions were described as follows:

> Acceptable work for registration as Engineering Technician[118]
> (a) Technological knowledge (i.e. both theoretical and practical):
> Duties that involve the application of both accepted and new technological knowledge in a recognised engineering discipline.

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[112] The information in this section is taken from an unpublished account written by Dr D J Jacobs, Executive Director of SERTEC, *SERTEC: Guardian of Quality in Technikon and Agricultural College Education: A Historical Overview 1983 – 1999,* undated, footnote 3,p.4 and p. 8. Copy kindly given to me by the author.

[113] Tom Cooper served on the SERTEC evaluation committees for many years and confirms that this did in fact occur to the mutual benefit of both.

[114] 'Some points to be considered with regard to a statement of policy', TECHNO.REG. 85/31, p. 2.

[115] Goode Report, Recommendations: A3.1 p. 20.

[116] Before any registration could begin, the BOCET had to establish a policy on what it would accept to be 'appropriate' practical training and experience. So it decided to convene a 'mini-seminar' to debate the matter. It was held on 16 February 1984 at the Witwatersrand Technikon Board of Control for Engineering Technicians, ECSA archives, Annexure C, Reference 44/19/2, 1984.01.31,.

[117] ECSA Archives, TEG.B.R. 84/65, Teg Reg 84/29, pp. 8-9.

[118] CR Annexure Register Technicians 1987, pp. 567-8.

(b) Manipulative skills:
The execution of tasks and projects requiring the effective handling, maintenance, adjustment and setting up of a variety of test instruments and equipment peculiar to a recognised engineering discipline or combination of disciplines.
(c) Mental skills:
Work requiring the application of mental skills in the resolving of a variety of practical or technical problems which include most of the following elements: diagnosis and tracing of faults; experimental investigation; design and development.
(d) Communication skills:
Work requiring the use of communication skills which utilise most of the following elements: -
⇒ Preparation of engineering drawings and documentation, work instructions, specifications;
⇒ Preparation of cost estimates, work schedules in respect of (smaller) projects;
⇒ Preparation of handbooks/instruction manuals for new equipment and/or procedures;
⇒ Writing of reports on experimental or other investigations;
⇒ Active participation in internal discussions, seminars or workshops, demonstrations and/or the presentation of courses.
(e) Personal and interpersonal skills:
Work offering opportunities for personal development, independent action and increasing responsibility which includes the various aspects of interpersonal relationships with inferiors, peers (other engineering technicians) and superiors (technologists, engineers, etc.).
(f) Managerial skills:
Work during which the basic requirements of management can be practiced, such as allocation of resources, time management and the co-ordination of the work of a (small) group which includes other engineering technicians.

- *Master Technician*

Initially the occupation of 'Master Technician' was recognised. The Master's functions flowed directly from those just described for the Technician:

> *A similar approach is applicable in respect of the information required to enable the Board to make a decision in the case of applications for upgrading of Engineering Technician to the higher grade of Engineering Technician (Master). In this regard, the holding of a post at a responsible level is important and refers, in the first instance, to responsibility for the technical work performed by junior engineering technicians. Responsibility also refers to the performance of work at a higher technical level with a minimum of supervision, the variety of technical activities for which responsible and how frequently it is required to report to a senior person as well as the professional status of the person to whom the reports are made.*[119]

However, this occupation was not destined to survive. On 24 January 1985, two months after the establishment of the Board of Control for Professional Technologists (Engineering), the Board of Control for Engineering Technicians met with them and together they resolved to phase out the Engineering Technician (Master) because 'it is creating confusion in the minds of the employers and the general public as the abovementioned persons cannot perceive the difference between the Engineering Technician (Master) and the Professional Technologist (Engineering)'.[120] This decision was implemented incrementally, first by *ad-hoc* agreements between the BOCs and finally with the passing of the Engineering Profession of South Africa Act, 1990, (No 114 of 1990).

- *Engineering Technologists*

[119] CR Annexure Register Technicians 1987, pp. 567-8.
[120] ECSA Archives, TEG. B85/149-50, [E 14].

The BOCNOL defined a Professional Technologist (Engineering) in the following terms:[121]

> *He is a person who, by virtue of a combination of education, training and experience has attained a level of competence which enables him to apply known engineering principles and techniques to the solution of practical problems of varying complexity in industry. His training can be relatively broadly based but he may also have specialised in a narrow field. His work may include research, development, design, commissioning, maintenance and any other activity which requires his level of competence. His stature is such that he may become a full Associate in a Consulting Engineer's Practice. He may through his competence be able to rise to some of the highest position in the engineering field.*

Central to the assessment of the work experience of an aspirant technologist was the level of responsibility that had been held, which included a description of the number and seniority of the people supervised and those to which the applicant had reported. Also required was the wage rate earned. Applicants were advised to submit details of work done on a standard form highlighting design, development and research, planning and control, quality control, costing, estimating, specifications and tenders, installation and commissioning supervision, maintenance, surveying and management.[122] Particular attention was paid to design as can be seen from this Sample Experience Report for all disciplines:[123]

> *Set out in detail, how you are going to take the design project. This may involve the survey of a route to be followed with all the accompanying problems. Identification of the problem areas in the design. Literature studies, if any. Sketch plans of the preliminary design. Selection of materials to be used for the parts to be designed. Design of these parts using conventional and computer assisted methods. Selection of components available on the market as part of the design and the reasons for their choice. Full working drawings of the design. Specifications. Estimated cost of the design. / Specimen calculations and drawings/sketches must be attached on which it is stated that it is your own work or work under your full control.*

Assessment was not always straightforward, however, as there were a range of variables that had to be considered. For example, there were those technologists 'with a narrow specialised field of education and/or experience and those with broad education and/or experience'. Even the matter of responsibility was not straightforward because 'a person in research or development might work alone but still do work of a responsible nature - a quality controller, a surveyor, an estimator etc. the same. Another way of measuring might be his 'title', but there is a variety of 'titles' indicating the applicant's position all differently worded but in fact meaning a similar position. Salaries might indicate responsibility, but this is confusing, because a civil servant might earn less but gets other hidden amenities compared with a person in a private enterprise.'[124]

- *Certificated Engineers*

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[121] Policy of the Board of Control for Professional Technologists (Engineering), Annexure B Item 2.2.12 on page TECHNO REG 86/39.

[122] 'Some points to be considered with regard to a statement of policy', TECHNO.REG. 85/30. See also Board of Control for Professional Technologists (Engineering) Same Experience Report (All Disciplines) BR Annexure Register Technologist 1990-1991, BR/162, TECHNO. REG. 90/9/27.

[123] Board of Control for Professional Technologists (Engineering), BR Annexure Register, Technologist 1990-1991, 90/787.

[124] 'Some points to be considered with regard to a statement of policy', TECHNO.REG. 85/31.

The Certificated Engineer seldom enjoyed a separate definition. This category of engineer was seen as somebody who had passed a Certificate of Competency exam set by the relevant government department. It follows that the practical experience required by the certificated engineers was aligned to the prescriptions of the Mines and Works Act or the Machinery and Occupational Safety Act or the Merchant Shipping Act (1951). The 'Guideline for Post Certificate of Competency Experience required for Registration as a Certificated Engineer' specified that three years 'acceptable' post certificate experience was required and elaborated 'acceptable' by stating that applicants would need to submit:

> *(p)roof of experience gained, from his employer/s, that his work has been of such a nature, that he has been directly involved with the safe installation, operation or maintenance of machinery. / Such acceptable work would include appointments within an inspectorate, electrical power generation and distribution, and appointments in the transport services that involve the applicant directly in safety aspects of the work. / However, in all cases mentioned above, the candidate must provide proof of his involvement in the solution of problems in connection with the installation, operation or maintenance of machinery which requires sound judgement and engineering management.*
>
> *Experience in design, engineering drawing, quality control/assurance, training or manufacturing would be acceptable provided that at least two of the required three years' experience is directly concerned with the installation, operation and maintenance of machinery.*[125]

A.B.J. Tinderholm was not only a founding member of the BOC for Registered Certificated Engineers; he was also a member of the Registration Committee from its inception.[126]

Registration criteria summary

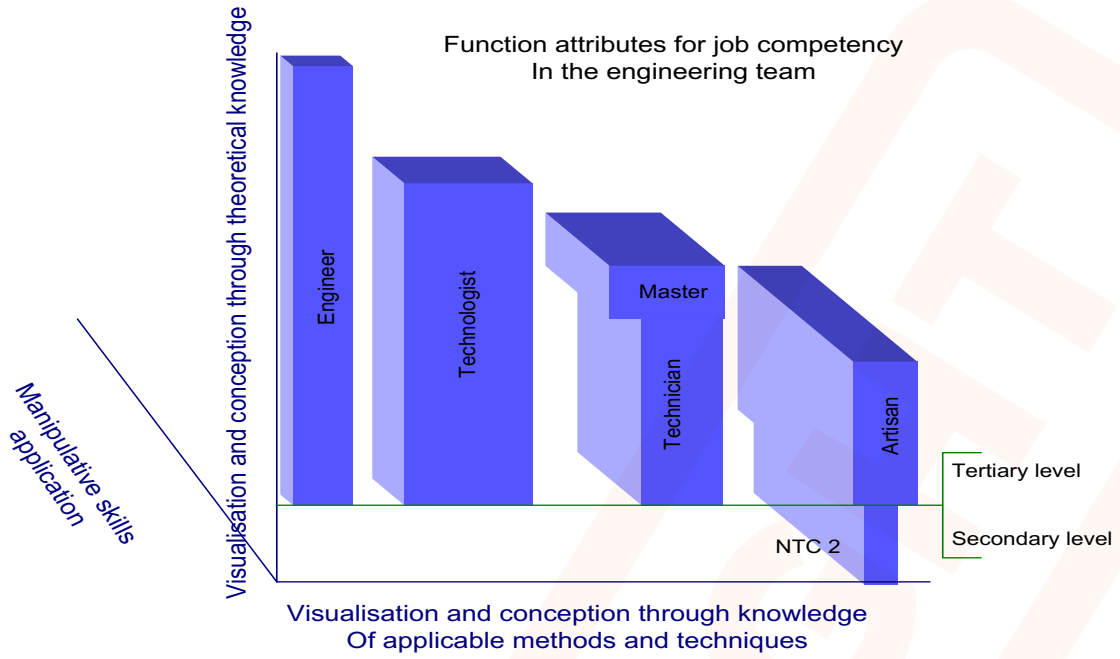
The differences between the various engineering occupations were captured in graphic form[127] and were often quoted and reproduced according to Tom Cooper:

Figure 10.3. Function attributes for job competency in the engineering team.

[125] Dr Annexure Register Cert. Eng. 1987-88, DR/59, EAC 88.09.06, 88/411.

[126] Board of Control for Registered Certificated Engineers, 18 November 1987, CERT. B. 87/2.

[127] Eduard C. Smit, Vice-chairman of the Board of Control for Engineering Technicians, 'What is an engineering technician? Three function attributes to distinguish members of the engineering team', *Engineering News*, February 16 1990, p. 17.



For a symposium held in September 1989, RS Loubser, a senior member of the SACPE leadership, produced a pamphlet entitled 'Profile of the Engineering Technician' in which he summarised what he called the 'attributes' of engineers, technologists, technicians and artisans recognised for registration purposes. This table is useful because it includes not only the educational and training requirements for registration but also the entry requirements for training – which contributed to the 'progression hurdles' faced by those advancing from below.[128]

Table 10.6. Attributes' of engineers, technologists, technicians and artisans recognised for registration purposes (R.S. Loubser)

Attributes	Category			
	Engineer	**Technologist**	**Technician**	**Artisan**
1. Typical fields of application	• Creative conception • Research • Complex problems • Team leader • Creating standards	• Narrow sector of the engineering field • Assisting the engineer • Works manager • Interpreting standards	• Go-between to artisan • Interpreting instructions • Fault finding • Designer draughtsman	• Manual skill • Reading drawings • Working to accepted practice

[128] R.S. Loubser, 'Profile of the Engineering Technician', Symposium, 7 September 1989, Pretoria, sponsored by SACPE, Table 1, p. 18.

2. Norms for Registration or Certification	Education	BSc 4 years	M Dip Tech (T5+ practice)	N Dip (T3 + training)	N2/3
	Obtained at	University	Technikon		Technical College
	Practice	3 years engineering experience	3 years technical responsibility	2 years technical experience	3/4years apprenticeship + trade test
3. Title (*after registration*)		Pr Eng	Pr Tech Eng	Pr Techni Eng	Artisan
4. Normal entrance requirements to the training		Matric Maths (HG) Science (HG)	N Dip	Std 10 Maths and Science	Std 7/8 (Maths) occasional selection to Std 10

*This table illustrates the point that when technicians initially achieved registration they were not seen as 'professionals' – they were denied the prefix 'Pr.' Technicians only achieved this in 1999 after a long hard battle with the Professional Engineers and not insignificant 'horse trading' all round. The engineers did not want to give up exclusive use of the Pr. The final titles agreed for the different members of the 'team' were Pr Eng to remain for the engineer, Pr Tech Eng for the technologist and Pr Techni Eng for the technician and Pr Cert Eng for the Certificated Engineers. There was never any contention with the abbreviation for the latter group. Originally the Technologists were to be Pr Technol Eng. But it was acknowledged that this abbreviation was unnecessarily long. The Technicians capitulated, with some trepidation, to get the matter finalised and it was agreed that it would be shortened to Pr Tech Eng. With that simple agreement 'the war had been won'. What the technicians had set out to achieve way back in 1972 had been achieved. They were recognised by the engineers and others as equals and an integral part of the professional engineering team.

Initially both Tom Cooper and Viv Nel were both registered as both Reg Eng Tech and Reg Eng Tech (M). Today however they are Pr Techni Eng as well as Pr Tech Eng.

Had Loubser added the Certificated Engineers, the table would have had to be adapted slightly to cater for the information already given above or otherwise cited:

Table 10.6. Loubser's table with the addition of certificated engineers.

Attributes	**Category**
	Certificated Engineer
1. Typical fields of application	• Safe installation, operation or maintenance of machinery which requires sound judgement and engineering management. • Appointments within an inspectorate, electrical power generation and distribution or in the transport services that involve the applicant directly in safety aspects

		• Experience in design, engineering drawing, quality control/assurance, training or manufacturing
2. Norms for Registration or Certification	Educational	Certificate of Competency (Commission of Examiners) normally following achievement of T4 or N6 plus two subjects: Legal knowledge and Plant or Mining Plant Engineering.[129]
	Obtained at	Technikon or technical college diploma or private training institution
	Practice	3 years' experience
3. Title (*after registration*)		Reg Cert Eng
4. Normal entrance requirements to the training		None for the examination, but indirectly the entrance requirements set by those providing the educational courses – ranging between standard 10 (with Maths and Science) for T programme and Std 7 for initial NTC 1 courses.[130]

Operational Procedure

The BOCs sought ways to render individual registrations as efficiently and effortlessly as possible, without jeopardising the standard they were seeking to protect and advance. The EAC's accreditation of provider institutions helped to make the recognition of qualifications relatively straight forward. The challenge was to achieve the same level of efficiency with regards to the work experience assessment. The Registration Committees adopted an approach whereby individual companies, especially the large companies and parastatals, where most of the training was done, were encouraged to submit their training programmes for inspection by the Registration Committee, and if approved, then students who satisfactorily completed these programmes were deemed to have complied with the work experience requirements for registration.

This process was taken very seriously, and major firms were required to submit and re-submit until their programme was deemed satisfactory to the relevant Board of Control. Where applicants had not completed an approved company training programme, detailed reports of precise work undertaken was required and where this was inadequate, as a last resort, site inspections were undertaken.

The Post Office's two approved programmes – with certificates for specialist technicians and diplomas for generalists – each had their own associated field training programmes. Matthews explains below how they were constructed:

> *The field training period … is divided among the different work categories* - Construction (8-12 weeks); Subscribers' Exchange Maintenance (55 – 48 weeks); Trunk Exchange Maintenance (20 – 10 weeks); Test Room (3 – 2 weeks) and Carrier terminal equipment and networks (for Diploma students only)]. The periods specified for each phase of the work are given as a guide only and should be adjusted to suit the individual pupil's progress.*

[129] Letter from ICMEESA to The Registrar, Board of Control for Registered Certificated Engineers, 3 June 1988, DR/38, EAC 88.06.27. (From Annexure Register, 88/272)

[130] Letter from ICMEESA to The Registrar, Board of Control for Registered Certificated Engineers, 3 June 1988, DR/38, EAC 88.06.27. (From Annexure Register, 88/272)

** First number in brackets for certificate students and second number for diploma students.*

> *During field training pupils are given suitable investigation tasks. These tasks are such as to require a pupil to think for himself, to revise study material, to act independently and otherwise display his initiative and self-reliance. In all cases, the task requires the pupil to investigate and not simply to answer examination type questions. In general, an investigation task requires a written report to be handed in by the pupil. The field training officer marks the report and returns it to the pupil and follows this up by personally checking the pupil's knowledge of the subject and satisfying himself that the pupil has no misconceptions. The field training officer must ensure that pupil technicians aim at a high standard o report, i.e., reports should be technically correct, neatly written in ink, properly set out, accompanied by neat and detailed diagrams, etc. A pupil completes at least 10 tasks during his field training.*[131]

This use of 'investigation reports' was later made a requirement for all applicants by BOCET, as Tom Cooper explained:

> *We moved to compulsory project reports. Applicants had to describe the work that they had personally undertaken and produce documentary evidence of the level of their involvement. It was required that they produce reports that they had written, and which showed that they had used and applied their intellectual abilities on the project and in the preparation of the report. This included calculations demonstrating the application of mathematics in deriving or establishing solutions to problems or procedures and the resulting design or application of solution. It was also required that applicable drawings, executed by or approved by the applicant, by way of authorising the drawing for use, be presented for scrutiny by the technician registration committee.*
>
> *One cannot deny there were times when we were inconsistent in our assessments and inadvertently registered persons that should have been rejected. We had one or two serious problems when we had not been through enough. For instance, in one particular municipal department we registered this technician but rejected his boss. (we were not aware of the relationship). It turned out that the underling had not been quite honest. It left a bit of a dent in the image of the board. Needless to say, there was an immediate tightening up and stricter requirements with respect to referees were introduced.*
>
> *In the case of the technologists, they required significant design work, both with respect to quantity and depth of application of engineering technology. On the other hand, a technician was not required to have necessarily undertaken original design work but showing that he had participated in such activities was an advantage. Essentially the applicant was required to demonstrate, through documentary evidence that he had, for instance, undertaken planning for maintenance and had executed or supervised such maintenance. However, he was still expected to show that he had thought through and prepared some practical design to resolve problems. The applicant's ability to clearly show compliance with this requirement in his submission was a major contribution to the likelihood of positive support for registration.*
>
> *Sometimes applicants would be fortunate in that persons serving on the registration committee were employees or had been employees of the company for whom the applicant was working. They were able to provide insight to the working environment of the applicant. Sometimes the input was negative and at other times supportive. I hasten to add that in such circumstances the committee member did not necessarily participate in the final decision to register the applicant or not. Such input from committee members was extremely useful in improving the member's knowledge of the actual engineering working environment and thus the quality of assessment of applicants for registration.*[132]

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[131] Matthews, 'Technical training in the South African Post Office', July 1975, pp. 147-9

[132] Interview with Tom Cooper, 29 July 2008.

Registration numbers and recruitment campaigns

Registration numbers

With the architecture for registration in place it would be reasonable to assume that applications would have poured in, as they had done for the engineers. But this was not the case. By 1989, six years after the launch of BOCET, with all three Boards of Control functioning, SACPE produced its first report of registrations, which showed:

Table 10.7. The total number of persons registered:[133]

Year	Professional Engineer	Certificated Engineers	Professional Technologists (Eng)	Engineering Technician (Master)	Engineering Technician
1987			721	1095	744
1988	12658	78	952	1095	1101
1989	13043	312			
Percentage registered against total registrable	± 80%	2,5%	?	?	?

The question marks in this table make comparison difficult. Some estimate of their size can be calculated using data given in a paper prepared by Dutkiewicz in 1990.[134] These suggest that in 1988, 17.14 per cent of technologists and 2.7 per cent of technicians had been registered. At an equivalent point - six years after establishment - SACPE had registered 9 690 engineers. It seems clear that technicians' response to registration was less enthusiastic.[135] This impression is shared by Kruger in his account of these events:

> *Unlike the registration of professional engineers, the number of applications received for registration with this Board of Control was disappointing and the institutions were, from time to time, addressed by the Chairman to encourage registration. Various reasons were given for this apparent lack of interest and it would appear that lack of recognition by employer organisations was the main*

[133] General statistics on Registration, SACPE, loose document in ECSA Archive.

[134] Dutkiewicz, 'Engineering Education in South Africa', TECHNO. EAC, 91.2.21, 91/26.

Numbers of Engineers, technologists and technicians in South Africa in 1988

	Professional engineers	Engineers*	Technologists	Technicians
Numbers	13 638	6 500	5 553	39 368

* Engineers – Those classed as engineers but without Pr Eng qualifications

[135] SACPE Annual Report, 1974 – 1975, Registration, p. 4.

reason. This created financial problems for the Board of Control and although SACPE assisted in various ways, the Board was still required to meet its expenses.[136]

Tom was later to reflect that this poor response rate contributed to financial non-viability of their many registration committees:

We were told by the SACPE head of finance that we had to close down the registration committees for each group and form a single committee to handle all registrations. There were just not enough registered technicians to financially sustain a set up similar to the engineers. No matter-it worked out well and was most certainly more manageable and efficient in the end. The registration committees for all groups, except engineers, still function in the same way today.[137]

ASRET in general and Tom Cooper in particular saw this as a challenge and responded with alacrity. The employers' 'lack of interest' was open to some influence by them, but there were fundamental issues at stake.

ASRET's recruitment drive for technicians

ASRET began a registration campaign to advocate registration with the BOCET. As part of this campaign Tom Cooper made numerous speeches to ASRET member societies about the benefits of registration. To relieve himself of the burden of individual preparations, he wrote a standard set of notes which he adapted to suit each occasion. The notes were only used as key lines in his presentations. Sometimes, according to the audience, he deviated widely. He said that in this way he could exhibit an enthusiasm in line and in reaction to the response of his audience. His belief has always been "enthusiasm begets enthusiasm". Typical of these notes were:

What are the advantages of registration?
Over the past few years I have often been asked. 'What are the advantages of registration?'
Among the answers I have given are the following:

1. Registration provides statutory recognition of the career of Engineering Technician. This can only enhance the status of the technician in the engineering fraternity and in the public eye. The present need by some technicians to seek, consciously or unconsciously, recognition by thinking of themselves as some sort of 'engineer' will no longer be necessary. Instead these persons can now take pride in being recognised as a member of that part of the engineering fraternity now known as 'Engineering Technician'.
2. Registration will ensure standardised recognition of qualification ad experience which will lead to the continued advancement of the status of the competent technician.
3. Registered technicians will have greater mobility since the prospective employer is assured of his capability. The employers will also therefore learn the difference between Technician as in Registered Engineering Technician and 'Technician' as in 'Let's advertise the post as a technician post – if we say, 'skilled operator' people might be put off – it has no class.'
4. The registration of engineering technicians will greatly improve the control and standard of qualification, training and experience necessary to meet the challenge of modern technology and will most certainly make the career of Engineering Technician more attractive to a greater number of school leavers.
5. Finally, there is of course that point which is close to all our hearts. 'What are the financial advantages of registration?' In some instances, I am sure registration will have a direct and immediate effect on income. There is however a more long-term consideration. / How often does one see, as I mentioned earlier, an advertisement offering employment for a technician

[136] Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991,* https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.
[137] Interview with Tom Cooper, 29 July 2008.

> and upon reading the qualification requirements it becomes all too evident that what is required is a skilled operator or at best an artisan. I am not belittling either of these types of persons but rather directing attention to the misuse of the title of the post being advertised. / No doubt you are asking yourselves as to what this has to do with the financial advantages of registration. Gentleman in the long term it has everything to do with it. / If the company which is advertising for technicians does not realise how much time, knowledge, effort and hard work is required to become an engineering technician it is certainly not going to offer a salary commensurate with the engineering technicians' education training and experience. The real technician does not of course have to accept such a post. But the situation tends to pull down the status of the engineering technician to a level much lower than that to which he is entitled. In consequence, the salaries offered to engineering technicians in general could be influenced by the salaries stated in such advertisements. Any youngster contemplating a career as an engineering technician could well be dissuaded by the apparent low financial return of the career.[138]

Another dimension to the ASRET campaign was to win the support of large employers, particularly the parastatals where some 45 per cent of technicians-in-training were contracted.[139] Initially many were hostile to the registration of technicians. Tom Cooper recalls that they began with the South African Transport Services (SATS):

> *Our endeavour was to get them to give us their support to persuade their staff to register. Some were concerned that our intention was to make every artisan a technician who would then demand higher pay. It was titles again. We were quick to allay their fears. 'No! not everyone is going to be eligible for registration'. In many cases we invited them to identify those of their 'artisan' staff who they thought were technicians to apply for registration. We accelerated that process for the applicants and then asked the employer to nominate registered technicians to serve on the registration committee. Some of those persons still serve on the registration committee.*
>
> *The result of this ploy was significant and is still paying off today in that the persons serving on the registration committee have a thorough knowledge of the technology status within the organisation and the deployment of engineering personal in that environment. Thus, when employees apply for registration, we rapidly got a feeling for their register ability. This reduced assessment time and most certainly cost.*
>
> *This process we repeated with many of the state and semi state bodies most successfully. The approach brought a remarkable amount of support from such bodies. So much so that in certain instances, the incentives offered by them for the staff to register, typical a motor vehicle, became the driving force. However, as a result, some negativity started to creep in when registration was refused. O Well! One can't win them all! We repeated this process on an ongoing basis with the Public Service, Army, Navy, Eskom, Sasol and SABC etc who were all major employers of technicians. We also made inroads into large corporations such as Siemens who were significantly supportive in that every year, they requested us to address their new recruits. Malcolm Gow was our man in that regard.*

The Post Office did not need to be encouraged; it led the field. This may have been a result of their very serious shortages in this category of labour as highlighted by the National Training Board earlier in this chapter, or it may simply have been that they indeed believed in the value of

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[138] Personal notes received from Thomas Cooper.

[139] Table 7, Getal Technikonstudente vanaf staats-, semi-staats en nutsorganisasies (Ingenieurswese) 1982, cited in G: 10 1982?, 45 per cent of technicians were in parastatals p. 11.

registration. Either way the Postmaster-General (not one of the ASRET institutes) nominated Malcolm Gow to take part in the activities of the BOC.[140]

However, it was not all plain sailing for everybody, as Nhlanhla Tshabalala, who was trained by the Post Office, but never registered – he does not recall ever being advised to do so. Here is his story:

> *I completed my N6, it was in 1986, I realised that with all these D-courses, and they call you a technologist, …it made no difference in people's lives. At that time, it was the time of the formation of the first black trade union in the Post Office, POTWA. After being influenced already, after completing N6 I said, 'I'm not doing the D courses', so I qualified in PTT as a technician. I said, 'No, to be a technologist, maybe it's just wording.' So, I completed in 1986 and then the Post Office sent me to one of the engineering yards as a qualified technician, I went to Power Park. In Power Park that's where I met the formers of the union, the people who established and formed POTWA. Like the first person, like Mr Khabisi Mosunkuthu, who is presently the MEC for Agriculture in Gauteng, here. I met people like Mr Bob Mabaso, the MEC for Social Development today. Oh, and during the training I met Mr Longise Hlongwane, the present President of SANCO and the present Executive Mayor of Sedibeng. I met Oupa Mopake, the present CEO of ISETT SETA … and the rest became history (laughs).* [141]

Having secured the support of many of the parastatals, ASRET approached the Public Service Commission (PSC) on the question that was 'close to the hearts' of all technicians, namely 'the financial advantages of registration'. Tom Cooper explained this move with care:

> *By the way, I said that we weren't a trade union – but we probably did do some trade union work in so far as we tackled the Public Service Commission on their salary structure and salary scales. At the time I said to the ECSA CEO, Paul Roux who accompanied us to see the PSC "should we be doing this?" He said this is not about pay it is about recognition of status. I had to agree that was our purpose for being there. At the time, the Public Service technicians were incensed that they were being categorised along with technical persons even at the lowest unskilled levels. In short if one was not an engineer then one was nothing. The technicians constantly badgered us and demanded of ECSA and ASRET in writing that we do something about recognition. I must say I had a high degree of sympathy for them when I learnt further on how they were being demeaned through crass ignorance on the part of the PSC.*
>
> *On one occasion, long before we tackled the public service head on over wages, we had a meeting with their human resources department and were discussing employment opportunities for technicians in the public service. We were astounded to learn their recruitment methodology. They said they had many posts for engineers but few for persons trained at institutions other than university. We then discovered that they used to hire persons with engineering degrees to fill vacancies and then work out what they would do with them later. On questioning them further it became very evident that much of the work the engineers were given to do was technicians work. We openly challenged them on this elitist attitude. I could go on further, suffice it to say it was like banging our heads against a brick wall. The fact is that much of the recruitment work was conducted by administrative personnel who did not have a clue about engineering competencies and qualifications. So, the safest thing to do was to hire degreed personnel. In fairness, the public service was not alone in applying that principal at that time. It was a South African thing.*

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[140] Letter from Postmaster General to the Registrar: dated 1984-09-28: 'In reply to your letter 43/2/1 dated 1984-05-15 I wish to advise that I have no objection to Mr. M T. Gow participating in the work of the Board. Yours faithfully Postmaster General (Signature looks like Erasmus). [Board of Control for Engineering Technicians Board 1984 – 91, TEG.B.R 84/164]

[141] Interview Nhlanhla (Jethro) Tshabalala, 28 February 2008.

But it was only later, in the 1990s, that they finally achieved success and the Public Service Commission recognised technicians and allocated improved salary scales to them. For technologists the change came when the B.Tech was introduced in 1995. Both were major achievements as some 45 per cent of technicians were in parastatals and half of the Certificated Engineers had travelled the 'technician' route.[142]

As a complementary initiative to its registration campaign, ASRET set out to lift the qualification standard for the registration of engineering technicians to enhance their standing. This is evidenced by a 'Global Statement' published by ASRET in 1987, which stated:

> *The Board of Control has indicated that there will be a gradual increase in the minimum qualification standard that will be considered as an alternative requirement for registration as an Engineering Technician.*
>
> *After June 1987 - only applicants with at least a Matric, NTC III or higher will be considered*
> *December 1987 - those with ATC II or higher*
> *July 1988 - those with NTD or higher*
>
> *As from July 1988 the three-year tertiary level National Diploma or an equivalent will become the normal requirement. Only in exceptional cases will applicants with lower qualifications be considered if they can prove beyond any doubt that they have been functioning on a technician level for a considerable length of time.[143]*

Initially Tom Cooper was a little less enthusiastic when the technologists did the same, but later, in 1995 when the technikons won the right to confer degrees and this became the *de facto* benchmark route for technologists,[144] he accepted it.

> *Technikon Degrees, I can remember the meeting ECSA had with the technikons. When the technikons started pushing for degrees, we felt they were doing so for selfish reasons. They were trying to compete with the universities and ECSA was not favourably disposed to the idea at the time. Let me rephrase that, a lot of people in the ECSA council were not in favour of it because they said that their motives were not genuine. I think the Technikon's perspective was that they could turn out just as competent people as universities. With very strong arguments they managed to convince the ECSA council members, but as I recall it was touch and go. The persons presenting their case were the best known to the engineering fraternity and from the highest levels of the technikon group. At first, for various reasons, the technicians were not too happy with this "Imitation Degree". Degrees were university territory. We eventually got used to it.*
>
> *Before the degrees came in, there was a Higher National Diploma. This diploma was phased out and replaced by the degree. However, we were happy to find that the academic standards required for the degree had been raised compared to the diploma. The technologists, who were already registered, were happy with that too, because it was enhancing their position. They had now moved a step or two closer to the engineer. Which is what, I believe the technikons were seeking when they pushed for the change in the first instance. In addition, Technologists could also obtain a doctorate. The degrees also now gave them the opportunity to further studies at universities.*

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[142] Letter from E Dalton, Pr Eng, Reg Cert Eng, to The Rector, Technikon RSA, 1988.06.13, DR ANNEXURE REGISTER, CERT. ENG. 1987-1988, 88/479.

[143] CR/17, REG.Com. 2.3.1987 in CR ANNEX REGISTER, Technicians, 1987, p. 62 and 63.

[144] Jacobs, D.J., 1999, 'A future quality assurance scenario for South African higher education', paper presented at the Excellence through Self-Evaluation Conference of the University of the Orange Free State, Bloemfontein, 1-2 September 1999.

These moves enhanced the standing of ASRET and SAARET vis-à-vis their membership – but the employers were less enthralled.

Employers' response to ASRET's drive

Initially the public and private sectors' responses to the recognition of technicians and technologists differed sharply.

The Post Office, as *the* lead technician-employing parastatal, had long embraced the notion of technician and had developed an elaborate training system in support of this conviction. Heinrich Dreyer describes how the Post Office system worked:

> *Well what happened, fundamentally, all the Post Office notes on any facet of technology were fundamentally B.P.O. (British Post Office) courses. It came from there … and we had a Head of Training Section which produced these notes and that's how the courses were. All the courses were aligned with the equipment that we had – the switching equipment, the transmission equipment … Of course, other equipment was German equipment or French equipment, or Italian equipment and we used to send guys to France, to Germany, to Italy. They'd come back, they'd write the course. And then with the curriculum and the course subjects, all that we'd do – because I was then involved in Head Office – we'd approach National Education and we'd say, 'This is this, and that is that' and 'Is it acceptable to them for us to include that in our Diploma courses or our Certificate courses?' That's how we got the okay from them. They were authenticated courses which we ran for ourselves. / National Education didn't vet our contents because we had an excellent relationship with the people to be in the technical area – like Mr. Smit and people … all BSc and MSc people. We had a good relationship with the people in National Education that we'd known them for years and years. And we'd go and discuss it with them, we'd leave the curriculum with them, and the contents and the notes … and they'd look at it and come back and discuss. Fantastic relationship we had with them. And then they'd give us the green light and then it would be published. And, ja, that's how it worked.*[145]

This relationship also ensured that the qualifications issued by the Post Office were recognised by the Department and were issued in their name, ensuring that the recipients were recognised on the labour market. There was only one down-side, as Heinrich Dreyer remembers:

> *There was a lot of animosity between certain technikons and the Post Office and certain technical colleges and the Post Office. There was animosity because they wanted to do everything. They couldn't accept the fact that this was an autonomous college that was also conferring diplomas on their students. In actual fact we had a fantastic lever with them, the technikons, because I had more students – my power base from the Post Office was the strongest one in the country with all technikons. These people like the Railways and Sasol and Eskom and all had far less students enrolled in those studies than us in the Post Office. So, in a way it was, say, like a golden egg that we laid for them. But we had a good relationship with a few principals of the technikons but in the main they were not very conducive to discussing things with us … you see they wanted a monopoly of everything. And we said, 'You people cannot teach telecommunications subjects. It's totally impossible. You haven't got the equipment; you can't do it.'*

This tussle, between a major industry actor and the key education providers, is worth noting here – as it suggests that in certain sectors at least the labour market actors still had a strong voice.

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[145] Interview with Heinrich Dreyer, 2 November 2007.

Other public sector and parastatal employers were slower to respond as Tom Cooper recounted above. This was probably due to the reluctance of Public Service Commission to award higher pay rates to this category of work. As Tom Cooper suggests this was essentially a wage cost issue:

> *First off, the Public Service would not accept the concept of a post designated 'technologist'. Well … they did not like the one for technician either. This was the battle ground! Fully qualified, registered technicians were being treated as if they had no tertiary education. Everyone who was employed in a technical field whether they had standard seven or a higher national diploma were all designated 'industrial technicians'. In short, they conveniently called everybody who wasn't an engineer an 'industrial technician'. If you were repairing parking meters you were an industrial technician. If you were assembling flipping thermometers you were still an 'industrial technician'. And the salaries of all were, very conveniently, locked down at that level.*[146]

Private sector employers were in a very different position from those in the public sector. For these employers, the cost of sending technicians and technologists-in-training to technikons for 20 weeks a year for three or four years, during which period no productive work was done, was considered too much, particularly since once trained, these people could easily be 'poached' by other employers (with the promise of a wage hike) or simply choose to leave.

In the absence of a solution to the problem, private sector employers had been endeavouring to transfer their technician training costs to the public education sector, as was noted in the Goode Report:

> *'(A)t a 1962 conference in Pretoria a strong plea was made by employers for the introduction of full-time college-based courses in order to increase the output of technicians, since the existing industry-based scheme produced only a fraction of the total required.*[147]

As noted above (in the Call of the Market) the problem of shortages was getting worse. The Goode Report described a common response as follows:

> *Essentially, the student starts at college for a year or longer with the earlier practical work done in the college where suitable facilities exist, and then as the training becomes more advanced, the student enters industry where the more complicated equipment is to be found. Some flexibility in courses is thus essential.*[148]

But in the marketplace, there were many employers who were not entering contracts with trainees at all. In 1981 for example, only 29,97 per cent, or 9,621, of technikon students (22,481) had industry contracts, the remainder were individual private students. The figure for engineering students was much higher, 76,34 per cent (or 7,669), which may have been attributable both to the shortage of these skills and to the payroll-based levy-grant system that had been established in the engineering industry. But even in engineering , 2,377 students were without contracts.[149]

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[146] Interview with Tom Cooper, 29 July 2008.

[147] Goode Report, section 6.3, p. 45.

[148] Goode Report, section 6.3, p. 45.

[149] ECSA Archive TEG. E. 85/69, [document G in ECSA file], Source Department of National Education, cited by the National Training Board in their report: 'Verslag en aanbevelings aan sy edele die Minister van Mannekrag deur die Nationale Opleidingsraad oor die finansierings van Technikonopleiding en verdere opleiding van ambagsmanne', February 1985, copy in p. 10.

But even when they did take on technicians-in-training there was a tendency for them to train students in their workplace practices only. This was uncovered when the EACs did site visits to the technikons. This is how Kruger recounts it:

> *These visits highlighted several very interesting features in the course structures. Because employers were required to support their bursars by granting them employment for six months of every year over four years and to pay the schooling fees for the remaining six months of every year over the four-year period, there were several large employer organisations who demanded and rightfully obtained course structures to meet their specific requirements. Some of these were very narrow and caused concern regarding eventual registration but did not necessarily preclude registration.*[150]

The BOCET and ASRET response to this development was very hostile. Tom Cooper recounts:

> *I can remember that there were certain companies … where these learners would be trained but they would never be able to work anywhere else but for that company. We called this 'captured employment'. Companies which practiced this form of training were advised that ECSA would not recognise their training for registration purposes. We even advised some of the students to seek employment elsewhere if they were expecting to eventually register with ECSA. I still believe it today – for an employer to take on a person and train them in such a way that they can only work on their equipment and nobody else's is totally unfair. Let me be a little more specific, it was usually large international companies that practiced this form of training mainly, I think, because that is what they did in their home countries where such practice was accepted because of vastly different economic and employment practices. When the ECSA registration committee did assessments for registration it expected diverse experience across a range of equipment.*

This view was shared by others in the engineering profession. Raymond Loubser, Vice President of SACPE in its last year (1990- 1991) expressed the same opinion in his 'Profile of an Engineering Profession' booklet published for a symposium in 1989:

> *Specialisation may appear to offer short term advantages to a particular employer as the technician becomes productive sooner and has a reduced market value to others. Such a technician will, however, need retraining sooner, as soon as he is required to handle associated tasks, even for the same employer.*[151]

SACPE together with the former Coordinating Council for Indian Education,[152] asked the National Training Board, to investigate whether this market failure that underpinned this problem could not be off-set by a tax exemption for the theoretical component of technician training at technikons, as well as the technical college component of artisan training. Their report considered the issue in depth:

> *Daar is bestaan eenstemmigheid dat onderwys die taak van die staat is in 'n ekonomie wat op die beginsels van die vrye marksisteem gegrond is. Daarenteen bestaan daar nie altyd duidelikheid oor die rol van die staat ten opsigte van opleiding nie. / As algemene uitgangspunt kan gestel word*

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[150] Kruger, *The History of the South African Council for Professional Engineers 1968 – 1991,* https://www.ecsa.co.za/about/pdfs/Period_1968_to_1991.pdf, accessed 19 December 2019.

[151] R.S. Loubser, 'Profile of the Engineering Technician', Symposium 7 September 1989, Pretoria, sponsored by SACPE, p. 6.

[152] ECSA Archive, TEG. E. 85/69, p. 10. [document G in ECSA file], National Training Board, 1985, 'Verslag en aanbevelings aan sy edele die Minister van Mannekrag deur die Nationale Opleidingsraad oor die finansierings van Technikonopleiding en verdere opleiding van ambagsmanne', Paragraph 1.1 and 1.2.

dat onder toestande van volmaakte mededinging geen firma bereid sal wees om die koste van algemene opleiding te dra nie, aangesien sodanige opleiding die toekomstige produktiwiteit van 'n werker in alle firmas verhoog. / 'n Firma sal dus nie bereid wees om in algemene opleiding te belê nie, aangesien dit die gevaar van afrokkeling verhoog. Algemene opleiding lei tot geskooldheid wat oordraagbaar tussen firmas is. / Daarenteen sal firmas bereid wees om die koste van spesifieke opleiding te dra. Met spesifieke opleiding word daardie opleiding bedoel wat slegs vir 'n spesifieke firma van nut is. / Hoewel die bogenoemde algemene uitgangspunt nuttig is om die saak in perspektief te sien, is die praktyk baie meer gekompliseerd. / Wat die vraag na opleiding betref, het individue gewoonlik nie die nodige fondse of toegang tot die kapitaalmark om self vir opleiding te betaal nie. Die onus word dus weer na die firmas verskuif, wat soos hierbo verduidelik, nie bereid sal wees om die koste vir opleiding te dra nie. Dit impliseer dat die hoeveelheid algemene opleiding minder sal wees as wat in 'n volkshuishouding nodig sou wees, aangesien individuele koste en voordele nie op die gewone wyse gelyk aan mekaar gemaak kan word nie. Daar is dus sprake van mark wanfunksionering, wat staatsinmenging regverdig.

[*There is agreement that education is the task of the state in an economy that is based on the principles of the free market system. However, there is not always clarity on the role of the State in respect of training. /A general premise may be that under conditions of perfect competition no firm will be willing to carry the cost of general training, as such training increases future productivity of a worker in all firms. /A firm will therefore not be prepared to invest in general training as it increases the danger of coaxing. General training leads to transferable skills between firms. /By contrast, firms will be prepared to bear the cost of specific training. This is specific training, that training is intended only for a specific firm's usefulness. /Although the above general premise is useful in seeing the case in perspective, the practice is much more complicated. In terms of the demand for training, individuals usually do not have the necessary funds or access to the capital market to pay for training itself. The onus is therefore again moved to the firms, which explains above, will not be prepared to bear the cost for training. This implies that the amount of general training will be less than being necessary in a nation, as individual costs and benefits may not be made equal to each other in the usual manner. There is therefore talk of market malfunction, which justifies state intervention.]*

Their key recommendation was not the one that the employers had hoped for:[153]

10.1 Dat belastingtoegewings nie uitgebrei word om die koste van technikon- en tegniese kollege-opleiding van ambagsmanne te dek nie.
[That tax concessions are not extended to cover the cost of Technikon and technical college training of artisans.]

Instead they noted:[154]

10.2 Die werkgewers ingelig word oor die feit dat belastingtoegewings steeds toegestaan sal word vir die indiensopleiding van tegnici en ambagsmanne. Die voorwaarde is dat sulke opleiding geformaliseer en by die Departement van Mannekrag geregistreer moet wees.

[The employers are informed about the fact that tax concessions will still be granted for the in service training of technicians and artisans. The condition is that such training is formalised and must be registered with the Department of Manpower.]

And suggested alternatively:

10.3 Hoewel daar sekere nadele aan inrigting gebaseerde opleiding verbonde is, behoort dit nogtans gestimuleer te word ten einde veral 'n vermindering in opleiding tydens

[153] *Ibid*, page unknown.
[154] *Ibid,* page unknown.

ekonomiese afswaai periodes teen te werk. Die nadele verbonde aan inrigtings gebaseerde opleiding kan grootliks uitgeskakel word indien die begrip van koöperatiewe opleiding deeglik gevestig en sinvol uitgehou word, en 'n nasionale liggaam vir koöperatiewe opleiding behoort gestig te word. Vir die doel behoort die Staat en die privaatsektor versoek te word om ruim studiebeurse vir studie aan technikons en aan staatsondersteunde tegniese kolleges beskikbaar te stel.

[Although there are certain disadvantages to institution-based training, it should nevertheless be stimulated, particularly in order to counteract a reduction in training during economic downturn periods. The disadvantages associated with establishment-based training can be largely eliminated if the understanding of cooperative training is thoroughly established and meaningful and a national body for cooperative training should be established. For this purpose, the state and the private sector should be requested to make ample tuition bursaries available for studies at technikons and to state-supported technical colleges.]

It seems that the incidence of students without industry contracts and students trained in the specifics of a single firm's operations remained common. The experience of Moegamat Hoossen, recounted in Chapter 2, who was trained in the 1970s to fix Mercedes Benz cars only - is a case in point.

This was not the only issue about which private sector employers were concerned. They were also worried by the proposals to raise the education qualification levels required for registration as these would have raised the scarcity and price of these already scarce practitioners. In a letter dated 22 October 1987 addressed to Mr P Gouws, Registrar of the Board of Control for Engineering Technicians, Brian Angus, the Executive Director of SEIFSA, wrote:

It has come to our attention that there is a proposal to the effect that holders of N6 certificates and appropriate experience will no longer be eligible for registration with the Board of Control.

We would like to express our strongest objection to the proposed change as we feel that it is essential that eligibility for registration should be based on appropriate education and demonstrable competence and that a specified formal education requirement such as a T-course qualification should not be the primary criterion for acceptance.

In view of the large number of engineering technicians in the metal and engineering industry, we hope that you will take cognisance of our views and ensure that consideration is given to acceptance of a flexible registration policy so as to allow suitable N6 candidates to register with the Board of Control.[155]

These employer concerns go some way towards explaining the difficulty that ASRET experienced in growing the numbers of registered technicians. Tom Cooper believed that the employers' response in general was to 'register the chief engineer and leave the rest'.[156]

Ben Nicholson, the artisan leader from the SEAWA and CMBU had a slightly different perspective:

The vast majority of artisans were employed by small employers; the big employers were the main employers of technicians and so on. And therefore, they could do things differently and they would

[155] ECSA Archive, CR ANNEX Register, CR/157, Technicians, 1987.

[156] Tom Cooper, Interview 29 July 2008.

set their own standards (and even assist their artisans to upgrade) … But the majority of industry relied on artisans. They couldn't afford to train people as technicians – and they didn't need them anyhow. Probably they had an engineer who would do that sort of work, but the artisan would then be expected to do the higher qualification stuff practically. But he was still an artisan and he prided himself in being an artisan.[157]

The differences between public and private sector employers was too narrow as the parastatals started to first commercialise and later to privatise. The Post Office is a classic case in point as evidenced in the decline in the number of technicians undergoing telecommunication training from 1978 to 1981:

Table 10.8. Number of diplomas and certificates at the Post office 1978-1981. [158]

Discipline / Years	1978		1979		1980		1981	
	Students	D&S	Students	D&S	Students	D&S	Students	D&S
Telecommunication	1074	390	1303	465	712	431	132	In

Students = registered students; D&S = number of diplomas and certificates issued; na= not available

The National Training Board noted this worrying development in its 1985 study referenced earlier:

> Hoewel die beskikbare gegewens oor 'n relatief kort periode strek, is enkel neigings tog van belang. Na 1979 ... die getal telekommunikasie tegnici 'n drastiese daling getoon het.[159]
>
> *[Even though the available data stretches over a relatively short period of time, single trends are of importance. After 1979... The number of telecommunication technicians showed a drastic decline.]*

Post-Registration

As with the engineers, people were expected to behave according to a carefully prescribed ethical code once registered. The Code of Conduct to which they were expected to comply was in each of the respective regulations. It was the Board of Control's responsibility to ensure that the Code was respected. The approach taken was to require those registered to comply with the Code, as a condition of registration, and to have a detailed process whereby those alleged to have infringed the Code could be 'brought to book' through peer pressure, fines and legal penalties. These two aspects are considered below:

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[157] Interview with Ben Nicholson, DATE OF INTERVIEW – I think Adrienne interviewed him on 2 separate occasions…

[158] ECSA Archive, TEG. E. 85/69, p. 12. [doc. G in ECSA file], Table 8 (translated) from 'Verslag en aanbevelings aan sy edele die Minister van Mannekrag deur die Nationale Opleidingsraad oor die finansierings van Technikonopleiding en verdere opleiding van ambagsmanne', February 1985.

[159] Table 8 (translated) from 'Verslag en aanbevelings aan sy edele die Minister van Mannekrag deur die Nationale Opleidingsraad oor die finansierings van Technikonopleiding en verdere opleiding van ambagsmanne', February 1985, copy in ECSA Archive TEG. E. 85/69, p. 11.

Code of Conduct

Each of the BOC's had within their respective regulations an entire chapter devoted to the Code of Conduct to which registered engineering practitioners would have to adhere. They are very similar to one another and closely parallel that published for the engineers in 1969[160] - although clearly experience led to elaborations as the years passed. Below an attempt has been made to paraphrase and cluster the Code's injunctions under four broad clusters (although they are not so clustered or headed in the respective regulations):

PARAPHRASE OF THE FOUR BOC's CODES OF CONDUCT

1. **Public Interest:**
   - Have due regard to public safety, health and interest.
2. **Interest/status of the profession:**
   - Protect dignity, standing and reputation of the profession;
   - Don't advertise in a way that harms the dignity of the profession;
   - Behave professionally in other countries;
   - Don't harm the reputation, prospects or business of other registered engineering professionals;
   - Don't misrepresent own or others' academic or professional qualifications or degree of responsibility
   - Don't review another engineer's work for a client without his knowledge
   - Only form partnership with other registered people, unless the Council/BOC approves otherwise.
3. **No price competition amongst registered engineering persons:**
   - Do not offer unfair 'deals' or discounts to get work;
   - Do not undercut other engineering professionals (especially if one has a salary to make it possible);
   - Do not undercut on price.
   - Do not compete unfairly.
4. **Ethical contract management, taking responsibility:**
   - Work within the scope of training and experience i.e. for which competent;
   - Work efficiently, competently and with fidelity;
   - Only receive payment from employer or client;
   - Do not destroy documents needed to verify work;
   - Sign drawings etc. so accountability is acknowledged and accepted;
   - Do not work with 'limited liability' companies unless the Council/BOC has approved the terms;
   - Declare any vested interest in writing, up front;
   - Cooperate with Council/BOC inquiries;
   - No kickbacks or 'commission' or benefit unless authorised.

[160] Systematic comparison of Codes of Conduct. Loose document in archive.

The more elaborate exposition of injunctions in relation to both the profession as well as to contract management and price competition suggest that these areas were more commonly infringed or alleged to have been infringed than that of public interest, although in the event of major accidents, clearly it would have been the latter that was cited.

It is both interesting and important to note that in the case of the BOC's no attempt was made to specify and restrict the work performed by registered practitioners, other than through the broad Code of Conduct edict which stated that:

> He shall not undertake work of an engineering nature which he cannot execute competently having regard to his education and experience.[161]

So, practitioners were essentially self-policing.

Investigating and Legal Matters Committees

A Legal Matters Committee was established in each BOC to hear cases of alleged infringement of the Code of Conduct, although separate committees were set up to investigate the cases before they were heard. The regulations all made reference to what was termed 'improper conduct' and the procedures to be followed for investigation and hearings into them. If a person was found guilty, they would face a penalty ranging from a censure, to a fine, to being 'struck off the register', depending on the seriousness of the infringement. In practice, very few were struck off the register, which can either be interpreted as 'the group protecting their own' or the effectiveness of this form of peer control.

The Birth of the Engineering Council of South Africa (ECSA)

Unification of the profession

The establishment of the Boards of Control under the umbrella of SACPE was the first step in a process that paved the way to the passing of the Engineering Profession (*singular)* of South Africa Act, 1990, (No 114 of 1990) whose purpose was:

> *To provide for the establishment of an Engineering Council of South Africa; for the registration of professional engineers, engineers in training, professional technologists (engineering), engineering technologists in training, certificated engineers, certificated engineers in training, engineering technicians and engineering technicians in training; and for matters connected therewith.*[162]

This Act signaled much more than an alliance – it was unification. The new Act gave rise to the birth of the Engineering Council of South Africa, or ECSA, on which all four occupational categories: technicians, technologists, certificated engineers and professional engineers were

[161] GG No. 10546, Regulation No. R 2607, Section 20(4) of 12 December 1986.
[162] Engineering Profession of South Africa Act, 1990, No 114 of 1990.

represented. True, some were more equal than others as can be seen from the composition of ECSA:

Table 10.9. Constituents of the Engineering Council of South Africa (1990)

Engineering Council of South Africa (1990)		
Nominating agent	**Number**	**Total**
Professional Engineers (one from each Branch of engineering):		8
By the Minister to protect or promote the public interest		2
By the Minister – a person employed by the state		1
Professional technologists nominated by SAARET		2
Certificated engineers nominated by ICMEESA		2
Engineering technicians nominated by ASRET (or its replacement)		2
Professors in engineering from university engineering faculties (must be Pr Eng)		3
Committee of Technikon Principles to nominate, at least one registered by BOC		2
Professional Engineers		4
• *Ingenieursafdeling van die Suid-Afrikaanse Akademie vir Wetenskap en Kuns*	1	
• Engineers' Association of South Africa	1	
• Federation of Societies of Professional Engineers (FSPE) or, on its dissolution, an association representative of the practitioners of engineering	1	
• SA Association of Consulting Engineer	1	
TOTAL		**26**

Nevertheless, the new ECSA Council now embraced all four occupations.

The Act gave ECSA wide-ranging powers broadly equivalent to those which had been enjoyed by SACPE and the BOCs. The role of the Minister of Public Works and Land Affairs was limited to 'the appointment of members of the Council, the reservation of work for persons registered in terms of the Act and for the approval of a tariff of recommended fees which a person registered

in terms of the Act may use as a guide to determine the fees for services rendered by him in private consulting practice'[163] captured in the Bill as follows:

> *after considering any relevant recommendation by the council ... and if he considers it to be in the public interest, with the concurrence of the Competition Board established by section 3 of the Maintenance and Promotion of Competition Act, 1979 (Act No. 96. of 1979)*[164]
>
> *6 (1) (k) The council shall have the power –*
> *to determine a tariff of recommended fees, which shall be approved by the Minister and which a person registered in terms of this Act may use as a guide to determine the fees for services rendered by him in private consulting practice: Provided that if he and his client have not agreed in respect of fees in any particular instance, such person shall not be entitled to charge fees which exceed the said tariff of recommended fees.'*

The Code of Conduct was excluded in the 1990 Act, but the ethical practice of those registered was still a matter of concern to the council, albeit more obliquely:

> *6 (2) (a) The council shall have the power to take the steps which it may consider expedient for the protection of the public in their dealings with persons registered in terms of this Act, for the maintenance of the integrity and the enhancement of the status of such persons and for the improvement of the services rendered by, and the standards of professional qualifications of, such persons.*

Employers oppose the new Act

The employers strongly opposed the new Act and in their comments on it prior to it being passed, both SEIFSA and the more radical Free Market Foundation of Southern Africa were quite clear on this. SEIFSA, as 'a major employer of engineers, technologists and technicians professionally qualified and otherwise', made the following points in its submission:

1. The Bill provides a monopoly structure in favour of a small group of registered persons. This is particularly undesirable at a time when the direction of national policy is strongly towards deregulation. …
2. The proposed Engineering Council of South Africa is to be dominated by professional engineers, professional technologists (engineering) and registered engineering technicians, i.e. registered persons. These people are therefore in a position to advise the Minister on the fees they will receive and the nature of the engineering work which is to be reserved exclusively for them. / The result is that group interests can be advanced without regard to the interests of the public at large.
3. The Bill contains no definition of the work to be reserved for the registered persons. Even the work previously reserved for Professional Engineers allowed for no clear definitions. To define the work to be reserved for technologists and technicians, is in SEIFSA's opinion, impossible. In the absence of any such definitions, the effect of the proposed legislation on the general public, and in particular on the employers of the registered persons, is impossible to evaluate. This is a strong reason for SEIFSA's opposition to the Bill.

   ⇒

   SEIFSA estimates that less than 20% of professional engineers are consultants, receiving fees for the services they offer. More than 80% of all professional engineers and virtually all professional technologists (engineering) and registered engineering technicians work for their employers on a salary basis. / It is clearly the prerogative of the employer, and not of any outside body such as the proposed Council, to prescribe the work his employees must do. It is immaterial whether the

[163] Memorandum on the Objects of the Engineering Profession of South Africa Bill, 1989, ref. bo-aw-0912881 A2.

[164] Section 6 (6) of Engineering Profession of South Africa Act, 1990, No 114 of 1990.

employees are registered persons or not. Incompetent people will not be employed because the employer is accountable to his customers for the goods and services he provides …

The structure of the proposed Engineering Council of South Africa is unacceptable to SEIFSA. The registered persons themselves are to dominate the Council. Although the employers in the Private Sector, as referred to in 4 above, are relied on to provide employment for the majority of registered persons, it appears these employers are to have no representation on the Council.

Finally, SEIFSA is of the opinion that the present system is adequate and that further regulation of the Engineering Profession in any form would be discriminatory, unnecessary and, contrary to current government policy in respect of deregulation. / Accordingly, SEIFSA respectfully requests that the Engineering Profession of South Africa Bill be withdrawn. …[165]

The Free Market Foundation of Southern Africa went the inevitable step further:

It is proposed that the Engineering Profession of South Africa Act 74 of 1989 (GA) should not be passed. It is also submitted that the Professional Engineers' Act No. 81 of 1968 should be repealed.

This legislation, like all types of professional registration and occupational licensing, ignores the free market principles to which the South African government is committed. It achieves the opposite of what it is intended to achieve. Rather than "protecting the public", it takes away the public protection free markets provide. Instead of "maintaining the integrity" of professionals, it enables professionals to abuse their status and power. Instead of "improving the quality of services" of professionals, it removes the incentive to improve that professionals have in a free economy (1968 Act section 7(n); 1989 Bill clause 6(2)(a)).[166]

But in spite of these objections the Act was passed, and technicians and technologists were 'free' to apply for registration and to enjoy the benefits that followed, to which as Ben Nicholson recalled, the artisans aspired and struggled to emulate. However, the opposition from employers was an obstacle and slowed registration, as has already been seen.

The birth of SAVI … and ASARET

The consequence of this legislative change – from SACPE to ECSA – also challenged the voluntary societies to re-organise themselves into a more coherent grouping. Up until that point FSPE, ASRET, SAARET and the ICMEESA remained separate organisations. Almost as soon as discussion on the new Act began, around 1986, the South African Institution of Mechanical Engineers became troubled by the disparate nature of engineering organisations. So, they started to conceptualise a more integrated organisation that could represent the engineering profession as a whole. Their own lively account of developments is reproduced below:[167]

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[165] ECSA Archive, DR ANNEXURE REGISTER CERT. ENG. 1989, 89/351 – 89/353, Letter signed by Brian Angus, Executive Director of SEIFSA, to The Secretary of Parliament, Cape Town, dated 18 April 1989, Ref.: 29-11wek.

[166] ECSA Archive, DR ANNEXURE REGISTER CERT. ENG. 1989, 89/356 – 89/361, Submission to the Joint Committee, Comment on the Engineering Profession of South Africa Bill 74 of 1989 (GA), prepared by Nancy Seijas, Senior Researcher, Free market Foundation of Southern Africa, dated 28 April 1989.

[167] The South African Institution of Mechanical Engineers, *A Century of Mechanical Engineering, 1892 – 1992,* Johannesburg: SAIMechE, 1993, pp. 24-27.

In recognising the disarray in the engineering profession, Council took a momentous decision to become actively involved in initiatives which would bring about unity. The Council's prime objective was to work alongside sister institutions with a view to finding a suitable modus operandi which would ensure that the engineering profession could speak with one voice and have a single point of contact. The concept of a single point of contact was seen to be vital in view of industry, government and outside organisations being able to interact with the engineering profession.

The overriding consideration facing the Council was the notion that for too long too much reliance had been placed on the government to do things and slowly but surely, the very position of the engineering profession was being eroded. Engineers had now taken a comfortable back seat and had become victims of an increasing anti-technology attitude which was pervading various echelons within the country.

The Institution threw its lot in with the formation of the Interim Council for the Unification of the Engineering Profession which was formed in early 1986. The Interim Council elected as its chairman the then President of the South African Institution of Mechanical Engineers, Dr Roy Marcus, and set about its task of trying to bring together all the dispersed groups.

After many months of debate, extensive consultation and refining and re-refining a model, a draft Constitution for the formation of the South African Engineering Association was presented to societies in early 1988. …

The Constitution … gave recognition to the total engineering family, which once again was a milestone in the history of the development of the engineering profession in South Africa. Following the lead from the South African Institution of Mechanical Engineers, all levels within the engineering profession were recognised as being equal members of the South African Engineering Association.

So that this new Association could represent the wider spectrum of the engineering profession, another important feature of the Constitution was the inclusion of a clause which made sure that all those representing the various engineering disciplines did so firstly in their own personal capacity and secondly with a clear understanding that they were to represent all organisations claiming to have some relationship with that particular discipline. …

The South African Engineering Association / Die Suid-Afrikaanse Vereeniging van Ingenieurs (SAVI) was officially launched in May 1990. … With the formation of SAVI, FSPE was disbanded.

SAVI's Constitution spelt out its purposes:

OBJECTIVES AND ACTIVITIES OF THE ENGINEERING ASSOCIATION

The objectives of the Association are to:

- advance the status and image of engineering;
- further co-operation, communication and unity amongst all sectors of the engineering profession;
- improve engineering education and training, and promote careers in engineering for all South Africans;
- promote liaison with other national, regional and local authorities, and the public;
- advise and act on matters of policy and legislation that affect engineering as a whole at a national level.

In the process of establishment of SAVI, ASRET was informed that there was a problem:

> *SPE, SAARET and ICMEE were organisations consisting of individual members. ASRET were told by SAVI that they were out of step with the rest of the vocational groups and must change to one of individual membership in order to remain a member of SAVI.*
> *ASARAT changed with little fuss to an organisation composed of individual members. The question of the non-recognition of technician societies by SAVI was solved by inviting them to become Patrons of the Association of South African Registered Engineering Technicians (ASARAT). Patron Institutes had a full voting seat on the council of ASARAT. … ASARAT took over the responsibilities of ASRET on ECSA (it was the same people) … ASARET continued ASRET's work but became a wee bit more financially viable because individual members proved better payers of their dues than the Institutes.*[168]

These decisions and their implementation meant many meeting hours for the ASRET executive, and even led to general meetings of the membership.[169] But this process was not restricted to ASRET / ASARET. The other societies were also involved in the many decisions associated with establishing SAVI.[170]

Finally, the work was done, and the following societies were listed as founding members of SAVI:

4.2.1 **Learned Societies**

S A Institute of Agricultural Engineers
S A Institution of Chemical Engineers
S A Institution of Civil Engineers
S A Institute of Electrical Engineers
S A Institute of Industrial Engineers
S A Institution of Mechanical Engineers
S A Institute of Aeronautical Engineers
S A Institute of Marine Engineers and Naval Architects
S A Institute of Mining and Metallurgy
Institution of Certificated Mechanical and Electrical Engineers of South Africa
Ingenieursafdeling van die SA Akademie vir Wetenskap en Kuns
S A Association of Consulting Engineers

4.2.2 **Vocational Societies**

The Society for Professional Engineers;
The Association of South African Registered Engineering Technicians;

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[168] ASARAT NEWS, March 1995, pamphlet, personal copy from Vivien Nel, p. 3.

[169] Journal Of The South African Institute Of Mining And Metallurgy September 1989 p. 283, Annual Report, for the year ended 30TH JUNE, 1989 http://www.saimm.co.za/publications/downloads/v089n09p271.pdf, accessed 18 March 2008

[170] Journal Of The South African Institute Of Mining And Metallurgy September 1989 page 283, Annual Report, for the year ended 30TH JUNE, 1989 http://www.saimm.co.za/publications/downloads/v089n09p271.pdf, accessed 18 March 2008 5.5.2 SAARET. 'Representative Dr Lurie The most significant developments during the year were the following. Representing the vocational group of engineering technologists, SAARET played a significant role in contributing to the constitution and establishment of SAVI. In order to conduct its business more effectively, SAARET was restructured during the year. Various working committees were constituted including those to deal with the following: education and training, publicity, membership, and quo vadis. A number of *ad hoc* committees were set up to deal with the constitution, awards, social functions, and liaison with other organizations.

Why was the whole 'engineering team' not registered?

Viv Nel was quoted saying:

> *I can understand the way things went, but it seemed a bit silly to me to say you've got the engineer, and he's the be-all and end-all and nobody else counts, and you say, 'That's fine. And okay maybe he designs the thing, but who builds it? There are more people in the team there's not just one guy.*

But it transpires he was working with two concepts, not one, here: (1) the engineering team as a whole and (2) those within the team that warrant registration. These should not be conflated.

The argument, that 'there are more people in the team' had been widely accepted for some time. For instance, when Straszacker wrote about engineering he spoke about it embracing the work of a range of practitioners:

> *53. (c) [Engineering] requires the knowledge and skills of several different categories of workers: the entrepreneurs, the managers, the professional engineers, the technologists, the technicians, and the manual workers: artisans, operatives and labourers.*[171]

The Goode Committee blurred out the work of the latter two categories (operatives and labourers) when talking of the engineering team, but certainly included the artisan (Fig 10.1. above).[172]

The arguments as to why engineers and technicians (and anticipating in time a little, technologists too) have been explored. But why did all the members of the 'engineering team', or at least the artisan, not also warrant registration (and membership of the professional body)? Well it seems that there were some artisans that *did* warrant registration as Tom Cooper explained:

> *I was a catalyst in the introduction of a category of registration called 'Specified Scope'. This was how we enabled certain classes of artisans to be registered as part of the professional engineering team but not under the title 'artisan'. Within ECSA I developed and sold the concept of 'Specified Scope' for Lift Inspectors, because the Department of Labour wanted the Lift Inspectors professionally registered to take accountability for their work. But the Act did not provide for such registration. … 'Specified Scope' was a term I coined. What it did was to enable the identification of the artisan functioning in a relatively narrow field of engineering at the competency level of a technician. By using the Act and using the title we were eventually able to register such persons This was how we got the Lift Inspectors on board.*
>
> *It was a breakthrough. Since then the concept of specified scope and the importance thereof, in terms of public health and safety has grown to the point certainly in the case of lift inspectors, where even engineers, technologists and technicians have to qualify and be registered as a lift inspector in order to sign off a lift installation for public use. What a turnaround! From that breakthrough the "specified scope" type of registration has grown and is growing considerably. This has aided many of the so called "artisan" group to become registered and formally be recognised as part of the professional engineering team.*
>
> *Another group now recognised is in the field 'Lifting Equipment', clinical engineering. Medical equipment maintainers now have an NQF registered qualification which will enable registration with*

[171] Straszacker Report, Part I, para 53, p. 6,.

[172] Goode Report, Fig. 2.4 Future Job Clusters, p. 9. – Figure 10.1

ECSA. Yet again this enables artisans to register. The divide is narrowing. The term "Specified scope" was a generic title which is now being replaced with a functional title hence Lift Inspector or Medical Equipment Maintainer or Lifting Equipment Maintainer. Other categories such as Gas, electrical and persons working in the Non-Destructive Testing industry are also being considered. In short, the path is open for artisans to become registered with ECSA but not under the title "artisan". "A rose by any other name……." would seem to be appropriate.

Interestingly:

It is significant that in all cases of "Specified Scope" it was the artisans themselves who approached ECSA for registration. This mainly came about as a result of artisans undertaking work at the level of a technician but who could not be registered due to lack of breadth of knowledge and appropriate competence to meet registration requirements as a technician. There also had to be a minimum number of persons that would achieve the potential to be registered to make it financially viable to introduce a particular category of registration.

These comments highlight two dimensions of registration which the average artisan was presumed to lack: one being 'responsibility for public health and safety' and the other 'breadth of knowledge and appropriate competence'. In this context Tom stressed the former:

One must be aware that registration is a pointless exercise unless the public is to derive some benefit in the form of safety or prevention of exploitation. This is a major point. Registration is about protection of the public not the registered person. To be blunt we have the situation that the registered person's own fees are used to prosecute him/her in the case of alleged or actual misdeed intended or otherwise. If ECSA were to be held responsible for the investigation and prosecution of every misdeed by an artisan reported by the public, ECSA would not be able to cope administratively and financially. It would be bankrupt within months.[173]

Putting aside the question of whether or not the registered person benefits from registration (which earlier arguments would suggest they do), it must be inferred from this that artisans, in general, were not viewed as performing work which could impact on public health and safety.

Further reflection on the criteria for registration of technicians suggests that there were probably also issues of managerial authority as well: it will be recalled, *inter alia*, that to be registered technicians had to demonstrate:

(g) Communication skills:
Work requiring the use of communication skills which utilise most of the following elements: -
- Preparation of engineering drawings and documentation, *work instructions*, *specifications*;
- Preparation of cost estimates, *work schedules in respect of (smaller) projects*; …

(h) Personal and interpersonal skills:
… *independent action and increasing responsibility which includes the various aspects of interpersonal relationships with inferiors*, peers (other engineering technicians) and superiors (technologists, engineers, etc.).

(i) Managerial skills:
Work during which the basic requirements of management can be practiced, such as allocation of resources, time management and the co-ordination of the work of a (small) group which includes other engineering technicians.[174] [emphasis added]

[173] Tom Cooper, email message to author on 23 November 2008.
[174] CR Annexure Register Technicians 1987, p. 567-8.

This point seems to be underlined in the guideline issued in 1987 by the BOCET Registration Committee which indicated that artisanal work would *not* count for registration purposes:

- (Applicants) must also be able to prove that they have been performing at the level of an engineering technician for an appreciable period of time.
- Experience at artisan level is not acceptable.

Experience as an artisan foreman, or in the training of either apprentices or artisans, will only be acceptable in exceptional circumstances.[175]

The difference between artisanal work and technician work, as summarised by the Goode Report (cited above in Table 10.1[176]), has artisans doing specific work of a more manual type requiring 'elementary' theoretical knowledge and importantly, with only a 'minor requirement' for mental skills as opposed to the technician who was deemed to be using mental skills 'to a greater or lesser degree most of the time'. Artisans were grouped with 'manual workers' by the members of the profession - having largely been relieved of their planning and design 'mental' abilities of which they had previously been so proud.

Partly questions of responsibility for public health and safety, partly broader and deeper knowledge of the technology and work process, partly elevated managerial responsibilities and partly pragmatic considerations related to numbers, administration and fees were used by the technicians to pragmatically explain why alliances with the artisans were not pursued.

Why did the artisans not argue for registration? It was surely not because they accepted that they were purely manual workers – Ben Nicholson was horrified at the suggestion:

> *What is an artisan without a brain!!! … An artisan is somebody who thinks, 'What do I do now? A plan … I've got this to do, how do I do it?' And he works out himself, he's not told what to do. An artisan is an independent guy, who knows his job, can think, can do it – plan it – and carry it way through to the end.*[177]

The strongest reason seems to have been that the artisans were already strongly organised and actively engaged in statutory structures of their own: the apprenticeship committees and industrial councils as spelt out in Chapter 4. They had long since won their claim for recognition and did not want or need a new identity – in fact in this period they were struggling to retain the one they had. Rather than join the technicians, they tried to recruit them into their craft unions, but they were unsuccessful. The technicians were simply not interested. Here is how Ben Nicholson put it:

> *(The technicians) never, ever approached us because they considered themselves superior. They wouldn't deal with us! That was the impression we always got. They didn't want to be part of us. When we approached a technician in a company like Iscor or something like that, they'd say, 'No, no, we have an engineering organisation. We are staff members. Iscor actually, with due respect to them, encouraged this. They didn't want this, because we were too powerful for them. If we'd have got involved in that side of things, we'd have upset their whole apple cart … because we tried to recruit them, of course we did.*

So, employers helped to maintain the divide too.

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[175] 'Acceptable work for registration as Engineering Technician', (Appendix A) CR Annexure Register Technicians 1987.

[176] Goode Report, para 3.2.2, p. 19.

[177] Interview with Ben Nicholson, 15 August 2008.

Ben also confirmed the above suggestion that the authority relationship between technicians and artisans helped to keep them apart:

> *But people, as people are, wanted to be seen as better, and the guys with the ATC I's and II's were always promoted to staff because they could then be supervising artisans – and that then gave them the right to supervise - they were much more qualified than the artisan theoretically not practically. In fact, one of our main complaints about the whole system was that it was beginning to foster a technically qualified but not physically qualified person, who is the proper artisan who is good –… technically qualified people don't do physical work – they supervise!*

LADDERS AND LEVERS

Looking back in 1990 the then Vice-Chairman of the Board of Control for Engineering Technicians, Eduard Smit,[178] reflected:

> *From 1981 onwards everything virtually reversed back to the pre-1972 situation in which apprentice and technician training was once again completely separated. The CATES which have become Technikons, now offered only diploma courses for technicians on a semester basis, while the Technical Colleges offered the original certificates courses now called 'N' course still shackled to the artisan apprenticeship.*
>
> *The opportunity of producing a properly trained lower level, narrow lane 'certificate technician', as well as a higher level, broader based 'diploma technician', with the possibility of easy conversion from one category to the other, was thereby completely lost. Indeed, a sad set-back for engineering technician training and for the needs of industry in South Africa.[179]*

Smit analysed the inadequacies in 1990 as follows:

> *Artisans are trained via an apprenticeship in which the practical training in manual and manipulative skills prescribed by law, are of a level demanding a theoretical back-up knowledge of only N2 (Standard 9) level, with particular emphasis on the relevant theory of the particular trade.*
>
> *Artisans could further their theoretical technical knowledge on the tertiary level through studies at a Technical College via the so-called 'N'-courses which provide for a narrow field of study in a limited number of subjects at each level, culminating in the National N-diploma (NN Dip) as highest qualification, which could be attained through part-time or full-time study. This diploma comprises 12 subjects normally with 4 subjects at each of the N4, N5 and N6 levels, which requires approximately 950 hours of lectures, not accompanied by any laboratory work. Since the practical training is designed purely for artisan requirements the immediate end-product is a highly educated or advanced artisan who has not in the first instance been trained to function as a technician.*
>
> *Given sufficient time and opportunity to experience the nature and demands of engineering technician's work, some of these advanced artisans often become successful engineering technicians. It is however a time-consuming route compared to the normal direct training route for engineering technicians via a technikon. / Although opportunity exists for artisans who have completed certain units of tertiary level studies on the N-stream at Technical Colleges, to convert to the T-stream offered by Technikons, it entails a considerable loss of time.[180]*

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[178] Eduard Smit, *Education and Training of Engineering Technicians in South Africa and Britain - A comparison,* Technikon Pretoria, 1990.

[179] Smit, *Education and Training of Engineering Technicians in South Africa and Britain*, p. 3.

[180] Ibid, pp. 3-4.

What Smit did not note, however, was the fact that the 'considerable loss of time' had an upside - unlike an increasing number of technikon students who no longer had a sponsoring company. In 1982 for instance only 29,97 per cent of technikon students had industry backing (although this figure was much higher (76,34 per cent) for engineering students).[181] Smit identified this as a problem when he undertook a study comparing the British and South African systems in 1988.

In Britain he found that 'a central, unifying, coordinating and controlling body namely the Engineering Industry Training Board (EITB) provides suitable guidelines and model training programmes for the in-service training of engineering technicians in all vocational directions, on which all employers base their training programmes'.[182] The Engineering Industry Training Board (EITB) operated on funds received primarily from levies on all engineering firms, and it was their task to ensure that trained manpower in the field of engineering meet the demands for properly trained men and women required by Britain's engineering industry.

> *Although in-service schemes for the practical training of engineering technicians was not mandatory, at the time of the aforementioned survey, only some 300 trainees were on training schemes which were not EITB approved.*[183]

Smit found that in South Africa

> *no similar central body or organization exists which could prescribe or control the in-service or experiential training of engineering technicians. It is left to the schools of each technikon to enlist the support of those employers whom it serves, to draw up guidelines for the practical in-service training and devise some system of control whereby training results are monitored. / In this way no uniformity of either content or quality throughout the country could be guaranteed.*[184]

Smit went on to recommend that a similar system to that found in Britain be instituted in South Africa under the National Training Board in co-operation with professional Boards of Control and bodies from industry, together with the Technikons and the Certification Council for Technikon Education (SERTEC).[185]

The SACPE responded to this by recommending to the National Training Board that a study be undertaken into the possibility of introducing tax incentives to firms to 'indenture' pupil technicians to remedy the problem – a recommendation which was simultaneously suggested by the Committee for Indian Education. On the basis of these proposals, the National Training Board (NTB) undertook research on the matter. The study identified a market failure in operation as the cost of technikon training was too high for individuals to carry and yet firms were unwilling to carry the cost of general education ('*algemene opleiding'*) as opposed to those for specific training ('*spesifieke opleiding'*). However they did not recommend a tax-break for a full technikon programme, principally because of the cost implications for the state and their belief that the

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[181] National Training Board, 1985, *Die finansiering van Technikon opleiding en verdere opleiding van ambagsmanne,* Ref. 32/8/5/5/1/4. Copy in BOCET Technicians EXCO 1983-91.
[182] Smit, *Education and Training of Engineering Technicians in South Africa and Britain*, p. 28.
[183] *Ibid,* pp. 8-10.
[184] *Ibid,* p. 21.
[185] *Ibid,* p. 28.

private sector should contribute to the costs[186] - in spite of the fact that a tax break for sending apprentices to technical college for N1 – N3 study was already in place. However, they did recommend that tax breaks should be afforded for the work-experience periods, provided that these programmes were formalised and registered with the Department of Manpower (which was not actioned) and that a national body for co-operative education be established with the goal of establishing generous study bursaries for technikon and technical college study – a recommendation which complimented other initiatives and saw the South African Association for Co-operative Education (SAACE) being established in 1985.[187]

The only available alternative for poor students, unable to find a sponsoring company, was study by correspondence – which whilst still leaving the requirement for laboratory unaddressed, was an option which many pursued – for instance in 1980 there were almost 12 000 correspondence students.[188] Initially these programmes were managed from the correspondence department from the Wits Technikon, but in 1980 they were split off into a separate institution, Technikon RSA. A similar route was followed for the technical college system - on 15 December 1983, the establishment of the correspondence Technical College of South Africa.[189]

The solution?

The Goode Committee had recognised this problem and recommended that the CATES should provide bridging courses for apprentices or artisans seeking to upgrade themselves.[190] The BOCET had taken this recommendation on board, and in their 1983 establishment regulation, Category 1(b) and 2(c) for registering engineering technicians were created:[191]

Category 1 (b) Engineering Technician

Minimum age	21 years
Educational Qualifications	National Technical Diploma … plus a bridging course to the three-year National Diploma in Engineering.
Practical Experience	A minimum of five years' appropriate practical experience to the satisfaction of the Board of Control, with practical experience shall have been gained as an engineering technician after the applicant had fulfilled the educational requirements referred to above. (*Emphasis added – AB*)

Category 1 (b) Engineering Technician (Master)

Minimum age	30 years
Educational Qualifications	National Technical Diploma … plus a bridging course to the three-year National Diploma in Engineering.
Practical Experience	A minimum of ten years' experience as an engineering technician in an appropriate engineering technology, which practical experience shall have been gained after the applicant had fulfilled the educational requirements referred to

[186] National Training Board, 1985, *Die finansiering van Technikon opleiding en verdere opleiding van ambagsmanne,* p. 37 (TEG. E 85/106).

[187] Pittendrigh, *Technikons in South Africa*, p. 215.

[188] Lurie, *A History of Wits Technikon*, p. 151.

[189] 15 December 1983 of the correspondence Technical College of South Africa. Government published Notice number 2768. BOCET accepted see TECHNI. EAC 87/13, 4 November 1987.

[190] Goode Report, Recommendation A7.27, p. 68.

[191] Government Regulation No. R. 1500, published 8 July 1983, Annexure A.

above: Provided that of the said 10 years, three years of the last six years shall have been gained in a post which, in the opinion of the Board of Control, is one of responsibility: Provided further that five years of the 10 years' experience referred to shall have been gained during a period of six years immediately prior to the applicant's date of application for registration. [*Emphasis added*]

Did this happen? Well it had not happened by 1984 if the Association of Technical Colleges is to be believed. In June of that year they wrote a formal letter to the Registrar of the Board of Control for Engineering Technicians stating:

> *In the case of the educational requirements the holder of a National Technical Diploma cannot comply with the so-called bridging course requirement, because it simply does not exist. This effectively excludes the holder of this qualification from applying for registration on an extremely unfair basis i.e. it is impossible to comply with the requirement.*[192]

Undeterred, in 1984, the Committee of Technikon Principals (CTP) developed their own guideline:

Guidelines to convert and N-Course qualification to a T-Course qualification

1. Conversion to the T-courses may commence from N4-level.
2. The pass mark of the N-course subjects must be at least 50%.
3. Persons in possession of an N4 certificate may be admitted to all the first semester subject examinations of the National Diploma (Engineering) of their choice at a technikon. A candidate may pass with a 50% examination mark without having obtained a year mark.
   The holders of an N5-certificate and the National Technical Diploma may be admitted to the examinations for the second and third semesters respectively of the relevant National Diploma courses.
   NOTE: Admission to the subject examinations must be discussed with the Directors of the Schools of the Technikons concerned with this matter. It may be necessary for candidates to achieve subject successes in previous semesters before being admitted to the relevant semesters. If a candidate requires tuition in a particular subject, it should normally be available at t technikon.
4. Using the above as a guide, conversion should take place as follows:
   - 4.1 Holder of an N4 certificate
     The candidate writes all semester 1 subject examinations of the course concerned. The successful candidate then enters for semesters 2 and 3 at the technikon to complete the National Diploma.
   - 4.2 Holder of an N5 certificated
     The candidates writes all semester 2 subject examinations PLUS Communications ... and Engineering Mathematics (if a course requirement)
     The successful candidate then proceeds with semester 3 to complete the National Diploma
   - 4.3 Holder of the National Technical Diploma
     - 4.3.1 The candidate writes all semester 3 subject examinations and obtains, if successful, admission to the Higher National Diploma.
     - 4.3.2 The candidate writes all semester 3 subject examinations PLUS Communication... and Two other subjects (if a course requirement. The successful candidate obtains the National Diploma and admission to the Higher National Diploma.

   Note: The holder of an N6 certificate must first obtain the National Technical Diploma.

[192] ECSA archive, TEG. EAC 84/40, Letter from A.T.Jackson, Member of the Education Advisory Committee on behalf of The Association of Technical Colleges to the Registrar, Board of Control for Engineering Technicians, Marshalltown, dated 19 June 1984.

5. Acceptable in-service training is necessary for the award of National Diplomas to persons who have converted.[193]

The BOCET received the letter with gratitude and resolved:

die dokument as riglyn gebruik word en dat elke geval op meriete behandel sal word.[194]

[The document is used as a guideline and that each case will be treated on merit]

This did not amount to a bridging 'course' however – and often required periods of fulltime study which those in employment could ill-afford.

Apprentices or artisans with NTC 6 would still have to write the T3 examination and would have had to somehow undertake the prescribed laboratory work if they wanted to attain a NDT.

Eventually the benchmark route for a technician was also established, a National Diploma from a Technikon, with entrants from other routes having to undertake the final year examination of the benchmark route for registration. Advancement from artisan to technician was to write benchmark examinations, and pass. This even took the same form for the technicians at the end of the day:

Part III - National Diploma (obtained at Technikon)
Part II - National N Diploma (obtained at Technical College)
Part I - National Senior Certificate
National N3 Certificate[195]

The view of the Association of Technical Colleges

On 22 February 1989 Mr LN Bentley, a Past Chairman of the Association of Technical Colleges gave a presentation at the CSIR on 'Links between Technical Education and Training: The roll of the technical colleges'. In his presentation he cited two key problems facing the colleges: (1) The admission of students (trainees) of the other population groups and (2) Failure to recognise and/or promote the National N-Diploma as an alternative route for the registration as an engineering technician. The first problem speaks for itself, but here is how he described the latter problem:

Problem
There are definite indications that the T3 technikon qualification is being favoured and propagated as the 'only' avenue for registration as an engineering technician.
Alternatively: the alternative routes or registration as an engineering technician, which include the National N Diploma route, are not being promoted.

Why technical colleges are concerned
Technical colleges foresee two major problems should this tendency continue:
(i) it is a discriminatory practice, not only against the N-courses but also against members of the black, coloured and asian population groups.

[193] Annexure to letter from The Committee of Technikon Principals to The Registrar of the SA Council for Professional Engineers, 1984-07-13 in TEG.EAC 84/42.
[194] Registrasie 6.3 (Kode TEG. EAC 6.3.8.84), TEG. EAC 84/101.
[195] BOCET EAC, 27 July 1988, item 5.3.4, Techni EAC 88/33.

(ii) The cost of technikon courses as an alternative to technical college courses is not within the financial means of the R.S.A.[196]

He concluded his presentation with the following;

In conclusion, the Association of Technical Colleges believes that:

1. Technical colleges have a vital role to lay in the education and training of the artisan and technician manpower of the RSA.
2. Technical colleges are by far the most cost-effective post-school educational institutions …
3. The registration as engineering technician of the N-Diploma students, with suitable practical experience, should be encouraged and not discouraged.
4. Technical colleges should be represented on all the Boards of Control to represent college interests.
5. Boards of Control, who believe that college courses have short comings, which they obviously have, should enter into negotiations with the Association of Technical Colleges so that these shortcomings can be addressed. Follow the example set by the Board of Control of Certificated Engineers.
6. Some of the trades introduced with the introduction of modern technology in the mines and industries are just as abstract and sophisticated as the functions of the technician. These trades should be evaluated on content and not on name. [197]

But for all that he addressed such critical constrains – racism and affordability - his voice was not heard. He did not have the support of either the profession or the government – although he did have the support of many employers.

The employers respond

The employers were sympathetic to the technical colleges for they too were concerned about the shift in emphasis from technikon to technical college training and the restriction it imposed on the advancement of artisans.

They had initially opposed the semester system, and urged that technicians be trained through a block release system. Although initially trialed, the semester system was reintroduced by recommendation of the Good Committee. The lukewarm attitude of employers led to a lack of registration with BOCET and informed their response to the growing preference given to technikon NDT away from the traditional NTD. This is confirmed by an exchange of letters between SEIFSA and BOCET. For instance, on 10th February 1988 the BOCET considered a letter from SEIFSA[198] in which the employers expressed concern that the possible changing of the criteria for the registration of holders of N6 certificates:

SEIFSA LETTER TO BOCET

10 February 1988

Registration with the Board of Control for Engineering Technicians

[196] L.N. Bentley, 1989.02.18, 'Links between technical education and training: the roll of technical colleges', EXCO DR/38 [EXCO: 89.04.19], 89/293 – 89/301, quote 89/298. C3.

[197] *Ibid,* quote 89/300.

[198] Letter dated 22 October 1987 see CR/157 op. bl. 555 van die Bylaeregister, cited in Techni, EAC 88/4.

It has come to our attention that there is a proposal to the effect that holders of N6 certificates and appropriate experience will no longer be eligible for registration with the Board of Control.

We would like to express our strongest objection to the proposed change as we feel that it is essential that eligibility for registration should be based on appropriate education and demonstrable competence and that a specified formal education requirement such as a T course qualification should not be the primary criterion for acceptance.

In view of the large number of engineering technicians in the metal and engineering industry, we hope that you will take cognisance of our views and ensure that consideration is given to acceptance of a flexible registration policy so as to allow suitable N6 candidates to register with the Board of Control.

Yours faithfully,
B. Angus, Executive Director[199]

BOCET responded in the following vein:

(a) Holders of the Full National Technical Diploma (N6) are not precluded from applying for registration. Applications from such individuals will therefore be considered but it is incumbent on the applicant to prove to the Board that he had functioned on the level of an engineering technician for at least five years.
(b) The Board is not considering changing this policy.[200]

The central phrase here being 'had functioned on the level of an engineering technician for five years' – which they used to ensure applicants had had 'mental' and 'managerial' as well as 'manual' responsibilities for the specified time period[201].

Some employers conceded the non-equivalence of the two streams – such as Mr Van Wyk, the Divisional Training Superintendent (Engineering) of Anglo American Corporation had shown (with 9 months tertiary level theoretical training up to N6 in technical colleges and 24 months to T4 in technikons) [202], nevertheless, judging from SEIFSA's letter, they were less concerned about the theoretical shortcomings of 'N' courses than was the profession, particularly in the light of the growing shortage of technicians which a Manpower survey estimated had risen from 3.3 % to 10,8% between 1977 to 1981[203]. Their response was, in the main, to provide firm specific training

[199] Letter from B Angus to Mr P Gous, Registrar, Board of Control for Engineering Technicians, 22 October 1987, CR ANNEX REG Technicians 1987, CR/157.
[200] BOCET, Besluit (Kode TEG. E6.4.1.5.10.87) Techni. EAC 88/4.
[201] 'Acceptable work for registration as engineering technician', Appendix A, CR ANNEX REGISTER Technicians, 1987, pp. 567-8.
[202] Letter from S. Van Wyk to The Registrar, Board of Control for Registered Certificated Engineers, 27 December 1989, ECSA, DR Annexure Register Certificated Engineers 1989, 90/106 – 90/107 [DR/16, EAC: 90.03.23].
[203] National Training Board, 1985, *Die finansiering van Technikon opleiding en verdere opleiding van ambagsmanne,* p. 6, (TEG. E 85/75)

and not require or encourage their 'technicians' to register – which, as Tom Cooper previously explained, was a continual issue of concern for BOCET.

However, to suggest that this was the *only* employer response at this time is very misleading – as has already been seen in the previous chapters, this constituency was very active. And in addition to their pragmatic initiatives they also resolved to intervene on the policy level. In November 1989 the main employer organisations in existence at the time: Afrikaanse Handelsinstituut; Building Industries Federation of SA; Chamber of Mines; SA Chamber of Business; and the Steel and Engineering Industries Federation of SA (SEIFSA) convened an education conference and there agreed 'that these organisations would formalise and unify the action that is required to get what employers want from South Africa's education system'.[204] They formed the Private Sector Education Council (PRISEC). This body set itself a much wider mandate than engineering education:

> PRISEC's goals are to work constructively and creatively, positively and pragmatically for an education system:
>
> - That is genuinely non-racial, non-sexist, unified and decentralised;
> - That is legitimate, appropriate and affordable;
> - That, among other things, gives pupils and students life skills and work skills that enable them to be employed, or to create employment for themselves and others;
> - That gives the private sector, as well as other interest groups and stakeholders, the right to be consulted about the goals, content, processes and structures of education; and
> - That helps South Africa to be a responsible non-racial democracy in which the dignity and rights of the individual, and in particular, freedom of association, are guaranteed. [205]

However, considering how to implement these goals PRISEC identified the need to

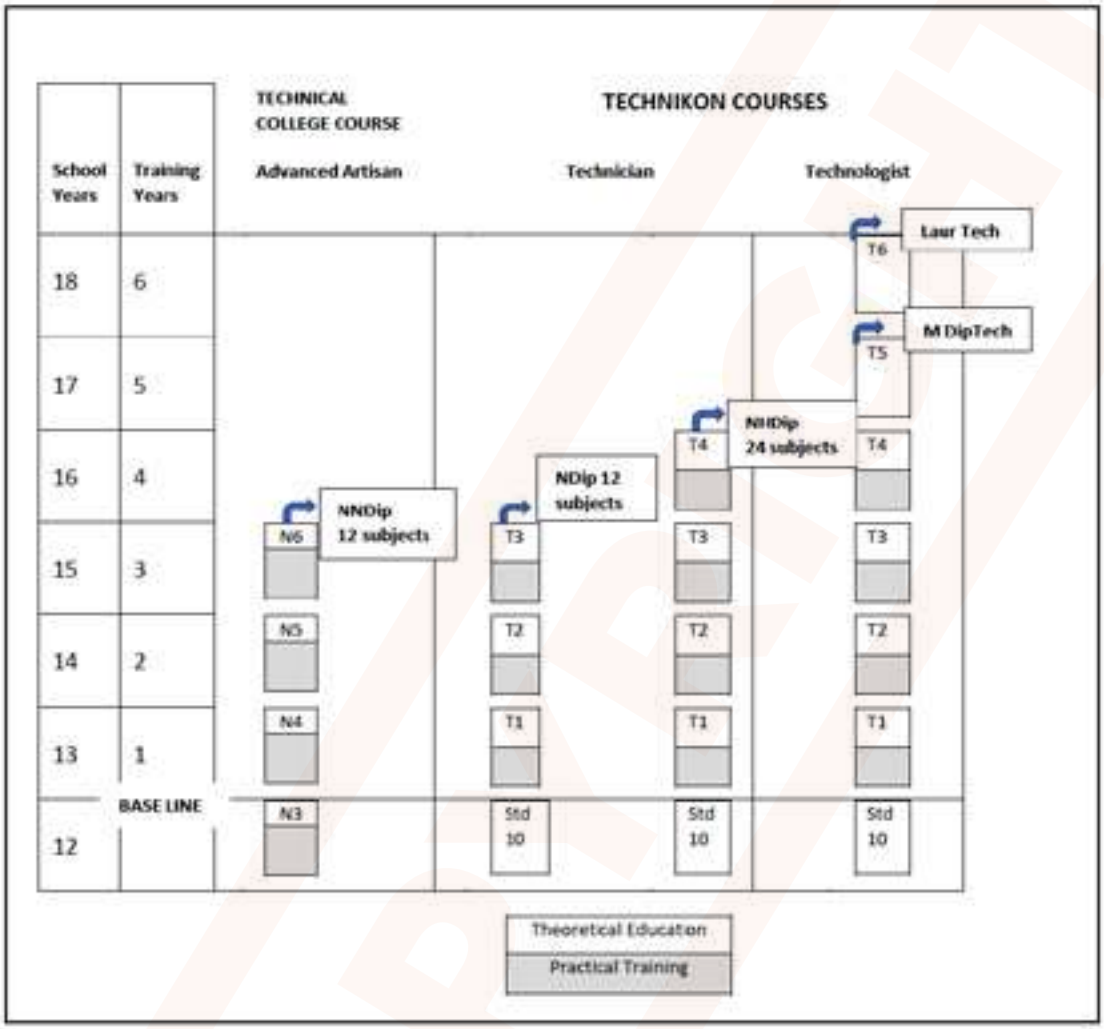
> *highlight the importance of mathematics, science and technology in the national economy and the need to re-allocate priorities and resources so that these areas of education can be strengthened*

and in the post school sector

1. It is proposed that the entire post-school sector should be seen as a unit and that it be planned as a whole. This could be achieved by extending the functions of the University and Technikons Advisory Council (AUT) to include technical college and teacher education with increased participation by the private sector in AUT activities.
2. Far greater interaction between the private sector and the technical colleges should take place to ensure that technical college courses meet the needs of employers and that employers, as a result, would make more use of the technical colleges.
3. That a campaign be mounted by the state and the private sector to ensure a rapid expansion of the technical college sector, rather than creating a new form of institution such as the intermediate college, bridging colleges or private sector community colleges. These colleges should be open to all population groups and it should be ensured that there is an adequate geographical distribution of technical colleges to provide accessibility to technical college courses in the remoter geographical areas. [206]
4. That in the process of co-ordination, attention be given to the interface between institutions in the post-school sector so that there may be adequate transferability of credits obtained in one type of institution should a student wish to move between the technical colleges, teacher training colleges, technikons and the universities. *(Emphasis added]*

[204] PRISEC, pamphlet issued 17 August 1990. Copy found, unfiled, in ECSA archive.
[205] *Ibid.*
[206] *Ibid.*

Fig 10.3. The prevailing South African situation for technical courses post 1981 and shows the proportion and amounts of theoretical education and practical training required for each training year, as well as the normal entrance qualification level.[207]



Source: Smit, *Education and Training of Engineering Technicians in South Africa and Britain,* p. 5

EVALUATION AND IMPACT

[207] Smit, *Education and Training of Engineering Technicians in South Africa and Britain,* p. 5.

The proposals by PRISEC show a quite different emphasis to those advocated by the engineering profession that preferred an expansion of the technikon system - indeed it is closer to the initial 'sweeper to engineer' proposition of NUMSA.

As for a 'trade union' voice – the profession stood in its stead and there is little doubt that they preferred the industry-supported technikon-based programme, but the 'silence from the excluded' – the craft unions in particular - is deafening. Had they expressed their view they might have pointed out that there was another important difference between the 'N' and 'T' routes – the former was open to all, whilst the latter was restricted to matriculants, although admittedly N3 was broadly accepted as its equivalent and so – provided 'N' to 'T' was possible, was not too much of a constraint. In general, it was true however that the matriculation was *the* divide between secondary and post-school training.[208]

So, for all that the employers and technical colleges opposed the shift, and the Certificated Engineers were antsy, the career path from artisan to technician was crumbling.

Even more so, the engineering profession was becoming more formalised, with professional bodies and international accords serving engineers, technologists and technicians, but excluding artisans.

The introduction of international engineering standards and recognition

With the advent globalisation, and the transient nature of engineers working on projects in a variety of countries, a number of international agreements or accords govern the recognition of engineering qualifications and professional competence.[209] In total there are seven accords, to which South Africa is signatory to three:

The International Engineering Alliance: Washington Accord

In 1989, six founding signatory organisations from Australia, Canada, Ireland, New Zealand, the United Kingdom and United States of America found that there were substantial similarities in the academic requirements for entry to the practice of engineering in each of their countries. They agreed in the accord to grant the same rights and privileges to graduates of other programmes accredited by other signatories as they granted to their own programmes.[210] A defining characteristic of professional engineering is the ability to work with complexity and uncertainty on complex engineering problems and activities. Recognition of accredited programmes is not retroactive but takes place from the date of admission of the country to signatory status. South Africa became a signatory in 1999.

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[208] This point was stressed by the Van Wyk de Vries Commission in 1974, cited in Pittendrigh, *Technikons in South Africa,* p. 183.

[209] International Engineering Alliance (2019), official Website, www.iea.com, downloaded 7 November 2019.

[210] International Engineering Alliance, *25 years Washington Accord: 1989-2014, Celebrating international engineering education standards and recognition*, 2014, p. 13.

> The Washington Accord model has become the international gold standard for mutual recognition of engineering education – George Peterson, Washington Accord Secretariat, 2001-2007.211

The Sydney Accord

The Sydney Accord for technologists was signed in 2001 to cover equivalence and international recognition for educational programmes for engineering technologists (or incorporated engineers as they were known in the United Kingdom). South Africa is one of nine signatories. The graduate attribute specification refers to broadly defined engineering problems.[212]

The Dublin Accord

Signed in 2002, the Dublin Accord covers equivalence and international recognition for educational programmes for engineering technicians. Most Dublin Accord qualifications are post-school diplomas of two years. The graduate attribute specification refers to well defined engineering problems.[213] South Africa is one of eight signatories.

The Engineering Profession Act of 2000 (No. 46 of 2000)

This revised Act provides for the establishment of the Engineering Council of South Africa (ECSA) to provide for the registration of professionals, candidates and specifies categories of the engineering profession, and also to provide for regulation of the relationship between ECSA and the council for the Built Environment.[214] The ECSA also represents South Africa at the International Engineering Alliance. It serves to set standards for education and professional competence, evaluates and accredits educational programmes, assess competency of applicants for registration, maintains a register of registered professionals, sets and enforces professional codes of conduct and investigates misconduct.

[211] *Ibid,* p. 20.
[212] *Ibid,* p. 22.
[213] *Ibid,* p. 22.
[214] Engineering Profession Act, 2000, No.46 of 2000.

CHAPTER 11

PRE- AND POST-DEMOCRACY

Freedom of Trade, Occupation and Profession
22. Every citizen has the right to choose their trade, occupation or profession freely.
The practice of a trade, occupation or profession may be regulated by law.
The Constitution of the Republic of South Africa. [1]

PEOPLE AND PLACES

To isolate one or two people is simply not possible for this Chapter. Many people and groups have contributed to the reform of education and training. To illustrate this, the membership of two committees is described. The first lists members of the National Training Board that developed the National Training Strategy Initiative (NTSI).

Table 11.1. Members of the National Training Board , 1994.

National Training Board (1994)[2]		
Constituency	**Organisation**	**Name**
State	Chairperson	R. Eberlein
	Department of Manpower	D. Haasbroek
	Department of National Education	G. Niebuhr
	Department of Education and Culture, House of Assembly	F.A. Booyse
Trade unions	Congress of South African Trade Unions	S. Morotoba
	Congress of South African Trade Unions	A. Bird
	Motor Industries Employees Union of South Africa	P.J. Pienaar
	Federation of SA Unions	B.J. van der Walt
Business	Afrikaanse Handelsinstituut	L.P. Bartel
	Transnet	P.J. Britz
	Chamber of Mines	A. Diepenaar
	Eskom	G.F. Lindéque
	Steel & Engineering Industries Federation of South Africa	J. Lopez
Prof. body	Engineering Council of South Africa	R.S. Loubser
Providers	Association of Regional Training Centres	D.F. Küsel
	Federal Committee of Technical College Principals	R.P.de Stadler

[1] *The Constitution of the Republic of South Africa,* Chapter 2, Bill of Rights.

[2] National Training Board, *A Discussion Document on A National Training Strategy Initiative: A Preliminary Report by the National Training Board*, April 1994, Foreword.

	Committee of Technikon Principals	A. du Preez

The second list is of the Executive Committee members of the *National Education Policy Investigation* process.

Table 11.2. Executive Committee members of the National Education Policy Investigation.

National Education Policy Investigation, Executive Committee[3]	
Chairperson	Jakes Gerwel
National Education Coordinating Committee Office Bearers	Ihron Rensburg
	Angie Ramarola
	James Maseko
Education Development Trust Office Bearers	Ivy Matsepe-Casaburri
	Joel Dikgole
National Education Policy Investigation Coordinators	Nick Taylor
	Isobel Gabashane
Congress of South African Students	Mfusi Klaas
Congress of South African Trade Unions	Mapete Leeu
	Welcome Ntshangase
	Rahmat Omar
South African Democratic Teachers Union	Duncan Hindle
South African Students Congress	Bronwyn Levy
Union of Democratic University Staff Associations	Susanne Booysen
ANC Department of Education	John Samuel
	Lindelwe Mabandla
Principles and Framework Committee Chair	Njabulo Ndebele
People's Education Commission Convener	Dirk Meerkotter
Education Policy Unit University of Durban-Westville	Enver Motala
Education Policy Unit University of Natal	Blade Nzimande
Education Policy Unit University of the Western Cape	Harold Wolpe
Education Policy Unit University of the Witwatersrand	Linda Chisholm
Midlands Education Development Unit	John Gultig
Education Development Trust Board of Trustees	Charles Villa-Vicencio
Rural campus representative	Tebogo Moja
Representatives from research groups and Editorial Group members	

[3] National Education Coordinating Committee, *The National Education Policy Investigation: The Framework Report and Final Report Summaries*, Cape Town: Oxford University Press, 1993, p. 61.

There are significant differences in the composition of the two groups. The membership of the National Training Board reflects the concept of 'tripartism' (state, labour, business) such as embodied in the work of the International Labour Organisation (ILO) and other European vocational system – with the addition of providers (putting aside the obvious racism in the selection process in South Africa). The **National Education Policy Investigation, Executive Committee** is made up principally of educationalists drawn from different communities, and follows more the approach of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The names cited are illustrative only of the many academic researchers, activists, industry training board managers, local and international policy advisors, who helped along the way. Their contribution must be acknowledged.

POLITICAL ECONOMY

Pre-April 1994

Economic growth boomed in the 1960s, with an annual average rate of GDP growth of over 9 per cent between 1963 and 1968.[4] This was also the time when liberation movements and their leaders were banned and driven underground. Economic growth was supported by, in Innes's words: 'the 'blocked rand system,[5] (and) the diversification of investments by some of the big mining groups especially into industrial, commercial and financial enterprises'.[6] As the economy boomed, investors flocked into the country, with foreign capital inflows rising from R255 million in 1965 to R501 million in 1970.[7]

The investments by the mining companies contributed to the development of a highly centralised, monopolistic economy, owned by a handful of extremely powerful players. It also heralded in the relative decline of agriculture and mining vis-à-vis manufacturing and finance.[8]

The buoyant economy led to a massive growth in the demand for labour. 'The number of manufacturing employees increased by 63 per cent between 1960 and 1970 and those in construction by a massive 182 per cent over the same period. Black workers were major beneficiaries of this phase of job creation: by 1968 they comprised 75 per cent of the total employed in manufacturing and 81 per cent in construction.'[9] However their wages did not keep pace with Inflation:

> In the early 1970s, inflation eroded wages as labour confronted price rises of up to 40 per cent on basic goods; in 1973, the average African pay was R13 a week, well below the R18 stipulated by the Poverty Datum Line.[10]

The first sign of resistance to these declining conditions for workers was a wave of strikes in Durban in 1973 as 70 000 workers demanded living wages.[11] These strikes led to the emergence of a strong militant, predominantly black, industrial trade union movement,

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[4] D. Innes, 'The History and Structure of the South African Economy', in Gill Marcus (ed.), *Visions of Black Economic Empowerment*, Jacana Press, 2007, pp. 49 – 73; p.59.
[5] A system introduced to slow the outflow of capital.
[6] Innes, 'The History and Structure of the South African Economy', pp. 49 – 73; p. 59.
[7] Innes, 'The History and Structure of the South African Economy', pp. 49 – 73; pp. 59-60.
[8] Forrest, *Metal that will not bend,* p. 6.
[9] Innes, 'The History and Structure of the South African Economy', pp. 49-73; pp. 59-60.
[10] S. Friedman, *Building Tomorrow Today*, Braamfontein: Ravan Press, 1987, cited in K. Forrest, *Metal that will not bend,* p. 8.
[11] Forrest, *Metal that will not bend*, p.8.

supported by left-leaning academics at the Natal University (Durban and Pietermaritzburg campuses). Similar developments occurred on the Witwatersrand and in the Cape supported by academics associated with the Universities of the Witwatersrand and Cape Town. The demands that emerged from these unions, and later from the Federation of South African Trade Unions (FOSATU) which they formed in 1979, was for a living wage and an end to racist labour practices more generally. This brought significant pressure on the state and capital.

A second source of pressure was students. Early signs were expressed by the black universities, where, under the leadership of Steve Biko, the Black Consciousness Movement was born. This developed into a wider struggle, which erupted on 16 June 1976, when many thousands of students (including those who later became members of the NUMSA Training RDG) campaigned against the use of Afrikaans in classrooms and more broadly for an end to Bantu Education. These struggles came to be known as the 1976 Soweto Student uprisings. These developments, together with the increasing imposition of sanctions by the international community, for which the ANC was campaigning, and the intensified action of *Umkhonto weSizwe*, the military wing of the ANC, led to a dramatic decline in growth. Real gross domestic fixed investment fell sharply from R17.6 billion in 1981 to R12.8 billion in 1986 and GDP growth fell first to 3 per cent between 1972 and 1981 then to 1 per cent through the 1980s.[12]

> Slow growth resulted in excess capacity and a low return on private investment. Although one should treat the figures with caution, capacity utilisation of manufacturing plant declined from 90 per cent in 1981 to 84 per cent in 1985 and 78 per cent in 1993. As a result of low investment, economic stagnation was accompanied by growing obsolescence of capital stock and declining competitiveness. Imports increased faster than exports, and stagnant output was associated with inflationary pressures. From 1972 to 1992, the average rate of inflation was 14 per cent, with annual rates ranging from 11 to 21 per cent.[13]

The National Party government, led by PW Botha responded to the declining economy and increasing social unrest with what it termed a 'total strategy' to fight what it saw as a 'total onslaught'.

> The strategy aimed to reduce foreign pressure on apartheid, remove the Marxist ANC from South Africa's borders, and promote a black middle class to counter radical township activity. On the labour front, the Riekert and Wiehahn Commissions were appointed to investigate the pass laws and labour legislation respectively. In 1979, the Riekert Report recommended that the African population be divided into urban 'insiders' with residence rights and homeland 'outsiders'. Simultaneously, the Wiehahn Commission recommended that Africans be brought into the statutory industrial relations system and that job reservation be scrapped. In 1979 the minister of labour abolished job reservation – except in mining – and metal employers and the white unions agreed to end closed shop agreements barring Africans from certain grades of work.[14]

Following the Wiehahn Commission, the Manpower Training Act No. 56 of 1981, was passed.

Implementing the 'Total Strategy' needed money which the state did not have. Its debt had risen dramatically and tax income declined. To increase revenues the government began to privatise state-owned companies like the Post Office, Eskom, South African Transport services and ISCOR. As the left-wing Community Resources and Information Centre (CRIC)

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[12] Innes, 'The History and Structure of the South African Economy', pp. 49-73; p. 59.
[13] G. Standing, J. Sender, J. Weeks, *Restructuring the Labour Market: The South African Challenge, An ILO Country Review*, Geneva: International Labour Office, ILO, 1996, pp. 24-5.
[14] D. O'Meara, *Forty lost years,* Johannesburg: Ravan Press, 1996; M. Murray, *South Africa, Time of Agony, Time of Destiny*, London: Verso, 1987, cited in Forrest, *Metal that will not bend*, pp. 9-10

expressed it: 'The main motivation of the South African government appears to be their desperate need for money. The state could probably earn up to R250 billion from privatisation. This would be enough money to wipe out the painful foreign debt of R60 billion and also put resources into its reform programme.'[15] In the late 1980s both Iscor and Sasol had been sold, but privatisation ceased between 1990 and 1994 in the face of rising opposition.[16] But other state-owned companies were commercialised, meaning they were made to work to more 'market' principles. This was to lead to cutbacks in the training budgets of these enterprises for the market.

Big business supported privatisation, looking to pick up profit-making concerns as part of its diversification drive. It was strongly opposed by the unions since privatisation routinely resulted in the restructuring of enterprises and job reductions.

The implementation of the 'Total Strategy' involved brutal interventions by the government (a number of NUMSA RDG members were detained) and opposition to it intensified.

> The extent of the political and economic crisis that confronted apartheid by the late eighties was so severe that even the ruling National Party came to realise that the '*kragdadigheid*' (forcefulness) approach that had been adopted by its leader PW Botha and expressed in his 'Total Strategy' was doomed to failure. As white business and Afrikaans leaders began putting out feelers to the ANC, it became clear that political change was in the air. In 1989 the National Party unceremoniously removed PW Botha from power and replaced him with FW de Klerk. Despite having a conservative background in previous cabinets, de Klerk understood that the only peaceful way forward for South Africa was to negotiate a transition to democracy in South Africa with the liberation movement. In February 1990 he set this process in motion by unbanning various political organisations, including the ANC, Communist Party and PAC and releasing their leaders from prison. The following year constitutional negotiations began and, despite a difficult few years during which mass killings occurred on an unprecedented scale in South Africa, peaceful democratic elections were finally held in 1994.[17]

In this context everyone was 'repositioning' themselves. According to Bryan Philips, head of training at Gencor, the large, Afrikaner-based mining conglomerate and later a leading negotiator on training matters for business in the National Training Board, commented:

> The big issue was less the political change as such and much more the impact of the re-integration into the global capitalist world. Eskom had access to coal at half the price from Columbia and Australia and other new producers. The productivity imperative in the mining industry was overwhelming. … (For example) we had to cut and cut and cut and cut in manganese. We got the production costs down to half what it had been five years previously and still we were told the costs had to reduce.[18]

From a trade union perspective these were bleak times. As Forrest explains:

> The response of business to declining profits was to cut costs by mechanising and reorganising production – which destroyed thousands of low-skilled jobs in the metal industry. Retrenchments sapped the unions' factory base and exposed members and shop stewards to victimisation.[19]

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[15] Community Resources and Information Centre, 'Privatisation in South Africa'*, South African Labour Bulletin*, 14(3), August 1989, pp. 58-9.
[16] A. Hirsch, *Season of Hope: Economic Reform under Mandela and Mbeki*, University of Kwa-Zulu Natal Press and International Development Research Centre, Ottawa, Canada, 2005, p.47.
[17] Innes, 'The History and Structure of the South African Economy', pp. 49-73; p. 64.
[18] Interview with Bryan Phillips and Annamarie Rademayer, 26 August 2006.
[19] Forrest, *Metal that will not bend,* p. 36.

This cost-cutting avalanche was also affecting the state-owned companies. In the Post Office a new union, principally for black workers, was launched in 1986, the Postal and Telecommunications Workers' Association (POTWA). It joined the militancy of its sister unions organising four major strikes over wages for 'unskilled' workers and general assistant grades 1 - 11 in the first year of its establishment. The union took a serious knock when only 1400 out of 3000 workers that went on strike were re-employed, with 'skilled' workers being given preference.[20]

In defence of the 'invisible hand of the market' arguments, Bryan Philips recounted an exchange between him and Derek Keys, then the CEO of Gencor:[21]

> I once asked Keys 'You are well known as being a deeply committed Christian. How do you reconcile your Christianity with heading up a company that went from 250 000 employees to 90 000 employees over the last few years? And he said if he didn't cut then the last 100 000 wouldn't have a job. And he was right, as soon as we were opened up to international competition our mines here fell like … Mid-90s. Think of JCI, Rand Mines – where are they – they're gone! [22]

In spite of these challenges, the unions grew. In 1985 a number of the independent trade union federations merged to form the Congress of South African Trade Union (COSATU). Initially it was allied informally to the ANC and the SACP, but only did so formally once these organisations were unbanned. In 1986 COSATU convened a group of left-leaning economists, the Economic Trends (ET) Group, to advise it on the stand it should take to defend its position on the imposition of sanctions. Its remit was broadened later to cover the economy more broadly. The interface with COSATU was primarily through Alec Erwin, who was also encouraging the establishment of Research and Development Groups (RDGs) in other policy areas (such as Training) at the same time. The work of the ET Group, together with a wide range of work within and for the ANC,[23] ultimately resulted in **The Reconstruction and Development Programme** (RDP) which was the policy platform on which the ANC entered into the April 1994 elections. It was based on six basic principles (an integrated and sustainable programme, a people-driven process, peace and security for all, nation-building, link reconstruction and development and democratisation of South Africa) and consisted of five key programmes:

- Meeting basic needs;
- Developing our human resources;
- Building the economy;
- Democratising the state and society, and
- Implementing the RDP.[24]

In 1990 COSATU established the Industrial Strategy Project (ISP) to promote manufacturing as key to future growth. This produced four key recommendations: creating employment;

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[20] 'Interview with Vusi Khumalo', President of POTWA, conducted by Coletane Markham and reported in the *South African Labour Bulletin*, 13(1), November 1987, pp. 16-21.

[21] Derek Keys was instrumental in the establishment of the National Economic Forum and later joined De Klerk's government. He was appointed the first Finance Minister in the ANC-led government of 1994, and [in Bryan Phillip's view] 'the effectiveness of the handover was evidence of this.'

[22] Interview with Bryan Phillips and Annamarie Rademayer, 26 August 2006.

[23] This work is outlined in Hirsch, *Season of Hope,* Chapter 2.

[24] African National Congress, *The Reconstruction and Development Programme*, Johannesburg: Umanyano Publications, 1994, p. 7.

increasing investment, raising productivity and improving trade performance.[25] In order to create employment, COSATU argued that greater focus on labour-intensive sectors was needed, particularly downstream components of chemicals and base metals, together with renewed emphasis on labour-intensive sectors such as clothing, leather and footwear.[26]

Somewhere in this mix was workplace transformation (enhancing 'worker control'). The ISP fully supported the Training RDG's proposals:

1. *A wage-skill nexus*: the establishment of a nexus between skills, grading, training and wages, which attaches a particular wage-relativity to a given skill.
2. *An approach which stresses cooperation and skills in the development of work organisation*: leading to working conditions that deliver more interesting and rewarding jobs while promoting greater efficiency.
3. *Democratic practices in the workplace*: decentralised structures of decision-making necessary to develop a cooperative and skilled approach to the design of products and processes.[27]

In other words, the industrial policy and the training strategy were aligned, and should apply, even in the proposed labour intensive sectors.

Post April-1994

Initially the RDP stood as the cornerstone of policy and an RDP Office was established:

> The establishment of an RDP office, in the Office of the President…, was an attempt to finesse both the problem of mobilising financial resources, and the problem of the co-ordination of policy and implementation of programmes. But the RDP office was never able to deal with the problem that its functions were in part a subset of those of the Department of Finance, and that its initiatives were, in part, seen as impositions on the line departments of government. This led to the disappointing performance of the RDP office as an institution, and to its dissolution early in 1996.[28]

The Asian model, on which the RDP Office was premised, would have given such a central planning office certain super-ordinate powers, but this did not happen.

This did not mean, however, that programmes initiated by the RDP were ditched. Rather they were carried forward by different line departments, only without the level of coordination originally envisaged between them. The South African economy did manage to respond positively to the demise of apartheid, with growth rising back into positive territory in 1993 and then rising to 4 percent in 1996, although the level of unemployment and poverty remained intractably high.[29] In response

> A group of officials, clustered around the Department of Finance and the Development Bank, and including senior officials from the Department of Trade and Industry and Labour, started working in late 1995 on a more focused macroeconomic policy document. Several academics

[25] A. Joffe, D. Kaplan, R. Kaplinsky, D. Lewis, *Industrial Strategy Project Report, Improving Manufacturing Performance in South Africa*, University of Cape Town Press, 1995, pp. 16 ff.
[26] Joffe, et al., *Industrial Strategy Project Report,* p. 16.
[27] Joffe, et al., *Industrial Strategy Project Report,* p. 87.
[28] Hirsch, *Season of Hope,* p. 60.
[29] Innes, 'The History and Structure of the South African Economy', p. 65.

were enlisted to test macroeconomic models, and World Bank economists who had worked on the South African model used in the 1994 World Bank paper were also drawn into the project.[30]

The result of these efforts led to the launching of the **Growth, Employment and Redistribution: A Macroeconomic Strategy** or GEAR as it was commonly called. It guided policy from 1996-2000. The Department of Finance summarised it under eleven headings including debt reduction, a reduction on tariffs to contain input prices and facilitate industrial restructuring, wage moderation, a speeding up of the restructuring of state assets including privatisation and a strengthened levy system to fund industrial training on a level commensurate with needs.[31]
GEAR was partially successful, with economic growth slumping to less than one percent in 1998, due mainly to international factors. It recovered slowly over the next two years to reach an annual growth rate of just over three percent in 2000, rising to 4.9 per cent in 2005.[32] Unemployment remained high and was getting worse.

In his State of the Nation Address on 3 February 2006, President Thabo Mbeki spoke about a new growth strategy, called the **Accelerated and Shared Growth Initiative of South Africa (ASGISA),** which consisted of a limited set of interventions intended to improve the implementation of key infrastructure projects, targeted industry policies and skills development as catalysts to accelerated and shared growth and development.[33]

> In this regard it is important to note that ASGISA represents a significant departure from the government's previous GEAR strategy. Where GEAR emphasised the government's desire to curtail public expenditure, ASGISA seeks to expand government expenditure as part of a strategy to enable the South African economy to achieve and sustain the target growth rate of 6 per cent per annum and to substantially reduce unemployment by 2014. Barring a domestic political crisis or a severe global economic crisis, these targets are achievable and could usher in a more prosperous economic era for the country and most of its people.[34]

The world economic crisis of 2008 again knocked the economy back and growth rates remain stubbornly below those necessary for the eradication of 'inequality, unemployment and poverty'.

EDUCATION AND TRAINING LANDSCAPE

Pre-April 1994

Apartheid government – Education

By 1981 the Nationalist Party's reform agenda ('Total Strategy') was already well underway:

> By 1981 sixteen 'technical centres' had been established by the DET in urban townships. 'The purpose of these centres was to introduce black schoolboys to elementary technical training',

[30] Hirsch, *Season of Hope,* p. 97.
[31] *Department of Finance (summary document)* 1996: 1-2, cited in Hirsch, *Season of Hope,* p. 99. [It can be noted however that the introduction of the skills levy in 1999 was the outcome of considerable pressure on the National Treasury from the Minister and Director-General of Labour at the time – personal experience.]
[32] Innes, 'The History and Structure of the South African Economy', pp. 65-6.
[33] Southern African Catholic Bishop's conference, Parliamentary Liaison Office, April 2006, http://noelimits.co.za/staging/CPLO2/pdfs/Briefing_Papers/2006/BP%20156%20ASGISA.pdf accessed 25 May 2019.
[34] D. Innes, 'The History and Structure of the South African Economy', p. 67.

> which would lead to technical high schools where a variety of training skills would be offered. There were at this time twelve technical colleges for blacks in 'white' South Africa and fifteen 'colleges' in the Homelands offering vocational training in such subjects as 'motor mechanics', electrical work and carpentry. The DET plans to erect another twenty-six 'technical centres' and another fourteen technical colleges.[35] … In 1981 there were also four technikons in South Africa catering for blacks – at Umlazi, Pietermaritzburg, Pietersburg and Mabopane East near Pretoria.[36]

At a policy level, in 1981, the Wiehahn and Riekert reports were published and:

> (w)hat Wiehahn and Riekert did for the establishment of a reformist initiative in labour relations and in the control of labour supply, de Lange has attempted for education, training and the supply of manpower.[37]

The de Lange Commission, headed by Prof J P de Lange, who was the rector of the Rand Afrikaans University, was based at the Human Sciences Research Council. Of the 26 members of his commission at least four were members of the Broederbond.[38]
Under the heading of 'Post Basic Education' the de Lange Commission proposed:

> Present secondary education will be divided into two phases and called 'post basic' education. The report recommends that after six years of basic schooling one of three futures awaits pupils:
> 1. They could be channelled into an academic school.
> 2. They could be channelled into a commercial or technical school.
> 3. They could leave the formal education system and enter into non-formal education. This could involve anything from in-service training to learning specific technical skills in a private institution. Thus De Lange identifies 'education' with 'formal' secondary education and 'training' with something else. Education in secondary, academic schools, is no longer compulsory.[39]

As a consequence of these proposals, Linda Chisholm describes how the Department of National Education (DNE) was reconstituted in 1984 in terms of the National Policy for General Education Affairs Act No. 76 of that year, and was concerned primarily with the general aspects of policy affecting all schools within an 'own affairs' education policy framework. She concludes that the DNE had become the home of the reformist wing of Afrikaner nationalism in education.[40]

These proposals were not introduced in full, as it became ever clearer that there was opposition to any form of apartheid policy. In the late 1980s, the government produced a

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[35] Rousseu, Director General of Education and Training, reported by Sowetan newspaper, 17 March 1981, and S. Maseko, 'Plan for black education to cost R63m', Rand Daily Mail, 17 September 1981, cited in P. Kallaway, *Apartheid and Education*, Johannesburg: Ravan Press, 1984, p. 27.
[36] S. Molefe, '*Why so few apprentices?*', Sowetan, 23 March 1981, cited in Kallaway, *Apartheid and Education*, p. 27.
[37] South African Labour Bulletin, volumes 5(2) and 5(4) 1979. The first volume, August 1979 was a 'Focus on Wiehahn' and the second volume, November 1979, was a 'Focus on Riekert'. Cited in Kallaway, *Apartheid and Education*, p. 24.
[38] Rand Daily Mail, 9 October 1981, http://www.historicalpapers.wits.ac.za/inventories/inv_pdfo/AK2117/AK2117-J3-21-AV2-001-jpeg.pdf accessed 28 May 2019.
[39] National Education Union of South Africa, '*De Lange … marching to the same order, Preface – One Year Later',* 1982, http://www.historicalpapers.wits.ac.za/inventories/inv_pdfo/AK2117/AK2117-J3-21-AV2-001-jpeg.pdf viewed 27 May 2019.
[40] L. Chisholm, 'From Revolt to a Search for Alternatives', in *Work in Progress*, 1986.

document, the *Education Renewal Strategy (ERS)* which Chisholm refers to as a 'negotiating agenda':

> The greater part of the ERS concerns the relationship between technical colleges, technikons and universities, or so-called post-secondary institutions. … (I)t is envisaged that changed admissions criteria and rationalisation and replacement of courses (including academic support programmes) at these institutions will enable universities to become centres of excellence, while technikons and especially technical colleges, renamed EDUKONS, will play a more important role. Although the desire is also expressed for 'a freer flow of students between the different post-secondary institutions,' access for black students to these institutions is likely to become more difficult. The idea is that EDUKONS should incorporate many of the bridging programmes currently offered at universities. The implication is that students with learning difficulties, often erroneously translated into black students, will be removed from the universities and educated at EDUKONS rather than at universities.[41]

These proposals were circulated but never formally negotiated and the progressive movement began its own policy development process.

Apartheid government – Training

In 1981 the Manpower Training Act, No. 56, was passed in the spirit of the 'Total Strategy'. Its passing marked the repeal of the many of the Acts discussed in earlier chapters,[42] and sought to bring all training legislation under a single umbrella. Most significantly, Chapter 2, Section 13 (5) (a) of the Act stated:

> Different conditions of apprenticeship may be prescribed … in respect of different classes of employers or apprentices, different designated trades and different areas, and in prescribing such different conditions, the Minister may apply any method of differentiation he may deem advisable: Provided that the Minister may not so differentiate on the basis of race, colour or sex.[43]

As the NUMSA RDG members recounted (see Chapter Two), this led to a flurry of recruitment by employers at black schools and colleges. This was the experience of Elias Kubeka but other artisan members of the RDG Group reported similar events:

> That was then, in 1980, the change of the Manpower Act to accept black apprentices. So the companies would come and make presentations to attract apprentices at the high schools. So

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[41] L. Chisholm, Draft Introduction, 16 January 1992, *'*A Negotiations Agenda in South Africa: The Education Renewal Strategy 1 & 2*'*, 'Human Resources Development' (Unpublished Discussion Paper, Johannesburg, circa 1992/3 p. 6.)

[42] Number and

year of law	Title of law	Extent of repeal
Act 37 of 1944	Apprenticeship Act, 1944	The whole
Act 28 of 1951	Apprenticeship Amendment Act, 1951	The whole
Act 38 of 1951	Training of Artisans Act, 1951	The whole
Act 28 of 1956	Labour Relations Act, 1956	Section 48A
Act 44 of 1957	Defence Act, 1957	Section 4(2)ter
Act 7 of 1958	Police Act, 1958	Section 34B(4)
Act 29 of 1959	Apprenticeship Amendment Act, 1959	The whole
Act 46 of 1963	Apprenticeship Amendment Act, 1963	The whole
Act 86 of 1976	Black Employees' In-Service Training Act, 1976,	The whole
Act 95 of 1979	In-Service Training Act, 1979	The whole

[43] Manpower Training Act (MTA), Act No. 56 of 1981, Government Gazette No. 7762, 9 September 1981.

> we filled in application forms and I was fortunate to be taken together with another group of students by Siemens. So I started my apprenticeship in 1981.[44]

It also permitted people like Petrus Mashishi, trained under the discriminatory Bantu Building Workers Act, to undertake a 'proper' trade test (see Chapter Seven). Petrus passed first-time in 1982 and became a qualified plumber, no longer 'just' a 'black building worker':

Figure 11.1. Manpower Training Act , 1981(Regulation 16) Certificate: Petrus Mashishi (Plumber).


REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF MANPOWER

Manpower Training Act, 1981
(Regulation 16)

Certificate

This is to certify that

PETRUS MASHISHI

identity document number 1-4572717-0

has passed a qualifying test in the trade/occupation

PLUMBER

in accordance with standards recognised by the National Training Board in terms of section 28 of the Manpower Training Act, 1981.

Registrar of Manpower Training

Number B 80/195

Date tested 23-2-1982

Date of issue 2-3-1982

The Manpower Training Act (MTA) abolished the National Apprenticeship Advisory Board and established the National Training Board (NTB). This had a range of functions including, to:

[44] Interview with Elias Kubeka, 29 February 2008.

(b) take steps for the establishment of uniform standards of training with a view to the control of and the promotion of the effectiveness of training;
(c) investigate the desirability and feasibility of a system according to which different grades of training are provided and persons are subjected to testing at different stages of their training;
(d) collaborate with the Department and other Departments of State and statutory bodies in connection with matters pertaining to manpower training;[45]

The National Training Board was active during the 1980s considering amendments to the MTA and, as fundamental change became inevitable in the eighties, embarked, in partnership with the Human Sciences Research Council, to consider training issues more broadly. In March 1991, the NTB/HSRC published the *Investigation into a National Training Strategy for the RSA* (NTS).

The ANC-aligned National Education Policy Investigation's Human Resources Development researchers (introduced under ANC Education below) called the NTS a 'remarkable document'. They summarised its central propositions as follows:

- Effective national co-ordination of all training efforts;
- Maximum flow of students between formal and non-formal training;
- Establishment of a system of national vocational qualifications (NVQs) which articulate with the formal education system;
- Establishment of a Certification Council for NVQs;
- Formation of a unified Department of Education; and
- Training to oversee and integrate the above.[46]

They suggested that at one level the proposals might seem to reflect those of the democratic movement. But closer inspection revealed a number of issues, including: the devolution of training to industry training boards and the privatisation of training; acceptance of the principle of voluntarism, ineffectual tripartism with limited advisory powers at national level; a high level of trust in the market as a regulating mechanism and a dual accreditation system located at both national and industry level.[47]

In 1991 COSATU was invited to send first one, then two, representatives to the National Training Board. Adrienne Bird and Sam Morotoba were nominated. They asked to add their signatures to the National Training Strategy Report so that it could be forwarded to the Minister of Manpower as proposed policy. The Chairperson, a conservative Afrikaner, insisted they sign a confidentiality agreement, and not report the proceedings of the NTB to outside parties. On mandate, they refused both demands, resulting in a period of bitter wrangling. The Chairperson was unexpectedly replaced in 1992 by Dr Ray Eberlein. When COSATU complained about his unilateral appointment, he announced he would not accept the position without the support of all NTB members. COSATU was put in a quandary and, without an obvious candidate of its own, finally agreed to work with the Dr Ray Eberlein.[48]

The second major change introduced by the MTA was provision for the establishment of committees for 'a particular industry, in a particular area or upon such other basis as may be necessary for the effective performance of the functions'.[49] These were tri-partite structures

[45] MTA, 1981, Act No. 56 of 1981, Chapter 1, section 4 (2).
[46] National Education Coordinating Committee, *The National Education Policy Investigation,* p. 172.
[47] National Education Coordinating Committee, *The National Education Policy Investigation*, p. 172
[48] Personal experience.
[49] MTA, Chapter 1, section 5, (2).

initially, with the chairperson appointed by the National Training Board and the members drawn equally from employers and trade unions. The Act was later amended and the committees became Industry Training Boards. These could be established on application from industry parties themselves and were no longer required to have equal numbers of employer and union members.[50] They continued to have a primary, but not exclusive, focus on artisans. For many this was seen to provide a much stronger role for the private sector but there was concern at the weakening role of the state. The shift also introduced a stronger distinction between 'industry' and 'occupation/trade' – a distinction that continues to haunt the system today.

The early committees, as well as the Industry Training Boards (ITBs) that followed, were permitted under the Act to collect voluntary levies from member employers. By 1994, twenty-three ITBs had been registered by the Registrar of Manpower,[51] they included one for the Metal and Engineering Industry, registered on 5 August 1991. It recommended a set of designated trades and the conditions under which they could be indentured.[52] NUMSA became increasingly interested in training issues, investing in Training Research and Development, since it was concerned about the exclusive focus on artisans and apprenticeships when the bulk of its members were not within reach of these grades.

ANC – Education and HRD

The focus here will fall on two processes: that conducted under the National Education Policy Investigation Progress (NEPI) and that under the Centre for Education Policy Development (CEPD).

With regards to the former:

> The National Education Policy Investigation (NEPI) (was) an inquiry into policy options for a future education dispensation in South Africa. It was commissioned by the National Education Co-ordinating Committee (NECC), a national body representing teachers, parents, and students, mainly from educationally disadvantaged black communities. The NECC was formed in December 1985 to co-ordinate and lead the struggles being waged within education institutions and in communities around the country against an inferior and racist education system, and against a government which was quite unwilling to change it. … NEPI was formally launched at the National Congress of the NECC on 7-9 December 1990, with the submission date for final reports in August 1992 making it an investigation of some 20 months duration.[53]

NEPI established twelve working groups, three of which have particular relevance to this study: the Adult Education (AE), Human Resources Development (HRD) and the Post-

[50] MTA, No. 56 of 1981 was subsequently amended several times: Manpower Training Amendment Act No. 88 of 1982; Manpower Training Amendment Act No. 1 of 1983; Manpower Training Amendment Act No. 39 of 1990; General Law Third Amendment Act No. 129 of 1993; General Law Fifth Amendment Act No. 157 of 1993.

[51] National Training Board, *A Discussion Document on a National Training Strategy Initiative: A Preliminary Report by the National Training Board*, April 1994, p. 114.

[52] Metal and Engineering Industries Education and Training Board: Designation of trades and prescription of conditions of apprenticeship (No. R. 1229), http://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=41865, accessed 21 May 2018

[53] National Education Coordinating Committee, *The National Education Policy Investigation: The Framework Report and Final Report Summaries*, Cape Town: Oxford University Press, 1993, p. 1.

Secondary Education (PSE) groups. Many policy options in relation to AE were developed, with implementation and funding questions for each discussed. The report indicates, under the HRD section, that 'COSATU seeks to negotiate with employers and the state for a nationwide Adult Basic Education programme open to workers as well as the wider community'.[54]

The HRD section of the NEPI Report endorses what it calls the ANC and COSATU proposals:

> Both the ANC and COSATU are proposing comprehensive restructuring of the economy by means of a two-pronged strategy, namely 'growth through redistribution' which would involve a redistribution of resources towards the mass of the population, and would in turn stimulate domestic demand; and a rapid increase in the export of manufactured goods. This process would be accompanied by active labour market policies, effective tripartism, career progress, and job mobility.[55]

Whilst acknowledging many strengths to such a model, the NEPI report does highlight what it calls 'weaknesses' with the model:

> 'High-participation, high-skill' HRD models have been successful in two types of society: highly authoritarian and late-industrializing countries including Japan, and strongly social democratic countries such as Germany and Sweden. These are characterized by a high degree of social cohesiveness. In the ANC/COSATU model, equity concerns tend to dominate over efficiency issues. In the short term, operationalizing this model could be difficult, in particular given the opposition of employers to large increases in general skills training and higher training and wage costs.[56]

These sobering observations were side-lined at the time as there was optimism that a strong social-democracy, based on a strong state and robust institutions established by it, would flow from the elections and carry the agenda forward.

The PSE chapter of the NEPI Framework report notes that:

> In 1991, 66% of South Africa's half a million PSE students were enrolled at universities, 22% at technikons, and 12% at … colleges. … A number of recent analyses of PSE in South Africa in relation to international trends have suggested that the proportion of students registered for university studies is too high in relation to the other two sectors, and that the distribution of students across different areas of specialization is inappropriate given South Africa's broad human resources development needs (e.g., enrolments in Engineering and Science are low compared to those in more industrialized countries). … An alternative policy is a centrally planned option in which the Ministry of Education, or a National Education Council, would plan the broad outlines of the shape of the PSE system based on financial considerations, redress concerns, and overall human resources development needs.[57]

In terms of the overall structure of the system, NEPI proposed two alternatives, a system perspective and one focused on schooling, both existing under a single Department of Education (Minister of Education with regional authorities, local authorities, and school governing bodies). However only the system perspective considered the interface with the labour market:

> The system perspective requires an indication of how the education governance sector is to be articulated with the training, non-formal and AE [Adult Education] sectors. This account proposes a top-level coordinating body with the function of ensuring that there is a degree of compatibility between policies developed by the tri-partite National Training Board and those developed by the Education Consultative Councils. It is envisaged that such coordination can be achieved by a high level of cross-representation on curriculum bodies, and by the

[54] NECC, *NEPI*, p. 174.
[55] NECC, *NEPI*, pp. 174-5.
[56] NECC, *NEPI*, p. 175.
[57] NECC, *NEPI*, pp. 216-7.

establishment of a common certification structure which would serve as a link between the sectors.[58]

From COSATU to the ANC HRD Desk to Education and Training Policy

In 1991, the NUMSA Congress approved the proposals from the NUMSA RDG and the COSATU Congress agreed similar proposals later in the same year. Detailed discussions were initiated between COSATU and the ANC on HRD issues, mediated through Gail Elliot for the ANC and Adrienne Bird for COSATU. Both were reporting back to internal structures – although the pace of developments was breath-taking.
COSATU was also invited to contribute to the Centre for Education Policy Development's (CEPD) education-development policy process, headed by John Samuels. This included involvement with the Task Team that dealt with the National Qualification Framework which was increasingly seen to be the 'carrier' of the HRD proposals. The outcome of these engagements are recorded in *A Policy Framework for Education and Training,* published in 1994, an outcome that was in turn integrated into the *Reconstruction and Development Programme (RDP)*.

The RDP was a broad framework agreement. Key amongst its proposals for training were the following:

> The education and training bureaucracy must be re-organised at national, sectoral and provincial levels through the establishment of:
>
> 3.3.5.1 a single national ministry responsible for education and training, to set national policies, norms and standards throughout the system, to undertake planning and provide budgetary resources for all aspects of education and training, and to manage higher education and development;
> 3.3.5.2 provincial departments …
> 3.3.5.3 statutory bodies to advise on policy and development …
> 3.3.5.4 industry-based education and training boards …
> 3.3.5.5 structures to represent the interest of all stakeholders and the broader community served by the institution …
> 3.3.5.6 a statutory South African Qualifications Authority with responsibility for accreditation, certification and the maintenance of national standards.[59]

The ANC's Policy Framework was inevitably a more nuanced document, but it too proposed that '(t)he education and training bureaucracy will be reorganised through the establishment of a single national ministry for education and training'.[60] The first two of its fundamental principles were:

- The state has the central responsibility in the provision of education and training;
- The provision of education and training shall be planned as part of a coherent and comprehensive national social and economic reconstruction and development programme, including a national strategy for human resources, and the democratisation of our society; [61]

Also included were the following principles:

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[58] NECC, *NEPI*, p. 162.
[59] African National Congress, *The Reconstruction and Development Programme*, Johannesburg: Umanyano Publications, 1994, p. 61.
[60] African National Congress, Education Department, 'A Policy Framework for Education and Training', internally published as the 'Yellow Book', January 1994, p. 9.
[61] African National Congress, 'Yellow Book', pp. 3-4.

- There shall be mechanisms to ensure horizontal and vertical mobility and flexibility of access between general formative, technical, industrial and adult basic education and training in the formal and non-formal sectors;
- There will be nationally determined standards for accreditation and certification for formal and non-formal education and training, with due recognition of prior learning and experience. [62]

The policy document then proceeds to elaborate a range of different sectors, one of which is what it calls the Further Education, defined as:

> The term used in this document to refer to those education experiences which follow the attainment of the General Education Certificate within the compulsory phase of schooling or through the Adult Basic Education Programme. Further education programmes lead to the award of the Further Education Certificate. …
>
> **Vision**
>
> Further Education will provide schooling, training and adult education as an integrated system. A balanced curriculum leading to the Further Education Certificate will be developed for all learners in a variety of learning contexts: students learning within formal institutions, workers in industry or out-of-school youth through Community Learning Centres. The curriculum will seek to open learning paths consistent with the goals of lifelong learning.
>
> **Policy proposals**
>
> In the medium term the Further Education Certificate will be introduced in order to allow flexible articulation from the workplace, school or other areas into higher education. These developments will occur within the national qualifications framework in co-operation with the South African Qualifications Authority.[63]

And in relation to Higher Education, the world of diplomas and degrees at universities and technikons, it had the following to say:

> Flexible access into and between universities, technikons and colleges will be facilitated by a single national qualifications structure. Articulation across institutions will be managed through the South African Qualifications Authority. The national qualifications structure will increase access to Higher Education by facilitating horizontal and vertical mobility between the different institution sectors. This will be promoted through the development of credit based/modular course structures, with credit accumulation and transfer. Accredited work-based courses undertaken at the post-FEC level will carry credit toward diplomas and degrees.[64]

It was proposed that details should be hammered out in two commissions: one on Further and one on Higher Education. But clear marching orders were given in relation to the critical General Education Certificate:

> The national curriculum for the FEC will be based on differentiating between compulsory core general subjects and optional vocational or academic subjects. The differentiation between core and options is necessary in order to integrate the education and training systems by unifying general education and vocational education and training into a single structure with a single qualification and certificate.[65]

Accordingly, it recommended that the NQF would have three major certificated levels or exit points:

(i) General Education Certificate (GEC) – marks the completion of general education (10 years of schooling) and ABE;

(ii) Further Education Certificate (FEC) – marks the completion of further education (based on the integration of general education and vocational education and training (whether school-based or work-based));

[62] African National Congress, 'Yellow Book', p. 4.
[63] ANC, 'Yellow Book', pp 108 – 110.
[64] ANC, 'Yellow Book', pp. 114.
[65] ANC, 'Yellow Book', p. 69.

(iii) Higher Education Diplomas and Degrees – marks the completion of college, Technikon or university-based education.[66]

The implication here is clearly that vocational training will be part of an integrated Further Education and Training band.

National Training Board Negotiations

Once the former chairperson had been removed and the first National Training Strategy was set aside, the National Training Board, with Dr Eberlein at the helm, began the whole process of policy formulation again. It was 1992 and the political context had changed completely. No doubt the two government representatives, Dr Deon Haasbroek from the Department of Manpower and Dr Gustav Niebuhr from the Department of National Education, drew on the earlier work in the course of their inputs, but they faced a much tougher set of challenges as the process unfolded. The NTB established a representative, inclusive approach to develop a national training strategy. It adopted a strategic planning methodology, based on twelve principles: integration, relevance, credibility, coherence and flexibility, standards, legitimacy, access, articulation, **progression, portability**, recognition of prior learning, and guidance of learners [highlight added].

Eight working committees, each consisting of four categories of major stakeholders, (employer organisations, trade unions, state representatives and providers of education and training), were established.[67]
The eight working committees were:

1. Environmental Scan
2. Integration of education and training; competencies and career paths, and certification
3. Training of trainers
4. Adult Basic Education and access to training
5. Supporting infrastructures; facilities and infrastructures; incentives, and finance
6. Labour market training strategies
7. International comparators
8. Legislation. [68]

Each working group undertook extensive work. Working Group Two dealt primarily with the establishment of the national qualification framework. The framework was premised on the assumption that there would be horizontal and vertical progression across the system. It was also assumed that learning could take place fulltime in the traditional institutions but could also be taken in bite-sized chunks. This was to ensure that those at work would be able to access these programmes too.

> All qualifications in an integrated credit-based system forming a National Qualification Framework would involve two fundamental elements or basic building blocks, namely ***units of learning*** (called 'units') defined in terms of learning outcomes, and ***modules of learning*** (called 'modules') describing the length, the form or mode of delivery (e.g. method of pedagogy

[66] ANC, 'Yellow Book', p. 70.
[67] S.M. Pityana, Director-General, Department of Labour, *The Growth of the National Qualifications Framework,* Conference on the National Qualifications Framework, held 22 – 24 April 1996, Technikon SA Conference Centre, Proceedings, Inter-Ministerial Working Group, HSRC, Johannesburg, 1996, p. 10.
[68] National Training Board, NTSI, pp. 2-13.

and assessment, use of distance study/open learning, structured work experience, assignments etc.)[69]

Table 11.3. NTSI's National Qualification Framework

<table>
<tr><td colspan="5">Levels 5-8 Non-compulsory: Tertiary and Research</td></tr>
<tr><td>Research</td><td>Higher Degrees</td><td>Initial Degrees</td><td>National and Higher National Diplomas</td><td>Professional [registration and] employment</td></tr>
<tr><td colspan="5">Levels 2-4: Non-compulsory: to Higher National Certificates
Core & Applied; Generic & Options</td></tr>
<tr><td>Senior Secondary Schools</td><td>Technical colleges and community colleges</td><td>Private Providers and NGOs</td><td>Industry Training</td><td>Labour Market Scheme & Regional Training Centres</td></tr>
<tr><td colspan="2">Level 1: Compulsory Schooling
General Certificate of Education</td><td rowspan="6"></td><td colspan="2" rowspan="2">Level 1: ABE and Training
General Certificate of Education</td></tr>
<tr><td>9-10 years</td><td>Grade 9/10</td><td colspan="2">Level 1</td></tr>
<tr><td>7 years</td><td>Grade 7</td><td colspan="2">Sub-level C</td></tr>
<tr><td>5 years</td><td>Grade 5</td><td colspan="2">Sub-level B</td></tr>
<tr><td>3 years</td><td>Grade 3</td><td colspan="2">Sub-level A</td></tr>
<tr><td colspan="2">Educare</td><td colspan="2"></td></tr>
</table>

Source: National Training Board, *NTSI*, Figure 5.1, p.96.

Working Group Five concentrated primarily on the question of financing and proposed that national and international research be conducted 'into the level and type of investment needed'.[70] Fortuitously the Japanese government at this time allocated funds to the National Economic Development and Labour Council (NEDLAC) for policy research. This opportunity was taken up by the NTB. Lindsay Falkov was appointed to undertake this research, which took him to eight countries. The research laid the foundation for the introduction of a compulsory skills levy. This was a key part of the COSATU strategy as an employer incentive was needed to optimise the chance of workers getting access in all sectors of the economy.

The NTSI's key recommendations are captured in clause 22 of the Report:

22.1 consideration be given to the formation of ***a single Ministry of Education and Training*** to replace the present number of Ministries with a number of statutory bodies with the appropriate legal authority to act in advisory capacities to the Minister and to deal with appropriate issues of governance.

22.2 one of those bodies, a ***National Council of Learning*** be established with appropriate subordinate councils, preferably including:

- An Educare Council
- A National Education Council covering compulsory schooling
- A National Education and Training Council

[69] National Training Board, NTSI, pp. 94-5.

[70] National Training Board, *A Discussion Document on a National Training Strategy Initiative: A Preliminary Report,* April 1994, p. 178.

- A National Tertiary Council

22.3 the present National Training Board be fundamentally ***restructured to form the National Education and Training Council*** to fulfil the functions proposed;

22.4 ***a South African Qualifications Authority*** be established to set up a coherent, integrated system of assessment, accreditation and registration for all national qualifications offered in South Africa;

22.5 the development as a matter of urgency of ***Subordinate Integrated Regional Structures*** for non-compulsory, pre-tertiary Education and Training be investigated, the investigation to include the existing regional structures of the various Departments of Education and Manpower and the informal regional Economic and Human Resources Development structures.[71] [Emphasis in original]

The NTSI also recommended the establishment of Sector Education and Training Organisations (SETOs – later to be called Authorities, SETAs). Their functions, fourteen in all, to include:

5.1 Take the lead in the development of higher standards of education and training and a skills and learning culture in their sector.

5.2 Identify and define the qualitative and quantitative needs of the work-force in its sector in terms of the national, regional and sectoral economic and development needs.

5.3 Develop flexible career paths in their sector. …

5.5 Facilitate the process of developing and describing educational and training standards for their sector. …

5.7 Develop the arrangements for the delivery of education and training for example by establishing partnerships with the formal providers of education and training to the sector. …[72]

Even whilst the transition was unfolding, pioneering and innovative pilot projects were undertaken to further explore and implement these concepts.[73]

In reality much of this work took place concurrently, but the influence of the *National Training Strategy Initiative* is acknowledged in the ANC document: 'The National Training Board Task Team on a National Training Strategy Initiative is another important example of participatory, consensus-building policy development from which we have learnt much.'[74]

Post-April 1994 – Progress of policy proposals

A single Minister and Department of Education and Training

Although there was a majority in favour of the establishment of a single Minister and Department of Education and Training, it did not happen. The reasons for this are unclear. President Mandela appointed Minister Bengu to head the Department of Education and Minister Tito Mboweni to lead the Labour Department. This was to have significant long-term effects as the two departments, driven by different paradigms of learning, developed in parallel.

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[71] National Training Board, *NTSI,* p. 111.
[72] National Training Board, *NTSI,* p. 115.
[73] 'The kind of work underway in the Hospitality Industry Training Board, in the National Public Works Programme, in the Engineering and Manufacturing Processes Pilot Project, in the Education and Training Development Practitioner Pilot Project, in the Engineering Council of South Africa, in Adult Basic Education and Training, in the Building Industry Training Board and in the Accountancy field'. From S. Pityana, *Conference on the National Qualifications Framework*, p. 14.
[74] African National Congress, 'Yellow Book', p. 5

A national qualifications framework

On 15 March 1995, the Minister of Education published his first White Paper which set out to locate education and training within the RDP, clarify the use of the term 'an integrated approach to education and training', and outline the approach to the establishment, roles and functions of the national and nine new provincial departments of education in the context of the draft 1993 Constitution.[75]

On the question of an 'integrated approach to education and training' the White Paper stated, in Chapter Two:

4. An integrated approach implies a view' of learning which rejects a rigid division between 'academic' and 'applied', 'theory' and 'practice', 'knowledge' and 'skills', 'head' and 'hand'. Such divisions have characterised the organisation of curricula and the distribution of educational opportunity in many countries of the world, including South Africa. They have grown out of, and helped to reproduce, very old occupational and social class distinctions. In South Africa such distinctions in curriculum and career choice have also been closely associated in the past with the ethnic structure of economic opportunity and power.
7. An integrated approach to education and training, linked to the development of a new National Qualification Framework (NQF) based on a system of credits for learning outcomes achieved, will encourage creative work on the design of curricula and the recognition of learning attainments wherever education and training are offered. It will open doors of opportunity for people whose academic or career paths have been needlessly blocked because their prior knowledge (acquired informally or by work experience) has not been assessed and certified, or because their qualifications have not been recognised for admission to further learning, or employment purposes. [76]

And in Chapter Five:

10. An integrated approach to education and training will link one level of learning to another and enable successful learners to progress to higher levels without restriction from any starting point in the education and training system. Quality assurance will be maintained by duly registered accrediting bodies. Learning and skills which people have acquired through experience and on-site training or self-education could be formally assessed and credited towards certificates, in order to enable them to qualify for entry to additional education or training. [77]

The NQF Levels were to be:

(1) **Level 1**: General Education Certificate (GEC), to be achieved by the acquisition of the required credits
- at the end of the compulsory schooling phase: one-year reception class (pre-school) plus nine years to Grade 9 (present Standard 7)
- through Adult Basic Education and Training programmes, which may be sub-divided into three sub-levels

(2) **Levels 2-4**: Further Education Certificate(s) (FEC), to be achieved by the acquisition of the required credits, which may comprise core units and optional units in different combinations, undertaken in a variety of modes, including
- senior secondary school programmes, up to Grade 12 (Standard 10)
- general and career-specific programmes offered in the college sector including those offered in the current Technical Colleges, Community Colleges, Intermediate Tertiary Colleges, other private vocational or academic colleges, and NGO providers

[75] Department of Education, *White Paper on Education and Training*, Notice 196 of 1995, Parliament of the Republic of South Africa Cape Town, WPJ/1995, 15 March 1995.
[76] Department of Education, *White Paper on Education and Training*, Chapter 2.
[77] Department of Education, *White Paper on Education and Training*, Chapter 5.

- programmes offered in Regional Training Centres, through workplace training, etc.

(3) **Levels 5-8**: Higher Education diplomas and degrees, achieved by the acquisition of the required credits, undertaken in programmes offered by
- professional colleges, both public and private - professional institutes
- technikons
- universities.[78]

Minister Bengu, in consultation with Minister Mboweni, established an Inter-Ministerial Task Team (IMWG) headed by Dr. Trevor Coombe, a leading advisor in the Department of Education, to develop the concept of a national qualifications framework. On October 4 1995, the South African Qualifications Authority Act, No. 58 of 1995, was passed unanimously by parliament,[79] the first piece of educational legislation passed by the new democratic government. It was a broad enabling Act establishing the South African Qualification Authority (SAQA) and requiring it to advance the objectives of the NQF, which were:

2. The objectives of the National Qualifications Framework are to:
a. create an integrated national framework for learning achievements;
b. facilitate access to, and mobility and progression within education, training and career paths;
c. enhance the quality of education and training;
d. accelerate the redress of past unfair discrimination in education, training and employment opportunities; and thereby
e. contribute to the full personal development of each learner and the social and economic development of the nation at large.[80]

The Act also empowered the SAQA to

5. (1) Subject to the provisions of subsection (2), the Authority shall-
a. (i) oversee the development of the National Qualifications Framework; and
(ii) formulate and publish policies and criteria for-
aa. the registration of bodies responsible for establishing education and training standards or qualifications; and
bb. the accreditation of bodies responsible for monitoring and auditing achievements in terms of such standards or qualifications; [81]

Thus, it was therefore legally mandated to implement the proposals outlined in the relevant policy documents developed before April 1994.

On the standard-setting side, SAQA initially created twelve National Standards Bodies (NSBs) in twelve organising fields: (1) Agriculture & Nature Conservation; (2) Culture & Arts; (3) Business, Commerce and Management; (4) Communication Studies & Languages; (5) Education, Training and Development; (6) Manufacturing, Engineering and Technology; (7) Human and Social Sciences; (8) Law, Military Science and Security; (9) Health Sciences & Social Services; (10) Mathematical, Physical, Computer & Life Sciences; (11) Services; and (12) Physical Planning and Construction.[82] They were representative structures designed to promote progression from lower to higher levels within particular fields of learning in the post-school system.

[78] Department of Education, *White Paper on Education and Training*, Chapter 5.
[79] Pityana, 'The Growth of the National Qualifications Framework', p. 11.
[80] SAQA Act No. 58 of 1995, http://www.saqa.org.za/show.php?id=5469 accessed 31 May 2019.
[81] SAQA Act No. 58 of 1995, http://www.saqa.org.za/show.php?id=5469 accessed 31 May 2019.
[82] S.B.A. Isaacs, *The National Qualifications Framework and the Standards Setting: Setting quality standards is the first step in the quality cycle*, SAQA, July 2000, pp. 6-8, http://saqa.org.za/docs/pol/2003/standard_setting.pdf, accessed 30 October 2019.

The actual work of developing individual qualifications was given to Standards Generating Bodies (SGBs), formally recognised by the relevant NSB. This was consistent with the notion that progression is not an afterthought once individual qualifications have been developed but integral to the design process itself.
The NSBs made sense to those from a labour market perspective, since people were employed across the full spectrum of NQF levels. The NSBs were not so popular with the public provider system, however, as NSBs cut across the work of the existing statutory bodies focused on bands of provision (SAFCERT and SERTEK), already in place for schools and colleges and technikons. So the two Ministries proceeded to work on policies within their own jurisdictions, separately – with rising educational dis-ease with NSBs.

Education and Training Policy and Legislation

Two short years after the SAQA Act, the Higher Education Act, No. 101 of 1997,[83] was passed by Parliament. This Act set out, inter alia, to provide for the establishment, composition and functions of a Council on Higher Education (CHE). The Act states that the CHE must both provide advice to the Minister of Education on a wide range of policy matters, and:

through its permanent committee, the Higher Education Quality Committee - (i) promote quality assurance in higher education; (ii) audit the quality assurance mechanisms of higher education institutions; and (iii) accredit programmes of higher education;[84]

Access to higher education programmes was defined in law:

The minimum requirement for admission to a higher education institution from 1 January 2009 is the National Senior Certificate, whose specifications were approved by the Minister of Education in the document National Senior Certificate – A qualification at level 4 on the National Qualifications Framework published in Government Notice No. 744 in the Government Gazette, Vol. 481, No. 27819, July 2005. Given the diversity of programmes and qualifications in higher education, the Minister has declared as policy the Minimum Admission Requirements for Higher Certificate, Diploma and Bachelor's Degree Programmes requiring a National Senior Certificate, published in the Government Gazette, Vol. 482, No. 27961, August 2005. These minima must be met by all applicants to entry level higher education qualifications. Applicants with different qualifications may only be admitted if they are judged equivalent by the designated equivalence-setting bodies.[85]

These provisions have been updated but in essence they mean that marks and subjects at school determine the pathways that can be followed. In addition, a 50 per cent rule applies in universities, meaning that a candidate can only qualify for a qualification from that institution if they had acquired at least half their learning credits from it.

The General and Further Education and Training Quality Assurance Act, No. 58 was enacted in 2001. This Act stipulated that:

5. (1) The [General and Further Education and Training Quality] Council must be regarded as having been accredited by the South African Qualifications Authority in terms of section 5

[83] http://www.saqa.org.za/docs/legislation/2010/act101.pdf, accessed 31 May 2019.
[84] https://www.up.ac.za/media/shared/409/higher-education-act-1997.zp86770.pdf, accessed 1 June 2019.
[85] Department of Education, The Higher Education Qualifications Framework in terms of the Higher Education Act No. 101 of 1997, Government Notice No.303533, 5 October 2007, http://www.saqa.org.za/docs/pol/2007/not0928.pdf No.928, accessed 31 May 2016.

(l)(b)(i) of the South African Qualifications Authority Act No. 58 of 1995 (Act No. 58 of 1995), as the body responsible for establishing education and training standards or qualifications for general and further education and training at education institutions contemplated in section 2.[86]

These laws effectively did away with the NSBs.

On the policy side, in 2006, measures were put into place to phase out the NATED ('N') courses completely as they were seen to be out of date and of poor quality and the number of workplaces available to students to be far short of the number required.[87] In their stead a three-year, full-time National Certificate (Vocational) (NCV) programme at NQF levels 2-4 was to be phased in from January 2007, with three possible exit levels. [88] The NCV would not require the students to have a work placement, but could be completed at college alone, albeit with a strong college workshop component.

Interestingly, the NCV areas of specialisation reflected the learning fields of the NSBs (Civil Engineering and Building Construction; Engineering and Related Design; Electrical Infrastructure Construction; Finance, Economics and Accounting; Hospitality; Information Technology and Computer Science; Management; Marketing; Office Administration; Primary Agriculture; Tourism; Safety in Society; Mechatronics; Education and Development; Drawing Office Practice; Process Plant Operations; Process Instrumentation.)

The phasing out of the N courses was reversed when industry objected, saying that they were still needed for the apprenticeship system. So, the decision was reversed initially for engineering NATED programmes[89] and later for other programmes. It was stipulated also that 'Students enrolled on the NI-N3 programmes must be indentured by industry prior to enrolment in the programmes listed' – but this was not enforced. [90]

Both NATED and NCV programmes persist at colleges. The Further Education and Training Colleges Act No. 16 of 2006, as amended, provided that:

43 (5) A college may apply to the Quality Council for Trades and Occupations established in terms of section 26G of the Skills Development Act, 1998 (Act No. 97 of 1998), for accreditation as a Skills Development Provider in order to offer qualifications registered

[86] HE Act, Chapter 2 point 5, https://www.umalusi.org.za/docs/legislation/2001/actno58_2001.pdf, accessed 1 June 1998.
[87] Government Notice 302, *Government Gazette* No. 28677, 29 March 2006.
[88] Formal Further Education and Training College Programmes at Levels 2 To 4 on The National Qualifications Framework (NQF) 2011, to be read with National Certificate (Vocational): A qualification at Levels 2, 3, 4 on the NQF, *Government Gazette*, No. 28677of 29 March 2006, as amended in, *Government Gazette*, No 30266 of 7 September 2007, http://www.dhet.gov.za/NCV%20Policy/Formal%20Further%20Education%20and%20Training%20College%20programmes%20at%20Level%202%20to%204%20on%20NQF%20in%202011.pdf, accessed 9 May 2019.
[89] Amendment Notice, Amendment to Government Notice 302 in *Government Gazette* No. 28677, 29 March 2006, for the Extension of Phasing Out of the National N Certificates: N1-N3, (Engineering Studies), *Government Gazette* Vol. 539, No. 33200, Pretoria, 17 May 2010.
[90] Amendment To Government Notice 302 in *Government Gazette* No. 28677, Dated 29 March 2006, for the Extension of Phasing Out of the National N Certificates: Ni-N3, (Engineering Studies), *Government Gazette* Vol. 539, Pretoria, 17 May 2010, No. 33200.

> on the sub-framework for Trades and Occupations contemplated in section 7(c) of the National Qualifications Framework Act, 2008 (Act No. 67 of 2008).[91]

This was however seen as additional to their regular, registered NATED and NCV programmes for which public funding was allocated. SETAs were expected to fully fund their programmes. Furthermore, as colleges complained at the time, SETA funds were welcome, but because SETAs have only five-year terms of office, their funding would be time-bound and could not support the more permanent capacitation of the colleges in these areas.

The Further Education and Training Colleges Act No. 16 of 2006 Act empowered the Minister of Education to establish a National Education and Training Council 'to advise him or her on any matter contemplated in section 41B or any matter identified by the Minister'.[92] Sadly this was not to be, especially given that an identical body had been envisaged by the NTSI for consultation across what it had called 'non-compulsory, pre-tertiary segment' of the learning system. The Education Act stated that:

> It would be essentially a national forum where the state, employer, trade union federations and other relevant stakeholders (such as providers of education and training) would be represented. It would replace the present National Training Board.[93]

In retrospect this was a major lost opportunity for inter-departmental collaboration, as will be discussed in the next chapter. As shall be shown, the National Skills Authority, which eventually replaced the National Training Board, reported to the Minister of Labour alone.

However, these comments should in no way detract from what was in fact achieved by the Department of Education in the 1994 – 2008 period, as Chisholm has reported:

> Since 1994 there has been a significant refashioning of the education and training landscape in South Africa. Eighteen racially-divided departments have been restructured into nine [provinces]. Education budgets are redesigned in principle to achieve equitable outcomes and overcome the racial disparities that marked apartheid budgeting allocations. Education control has been decentralised, and schools, colleges, technikons and universities have been opened to all races. Curricula, their review and design, have been revamped and management and administration reorganised. … Teacher education is now provided under the auspices of the higher education sector. Higher education has itself been reorganised. A new multi-lingual language policy has been articulated for schools. … Substantially altered education philosophies now suffuse policy documents.[94]

Skills Development Policy and Legislation

Minister Mboweni, adopted the NTSI Report as a basis for his training policy and on the basis of it released a Green Paper, entitled *'Skills Development Strategy for Economic and*

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[91] Further Education and Training Colleges Act 16 of 2006 as amended by Higher Education and Training Laws Amendment Act 25 of 2010, Section 43(5), accessed 3 June 2019, http://www.saqa.org.za/docs/legislation/2010/act16.pdf,

[92] Further Education and Training Colleges Act 16 of 2006, as amended by Higher Education and Training Laws Amendment Act 25 of 2010, Section 43(5), accessed 3 June 2019, http://www.saqa.org.za/docs/legislation/2010/act16.pdf, Section 41L. Consultative bodies, (1) and (2).

[93] NTB, *NTSI*, section B, paragraph 17, p. 108.

[94] L. Chisholm, (ed.), *Changing Class: Education and Social Change in Post-Apartheid South Africa*, London: Zed Books, and Cape Town, HSRC Press, 2004, p. 1.

Employment Growth in South Africa',[95] for public comment. The term 'skills development' was used to distinguish it from 'training' at the request of the Minister of Education as the term 'training' was widely used in 'education' policy documents. The distinction between the two terms was unclear, but increasingly 'training' became associated with 'vocational training', whilst 'skills development' focused more on 'occupational training' – the former falling under Umalusi and the CHE and was generally viewed as more generic, not as focused on a particular occupation but rather a family or group of occupations without necessarily offering the full range of skills required for any one, whilst the latter fell under the QCTO which focused on clear occupations. However in practice these terms overlapped and continued to be a source of rankling – with one accusing the other of being too 'theoretical/ practical' or 'not theoretical/practical enough'.

The Skills Development Act No. 97 was passed in 1998. It replaced the National Training Board with a quadripartite National Skills Authority to provide advice on training matters to the Minister of Labour much as its predecessor had done. It also established the Sector Education and Training Authorities with significant planning, resourcing and funding powers, requiring them to be established across every economic sector in the land (hence being much more widely embracing than the old Industry Training Boards). It was linked, in 1999, with the passing of the Skills Development Levies Act, which introduced a 1 percent payroll levy to be collected by SARS – 80 percent to be transferred to the SETAs and 18 percent to a new National Skills Fund to fund projects identified as being of national importance[96] [with 2 per cent going to SARS to offset the costs of collection]. The levy, won with great tenacity by Minister Mboweni and Director-General Sipho Pityana against strong objections from National Treasury and employers[97] and was only reluctantly accepted on the understanding that employers would get 60 percent back when they submitted Workplace Skills Plans (this was later to change). The levy gave the skills development strategy much greater leverage and influence.
Twenty-five SETAs were formally established in 2001 following extensive engagement with social partners. Their establishment required the incorporation of existing Industry Training Boards into the new structures and the establishment of new structures where there had previously been none. South Africa stood proud as every single sector of the economy was covered by its own SETA.

Section 10, sub-section 1, of the Skills Development Act stated that a SETA must:

> within a week from its establishment, apply to the South African Qualifications Authority for accreditation as a body contemplated in section 5 (1) (a) (ii) (bb) and must, within 18 months from the date of that application, be so accredited;[98]

A new learning delivery vehicle, the learnership, was also introduced by this legislation. The resonance with earlier 'learnerships' outlined in previous chapters, should not be over emphasised as the architects of the 'new' learnerships were unaware of the earlier ones when

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[95] Department of Labour, 1998, 'Skills Development Strategy for Economic and Employment Growth in South Africa', http://www.labour.gov.za/docs/policy/greenps/skills.html, accessed on 3 January 1998 from The WayBackMachine https://web.archive.org/ and C. Vorwerk for his consolidated capturing of the web pages version of 1 March 1998.

[96] SDA, Chapter 7, p. 28.

[97] Personal experience.

[98] https://www.google.com/search?client=firefox-b-d&q=Skills+Development+Act+No+97+of+1998 accessed 1 June 2019.

drawing up the proposal, although both share an industry location.[99] Learnerships were to be developed by the SETAs. They were defined in the Skills Development Act of 1998 as:

> **16. Learnerships**.--A SETA may establish a learnership if--
> a. the learnership consists of a structured learning component; the learnership includes practical work experience of a specified nature and duration;
> b. the learnership would lead to a qualification registered by the South African Qualifications Authority and related to an occupation; and
> c. the intended learnership is registered with the Director-General in the prescribed manner.[100]
>
> **17. Learnership agreements**.--(1) For the purposes of this Chapter, a 'learnership agreement' means an agreement entered into for a specified period between--
> a. a learner;
> b. an employer or a group of employers (in this section referred to as 'the employer'); and
> c. a training provider accredited by a body contemplated in section 5 (1) (a) (ii) (bb) of the South African Qualifications Authority Act or group of such training providers.[101]

Learnerships were introduced to provide workers and unemployed persons with stepping stones towards trade qualifications in particular, but also to provide for other occupational programmes. By giving exit options at NQF levels 2, 3 and 4 it was hoped that more lower level workers would have access. This proved to the case, with many learnerships being registered and delivered at the lower levels.

Skills programmes, even shorter, more focused programmes than the learnerships, were also introduced in the Skills Development Act. They had to be occupationally-focused and credit bearing towards a registered qualification on the NQF.[102]

The other routes to artisan status: through a traditional apprenticeship, through recognition of prior learning and a route through the education system provided that the prescribed work experience was undertaken, ran in parallel to the learnership option – all learners having to pass the requisite trade test to qualify.[103]

Implications for SAQA

In 2001, the Minister of Education initiated a review of the NQF, to see how it might be improved. The Review recommended that the twelve National Standards Bodies should be dis-established and their functions allocated to what were to be called Quality Councils (QCs) with both standard setting and quality assurance functions. Three such Councils were designated to be responsible for defined sectors, working in close collaboration and within a framework determined by SAQA. The three Quality Councils are Umalusi, responsible for basic education, the Council for Higher Education and the Quality Council for Trades and Occupations (QCTO). The QCTO was established by the 2008 Amendment of the Skills Development Act, which also included the establishment of a National Artisan Moderation Body (NAMB) with the authority to recommend certification of artisans to the QCTO. The earlier Department of Labour proposal that this QC be called the Trade, Occupation and

[99] Personal experience.
[100] Skills Development Act (SDA) No. 97 of 1998, as amended, Clause 16, section 16 and 17, http://www.saqa.org.za/docs/legislation/2010/act97.pdf, accessed 1 June 2019.
[101] SDA, Chapter 4, Learnerships.
[102] SDA, Chapter 5, Section 20.
[103] SDA, 1998 as amended in 2008, section 26D, (2).

Profession QC (TOP-QC) (with wording taken from the new Constitution) was rejected as it was deemed to infringe the orbit of the CHE and the relationship it already held with professional bodies. In this context SAQA was to have oversight, research and advisory responsibilities.[104]

At this time SAQA also acquired the responsibility of registering professional bodies – some of which, like the Engineering Council of South Africa, had statutory functions with regards to the accreditation of university engineering programmes.

These policy prescripts were subsequently enshrined in an altogether new National Qualifications Framework Act No. 67 of 2008.

The changes in the remit of SAQA and the designation of three quality councils was designed to produce an integrated approach that addressed the particular needs of different client groups. The result, however, was the creation of three disarticulated sub-systems. This view was confirmed by the Articulation Policy, promulgated by the Minister of Higher Education and Training in January 2017, which concluded that:

> The NQF creates a framework for articulation between and within the three sub -frameworks, but articulated learning pathways across and within NQF levels and sub -frameworks are minimal.[105]

The Department of Education and Training

In a major policy step, the government, after adopting the ASGISA growth strategy, identified skills shortages as a key constraint on growth and so launched the Joint Initiative for Priority Skills Acquisition (JIPSA):

> [JIPSA] was launched in March 2006 to identify solutions to major skills shortages constraining South Africa's ability to meet the economic growth objectives contained in the Accelerated and Shared Growth Initiative for South Africa (AsgiSA). JIPSA has taken the form of a high level Joint Task Team (JTT), representing the different social partners engaged in the skills development environment, a Technical Working Group (TWG), and a Secretariat.[106]

One of its key priority areas was artisan development, particularly in engineering and construction. In its effort to achieve a substantial increase in the number of skills in these sectors, it worked closely with the Departments of Labour and Education to clarify and align learning pathways (National Vocational Certificate (DoE) and learnership / apprenticeship (DoL)) and requirements to access trade tests for artisan status.[107] The work spotlighted the need for greater collaboration between the two departments. This was a key factor that

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[104] Ministers of Education and Labour, *Enhancing the efficacy and efficiency of the National Qualifications Framework*, Joint policy statement by the Ministers of Education and Labour, Pretoria: Government Printer, http://www.labour.gov.za/downloads/documents/useful-documents/skills-development-act/Joint%20Policy%20Statement.pdf, accessed 2 January 2008.

[105] Department of Higher Education and Training, *The Articulation Policy for The Post-School Education and Training System of South Africa (No.12),* National Qualifications Framework Act No. 67 of 2008, *Government Gazette* No. 40545, 13 January 2017, Paragraph 50.

[106] Joint Initiative on Priority Skills Acquisition (JIPSA), *Consolidated Report: Artisans,* October 2009, Final Draft Report, Foreword, p. i, *http://hrdcsa.org.za/wp-content/uploads/research-reports/2.%20JIPSA_Artisan%20report_Final%20%20Oct%202009.pdf,* accessed 4 June 2019.

[107] JIPSA, *Consolidated Report: Artisans,* http://hrdcsa.org.za/wp-content/uploads/research-reports/2.%20JIPSA_Artisan%20report_Final%20%20Oct%202009.pdf, accessed 4 June 2019.

contributed to the President proclaiming the Department of Higher Education and Training (DHET) into being on 7 July 2009 in terms of Proclamation 48 (2009). All the functions pertaining to Higher Education, Further Education, Adult Education, Qualifications, and Skills Development, which had been located in the former DoE and DoL were absorbed into the newly formed DHET.[108] The establishment of a single department to be responsible for these functions was a major step to end the divide that had evolved since 1995. However the driver for artisan development fell to the Indlela Chief Directorate of the Skills Branch and collaboration with the TVET Branch was exploratory rather than systemic.

The new department picked up the responsibility for the implementation of the NQF Act and the Skills Development Amendment Act, both enacted in 2008, including the establishment of the QCTO. This involved intensive work initially under the Skills Development Branch of the new department and later (from 2012) by the QCTO itself as a statutory body in its own right under the 2008 Skills Development Amendment Act. At the same time the other QCs were developing their own NQF sub-frameworks and the Department of Basic Education was formulating a three-track system for senior secondary schooling (academic, vocational and occupational) as part of the general and further education and training sub-framework. Sadly, these developments did not involve sufficient consultation and collaboration between departments, SAQA and the interface Quality Councils: hence three discrete qualifications sub-frameworks were developed.

Only in January 2017 did the Minister publish an Articulation Policy which, as noted above, acknowledged minimal bridges within and between the three sub-frameworks at the time. It identified the following barriers to articulation:

> The following issues are seen to be barriers to articulation:
> a. Academic qualifications are considered more valuable and credible than comparable vocational or occupational qualifications;
> b. Some qualifications on the NQF are seen to be 'dead end' in nature, and do not lead to further learning;
> c. There are general perceptions that the purpose and nature of technical and vocational education and training is to offer learning programmes which focus on a relatively narrow band of employment-related or job-specific skills and competencies, when in fact the qualifications/part-qualifications could have wider relevance;
> d. There has been inadequate building of coherence between the NQF sub-frameworks;
> e. There has been an absence of robust articulation arrangements or alignment work between the different programmes and institutional types; and
> f. There is a general lack of institutional flexibility to support learners as they 'stop in and stop out' of their studies, where research has shown that this kind of `staggered pathway' is the norm at all NQF levels.[109]

To remedy this situation the Policy proposes national principles to guide the work of SAQA and the Quality Councils and introduced a requirement that SAQA, before registering any qualification on the NQF, should require that access and progression pathways be identified – essentially a bottom-up approach in an already structurally divided world.

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[108] http://www.dhet.gov.za/Publications/DHET%20Milestones%202009%20-%202016.pdf accessed 3 June 2019.

[109] 'The Articulation Policy for the Post-School Education and Training System of South Africa', published in terms of the National Qualifications Framework Act No 67 of 2008, *Government Gazette* No. 40545, 13 January 2017, paragraph 7.

In an effort to promote collaboration between SETAs and the public provider system the Minister of HET issued regulations which massively reduced the quantum of levy that individual employers could get simply by completing a Workplace Skills Plan and Annual Training Report. This was reduced from 60 percent of levy paid by employers, to 50 percent, and finally to 20 per cent.[110] The regulations required SETAs to allocate 80 per cent of their discretionary funds to PIVOTAL programmes. These are professional, vocational, technical and academic learning programmes that result in qualifications or part-qualifications on the National Qualifications Framework deemed to be in short supply at national or sector levels.[111] This so enraged employers that they took the Minister to court. This ruled that the Minister had acted within his legal powers and that he had followed appropriate procedures.[112]

PIVOTAL programmes were also intended to create a framework within which expanded use is made of public education and training providers for the provision of skills development programmes, particularly by partnering them with the SETAs for 'structured workplace learning'. This is, defined as:

> the component of learning in an occupational qualification, an internship, or work placement for professional designation whereby a learner is mentored by a qualified, and where required, registered mentor in the application and integration of the knowledge and practical skills learnt, under supervision, in the actual context of a workplace in accordance with the prescripts set by the relevant qualification authority or professional body. [113]

The successful implementation of workplace learning depends heavily on the collaboration of SETAs, employers and education and training providers since no formal structural alignment was proposed.

When the Minister of Higher Education and Training published a second White Paper, entitled '*Post-School Education and Training: Building an Expanded, Integrated Post-School System*' in 2014,[114] he stated

> 9.1.3 Articulation
> It is widely recognised that articulation across the post-school system is poor. For example, at present many universities do not recognise courses taken in other universities, and sometimes courses within the same university are not recognised across departments and faculties. It is true that departments and institutions may have valid reasons for not recognising students' credits. However, in developing and supporting an articulated post-school education and training system, institutions should make every effort to avoid unfair and irrational barriers to acceptance and credit transfer. Students also need somewhere to turn when they feel they

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[110] 'The Sector Education and Training Authorities (SETAs) Grant regulations Regarding Monies Received by a Seta and Related matters', *Regulation Gazette* No. 9867, Vol. 570, Pretoria, 3 December 2012, No. 35940, passed under the Skills Development Act No 97 of 1998, Government Printer, Section 4 (4).

[111] 'The Sector Education and Training Authorities (SETAs) Grant regulations Regarding Monies Received by a Seta and Related matters', Section 3, point (6).

[112] The Labour Court of South Africa, Case no: JR 1040/16, in the matter between Business Unity South Africa (applicant) and the Minister of Higher Education and Training (first respondent), the National Skills Authority (second respondent) and the National Skills Fund (third respondent), heard 21 August 2018 and delivered on 31 August 2018.

[113] 'The Sector Education and Training Authorities (SETAs) Grant regulations Regarding Monies Received by a Seta and Related matters' - see definitions.

[114] *White Paper for Post-School Education and Training: Building an Expanded, Effective and Integrated Post-School System*, DHET, 2013, viewed 5 June 2019, http://www.dhet.gov.za/SiteAssets/Latest%20News/White%20paper%20for%20post-school%20education%20and%20training.pdf

> have been unfairly denied access, or where credit has been unfairly not recognised. This role could be played by SAQA as part of its function of promoting articulation. …
> All role players must work together to eliminate unnecessary barriers. For example, different types of institutions – traditional universities, universities of technology, various types of colleges and SETAs – should work to create bridges between vocational or occupational programmes and academic programmes in order to promote articulation. It is the duty of all institutions in the post-school system – including the DHET, SAQA, the Quality Councils and the education institutions – to work together to ensure that there are no dead ends for learners. Articulation should be both vertical in terms of moving to higher levels of the NQF and horizontal, catering for movement from, say, a vocational 'stream' to an academic one or vice versa.[115]

These injunctions for greater collaboration have yet to find systemic expression in the work of the post-school system.

Similarly, in March 2019, the Minister published a National Skills Development Plan which spelt out specific targets for SETAs to meet in their partnership with the public provider system.[116] The challenge going forward is how to give this alignment practical effect, given the uncomfortable arrangement between the qualifications of the three sub-frameworks.

OCCUPATIONAL ARCHITECTURE AND ORGANISATIONS

The organisations which dominated the debates on skills development and career pathing shifted over this period. At industry level employer organisations, such as the Chamber of Mines and the Steel and Engineering Industries Federation of Southern Africa (SEIFSA), and black industrial labour unions, such as NUMSA, took centre stage, where these matters were negotiated. The previous craft unions were pushed aside both because representation on industrial councils and the like shifted to ratios based on membership numbers and, more fundamentally, because they were discredited following their collusion with the apartheid state. In the metal and engineering industry NUMSA had submitted its proposals in 1993 to the four industrial councils to which it belonged. An evaluation of the progress was undertaken by the union prior to their 6th National Congress in August 2000. A summary of their findings results are shown on the next page. The table suggests that some progress was made, particularly in those sectors dominated by large multi-national companies, Automotive and Tyre. Motor and Engineering lagged behind, due to the different conditions pertaining in these sectors (large number of workplaces dispersed country-wide, many smaller enterprises with few employees).

Even in the automotive sector all was not well. According to Harry Geldenhuys, the training shop steward at SAMCOR, in a large automobile plant,

> only certain kinds of workers have been able to move in the new system. Workers in certain job categories that are prioritised by management have benefited from the system. For example, team leaders at Toyota received training and were moved. In addition, workers with high levels of education who can teach themselves have been able to move. Harry relates that 'in plants

[115] *Post-School Education and Training*, viewed 5 June 2019, http://www.dhet.gov.za/SiteAssets/Latest%20News/White%20paper%20for%20post-school%20education%20and%20training.pdf
[116] Minister of Higher Education and Training, 'Promulgation of the National Skills Development Plan (NSDP)', No. 375, *Government Gazette*, 7 March 2019, No. 42290, also available on www.gpwonline.co.za

like Delta you have people who were employed with matric … Those are the people for whom it was easy to take those modules home and request assessment. And those people would move up the skills ladder.'[117]

Table 11. 4. NUMSA reports progress on key education and training demands, 2000

[117] M. Samson, 'From Sweeper to Engineer? The Successes and failures of Training in the Three Year Bargaining Strategy', *NUMSA Bulletin*, May 2000, p. 29.

NUMSA reports progress on key education and training demands[118]				
Demand	**Auto**	**Tyre**	**Motor**	**Engineering**
1. Negotiate a new training system so that workers can climb the ladder.	• The 1993 Auto Agreement included a new qualifications framework • A qualifications framework called AMIC was completed in 1995 for levels/grades 2-4. • AMIC includes ABE at all levels • Workers must complete ABE, core, non-technical areas like H&S and technical skills.	• The 1993 Tyre Agreement included a new qualifications framework. • The Training Board has drafted 20 new qualifications for levels 1-4. • These have been submitted to SAQA for registration	• The Training Board has developed three draft qualifications • Qualifications are for NWF levels 1 – 5 and are based on unit standards • NUMSA has had limited involvement	• The Training Board has rewritten technical skills covered by the trades in unit standard format for levels 1-4 of the NQF • No qualifications model has been developed, as the fundamental and core have not been developed for each level.
2. Design modules	• All modules have been completed except technical, non-production and administration. • Modules outcome statements • Each company has developed its own materials • Levels 5-7 not completed as per agreement.	• Unit standards, similar to the Auto training modules, developed for the 20 new qualifications • Training modules, on how to achieve the standards, not yet developed.	• Training modules have been written for almost all of the designated trades • Training modules have been written for the Chapter 3 and Administration and Support qualifications	• The ITB has drafted approximately 500 unit standards for the trades for the NQF. Parallel to this, collective bargaining processes have clustered tasks into the 5 grade system. The two process are not linked. • No training modules
3. Recognition of Prior Learning (RPL)	• RPL exercise was conducted in 1996 • Each company used its own process for this.	• An industry RPL negotiated in 1998, signed early 1999 • Same process in each plant • Process awaits SAQA	• There is no industry policy on RPL • No RPL exercises have been conducted at industry level	• No RPL specific. The Bargaining Council has 'Implementation Guidelines', done by ITB. Each co. must have training com.

[118] Samson, 'From Sweeper to Engineer?', *NUMSA Bulletin*, May 2000, pp. 26-27.

4. Train workers – two modules per year	• Skills training on the job whilst theory to be done in own time, half of which to be paid by company at normal rates.	• Skills training on the job whilst theory to be done in own time, half of which to be paid by company at normal rates.	• There is no agreement on the right of workers to a certain amount of training per year	• No agreement on the right of workers to a certain amount of training per year
5. Skills based grading	• The 1993 Agreement established a new skills-based grading system for Levels 1-7. • Workers who complete levels 1-4 are paid at the higher level, even if their job doesn't change.	• The 1993 Agreement established a new skills-based grading system for Levels 1-7. • Workers who complete levels 1-4 are paid at the higher level, even if their job doesn't change.	• There is no agreement on skills based grading in industry	• The bargaining council has negotiated a voluntary 5 grade system, that sets out skill definitions for each grade • *The Constructional Engineering Association implemented the agreement.*[119]

[119] Information added to table, received on 6 June 2019, from Janet Lopez, Training Officer for SEIFSA at the time.

And for others?

> We agreed that we would RPL people and then we believed that our people would be skilled enough to move to a higher grade. But … [according to the model] you must have ABE, core modules as well as the technical skills. We thought our people would move because of their technical skills. Our people are not educated, the core which we are talking about, not all of them were taken to health and safety courses and this and that. A lot of people failed the RPL so no-one moved into higher grades,' says Nxumalo. And now says Nxumalo, 'RPL is acting against us. Employers say 'we have done RPL, we have got your records, you are not paid because you are not qualified'.[120]

The agreement that by the year 2000 everyone in the industry would have at least a General Education and Training Certificate or Standard 7 was almost a non-starter. In the negotiations, NUMSA agreed that workers would have to do the training outside working hours and would only be paid for half the time.

> Lots of workers claimed to be tired and all that jazz. Even those who were interested found that management says they must work overtime the same time as their classes. .. Certain individuals would compare going for money and going for classes and they go for money... Some didn't even start, others started and faded as a result of overtime. Others would say 'Why do you say we can be taught, our tradition doesn't allow old persons to learn', remembers cde Mlungisi.[121]

Unions in the other sectors under COSATU similarly made little progress. In the mining sector the agenda (to the extent that it was the same – which clearly was not the case given the 'task focus' of employers in that sector) was advanced by employers.

Bryan Philips (BP) and Annemarie Rademeyer (AM), from the management of Gencor Mining, and representatives on the Mining Qualification Authority (MQA), the mining SETA, elaborate their view of NQF developments:

BP In terms of decision making you had government, employers and COSATU together. And when you get to a vote, employers lost two-thirds to one third. Business represents anyway a neo-Liberal world view: 'Leave us alone, let us get on with our business' is what business would like most. If I have to interact with you, okay but reluctantly. And at the MQA was Anglo and then Billiton; to adopt agreed positions was difficult. If you are competitors, why would Anglo whose training system was structured in what we saw as a fragmented way – why should it shift? What was the imperative driving them to a more focused approach? They don't have it! So you end up with compromise after compromise and the product is unusable! That's what we ended up with.

AM Yeah, we wrote the standards by 1996 and we were applying them in the mines already. It was 1998 or '99 before they were signed off by those endless committees in the MQA. Ah! By then those standards should have been through two or three in-house re-workings to make sure that they were still fit for what was going on underground and you were taking two/three years to sign off the original version. And because the processes were so long and slow – there was no way that you could retain that 'bounciness' that you needed to make sure that they were relevant. So if you think that we are in 2006 now – if they are still those standards, then we are in exactly the place we were in 1990 where what training does doesn't match what is going on underground.[122]

This was a critique of the processes in place but not a fundamental criticism of the intent of the NQF. Massive workplace restructuring was afoot and there was a need to up-skill those 'working on the line'. This they illustrated from their experience:

BP Traditionally the artisan would have to come to check and correct the hydraulic level. The average breakdown time (two/three?) hours – and all the time the driver and others must stand around doing nothing because they are not allowed to touch the machine. This was even covered

[120] Grice, 'The 3-Year Auto Agreement', *NUMSA Bulletin*, May 2000, p. 21,
[121] Grice, 'The 3-Year Auto Agreement', *NUMSA Bulletin*, May 2000, p. 21.
[122] Interview with Bryan Phillips and Annamarie Rademayer, 26 August 2006.

> by regulation – the miner must check the hydraulic level. Now sure, if it is a more complex problem then fine, but in particular checking the hydraulic level is not rocket science. … [We proposed then that] the driver checks his hydraulic level *before* he starts the shift, then the machine doesn't break down – you prevent the breakdown by having him check the hydraulic levels. So, we were not taking away the artisan's role – we found a way around that. So, you redesign [the driver's] job, with a new skill and responsibility. And in terms of the Mines Health and Safety Act you are not allowed to require a miner to do something that they hadn't demonstrated competence. So, the standards-based approach was perfect for this. If he had the standard to the satisfaction of an accredited workplace assessor then he had the skill required. When this changed, the productivity levels rocketed. [123]

This kind of restructuring of the work process, and consequently of occupations (*de facto* neither 'miner' nor 'driver' were unchanged by these function shifts) demonstrated how the labour market was changing and confirmed that there was indeed a climate for an incremental approach to skills development as proposed by the ANC and COSATU and agreed in the many policy documents that have been described.

At the national level a picture emerges of a doubling of semi-professionals, a growing number of supervisors (many ex-artisans) and a declining number of artisans and apprentices, as well as a small decline of semi-skilled workers, although this remained the largest group of workers. The decline in the number of unskilled manual workers is most marked and for the country, most disturbing, as this represented a reduction in the opportunities for the burgeoning number of unemployed people.

Table 11. 5. The structure of employment (as covered by Manpower Surveys), 1965 and 1992.

Structure of employment (as covered by Manpower Surveys), 1965 and 1992			
	1965 (%)	**1992 (%)**	**Change (%)**
Top and middle managers	2.5	4.4	216
Professionals	1.2	3.1	360
Semi-professionals	6.4	12.1	237
Routine white-collar workers	17.8	16.5	65
Routine security personnel	2.4	4.6	247
Supervisors	0.9	3.5	599
Artisans and apprentices	6.2	5.1	46
Semi-skilled operatives	29.7	27.1	62
Unskilled manual workers	28.5	18.1	13
Unskilled menial workers	4.5	5.6	123
Total	100.0	100.0	78

Source*: Data provided by Owen Crankshaw, cited in J. Seekings, N. Nattrass, Class, Race, and Inequality in South Africa, Scottsville: University of Kwa-Zulu Natal University Press, 2006, p. 100.*

Table 11.6. Crankshaw's occupational classification, 1992

[123] Interview with Bryan Phillips and Annamarie Rademayer, 26 August 2006, White River.

Crankshaw's occupational classification, 1992		
	Number	**Percentage**
Top Managers	54,947	1
Middle managers	201,054	3
Professionals	179,033	3
Semi-professionals	706,522	12
Routine white-collar workers	963,594	17
Routine police officers	267,597	5
Supervisors	204,566	3
Artisans and apprentices	298,095	5
Semiskilled workers	1,423,361	24
Drivers	155,064	3
Unskilled manual workers	1,053,999	18
Unskilled menial workers	325,691	6
Total	5,833,513	100

Source: *Table provided by Owen Crankshaw using data from the 1992 Manpower Survey, cited in Seekings and Nattrass, Class, Race, and Inequality in South Africa, p. 243.*[124]

These figures also serve to emphasise that the largest number of people were employed as semi-skilled and so-called unskilled manual workers. This is the group that the ANC/COSATU policies had set out to assist, however, as seen above, they were the group that struggled the most.

Part of the problem might have been the one which Chisholm identified:

> F.W. de Klerk's February 2 1990 announcements have had a dramatically disorganising effect on organisations. As a new negotiations agenda has opened up, the unities built by an anti-apartheid agenda have disintegrated. Likewise, as attention has become focused on national negotiations, energies have been sucked upwards away from the grassroots and the building of organisation. A yawning chasm is emerging in all organisations between leadership and the rank and file. Activists are now required to be groomed for the new state, instead of building organisation. And yet everything depends on this organisation: the capacity to negotiate from a position of strength, and the capacity to deliver effectively. The tensions that have been set

[124] Neither of these tables records domestic and farm workers nor do they reflect the unemployed, a fact which Seekings and Nattrass take issue with on account of the categories being insufficiently aligned to income distribution. However, for the purposes of this chapter, the tables do illustrate the shift upwards in the skill profile of the employed workforce.

> up cannot be easily resolved. They have to structure our priorities, though, and the way we move, in a prefigurative way, towards the future.[125]

But in truth, the trade union officials engaged in the skills development discourses were ill-equipped to give guidance to the shop stewards at the 'coal face'. What did increase 'workers' control' at the shop floor actually mean? Did the driver have greater control when he checked the hydraulic levels? SETAs were intended to support the management of Workplace Skills Plans from company-based bi-partite training committees, but they were poorly capacitated to do so. There was therefore a breakdown between 'industry and sector policy' and 'skills development' discourse. Even the focus in JIPSA on artisan training in isolation from a more inclusive, progressive approach reduced the focus on the training of other workers – 'artisans' became the main game in town. Perhaps a link with the Productivity Institute of South Africa, a Department of Labour agency, might have helped, but it was not explored at the time.

Completely parallel initiatives were underway for technicians, technologists and engineers as outlined in the previous three chapters, each with their own 'organisational stories'. The prospect of meaningful 'career pathing' was diminishing.

LADDERS AND LEVERS

Following the passing of the NQF Act No. 67 of 2008, there were three Quality Councils under the SAQA: the Council on Higher Education (CHE), Umalusi and the Quality Council for Trades and Occupations (QCTO). The NQF was also extended from eight to ten levels. Each Quality Council was charged with developing their own Qualification Sub-Frameworks and operational methodology. The table below lists the qualifications of each sub-framework:[126]

Table 11.7. The qualifications of each sub-framework of the three Quality Councils.

NQF levels	Higher Education Qualification Sub-Framework		General and Further Education and Training Sub-Framework		Quality Council for Trades and Occupations
10	Doctoral degree Doctoral degree (professional)				
9	Master's degree Master's degree (professional)				
8	Batchelor Honours degree Post-graduate diploma Batchelor's degree				Occupational Certificate
7	Batchelor's degree Advanced Diploma				Occupational Certificate

[125] L. Chisholm, 'A Negotiations Agenda in South Africa: The Education Renewal Strategy 1 & 2, Draft Introduction', Unpublished document received from the author, 16 January 1992, p. 11.
[126] 'Amendment to the Determination of The Sub-Frameworks that comprise The National Qualifications Framework', Notice 891 OF 2013, *Government Gazette*, Vol. 578, Pretoria, 30 August 2013, No. 36803.

					(NATED Level 6 plus National Diploma)
6	Diploma Advanced Certificate				Occupational Certificate (NATED Level 5)
5	Higher Certificate				Occupational Certificate (NATED Level 4)
4			National Certificate e.g. National Senior Certificate for Adults National Senior Certificate National Certificate (Vocational) (NATED Level 3)		Occupational Certificate
3			Intermediate Certificate (NATED Level 2)		Occupational Certificate
2			Elementary Certificate (NATED Level 1)		Occupational Certificate
1			General Certificate		Occupational Certificate
			ABET Level 3		
			ABET Level 2		
			ABET Level 1		

The CHE adopted an approach whereby generic standards and procedures were adopted for the registration of a specific qualification under each of the qualification types. Institutions, both public and private, were free to develop their own specific curricula for a particular qualification type and submit it to the CHE for consideration (the so-called 'nested' approach). This, in practice, meant that the content of different qualifications for a single qualification type could differ quite markedly between institutions. As a result, mobility across universities or universities of technology was subject to a process of Credit Accumulation and Transfer (CAT), and subject to the 50% rule that required at least half of the credits of a single qualification to be earned at the institution that issued the final qualification. There is no single national curriculum for any of the qualifications registered.

The CHE has also entered Memoranda of Understanding with a number of statutory professional bodies, such as ECSA and the Professional Health Association. These bodies work with CHE on the accreditation of professional qualification providers and their programmes. This brings a degree of uniformity to the system. The professional bodies and their designations were registered by SAQA in terms of the NQF Act, section 30. In SAQA's view 'a professional designation to the sub-frameworks of the NQF is determined by the qualification or qualifications that underlie the professional designation concerned, as contemplated in SAQA's Policy and Criteria for Recognising Professional Bodies and

Registering Professional Designations for the Purposes of the National Qualifications Framework Act No. 67 of 2008 (2012).'[127]

Umalusi functions differently. It manages national school and college examinations and depends on the Department of Basic Education for the development of curricula. There is a clear system of progression from the academic qualifications (e.g. National Senior Certificate) into the Higher Education Qualification Sub-Framework based on credits earned. However, progression from occupational qualifications and vocational programme is less straightforward, managed by a more specific evaluation of learning programmes and individual performance in relation to the relevant programme at the specific higher education institution to which an application is made. Automatic progression is not currently provided for these programmes.[128]

The Department of Basic Education has recently introduced a three-stream model for grades 10, 11 and 12 at technical high schools in response to the high failure, drop-out and repetition rates at universities and to provide alternative routes. International practice suggests that between 20 per cent and 30 per cent of the population goes to university and other education and training options need to be developed to provide young people with the skills to compete in the labour market.[129]

> The Three Stream Model was delineated into three pathways -- academic, technical vocational and technical occupational. The Department envisaged that it could subject learners to public exams at the end of Grade 9, which would be helpful in terms of streaming learners into the further education and training (FET) field. The DBE's intention with the technical vocational stream was to improve in producing artisans as part of responding to the National Development Plan (NDP). Technical and Vocational Education and Training (TVET) colleges had made an effort to produce artisans, but the foundation started with schooling. The Department had now heightened its relationship with industry, and industry had assisted in developing the curriculum, and were now on board in terms of sponsoring and funding the activities of the subjects related to preparing learners for the world of work.[130]

These programmes fall under provincial competence. Their alignment with the Umalusi and QCTO qualifications has yet to be clarified.

The QCTO has adopted a system of recognising Development Quality Partners (DQPs) and Quality Assurance Bodies (AQPs). Its policy states that:

- Development Quality Partner means a body delegated by the QCTO to manage the process of developing specific occupational qualifications, curricula and assessment specifications,
- Assessment Quality Partner means a body delegated by the QCTO to develop assessment instruments and manage external summative assessment of specific occupational qualifications.[131]

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[127] Amendment to the Determination of the Sub-Frameworks that comprise the National Qualifications Framework, *Government Gazette* No. 36803,Vol. 578, Pretoria, 30 August 2013, clause 16.
[128] See link http://www.saou.co.za/wp-content/uploads/2016/04/Circular-S8-of-2018.pdf, accessed 10 June 2019.
[129] 'Three-Stream Model; Fourth Industrial Revolution*:* Department progress report', Basic Education, *Parliamentary Monitoring Group*, Chairperson: N Gina (ANC), 8 May 2018, accessed 10 June 2019 https://pmg.org.za/committee-meeting/26296/
[130] Department progress report, Basic Education, 'Three-Stream Model; Fourth Industrial Revolution', *Parliamentary Monitoring Group*, 08 May 2018, Chairperson: N Gina (ANC), accessed 10 June 2019, https://pmg.org.za/committee-meeting/26296/
[131] QCTO, 'Policy on Delegation of Qualification Design and Assessment to Development Quality Partners (DQPS) and Assessment Quality Partners (AQPS)', Version 1: adopted 22 June 2011,

There is therefore *no consistent logic* and *no clear platform* for the design of articulated qualifications and pathways. This in spite of the injunction of the Articulation Policy that:

> **Principle 8: Articulation must be done by design:** The Post-School Education and Training system must be articulated by design rather than by default. The NQF creates a framework for articulation between and within the three NQF Sub-Frameworks. For articulation to work there must be effective articulation at the systemic, programmatic and curricular levels.[132]

EVALUATION AND IMPACT

The South African economy was clearly undergoing major restructuring over this period, a restructuring that could well have accommodated an incremental training approach – with the vast increases in so-called semi-skilled workers at its heart. However, as the NEPI HRD report warned, influencing and shaping such systemic change required either an authoritarian state or one with strong social democratic institutions such as those in Germany and Sweden.[133] In truth neither of these was in place. The RDP Office, the logical location to drive change, was closed, the Sector Education and Training Authorities were new and their employer/trade union membership was too often adversarial. The restructuring was largely capital-driven, with marginal gains for more educated and skilled workers.

However this is not to say there were not significant gains along the way. The rollout of learnerships was proving to be a useful vehicle for the induction of unemployed people into the labour market. In 2013 some over 22 000 per annum unemployed youngsters completed learnerships.[134] And whilst some learners clearly rotated around learnerships for the stipends paid, there was a very high take up rate into formal employment.

> What is quite clear from our analysis is that there is a link between employment outcomes and the successful completion of a learnership or apprenticeship qualification. We found in aggregate, that both systems decrease the unemployment rate of participants, although the learnership system appears to have a more significant impact. … The gain in employment is particularly marked for the youth. These participants have thus successfully shifted from a disproportionately higher unemployed rate, to a rate of employment higher than the national population. This is despite the context of global recession and economic downturn in South Africa by 2010. It also stands in stark contrast to low formal employment rates (48%) recorded in 2009 for individuals completing a qualification in the FET College sector.[135]

What is also clear is that the progression to Level 4 was for a small minority only (5 per cent). This is consistent with the proportion of artisan places in industry at the time and does not

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definitions, accessed 6 June 2019, http://www.qcto.org.za/images/Policies/delegation_to_dqps_and_aqps.pdf

[132] DHET, 'Articulation Policy Principles, The Articulation Policy for the Post-School Education and Training System of South Africa', *Government Gazette* No. 40545, 13 January 2017.

[133] NECC, *NEPI*, p. 175.

[134] Presidency, 20 Year Review South Africa, Section 3 Social Development, accessed 10 June 2019, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Chapter%203%20Social%20Transformation.pdf , p. 52.

[135] G. Kruss, A. Wildschut, D. Janse van Rensburg, M. Visser, G. Haupt and J. Roodt, *Developing Skills and Capabilities through the Learnership and Apprenticeship Pathway Systems: Synthesis Report. Assessing the impact of learnerships and apprenticeships under NSDSII, Impact Assessment of National Skills Development Strategy II,* HSRC, January 2012, Shelf number 7027, pp. 22 – 23, http://www.hsrc.ac.za/en/research-data/view/5675 accessed 3 June 2019. Reference in excerpt from A. Gewer, *Choices and chances: FET Colleges and the transition from school to work,* Report on FET Research Study, commissioned by HRD Support Unit (DHET), National Business Initiative, 2010.

necessarily refute the logic of a progression system.[136] Even in the 1920s and 1930s only a minority advanced. Criticisms of the learnership system seldom took this perspective, arguing that it had failed because it did not provide opportunities for the majority and too little attention was given to theory. Whether the learners at these levels would have coped with more strenuous theory requirements is a moot point.

In the artisan space a wide range of interventions, first under the Human Resource Development Council (HRDC)[137], then under the Department of Labour, and finally, post-2008 under the Skills Branch of the Department of Higher Education and Training, continued to bolster the number of these skills: from 16 114 trade completions in 2015-6 to 22 859 in 2017-18 alone.[138] This, in a difficult economic climate, was a truly positive result.
It is more difficult to evaluate the career path implications of developments on the 'education' side of the equation as primarily enrolment rates are reported, not subsequent employment rates, although the following summary points, taken from the South African 20 Year Country Review, are included for reference:

- Schooling participation rates increased significantly over the period of the 20 Year Country Review, which reported that gross secondary enrolment improved from 51 per cent in 1994 to 89 per cent in 2012, while gross primary enrolment in 2012 was high at approximately 98 per cent .[139]
- University enrolment has almost doubled in volume, increasing from 495 356 in 1994 to 938 201 in 2011 at public universities and universities of technology. This is partly as a result of increased financial aid to students. The NSFAS (established in 1999) has steadily grown its allocations to universities and FET colleges from R513 million in 2000 to R3.2 billion in 2009. Between 1991 and 2011, as many as 991 759 student beneficiaries received R25 billion in NSFAS loans and bursaries.[140] Increased access to this funding has reduced financial obstacles to FET colleges. [141]
- Colleges were slowest to expand enrolment in the immediate period following 1994. Even after the mergers, the public FET sector failed to attract students for a variety of reasons, including poor marketing, lack of capacity and a poor image. Enrolments have nevertheless recently surged from 271 900 in 2000 to just more than 400 000 in 2011

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[136] Joint Initiative on Priority Skills Acquisition (JIPSA), *Consolidated Report: Artisans*, October 2009, Final Draft, http://hrdcsa.org.za/wp-content/uploads/research-reports/2.%20JIPSA_Artisan%20report_Final%20%20Oct%202009.pdf , p. 2, accessed 25 November 2019.
[137] The Human Resource Development Council of SA is a national, multi-stakeholder advisory body chaired by the Deputy Minister. It was established in 2010 to facilitate conditions that promote the optimal participation of all stakeholders in the planning, stewardship, mentoring and evaluation of HRD activities in South Africa.
[138] Figures obtained from David Mabusela, the Chief Director: Skills Development (National Artisan Development), Department of Higher Education and Training, on 4 June 2019 by email.
[139] Presidency, 20 Year Review South Africa, Section 3 Social Development, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Chapter%203%20Social%20Transformation.pdf, p. 48, accessed 10 June 2019.
[140] Presidency, 20 Year Review South Africa, Section 3 Social Development, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Chapter%203%20Social%20Transformation.pdf, p. 24, accessed 10 June 2019. Information sourced from Department of Higher Education and Training, 2013.
[141] Background Paper: Education, Twenty-year Review, South Africa, 1994 – 2014, p. 23, accessed 10 June 2019, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Education.pdf, p. 24.

> ... The FET Plan, published in 2008, envisaged FET colleges being repositioned as 'institutions of choice'. A total of 100 000 new spaces opened up across all FET colleges in 2013. Bursaries for FET college students increased from R100 million in 2007 to R1.7 billion in 2012, benefiting some 237 908 students between 2009 and 2011.[142]

The first and perhaps the most glaring lesson from all of the above is the critical importance of basic schooling. The NUMSA report shows that workers without literacy and numeracy skills found acquiring them, with family and work responsibilities and the ever-present temptation of doing overtime for much needed money, just too difficult. Adult Basic Education programmes remain vital, particularly for existing workers. Higher education and technical and vocational education and training resources are stretched if they have to provide remedial education because of the failures of the basic education system.

Whilst participation rates rose at schools, the number dropping out of the system between Grades 9 and 12 remained a concern – in 2002 about 83 percent of 16 to 18 year olds were in some kind of educational institution while by 2011 the number had risen to only 85 percent.[143] This has since become known as the NEET problem – those youngsters Not in Employment, Education or Training.

In March 2019, the Minister published a National Skills Development Plan which states that specific targets will be set for each SETAS in terms of their partnerships with the public provider system.[144] The challenge going forward is how to give this alignment practical effect, given the uncomfortable arrangement between the qualifications of the three sub-frameworks.

> The NQF Levels were to be:
> (4) **Level 1**: General Education Certificate (GEC), to be achieved by the acquisition of the required credits
> - at the end of the compulsory schooling phase: one year reception class (pre-school) plus nine years to Grade 9 (present Standard 7)
> - through Adult Basic Education and Training programmes, which may be sub-divided into three sub-levels
>
> (5) **Levels 2-4**: Further Education Certificate(s) (FEC), to be achieved by the acquisition of the required credits, which may comprise core units and optional units in different combinations, undertaken in a variety of modes, including
> - senior secondary school programmes, up to Grade 12 (Standard 10)
> - general and career-specific programmes offered in the college sector including those offered in the current Technical Colleges, Community Colleges, Intermediate Tertiary Colleges, other private vocational or academic colleges, and NGO providers
> - programmes offered in Regional Training Centres, through workplace training, etc.

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[142] Background Paper: Education, Twenty-year Review, South Africa, 1994 – 2014, p. 23, accessed 10 June 2019, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Education.pdf, p. 24.

[143] Background Paper: Education, Twenty-year Review, South Africa, 1994 – 2014, p. 23, accessed 10 June 2019, https://www.dpme.gov.za/publications/20%20Years%20Review/20%20Year%20Review%20Documents/20YR%20Education.pdf

[144] Minister of Higher Education and Training, Promulgation of the National Skills Development Plan (NSDP), No. 375, *Government Gazette*, 7 March 2019, No. 42290, Also available on www.gpwonline.co.za

(6) **Levels 5-8**: Higher Education diplomas and degrees, achieved by the acquisition of the required credits, undertaken in programmes offered by

- professional colleges, both public and private - professional institutes
- technikons
- universities[145]

See above already 'bands' not pathways.

NTSI: 22.3 the present National Training Board be fundamentally ***restructured to form the National Education and Training Council*** to fulfil the functions proposed;
What is not highlighted in any of these documents is the link between skills, grading and pay. This was deemed to be an industrial relations matter, to be catered for in the interface between industrial councils and industry training boards, but a matter out of the bounds of education and training policy.

NEPI 'The system perspective requires an indication of how the education governance sector is to be articulated with the training, non-formal and AE [Adult Education] sectors. This account proposes a top level coordinating body with the function of ensuring that there is a degree of compatibility between policies developed by the tri-partite National Training Board and those developed by the Education Consultative Councils. It is envisaged that such coordination can be achieved by a high level of cross-representation on curriculum bodies, and by the establishment of a common certification structure which would serve as a link between the sectors.'[146]

In both the apartheid government and in the ANC structures 'education' and 'training' policy-makers were located under different portfolios. In the apartheid government there were a variety of education departments, divided along racist lines, whilst training was under the Manpower Department. In the ANC there was an Education Desk and a separate Human Resources Development Desk. It comes as no surprise therefore that developments in the late '80s and early '90s evolved from these divided bases. Indeed it is more surprising that there were such concerted attempts to integrate the two, or at least to adopt an integrated approach.

Even COSATU had established parallel 'streams' in its Participatory Research Project – ABE and Training – with an uneasy alignment between them.

There was also a strong shift from 'trade/occupation' to 'industry sector' - a paradigm shift which was not picked up in the public discourse at the time.

In concluding this section, Seekings and Nattrass[147] argue that the root cause of the scale of unemployment and the most 'terrible' apartheid legacy was the decades-long destruction of the African peasantry. They argue that a combination of earlier land policies (e.g. 1913 Land Act as well as poll taxes) and subsequent measures to keep the majority of the poor in under-resourced and over-populated reserves (later called Bantustans), effectively killed off the African peasantry in South Africa and instead created a massive number of landless workers who streamed first to the mines and then to the towns to find work. During the 1950s and 1960s there was work to be had, but thereafter the number of workers seeking work began to

[145] Department of Education, *White Paper on Education and Training*, Notice 196 of 1995, Parliament of the Republic of South Africa, Cape Town, 15 March 1995, WPJ/1995, Chapter 5.
[146] National Education Policy Investigation (NEPI), *The Framework Report and Final Report Summaries*, Cape Town: Oxford University Press, 1993, p. 162.
[147] Seekings, and Nattrass, *Class, Race, and Inequality in South Africa*, Chapter 1, particularly pp. 17-8.

outnumber the jobs available. The slow growth in industry for manual workers was choked off, they argue, by measures used to encourage capital-intensive rather than labour-intensive forms of production. This 'growth strategy', continued after the elections. This sobering analysis points to the need for some form of land reform and labour-intensive industry growth. It also somewhat problematizes the 'high-productivity / high skill' strategy that was promoted by both the government and unions over this period, although the desire to retain and expand export markets for foreign exchange, profit margins and decent wages, was always a counter-tension.

CHAPTER 12

FORESIGHT WITH HINDSIGHT: SEARCHING FOR THE MIDDLE WAY

I'm still hoping to write an account which navigates around both positions (I'm right, you're wrong) respectfully, taking care to hear all sides whilst understanding that these views leave the world divided between us and them. The presumption that I might make a lens which sees both sides sympathetically and then situates them in a bigger frame is presumptuous of course. So I oscillate between the humility of defeat and an optimism born of hard-wiring received down the generations through my father – who it turns out I am still trying to please after all these years! Such is life.

Adrienne Bird[1]

THE ORIGINS OF CHAPTER 12

Adrienne worked on this book until shortly before she died. Unfortunately, she did not live to see it finished. She never thought of it as simply a history book (although it is a rich record of stories and events to add to our country's social and economic history). She wanted it to be a contribution to the ongoing debate about skills development in South Africa. This was to be the substance of the final chapter, which she did not complete. She did give it a title – *Foresight with Hindsight, Searching for the Middle Way*. Clearly, she was keen to identify lessons learned, to highlight the challenges that have been faced by individual learners, policy makers and legislators, so as to inform and question current and future policy and practice. She recognised, too, that skills development has been a contested issue. Employers, workers, educationalists, professional bodies and government departments have different perspectives and priorities when it comes to determining the agenda for skills. Thus, *"Searching for the Middle Way",* reflected her view that protagonists of different views should meet, address disagreements honestly and seek a *community of interest*.

Adrienne left fragmentary notes on this final chapter, and she discussed issues with colleagues and friends. It had been her intention, had she lived, to convene a workshop of former colleagues to discuss the 'lessons learned' and to identify key issues to contribute to the education/skills debate. With the support of Wits University, a workshop was held in November 2019, attended by some 15 former colleagues, academics and individuals from the private sector, trades unions and government. Various people made also made inputs before and after the workshop, some commented on the draft chapter that emerged. The workshop concentrated on three issues:

- To review the structure and content of the first 11 chapters of the book;
- To discuss the lessons learned, particularly in terms of the current and emerging skills environment;

[1] Adrienne Bird email to Bryan Phillips on 19 January 2009.

- To identify significant issues, and to pose questions, rather than to put forward conclusions.

Thus, this final chapter has been drafted on the basis of Adrienne's notes, emails and records of her discussions, recollections of friends and the outcomes of the workshop. It is not the chapter she would have drafted, but it seeks to reflect her thinking.

Adrienne's Objective

Sebolelo Nomvete encapsulates Adrienne's vision and objective in this quote:

> After the NQF Review[2], an inter-departmental task team was established to consider the report and advise the Ministers. We were trying to find points of consensus via intense conceptual debates. Adrienne brought her father's three certificates (trade, engineering and professional certification). She put them up on the wall and told us "I know this can be done, because my father did it. So what do we need to do to make this viable for everyone?" [3]

She wanted to see an education and training system that benefitted the many, and which provided destinations and pathways, from wherever individual learning journeys might start.

Since 1994, a new education and training system and structures emerged, designed to provide quality learning for all. Technical and vocational education and training (TVET) was transformed, with clear policies, supported by legislation. New and reformed institutions and the skills development levy provide a dedicated funding stream to complement other public funds. But Adrienne recognised that the seamless pathways of opportunity for the many had not been delivered. She identifies two principal factors that inhibit progression. First, the state of general education, which is not providing sufficient numbers of young people with the literacy and numeracy skills to enable them to benefit from TVET and higher education opportunities. The second factor is the architecture of the National Qualifications Framework, which, she suggests, has consolidated 'divisions' between education and training, rather than erasing them.

On the state of general education, Adrienne offered no additional views, though no doubt would recognise that there is no 'magic' or quick solution to improve the experiences of primary and secondary education and their outcomes. However, she was engaging with the structure of the NQF and ways in which institutional change might bring positive change.

NQF Issues and Discussions

There are extended discussions between Adrienne and Shirley Lloyd, in emails and cited in Adrienne's notes, regarding SAQA's current approach to articulation. Crucially, Adrienne prefaces this with a comment on the De Lange Commission's distinction between formal and non-formal learning, and notes that "what labour was trying to do was to formalise the non-formal". Here she draws on Rosemary Lugg's distinction between "corporatist"/neo-liberal and

[2] Discussion relates to the of the drafting of the document: Department of Labour, 2002. *Report of the study team on the implementation of the National Qualifications Framework.*
[3] Sebolelo Nomvete, email input to Chapter 12, 2019.

more radical 'social democratic' discourses, and signals her intent to build on Lugg's analysis as a framing. Her notes also revisit the issue of development sector education, especially in relation to the Cosatu Participatory Research Project and the accreditation challenges for trade union education.

SUMMARY OF EMAIL DIALOGUE BETWEEN ADRIENNE BIRD AND SHIRLEY LLOYD, 2018

Adrienne queried whether the new Minister's Articulation Policy is "premised on a set of three qualification frameworks that themselves do not articulate". Shirley responded that the three sub-frameworks (schooling, higher education and trades/occupations) were supposed to articulate. The NQF under the SAQA Act was premised on an integrated framework, under the SAQA Act this moved toward an articulated framework. However, in Shirley's view, the three sub-frameworks have entrenched silos. The level descriptors were supposed to aid articulation and guide the development of learning outcomes based on the purpose of the qualification. "Parity of esteem" was intended to ensure that qualifications within different sub-frameworks would be comparable in terms of the level of cognitive and other skills; as well as the level of teaching, learning and assessment needed to achieve these. Adrienne noted that articulation hasn't therefore been designed into the system in linear ways, instead the new approach is to build bridges between different system components. Shirley agreed.

Under the SAQA Act, the idea was that pathways would be designed into qualification frameworks, and further articulation would be provided through Recognition of Prior Learning (RPL).

The first of these did achieve some results (perhaps inadequately reflected in studies and official reports to date). For example, before SAQA, electricians were demarcated into 7 various fields of practice (mining electricians, local government electricians, civil electricians, etc.), with no formal articulation routes. Under SAQA, these were synthesised into a single qualifications framework for electricians with electives that made horizontal and vertical progression more seamless. This impact of SAQA's early work does need more forensic analysis before the qualification pathway babies 'are thrown out with the bathwater'.

In the case of RPL, the workshop noted that studies on articulation which draw on the National Learner Record Database (NLRD) almost certainly and significantly under-represent the numbers of people who have achieved qualifications through RPL routes. However, RPL has been taken up mostly as an efficiency mechanism in professional bands, linked to professionalisation strategies – the examples of estate agents and insurance brokers are two instances, and the figures on these alone exceed the NLRD statistics on RPL. It has also been taken up to a limited extent (with some institutional impacts in many cases, again an under-explored theme in existing research) within the provider sector. RPL found much more limited traction in relation to the redress agenda, and indeed in relation to the more transformative thinking SAQA themselves attempted to drive under Elana Michelson's leadership (then SAQA International Advisor on RPL):

> The recognition of prior learning (RPL) has been a vehicle for assessing the informally gained experiential learning of workers in many countries in the world…. Approaches have ranged from the liberal humanist cultivating of self-knowledge and self-affirmation to the instrumentalist testing of workers against the needs of global capital, with the common denominator being a focus, humanist or technicist as the case may be, on the atomised individual.
>
> The introduction of RPL to South Africa held out the promise of a different approach, namely the use of RPL as a mechanism for collective social and economic redress. RPL was intended to affirm workers' knowledge by recognising broad equivalence between formally and informally gained expertise, eliminating "artificial hierarchies" of prestige and creating parity of esteem among unequally valued communities of practice and knowledge…[4]

Articulation and progression had some success under the SAQA Act, therefore, but not as much as hoped; and specifically was not very successful in providing redress. This led to an Articulation Policy, published in January 2017 as a Minister's Policy[5]; which provides a more sociologically nuanced approach rather than relying so heavily on qualification pathways. Informed by extensive research into actual ("systemic" and "specific") pathways, the policy aims to improve "relational agency" between system components. It affirms the need to locate education and training in relation to wider development strategies (including recognising historical and current inequalities) and affirms "parity of esteem" as a starting point using level descriptors. It describes some principles and mechanisms of articulation as well as legally allocating roles and responsibilities for achieving these. Qualifications remain a route for achieving progression and articulation, but these are now located within a broader landscape of education and training eco-systems; a wider framework of level descriptors; and a more delicate and (somewhat) epistemologically more sensitive architecture enabling access and progression (including a renewed commitment to RPL). Put more simply, the Articulation Policy takes the view that building closer relationships between various institutions in the skills "eco-system" will allow contextually appropriate pathways to evolve as needs arise.

As an input to SAQA's articulation debates, it is worth returning to two pilot projects Adrienne led before SAQA was established, to make sense of this. The 1996-98 Engineering and Manufacturing Processes (EMP) project has already been cited in chapter 1. The parallel Education, Training and Development Practices Project (ETDPP) was the second. Adrienne commissioned and led both, and wrote and signed the foreword to both reports.

The ETDPP Phase Two report synthesised 16 studies from Phase One, conducted by a team of 60 researchers (including four professors of education and many junior researchers who went on to become professors, SETA CEOs or SAQA employees). The report described different "fields" and "sites" of education, training and development, conceptualising these as dynamically located within non-formal, informal and formal institutions. Perhaps still relevant today, it framed criterial features of each as below:

Table 12.1. Education, training and development practices across sites

Category	**Formal**	**Non-Formal**	**Informal**
Organising principle	Knowledge hierarchy	Occupational role	Project goal

[4] Elana Michelson, *Epistemic Injustice and the Struggle for Recognition: Human Dignity and the Recognition of Prior Learning, 2013,* p. 1.
[5] Email correspondence Shirley Lloyd, 16 January 2020.

Boundary conditions	Decontextualized	Functional	Embedded
Contractual conditions	Pedagogic (student)	Economic (worker)	Associative (member)
Evaluation criteria	Norm-referenced (acquisition)	Criterion-referenced (application)	Commitment-referenced (participation)
Evaluation mode	Examination	Performance	Undifferentiated
Evaluation indicators	Course-based	Performance-based	Participation-based

Source: *Department of Labour, 'Education, Training and Development Practices Project (ETDPP) Phase Two Report', Pretoria, 1998, p. 32.*

Here we return to Adrienne's intent to use Rosemary Lugg's discourse analysis, but illustrate our observations in relation to RPL specifically. Judy Harris's study[6] exemplifies (in relation to RPL practices) Rosemary Lugg's[7] discourses historically informing the NQF. These are liberal humanist discourses (broadly correlated with "formal" fields and sites in the above table); human capital discourses (broadly correlated with "non-formal"); and "radical-emancipatory" discourses (broadly correlated with "informal").

The key issue about these discourses is that they have very different views about the nature of knowledge and skills; how these are generated and acquired; the social purposes of education, training and development; and the forms of education, training and development appropriate to each. Providing articulation or progression across such discursive divides is seldom possible through a simple pathways mapping. Hence the vision of the new Articulation Policy is to benchmark qualifications against a shared set of level descriptors and articulate them through "parity of esteem" rather than requiring identical outcomes.

This is directly relevant when considering the current political economy. Adrienne believed that education and training systems should be responsive to who people are, and where they live, learn and work. These are – obviously very broadly - the three sets of spaces in which they still do so. The political economy is reshaping the landscape of where people live, learn and work. The education and training system is as yet only partially responsive to people in each of these spaces (and to the landscape/regime changes). Constructing learning and career pathways within and between these spaces is what Adrienne was aiming to achieve. But achieving her vision will require taking on board her approach of talking with and hearing the human beings who live, learn and work within these spaces.

Institutional Structures

[6] Judy Harris, *Recognition of Prior Learning: Power, Pedagogy and Possibility*, Pretoria: HSRC Press, 1998.

[7] Rosemary Lugg, 'Making Different Equal? Fractured State and Ruptured Policy: The National Qualifications Framework in South Africa', *International Journal of Educational Development*, 29(3), May 2009.

As well as systemic issues, Adrienne had begun to think through institutional arrangements and was suggesting radical changes.

Adrienne wrote in her notes:

> The Skills Development Act set up separate structures for advice and execution – the NTB/NSA and the SETAs. The Higher Education Act set up the CHE to do both - advise and oversight. Going forward is this not the better model?[8]

.

According to colleague, Gerda Magnus[9]*:*

> As I worked very closely with [Adrienne] in the past three years we discussed and debated so much.
>
> So, the Centres of Specialisation (CoS)[10] was in a way a test case for a lot of the recent thinking. Some of the latest thinking …was to attempt to create a structure similar to that… in Germany. We had first thought it should be SAIVCET but later agreed the NSA would be a more appropriate vehicle. Integrating QCTO, SAIVCET, NAMB and NSA into a single mega structure. This will become the vehicle through which most of the issues she was dabbling with could be resolved.

Are the current institutional arrangements for governance, planning, implementation and evaluation of skills development possibly one reason why articulation and progression have not worked as well as envisaged? Adrienne at least seemed to think so…

Current Policy and its Development

Adrienne wanted to contribute to the debate about the future direction of skills development policy. She argued that this should begin with two current policy documents: the National Skills Development Plan (NSDP) and the White Paper on Post-School Education and Training.

The National Skills Development Plan states that its mission is to:

> **Improve access** to occupations in high demand and priority skills aligned to supporting economic growth, employment creation and social development, whilst also seeking to address systemic considerations.[11]

The White Paper sought to provide the context for skills development and to suggest that it warranted higher priority in national policies.

> National economic development has been prioritised, and the role of education and training as a contributor to development has begun to receive much attention. This is not to devalue the intrinsic importance of education. Quality education is an important right, which plays a vital role in relation to a person's health, quality of life, self-esteem, and the ability of citizens to be actively engaged and empowered. However, few can argue with the need to improve the performance of the economy, to expand employment and to equip people to achieve sustainable livelihoods. *This means improving partnerships, developing effective and well understood vocational learning and occupational pathways, and improving the quality of the learning and work experiences along those pathways.*

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[8] A. Bird, 'Foresight with Hindsight', Notes toward Chapter 12, unpublished, 2018.
[9] Gerda Magnus, email input into Chapter 12, 14 January 2020.
[10] For details on the aims and objectives of the Centres of Specialisation (CoS) programme of the Department of Higher Education and Training see http://www.dhet.gov.za/TVET%20Conference/TVET/Centeres-of-Specialisaiton-in-the-TVET-College-Sector.pdf - accessed 15 January 2020.
[11] National Skills Development Plan 2030, Department of Higher Education and Skills, March 2019.

The commitment to widen opportunities and to develop occupational pathways was supported by Adrienne. The 'how' of implementation may have been more controversial, and as we have seen, she had views about institutional structures to reinforce a more integrated approach to the identification of key skills, the design of qualifications and the delivery and assessment of training.

A major issue for the successful implementation of effective training is the identification of occupations that are in demand. Adrienne referred to the "re-imagined industrial strategy", which the ANC discussed in the Gauteng Lekgotla in March 2019. Ten priority sectors were identified: *"the automotive industry; clothing, textiles, leather and footwear; gas, chemicals and plastics; renewable energy; steel and metal fabrication; tourism; high-tech industries; the creative industry; the oceans economy; and agriculture and agro-processing".* Within these sectors, Adrienne suggested that a planning tool, which she had "initiated and developed with Allyson Lawless, for identifying the skills for Strategic Integrated Projects, could be used to determine occupations and their skill requirements.

The November 2019 Workshop

The workshop considered some core strategic issues in the current political economy. Following Adrienne's question of "what occupations are needed?", the workshop noted that dramatic shifts are taking place in the political economy of work in South Africa (and indeed globally). Adrienne's notes flag these as strategic considerations; but did not draw out the implications as fully as reflected below.

First, as a baseline demographic: there is a large and rapidly increasing number of people who are Not in Employment, Education or Training (NEETs). In 2009, there were an estimated 3.2 million NEETs [12]; by 2018 this had increased to roughly 6 million[13] and NEETs featured as a core issue in the 2018 Presidential Jobs Summit Colloquium. Already in 2009 , NEETs exceeded the total number of people in schooling, higher education and technical/vocational education.[14]

The workshop discussed that NEETs are not idle; instead they work outside the market economy, in ways that are not adequately supported by formal education and training.

> The market economy "should be seen as one part of a diverse economy, constituted by a host of economic practices articulated with one another in dynamic and complex ways and in multiple sites and spaces"[15]

Outside of the market economy are the state economy; household economies; economies of the commons; and the "underground economy". This is relevant to Adrienne's analysis in several ways:

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[12] Nico Cloete, *Responding to the educational needs of post-school youth - Determining the Scope of the Problem and Developing a Capacity-Building Model,* Council of Higher Education, Pretoria, 2009.
[13] Michael Rogan (ed), *Post-school education and the labour market in South Africa.* HSRC Press, Cape Town, 2018.
[14] D. McLean, Presidential Jobs Summit Colloquium participant, 2018.
[15] Adrienne Smith and Alison Stenning, 'Beyond Household Economies: Articulations and Spaces of Economic Practice in Post-Socialism', *Progress in Human Geography,* Vol. 30, Issue 2, 2006.

- Adrienne began her work on pathways at a point when the strategic imperative was about transforming the market economy; and where artisans and engineers were regarded as "scarce skills". Given the large and increasing number of people excluded from the market economy currently, the strategic imperative has shifted (indeed, this issue now dominates policy dialogues in South Africa and elsewhere). Adrienne's book focuses largely on the artisan-engineering pathways; is relevant in its own right, but is instructive also as an instance of pathway questions more widely. *If more people are working outside of the market economy, how can pathways within and between different economies help people to act for change in their lives?*

- In the current context, many artisan and engineering students are unable to find employment in the market economy once they have qualified. In some cases, they are unable even to find the work experience needed to qualify or register for professional practice. These young people are trying to find new pathways, often through other economies. For example, hundreds of artisan students in Limpopo earned the work experience needed to qualify by volunteering to work on churches, schools and adult learning centres. Local government became interested in supporting this. *Are there possibilities for pathways emerging within and between economies through routes such as these?*

- Adrienne's leadership on the Strategic Integrated Projects aimed to provide exactly these kinds of opportunities. *If the state is investing heavily in infrastructure development, how can pathways be created for artisans, engineers and others in ways that help ordinary people to climb their way up ladders and use the levers in the economic spaces in which they work?*

Secondly, Adrienne noted the impact of the Fourth Industrial Revolution (4iR). In essence, this is about how technology is reshaping work and workplaces; and how technology is often displacing work. Technological developments include robotics, 3D printing, information technology, nano-technology, biotechnology, big data and cloud computing, the Internet of Things and other trends. The confluence between these technologies, and the impact on social and industrial organisation has led to claims that "the scale, scope and complexity of how technological revolutions influence our behaviour and way of living will be unlike anything humankind has experienced".[16]

The workshop discussed these issues. We agreed that 4iR is a new brand for a long-emergent set of trends, but that these are now impacting at exponential rates. The impact is not always negative in terms of employment growth (4iR is opening up some new jobs and changing other jobs rather than always displacing). However, the net impact does mean that:

- Many occupations and professions are "disintegrating" and reforming as inter-related business processes/teams. For example, the occupation of a banker is being displaced by collaborations between behavioural psychologists, IT specialists and financial managers. People who used to work on production lines are now being

[16] Klaus Schwab, *The Fourth Industrial Revolution: what it means, how to respond,* World Economic Forum, https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/ - accessed 15 January 2020.

displaced by others who operate or maintain the computers and machines that do production. *Adrienne's focus in this book on articulation, access, progression and redress is more relevant today than ever, as a mechanism to ensure "just transitions".*

- 4iR is reshaping pathways for artisans and engineers in particular. Current lines of investigation explore three inter-related themes.[17] Routine tasks are rapidly being replaced by robots and computers. Some cognitive tasks are being replaced by predictive algorithms, but these often affect rather than replace existing jobs. Jobs that require person-to-person interfaces are interfacing in new ways with emerging technologies. The "skills bifurcation" between high-skill (e.g. engineering) and medium-skilled (e.g. artisan) jobs is more extreme now than historically. Fewer and more highly skilled artisans are needed in the market economy. Cognitive skills and technological literacy are the key factor in possible pathways. These themes mirror comments by Adrienne in some of her notes regarding "the widening gulf between "head" and "hand" at work and the implications this has for career progression possibilities".[18]

- The net employment effect is that fewer people are likely to be employed in the market economy; but larger numbers are likely to survive in household, informal and commons economies. The NEETs will continue to increase in number. In this context, one focus Adrienne was pursuing was how to assist those working in the market economy in ensuring a "just transition": how do we identify the new or changing jobs, how to help transition employees from existing to new or transformed work opportunities, and how to ensure their skills help to create growth? Her exploration of a link to Productivity South Africa is relevant here. A second focus – implicit only in Adrienne's questions regarding the accreditation of development sector education and training – is how to support those working outside of the market economy. In the first case, the workshop noted the link to the NSDP framing of "skills eco-systems"; in the second, also the re-emergence of community colleges under NSDP (although skills eco-systems are also a relevant framing here).

- The methods for anticipating skills needs, and Adrienne's question regarding how to identify the jobs, itself will almost certainly need further attention. Thus Sebolelo Nomvete and Daryl McLean noted that this should probably begin with forensically identifying the new and emerging technologies; mapping them onto existing value chains (and the structure of employment); then posing questions regarding just transitions and skills pipelines. Chris Vorwerk and Santa van Niekerk noted that changes to educational systems are achieved over the long-range, and that current regimes for qualification development and implementation will need more rapid response mechanisms.

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[17] David Autor and Gordon Hanson, 'When Work Disappears: Manufacturing Decline and the Falling Marriage-Market Value of Young Men', *American Economic Review: Insights*, 1(2): 161-178, 2019; Beyza Sumer, 'Impact of Industry 4.0 on Occupations and Employment in Turkey', European Scientific Journal, April 2018, Vol. 14, No. 10, https://pdfs.semanticscholar.org/943a/8ec2c738f329cdae3a8b9c5530d63529a4d4.pdf - accessed 15 January 2020.

[18] Adrienne Bird, proposal to Wits Enterprise 2018.

Thirdly, the workshop discussed the impact of climate change, another issue flagged by Adrienne. The workshop considered the 2018 Trade and Industrial Policy Strategies study on Unlocking Green Jobs.[19] Some 3.2m jobs in the market economy are moderately or heavily dependent on water. These jobs are concentrated in areas where there are existing or emerging water shortages. As water dries up, so do jobs. Cape Town provides a paradigmatic case study. Yet it is possible to create 600 000 new jobs in clearing alien vegetation from water catchment areas (alien vegetation consumes about 4.7 per cent of annual mean runoff); beneficiating the alien biomass along distributed value chains by pulping to extrude materials for fire-proof, low-cost housing (thereby mitigating shack fires); restoring and using the land for productive purposes; and manufacturing, installing and maintaining water-efficient technologies. Both artisans and engineers are required to unlock these jobs. The skills set for both may need to evolve in relation to climate change. Pathways may be opened, depending on how South African society and economy respond to the challenges.

The response to climate change as crisis/opportunity, here illustrated only in relation to water, was not a theme in Adrienne's book; but it is a major factor in the current and emerging political economy. We believe it honours Adrienne's intent partly in this respect (see also Tony Vis's closing comments on Adrienne's respect for the environment). More widely, we believe it exemplifies Adrienne's approach always to take a more strategically focused, interventionist approach. Pathways for her were not an end in themselves; they were a means toward helping people find ways to reinvent themselves and the world in response to the challenges they face.

Lessons learned, the NSDP and SAQA's current approach to articulation

The workshop noted many other lessons that can be learned from Adrienne's study. In particular, Chris Vorwerk pointed out that it was State Owned Enterprises (SOEs), that made possible Ken Bird's progression through their staff development policies and strategies, have historically played this developmental role in SA (and could do so better currently). The workshop agreed that this institutional (rather than purely systemic) lens is important. Before the workshop, Allyson Lawless had pointed out that navigating systemic and institutional hurdles (Allyson's father had followed a similar training path to Adrienne's father) requires extraordinary commitment from individuals.

ADRIENNE'S PERSONAL JOURNEY

Adrienne's personal journey described through the eyes of those who met her and worked with her at various points, has been summarised in Chapter 1.

[19] D. McLean, *Unlocking Green Jobs in South Africa,* Trade and Industrial Policy Strategies, Pretoria, 2018, https://www.tips.org.za/images/Unlocking_green_jobs_in_South_Africa_A_catalytic_intervention_Synthesis_report_.pdf - accessed 15 January 2019.

Although perhaps best known as a senior figure in government, Adrienne operated in interstitial spaces throughout her life. She was a competent academic; she worked in trade unions; she worked with (but never for) the private sector; she engaged intensively with ordinary people she met in her day to day life. Throughout, she engaged collectively and collaboratively (but while developing and interrogating her own views). As Pauline Seemise describes:

> I have my own history with Adrienne. But my brother Patrick Mathlaela was a security guard at Indlela. He came from a rural village in Makapanstad. He was highly intelligent, and often advised me on complex challenges I was struggling with in my life and work. But he suffered from dysgraphia (now a recognised learning disability) so he battled with education and later with employment applications. After years of "piece" jobs, he found full-time employment as a security guard at Indlela (a place Adrienne often came to for meetings). He would call me every time Adrienne had checked through security, to say that, however busy, she had again made time for a few minutes of discussion with him, and they had discussed the work she was doing. His inspiration was that people with his abilities and disabilities were being heard and seen by people at senior levels, his hope was that people like Adrienne would open up pathways for him and the next generation. Pauline Seemise.[20]

Adrienne's work encompassed probably every aspect of education, training and development. A superb educator herself, she brought these abilities into stakeholder engagements. (Her response to a five minute grandiose question at the launch of the National Skills Development Strategy was a simple "yes": it brought the house down). She played a central role in research informing national strategies, and without her work and commitment it is unlikely that the skills development legislation, the National Skills Development Strategy and the first National Human Resource Development Strategy would have seen the light of day. She helped navigate these and many other policy initiatives through stakeholder processes. She spearheaded interventions to put in place resources to support the funding of skills, including; the National Skills Development Levies Act (for which she always generously credited Lyndsay Falkov), tax rebates for learnerships and book publishing to financing mechanisms for skills under the Strategic Integrated Projects Bill. She led the establishment of the Quality Council on Trades and Occupations; represented the skills sector on SAQA; and headed up processes to develop skills and jobs through a variety of interventions.

Adrienne never lost sight of the human beings in the system; but equally that she always recognised that people are constrained by the social and economic conditions that confront them, and that ladders and levers are the least we should afford them.

Where Eagles Fly – A postscript from Tony Vis

Above the waterfall at Walter Sisulu Botanical Gardens is a rock ledge where a pair of black eagles have been nesting for decades. Adrienne was an avid bird watcher. She enjoyed watching the black eagles at the botanical gardens. Sometimes there would be chicks in the nest. Black eagles are highly endangered in South Africa, but Adrienne believed that with sound conservation management, black eagles could continue to multiply, and to fly.

[20] Pauline Seemise e-mail correspondence with Daryl McLean on Ch 12 input, 2019.

When Adrienne was at her desk looking back at the past and into the future, when she was contemplating what sort of jobs people would have and what kinds of work they would need to be trained for, she did so with her core values and principles in mind.

Adrienne felt deeply that there are historical injustices in South Africa, and that these must be addressed. But she also believed that persistent inequality had the potential to unravel our society and economy going forward. Hence she took lessons from other countries, and engaged passionately in these discussions within South Africa. For instance, she saw that in Germany, apprenticeship training was a pathway to highly regarded and well paid jobs in industry, while the Scandinavian social democracies illustrated for her the significance of equitable policies.

Her main concern was for people, workers in particular and people living on the fringe. Thus technology, she thought, ought to be purposed to improve the lives of poor people, provide opportunities for the younger generation, especially those excluded in the past. She wanted to give hope to workers in basic employment that they may, by improving their skills and knowledge while on the job or by way of part-time training programmes, be able to advance to better paid and more productive forms of employment.

Adrienne was opposed to technology being deployed only to enrich directors and shareholders. One day I showed Adrienne an article in the Scientific American Journal about how robots are displacing jobs.[21] The article described the ways technology was transforming the workplace by either eliminating certain jobs, or alternatively by allowing suitably trained workers to produce more goods over a wider range in combination with robots and AI directed processes. On reading the article, Adrienne nodded, "Interesting . . .", but took our conversation to how one would integrate this with, and find employment in a rapidly changing world. She embraced change without losing sight of her wider commitment to addressing poverty, inequality or human development.

Adrienne referred to the international SKA telescope project being built in South Africa and Australia. Under the leadership of project manager Bernie Fanaroff, the Square Kilometre Array project made South Africa a pioneer of new science and technology required for the development and construction of the telescope. This included setting up special education programs and universities and colleges to support the project, i.e. PhD scientists, engineers, technologists and artisans, many of whom would come from Kimberly and from the region. Adrienne was seeking examples of where, with enough motivation, focus, hard work and mentorship, South Africa could prevail.

Scarce skills has been a buzz-word for a while. Some years ago Adrienne, in her Special Projects Unit at DHET, together with Allyson Lawless, undertook a broad research and analysis project to identify scarce skills in relation to occupations and training programmes. This culminated in a book, *Skills for and through SIPs*, released at a prestigious event attended by Minister Blade Nzimande.

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[21] Scientific American (2017). *Jobs and Robots: Bracing for Technological Disruptions to Come*. https://www.scientificamerican.com/article/jobs-and-robots-bracing-for-technological-disruptions-to-come/

At the time drafting, civil and mechanical engineering were listed as scarce skills. I said to Adrienne that architects don't apparently need the assistance of draftsmen anymore, not much anyway. She could not specifically say where I, as a draftsman, should seek the next drafting job or contract, but she did emphasise the importance of 'learning pathways', so people in such a position could move from one speciality to something related without having to start over. Perhaps I could use my time to become an expert in designing 'green' efficient buildings and then be able to teach others.

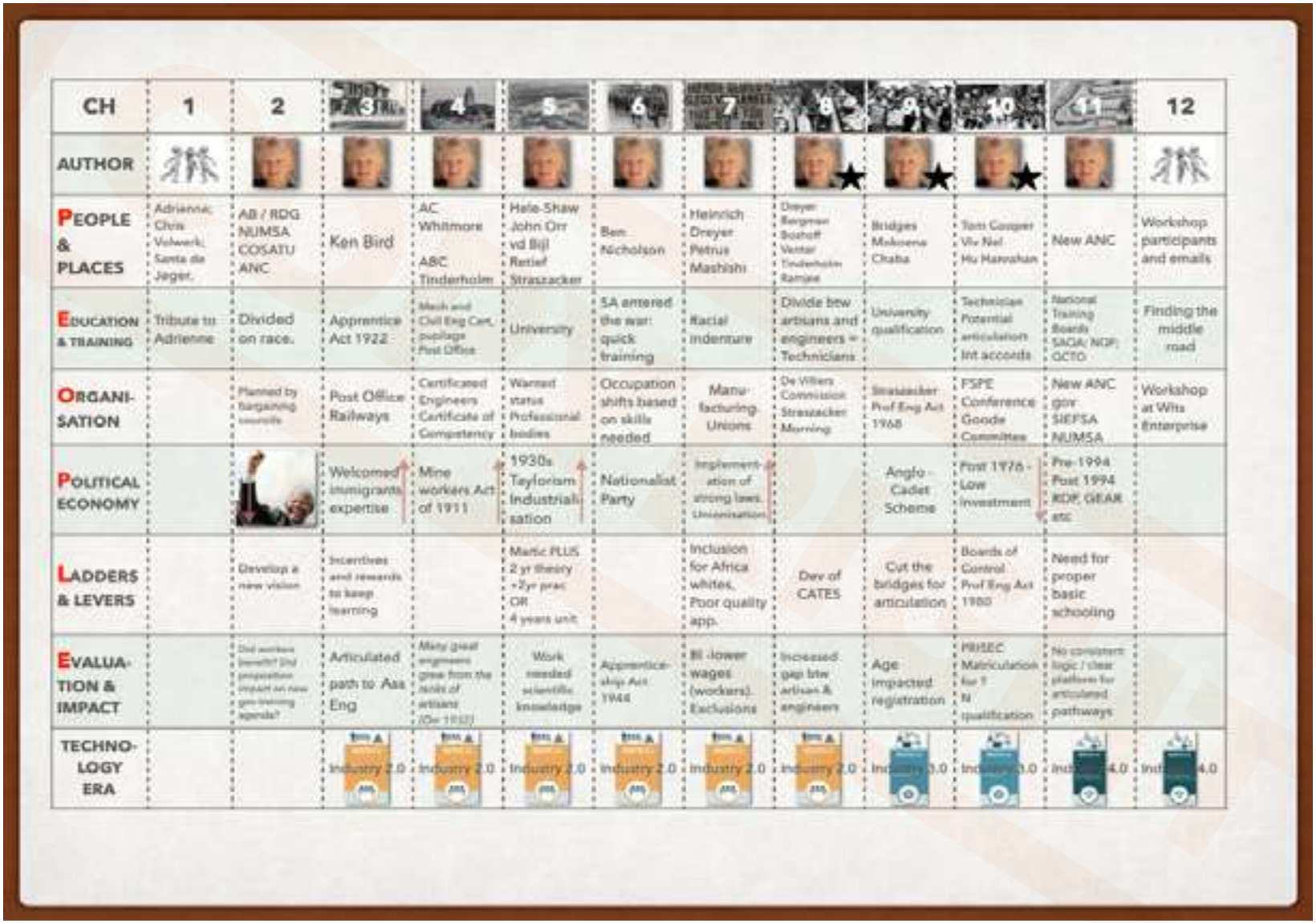
Adrienne believed that retired professionals or people with skills had a duty or obligation to society to pass on their knowledge to the next group of learners. That certainly was the basis for how apprentices were traditionally inducted by qualified artisans in their particular trade.

She endeavoured to forge partnerships between industry and government sponsored colleges and universities. She thought that new jobs, whether in the carbon neutral energy sector, eco-tourism or sustainable farming methods, would most likely arise out of multi-stakeholder partnerships doing things proactively and not waiting for instance for the auto sector to purge whole categories of workers from their assembly lines. For her, the way to approach a hard problem was through openness, imagination, engagement and perseverance.

Adrienne was not someone who would easily give up on what she was trying to achieve. She continued against all odds. On the last Friday before she died, with her eyesight failing due to the leukaemia, she still wanted to dictate, to her sister, Korki, the next morning, what her thoughts were for the final chapter of her book, to offer her inputs on what she believed to be the way forward.

She passed away in the early hours of Saturday morning, 15 June 2019.

APPENDIX I: BOOK SUMMARY



CH	1	2	3	4	5	6	7	8	9	10	11	12
AUTHOR								★	★	★		
PEOPLE & PLACES	Adrienne; Chris Volwerk; Santa de Jager.	AB / RDG NUMSA COSATU ANC	Ken Bird	AC Whitmore ABC Tinderholm	Hale-Shaw John Orr vd Bijl Retief Straszacker	Ben Nicholson	Heinrich Dreyer Petrus Mashishi	Dreyer Bergman Bosholf Venter Tinderholm Ramjee	Bridges Makoena Chaba	Tom Cooper Viv Nel Hu Marvahan	New ANC	Workshop participants and emails
EDUCATION & TRAINING	Tribute to Adrienne	Divided on race.	Apprentice Act 1922	Mech and Civil Eng Cert, pupilage Post Office	University	SA entered the war: quick training	Racial indenture	Divide btw artisans and engineers = Technicians	University qualification	Technician Potential articulation Int accords	National Training Boards SAQA; NQF; GETC	Finding the middle road
ORGANI-SATION		Planned by bargaining councils	Post Office Railways	Certificated Engineers Certificate of Competency	Warrant status Professional bodies	Occupation shifts based on skills needed	Manu-facturing Unions	De Villiers Commission Straszacker Morning	Straszacker Prof Eng Act 1968	FSPE Conference Goode Committee	New ANC gov SIEFSA NUMSA	Workshop at Wits Enterprise
POLITICAL ECONOMY			Welcomed immigrants expertise	Mine workers Act of 1911	1930s Taylorism Industriali-sation	Nationalist Party	Implement-ation of strong laws. Unionisation		Anglo - Cadet Scheme	Post 1976 - Low investment	Pre-1994 Post 1994 RDP, GEAR etc	
LADDERS & LEVERS		Develop a new vision	Incentives and rewards to keep learning		Matric PLUS 2 yr theory +2yr prac OR 4 years unit		Inclusion for Africa whites. Poor quality app.	Dev of CATES	Cut the bridges for articulation	Boards of Control Prof Eng Act 1990	Need for proper basic schooling	
EVALUA-TION & IMPACT		Did workers benefit? Did preparation impact on new gov training agenda?	Articulated path to Ass Eng	Many great engineers grew from the ranks of artisans (Dr 1912)	Work needed scientific knowledge	Apprentice-ship Act 1944	BI -lower wages (workers). Exclusions	Increased gap btw artisan & engineers	Age impacted registration	PRISEC Matriculation for ? N qualification	No consistent logic / clear platform for articulated pathways	
TECHNO-LOGY ERA			Industry 2.0	Industry 2.0	Industry 2.0	Industry 2.0	Industry 2.0	Industry 2.0	Industry 3.0	Industry 3.0	Industry 4.0	Industry 4.0

Table legend	
	Adrienne requested the assistance of a co-author, Mickey von Maltitz to complete these chapters.
	The economy was increasing or shrinking during that period.

APPENDIX II

RESEARCH INTERVIEWS

Table 1. Interviews conducted by Adrienne Bird to gather primary research data.

Name of interviewee	Organisational affiliation in the context of this book	Date/s of Interview
ABJ Tinderholm	Certified Engineers	15 October 2007
Alan Meyer	SAIEE	13 February 2007
Albert Boshoff	SARHWU	30 October 2007
Alan Bennett	Post Office	13 November 2007
Belinah Khumalo	NUMSA	25 March 2008
Ben Nicholson	SEAWA	15 August 2008 and 10 Nov 2006
Ben van Wijk	TUT Engineering	27 May 2008
Bill Bergman	Technicians	21 November 2007
Bill Venter	Altron	Notes provided by Mr Grant Rogerson 22 February 2008.
Bob Round	Post Office	Written communication November 2006-January 2007
Bryan Phillips and Annemarie Rademeyer	Employers	Discussion 26 August 2006
Petrus Mashishi	SAMWU	2 June 2009
Dave Adler	Cadet Scheme	17 October 2008
Des East	MICWU	Done by Jenny Grice 2 June 1997
Dirk Vermeulen	SAIEE	18 October 2006
Dr Heinrich Dreyer	Post Office -Training	2 November 2007 and 20 November 2007
Elias Kubeka	NUMSA	29 February 2008
Gerald van Rensburg	Tradesman	Synopsis about April 2009
Hu Hanrahan	Wits Engineering Department	18 Oct 2006, 5 Feb 2008, 19 Feb 2008, 21 Feb 2008
Ike Abrahams	NUMSA	2 April 2008
Jacob Maroga	CEO: Eskom	5 December 2008

James Jayiya	NUMSA	Interview with James' sister: Thandile Judith Jayiya 10 May 2008, Uitenhage
Jenni Case	UCT, Engineering	27 March 2008
Jethro Tshabalala	Post Office - ANC	28 February 2008
John Drysdale	Head of HR, Anglo American	Telephone interview 5 Nov 2008, Handwritten message 9 Nov 2008
Joshua Manana	NUMSA	17 March 2008
Judy Favish	NUMSA	27 March 2008
July Khosa	NUMSA	19 March 2008
Keith Prins	Post Office	24 October 2007
Kantilal Ramjee	Engineer ESCA	3 December 2008
Khabisi Mosunkuthu	POTWA	2 October 2008
Les Nhlapo	NUMSA	4 April 2008
Lyndall Shope - Malofe	Chair: Presidential National Commission on Information Society & Development	Personal CV provided
Malcolm Gow	Post Office	22 January 2007
Malose Chaba	Engineers	19 September 2008
Michael Crouch	SAIEE	24 October 2006
Mike Case	University of Johannesburg, Engineering Dept.	29 April 2008
Moegamat Hoossen	NUMSA	27 March 2008
Oupa Mopaki	Post Office -POTWA	24 July 2007
Paul Roux	CEO ESCA	Email correspondence 29 August 2008
Pieter Kapp	Akademie	30 July 2008 (also ch 8 Akademie references)
Reuben September	Chief Executive Officer: Telkom SA Ltd	Profile from webhttp://www.whoswhosa.co.za/Pages/profilefull.aspx?IndID=3356 accessed on 8th October 2008
Rod Harker	Post Office	Emails 24 October 2006 to 18 November 2006
Rolf Stumpf	ND of Education	9 November 2006
Roy Marcus	Engineers	19 September 2008
Sam Morotoba	NUMSA	24 November2007
Smunda Mokoena	Engineers	28 August 2008 and http://www.engineeringnews.co.za/article.php?a_id=110291 accessed on 4th

		November 2008 Engineering News article By: Martin Creamer CEO and regulator member, National Energy Regulator of South Africa (Nersa)
Stan Bridgens	SAIEE	25 October 2007
Terence Doyle	DME	1 August 2007
Thomas Cooper	Technicians	29 and 30 November 2008; various emails 3 – 28 November 2008
Toyer Lillah	NUMSA	10 May 2008
Trevor Coombe	ANC Structures	17 May 2019 (teleconference)
Victor Kgalema	NUMSA	Interview with Jenny Grice, 29 August 1997
Viv Nel	Technicians	1 July 2008, email 1 December 2008

APPENDIX III

RELEVANT SOUTH AFRICAN GOVERNMENT ACTS

Year	Act	Brief outline of the relevance of the Act
1896	Mining Regulations.	Provision of Certificates of Competency on the mines in the Transvaal.
1906	Mining Certificates Amendment Ordinance, No.11	Certification of mining engineers.
1911	Mines and Works Act, No.12	Introduced job reservation on the mines.
1913	Natives Land Act, No.27	The law incorporated territorial segregation into legislation for the first time since the Union in 1910.
1918	Regulation of Wages, Apprentices and Improvers Act, No. 29	Local Trade Boards were appointed to fix minimum wages and regulate working conditions.
1918	Factories Act, No.28	This act was promulgated after WW I to set a standard to regulated safety in SA industry.
1920	Native Affairs Act, No.23	This established a native affairs commission, provided for a system of local councils in the reserves; and authorised the administration to convene conferences of chiefs, councilors and 'prominent natives'.
1921	University of Witwatersrand, Johannesburg, (Private) Act, No.15	Establishment of the University of Witwatersrand.
1921	Juveniles Act, No 33	Management of progression of juveniles from school to employment.
1922	Apprenticeship Act, No 26	Set parameters and guidelines for implementing apprenticeships.
1923	Higher Education Act, No. 30	Formal division between universities and technical institutes.
1923	Native (Urban Areas) Act, No. 21	Restricted African access to urban areas, other than to provide services to Europeans.
1926	Mines and Works Amendments Act, No. 25	Further entrenched job reservation.
1927	Immorality Act, No. 5	An act of the Parliament of South Africa that prohibited extramarital sex between white people and people of other races.
1927	Native Administration Act, No. 38	The Governor-General of South Africa could a person or group from one area to another whenever he deemed this 'expedient or in the general public interest'.
1930	Apprenticeship Amendment Act, No. 22	Attendance of classes and passing of theoretical exams.
1930	University of Pretoria (Private) Act, No. 13	Transvaal University College becomes University of Pretoria.
1931	Mine and Works Amendment Act, No.22	Employment of a certificated man became compulsory if there was one 75 horsepower engineer or if the plant totaled 250 hp or more.

1931	Factories Act Amended, No.26	Required certification of competency for factory inspectors.
1936	Representation of Natives Act, No.12	Legislation passed in South Africa which further reduced black rights at the time.
1936	Native Trust and Land Act, No.18 Renamed Bantu Trust and Land Act, 1936 And Development Trust and Land Act 1936.	South Africa passed a law that served as the reorganization of its agricultural structures.
1937	Industrial Conciliation Act ,No 38.	Wages, conditions and functional ranges of work for artisans, operators and others could be nationally set through negotiation with registered unions.
1939	Electric Wireman's Act, No. 20	Established the Electrical Wireman's Registration Board.
1941	Factories, machinery and Building Act, No. 22	Compulsory for an engineer and machinery had to be certificated.
1944	Apprenticeship Amendment Act, No. 37	Introduced designated institution's for training, a National Apprenticeship Board, Ministerial powers to modify the earlier apprenticeship framework, and prohibited race discrimination.
1945	Native (Urban Areas) Consolidation Act, No.25	Tightened influx control laws.
1950	Suppression of Communism Act, No. 44	Legislation of the national government in apartheid South Africa which formally banned the Communist Party of South Africa.
1950	Group Areas Act, No.41	This Act enforced the segregation of the different races to specific areas within the urban locale.
1951	Bantu Building Workers' Act, No. 27	To provide for the training and registration of building workers, for the regulation of their employment and conditions of employment, and for other incidental matters.
1952	Native Services Levy Act, No 64	Required employers of black labour in urban areas to pay to the municipalities, a monthly levy for each employee.
1953	Native Labour (Settlement of Disputes) Act, No. 48	It withdrew employee status from African workers and excluded their trade unions from registration to prevent strike action.
1953	Bantu Education Act, No.47	A segregation law which legalized several aspects of the apartheid system. Its major provision was enforcing racially separated educational facilities.
1955	Vocational Education Act, No. 50	To bring technical colleges under state control .
1956	The Industrial Conciliation Act, No.28	Excluded black workers from industrial conciliations, restricted them to employer works and liaison committees.
1959	Extension of Universities Act, No.	Separate ethnic universities
1964	Educational Services Act, No. 41	Reversed technical college to provincial control.
1967	Advanced Technical Colleges Act, No.40	In order to provide for the establishment of technikons.
1979	Industrial Conciliation Amendment Act, No. 94	Legislation that made it possible for blacks to participate in the legal machinery set up for collective bargaining.
1981	Labour Relations Amendment Act, No.57	Abolished all racial distinctions with regard to union membership and permitted the formation of mixed trade unions.
1981	Manpower Training Act, No.56	Africans permitted to training as artisans.

1990	Manpower Training Act Amendment, No.39	Organisations could supply training to the unemployed.
1995	SAQA Act, No. 58	To provide for the development and implementation of a National Qualifications Framework and for this purpose to establish the South African Qualifications Authority.
1999	Skills Development Levies Act, No.9	The levy grant scheme that serves to fund the skills development initiative in the country.
2001	General and Further Education and Training Quality Assurance Act, No 58	To provide for quality assurance in general and further education.
2006	The Further Education and Training Colleges Act No. 16	To provide for the regulation of further education and training.
2008	National Qualifications Framework Act, No.67	Facilitate access to, and mobility and progression within, education, training and career paths; Enhance the quality of education and training; Accelerate the redress of past unfair discrimination in education, training and employment opportunities.

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