

Building Capacity for the unfolding REDS in the EDI



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1 Introduction

Background

In terms of the expected economic growth, government has set targets divided in two phases. In the first phase, between 2005 and 2009, an average annual growth rate of 4,5% or higher is targeted. During the second phase, between 2010 and 2014, an average annual growth rate of at least 6% of gross domestic product (GDP) is targeted. In addition to these growth rates, there is a need to ensure that the benefits of growth are shared to alleviate unemployment and poverty in the South Africa. A reduction in unemployment to below 15% and a reduction in the poverty rate to one sixth of households by 2014 are targeted.

A task team led by the deputy president, and comprising of different ministries, including the Department of Public Enterprises (DPE), has been constituted to develop a strategy to ensure the achievement of the ASGISA objectives.

State owned enterprises (including Eskom and Local Government) contributions to ASGISA are integrated into the task team deliverables.

The planned Regional Electricity Distributors (REDS) within EDI, by virtue of its core business of supplying electricity and operations of the networks, Capital expansion programme and developmental mandate is ideally positioned to make a significant contribution to ASGISA. Various national research, investigations, and debates, as to whether the country has the skills capacity required by the Construction and Engineering environment to meet in the demand for creation and maintaining the infrastructure have been done.

Despite the growth in the Electrification drive in Eskom and Local Government, the construction industry at large is emerging from a significant phase of decline that has seen limited investment in Human Capital development resulting in the loss of available capacity. Eskom and Local governments Capital expansion drive in electrifying 3, 5 million households by 2012, the Eskom' expansion programme in building more power stations, and government's announcement of the large Government infrastructure programme in 2005, such as the Gautrain Rapid Rail link, the development of the infrastructure for the 2010 Fifa Soccer World Cup, plus the growth globally, highlighted the skills shortages. It also necessitated the investigations to ensure that the country will be able to deliver the human capital capability to deliver for infrastructure development projects and the operating and maintaining such infrastructures.

This report has been developed using information from the many researches that have been done. Refer to acknowledgements.

The Joint Initiative on Priority Skills Acquisition (JIPSA) has identified a number of priority skills such as Artisans, Engineers in all categories in the engineering. JIPSA target to facilitate the training of up to 50 000 artisans by 2010.

2 Current status

Commercialisation of SOE's Training facilities from 1987/88 onwards coupled with the rationalisation and consolidation, which took place within government post 1994, resulted in a severe decline of training capacity in the country.

SOE training facilities and Industry training facilities decreased dramatically by closing rather than building capacity. The outsourcing of training across SOE as well as industry has further contributed towards this.

One of the factors hampering expanding capacity across the board, aside from the costs of upgrading training equipment, is the severe shortage of qualified technical instructors. The shortage of qualified and registered workplace Mentors, Coaches and Assessors has been identified as an important contributing factor to ensure that critical workplace training occurs.

Further overwhelming conclusions of the investigations highlighted a number of serious challenges.

"...as many as 90% of South Africa's consulting engineering firms are trying to employ skilled Engineers, Technologists and Technicians but finding it hard to identify prospective candidates." *The Civil Engineering Contractor Bulletin, 16 October 2006.*

There is a concern that the current boom promise may fade due to the lack of skills. Eskom's chief economist, Mandla Maleka says government has to provide an environment for a bigger pool of skills "even if it is regulatory", to plug the gap. The skills shortage is considered so serious it could sabotage the ASGISA initiative. Deputy President, Phumzile Mlambo Ngcuka, who is driving the initiative, has alluded to this, Government's R372bn infrastructure investment between now and 2009 is expected to stretch the country's skills pool to its limit. *Business Day 13 June 2006.* This excludes the Eskom Capital Expansion programme.

The current growth rate puts enormous pressure on the depleted skills in the country and will need substantive interventions because:

- The current growth in infrastructure investment has come on the back of lows in the industry that have not been experienced in decades
- Labour practices of the past decade have resulted in fundamental structural changes favouring labour brokering, resulting in declining investments in skills development, and
- There have been fundamental changes, and breakdowns, in the skills supply pipeline.

To enable the industry to reach the planned growth rate targets over the next 5 years it is imperative that following demand for skills was achieved:

- Management, Supervisory, and Engineering capacity are developed
- Artisans are developed to provide in the core, critical and scarce skills.

Furthermore, of great concern is that almost 40% of the senior officials and managers have five years or less experience in the public sector.

2.1 Capacity need in EDI

2.1.1 Local Government

The audit indicated a 41% vacancy rate within the Artisan levels.

Estimated Engineering and artisan requirements in Local Government

Artisan Type	Total extrapolated			
	Filled	Vacant	Vac as % total	Totals
Boilermaker/Welder	144	96	40%	240
Electricians	2915	1608	36%	4523
Fitters	168	36	18%	204
Instrument Mech.	36	24	40%	60
Machinery operators	24	36	60%	60
Millwright	36	60	63%	96
Sen Eng asst.	84	84	50%	168
Traffic signals	36	12	25%	48
Traffic signal asst	36	12	25%	48
EDI Total	3479	1968	36%	5447

Estimated EDI Artisan requirement in Local Government

JIPSA report 23 June 2006

2.1.2 Skills required in Eskom for infrastructure projects

Skills Required for period (2006- 2012)	Eskom Dx	Eskom Build Prog.	Total
Coded Welders		300	300
Draughtsman		65	65
Electrical Fitter		20	20
Electricians	4300	300	4600
Engineering Technician (Electrical)		300	320
Engineering Technician Civils		160	180
Engineers-Mechanical, Electrical, Instrumentation		400	400
Fitter		600	611
Instrument Technicians		200	200
Millwright			33

Estimated EDI Artisan requirement in Eskom (EDI)

JIPSA report 23 June 2006

Skills Required for period (2006- 2012)	Eskom	Eskom Build Prog.	Total
Officers		400	400
Project Managers	40	200	240
Sheetmetal Workers		30	34
Supervisor		200	201
Welder	200	30	253
Finance Managers	10	400	410
Safety Advisors	10	300	310
Technicians	50		50

Estimated EDI Artisan requirement in Eskom

JIPSA report 23 June 2006

2.2 Pipeline output

Analysis done in the skills pipeline of from schools, Further Education (FET), and Higher Education (HET) shows increasing numbers of students entering the training institutions. The Nett output of the pipeline is negatively affected by, the success rate of throughput, natural attrition, changes in work processes and the lack of experiential (workplace) training for qualification to meet the required demand.

Based on the above the biggest gap exist in the critical and scarce skills categories.

It has also become clear that the human capacity (instructors, coaches) to deliver the training has been depleted.

The lead time to provide adequately competent staff in the engineering environment is long and will have a negative influence leaving gaps in the engineering environment if immediate actions are not instituted. The time to deliver a professional registered engineer is 8 years (without experience), for Technicians and artisans 4 to 5 years. The high attrition rate in the critical and scarce categories plus the lead time to deliver these competencies places more challenges on meeting the requirements.

The acceleration of the study period for a qualification poses other negative results on the level of competencies. The Learning part can be accelerated and shortened but the lack of practical workplace training negatively affects the level of competence which leads to accidents, fatalities, and sub standard work. Experience and workplace training cannot be accelerated.

2.2.1 Schools pipeline

The South Africa's school system produces 10 000 students with matric exemption with a result between an A and C symbol in higher grade Mathematics and Science annually.

1995 - 1 666 980 pupils started in grade 1

2001 - 932 161 reached grade 7 (Std 5), 55% of those started in grade 1. A 45% drop out.

2006 - 528 525 pupils wrote grade 12, 32% of the learners that started in grade 1 in 1995. A drop out of 68%

351 503 passed grade 12 or 21% of those started in grade 1. Drop out rate of 79%

85 830 obtained matric exemption or 5% of those started in grade 1

10 000 obtained matric exemption with between A and C symbols in higher grade Mathematics and Science, or 0, 6%.

The drop out rate of the students between Grade 10 to grade 12 is 50%

The minister of Education, Me Naledi Pandor announced on 17 September 2009 the implementation of a General Education Certificate at grade 10 level. This will support the proposed development of a Linesmen type qualification and career path.

In an international Mathematics and Science study South Africa was ranked last.

50 Countries participated where the grade 8 pupils were assessed. The maximum points that can be achieved were 800 points. 4 levels of achievement were specified:

Advanced international Benchmark = 625 points and above

High international Benchmark = between 550 and 625 points

Intermediate international Benchmark = between 475 and 550 points

Low international Benchmark = between 400 and 475 points

The top achievers were Singapore (605 points), South Korea (589 points), Hong Kong (586 points), Taiwan (585 points) and Japan (570 points)

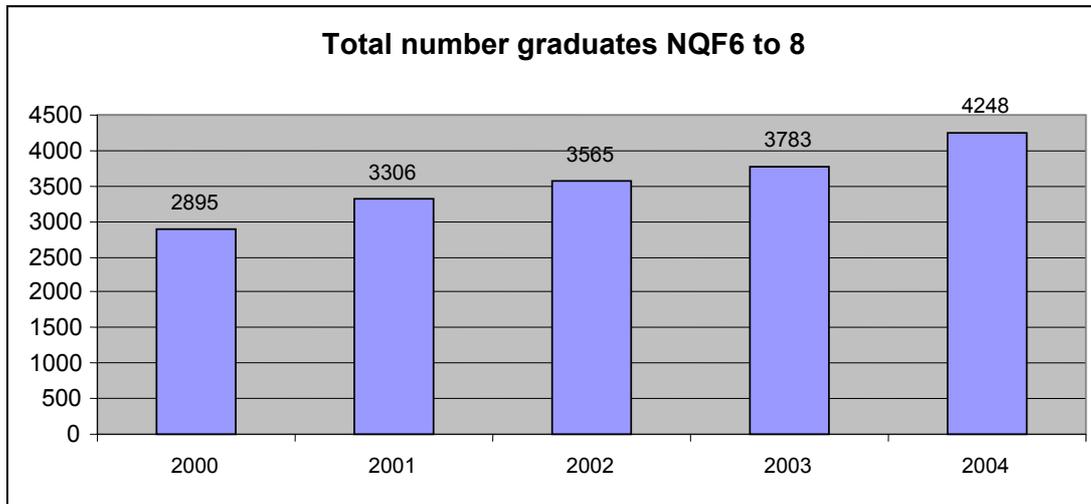
South Africa ended the lowest scoring 264 points on Mathematics and 244 on Science. 10% and 13% of SA grade 8 learners participated, respectively scored higher than 400 points.

"Inadequate mathematics and science education is probably the single biggest obstacle to African advancement in the country. It impacts severely on the development of high-level skills in the workforce and thus limits economic growth". (*From Laggard to World Class Reforming Maths and Science Education in SA schools. Centre for Development and Enterprise, 2004*)

The fact of the apparent low standard has a direct correlation with the success rate to produce Artisans, Technicians, Technologists and Engineers. However as indicated previously this create the opportunity for industry to use the numbers that are not academically strong enough to be trained as artisans, starting from a grade 10 level.

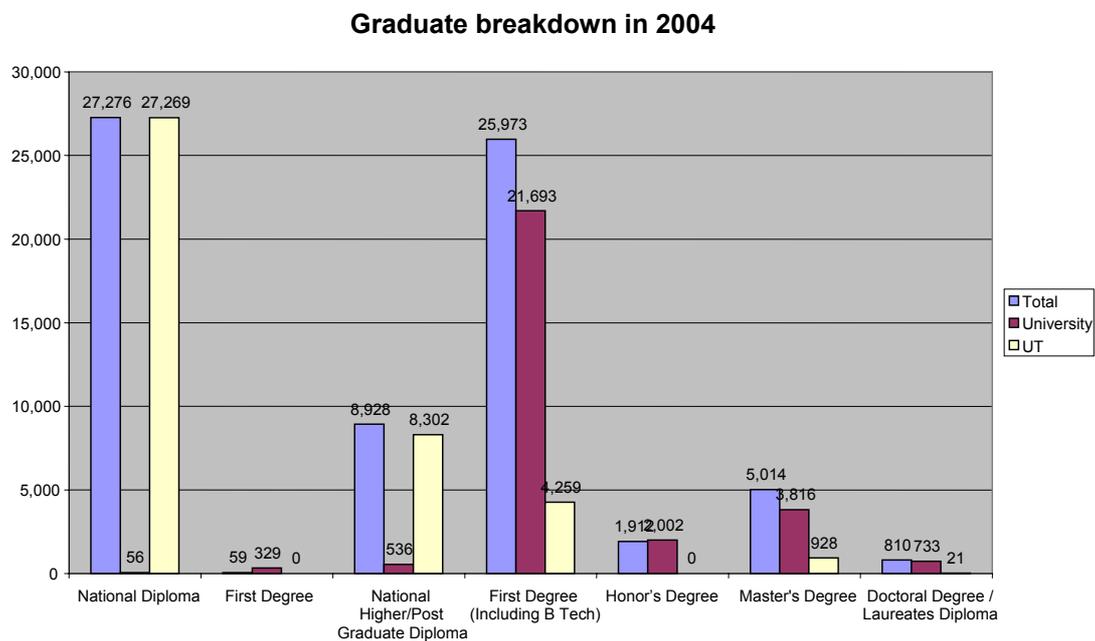
2.2.2 Tertiary Institutions

The graph indicate the output of all the Engineering disciplines in SA for which all the industries have to compete.

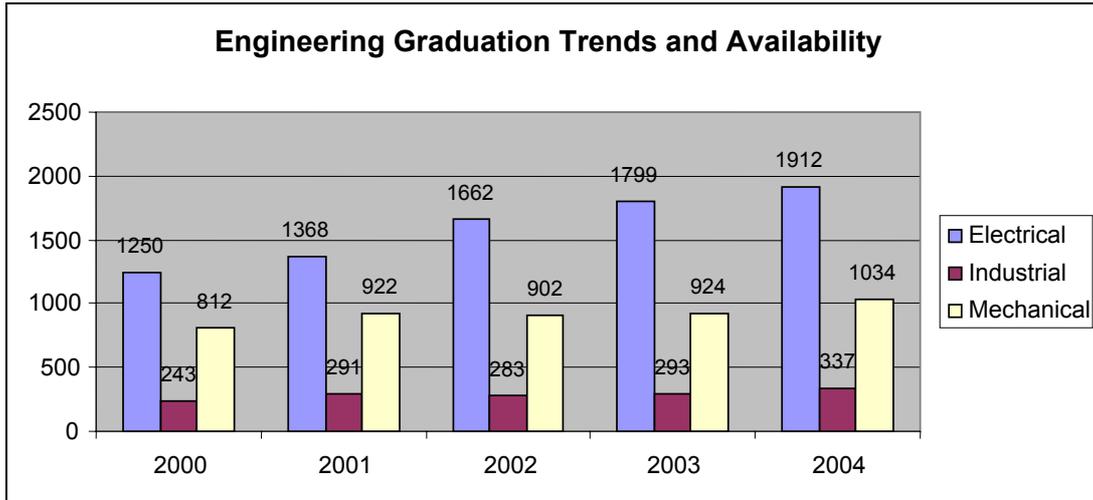


The graduation trends and availability National Learners Records Database from SAQA – February 2007

The outputs of graduates are increasing year on year. Despite of the growth, the average time to attain a BSc engineering degree has increased from 48 months to the current 56 months. (*University of Pretoria, Engineering faculty*)



Of all graduates available in 2004 39% qualified with a national diploma, 31% with First degree, and 6% with Btech. The figures indicate the total number and not only Engineering



Legislation places heavy demands on specific population groups that are not readily available. In 2004 an average of 18.5% of graduates available from Universities and Universities of Technology across all engineering disciplines was African.

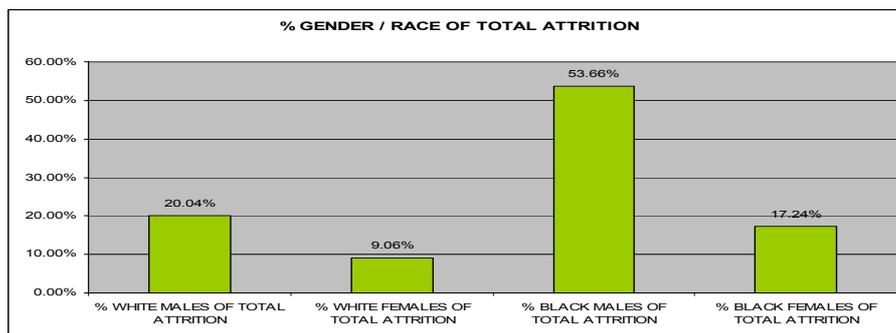
- Employment Equity Legislation prescribes strict targets of employment of historically disadvantaged South Africans even though the following is reality regarding availability.

In 2004:

- Only 15% of available graduates in Industrial and Mechanical engineering disciplines was African
- 17% of available graduates in Metallurgical engineering was African
- 20% of available graduates in Mining engineering was African
- 28% of available graduates in Chemical engineering was African
- 19% of available graduates in Electrical and Electronic engineering was African

3 Attrition rate of Skilled Technical competencies

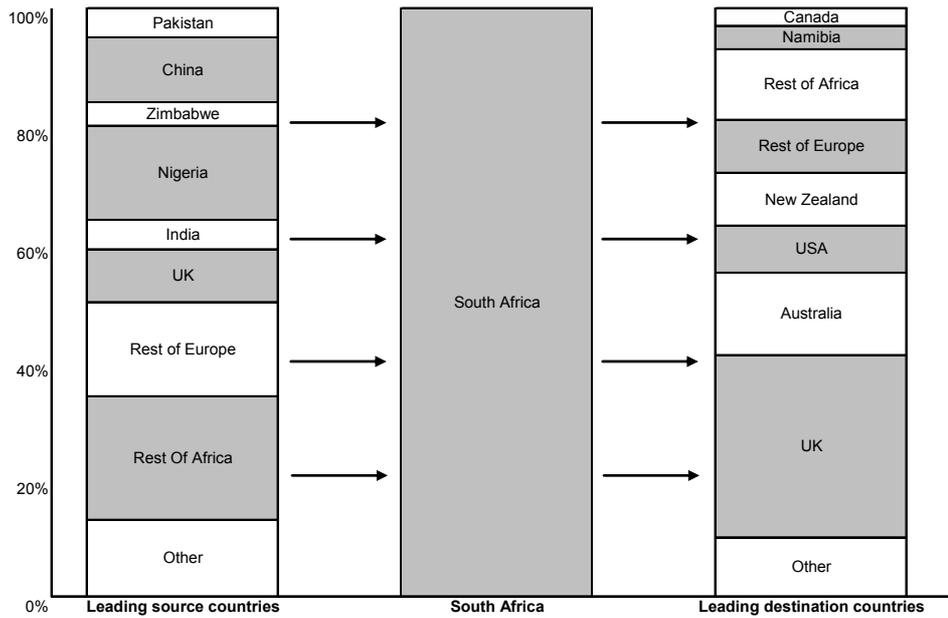
3.1 Typical Attrition rate in Eskom



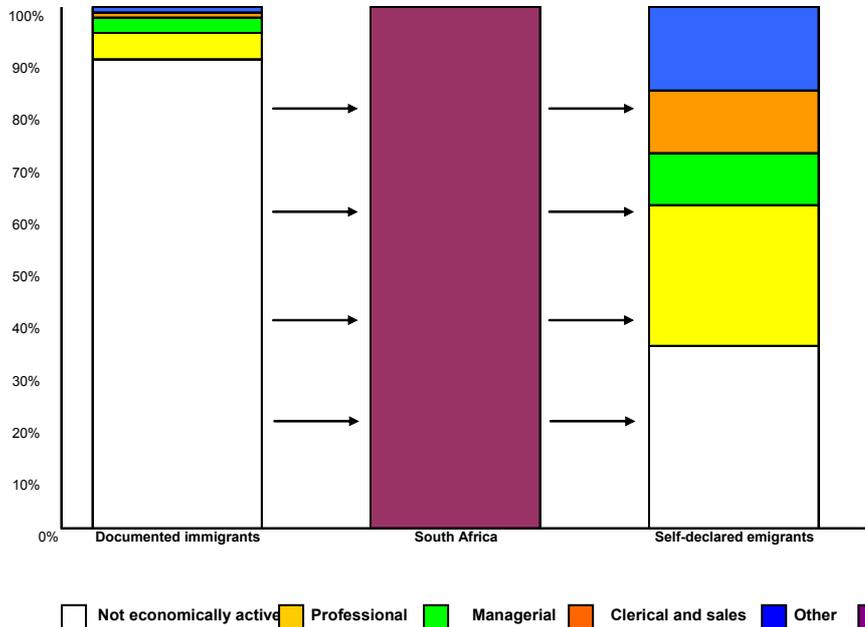
The attrition rate amongst Black males is much higher than the other categories which possibly is an indication of the lucrative opportunities in the external markets.

3.2 Attrition of staff to foreign countries

Major lossess occurs due to self-declared South African emigrants. The major countries are United Kingdom, Australia and the rest of Africa, whereas the most popular source of countries of immigrants are Nigeria and the rest of Africa.



Documented migration, Statistics South Africa, 2003 Report No. 03-51-03



Not economically active
 Professional
 Managerial
 Clerical and sales
 Other
 SA

Documented migration, Statistics South Africa, 2003 Report No. 03-51-03

SA has suffered a net loss of skills due to migration. Stats for 2003:

- 60 Industrial engineers
- 6 Chemical engineers
- 3 Electrical engineers
- 3 Mechanical engineers
- 1 Metallurgical engineer

- 29 Mining engineers
- As well as:
- 356 artisans
 - 25 Production Foreman/Supervisors

4 Capacity

4.1 Resource Capacity in the EDI to deliver training

Audits were done in the SOE's with specific focus on the competencies that will be required in the EDI. The report is not focused on the training of "generic" industry electricians because the resources, both instructors and facilities in this area are much more available. The competencies of electricians required in the Distribution business are more focused on Build, Maintain and Repair of overhead lines, and Substations.

The critical shortage of technical instructors is evident, and the age distribution of the current instructors clearly indicates an ageing workforce, and urgent attention is required to this area to build the necessary capacity.

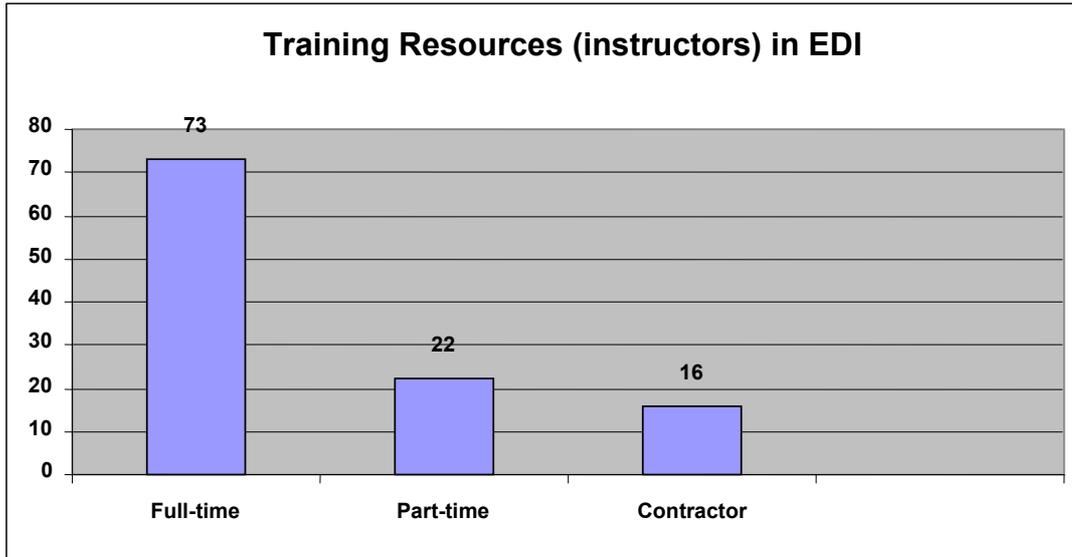
The survey revealed that the average learner/instructor ratio varies 10:1 to 15:1. However, it emerged that there is a shortage of qualified technical instructors across all categories. This could impact negatively on the ability of Training institutions to maintain and increase their existing training capacity. A similar problem exists around the shortage of workplace Assessors and Mentors, which should form the basis of further research.

Preliminary estimates reveal that the current shortage of instructors across government (including local) and SOE's is in excess of 120.

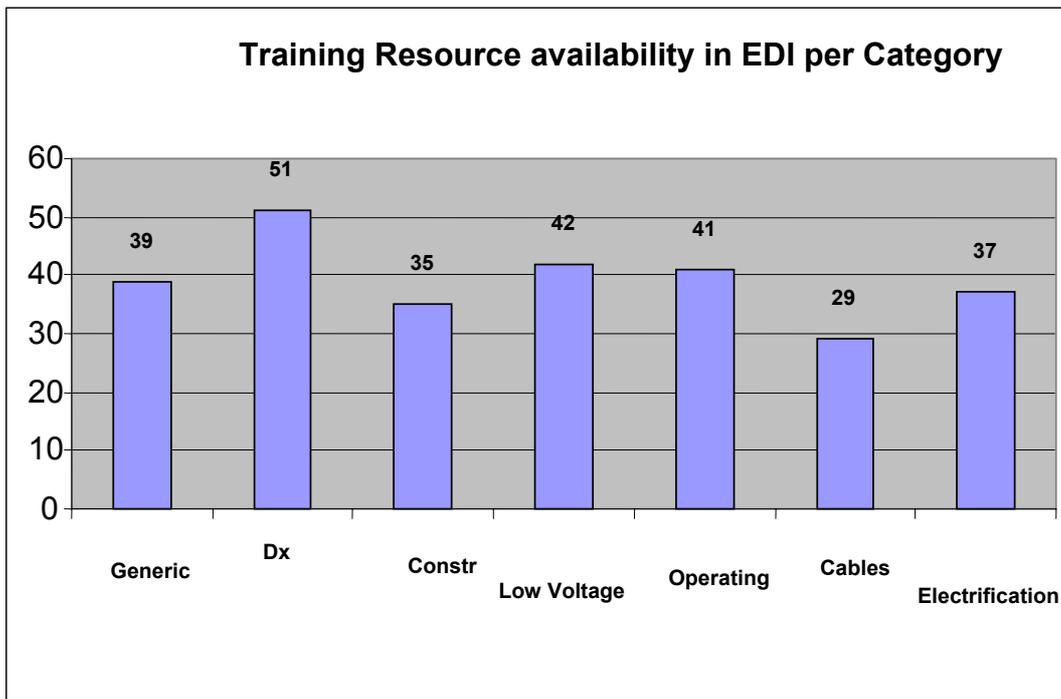
It is estimated that the shortage in the SOE's, e.g. Eskom and Local Government is in excess of 55.

The reasons of the current shortage of instructors are multi-faceted and require further research. However, during the course of this study, the following emerged as some of the contributing factors:

- A consequence of allowing training capacity to deplete (as occurred to varying degrees across SOE's and government) has been the failure to retain staff especially in the case of technical instructors. Training Centres, wanting to increase capacity, are now finding it extremely difficult to attract instructors in the Distribution electrical field, with the necessary skills and competencies and ability, to train learners in this field. A suitably qualified instructor in the Distribution environment is regarded as a critical and scarce skill and is not readily available.
- People are rather hesitant to become instructors, as they believe that educators are not valued in society. This raises issues around status and remuneration of such professions within the public sector and beyond.
- A number of institutions indicated that their instructors had left for more lucrative jobs in the private sector; had become consultants or had left the profession. One or two institutions indicated that there was little incentive for instructors to remain in service because of the lack of career-pathing and upward mobility.
- Most employers have found that there is not a high level of willingness amongst their personnel to become instructors. This is especially so in relation to experienced artisans. Many of them do not have the aptitude for training while others believe that there is not a sufficient incentive to move into training. There is a view that an instructor is considered to be a more 'low level employee' as he is no longer on the production line.
- An added factor is that the job of an instructor is not an easy one – hence the need to consider some form of built-in incentives to encourage suitable candidates to consider training as a career option. Eskom is currently exploring various ways in which to incentivise senior artisans to become instructors, not necessarily on a permanent but rotation basis.

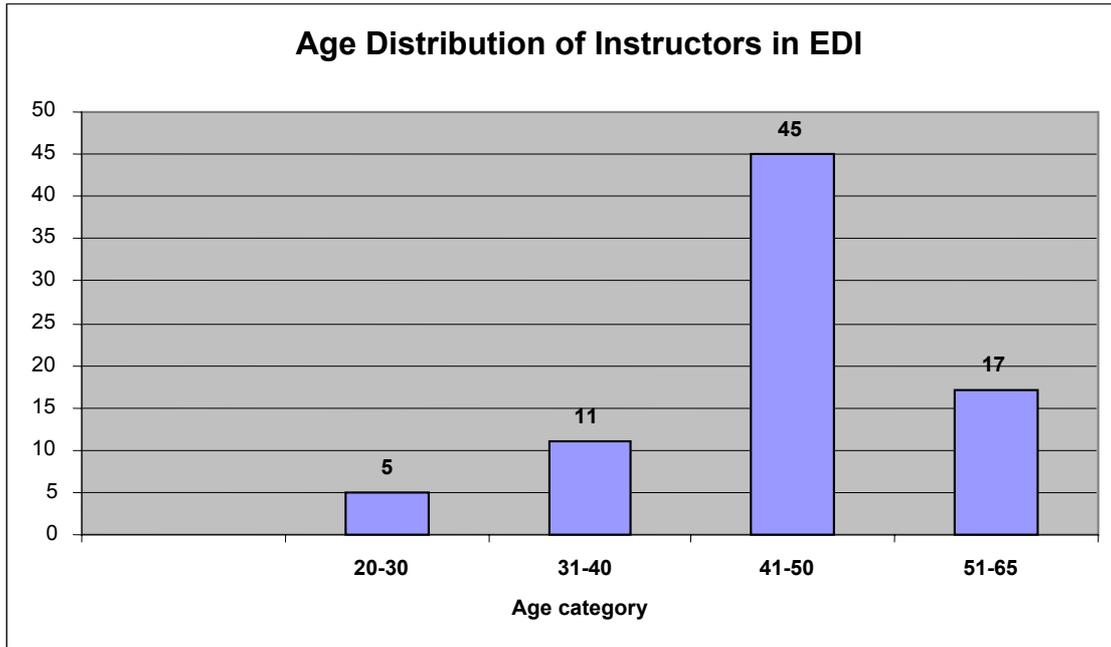


Instructors with Distribution electrical skills in the EDI



Instructors with Distribution electrical skills per category in the EDI

The graph indicates the numbers of instructors in the EDI (Eskom and Local Government) that can deliver in the Distribution requirements. The Generic category refers to the training of the “generic” electricians, where the Dx category refers to Distribution specific competencies. The numbers of the different categories can be a double count, where the same instructor may be multi-skilled to deliver in more than one category.



Instructors with Distribution electrical skills in the EDI

The age distribution graph indicates an aging workforce. The majority of instructors in the 41-50 age groups tend to be more towards the upper level of the age group.

4.2 Facilities Capacity in the EDI to deliver training

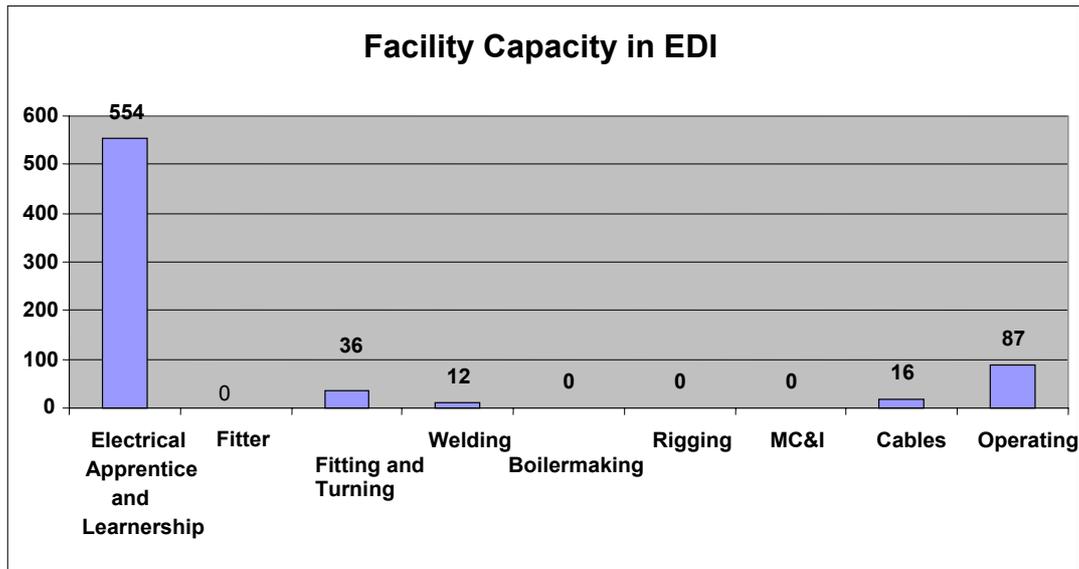
Site visits to Eskom and Local Government electrical Training centres revealed that there are well equipped centres including classrooms, but some are in the need of upgrade. There is a real need to improve and equip simulators to enhance the training of distribution related training such as Line construction, - inspection, - maintenance, and – repairs, Substation construction and maintenance.

The main factors in the Industry that are hampering expanding of capacity are:

- Funding of upgrading equipment and facilities
- Severe shortage of Technical instructors
- Shortage of workplace Mentors and Coaches

Provincial and Local Government revealed the following:

- The main Training capacity is within the Metros
- Municipal Training Centres used to exist in 18 municipalities around the country but was closed down or reduced to a minimum
- Smaller municipalities are hesitant to develop artisans due to the lack of Instructors, and workplace assessors
- Finding accredited providers and funding
- Some municipalities possibly diverting Training budgets to other activities



Capacity to provide Distribution electrical skills in the EDI

Although the graph indicates that there is a capacity to train 554 artisans, it actually refers to the “generic” electricians. The current actual capacity in the EDI to train Distribution electricians are less than 250.

5 Recommendations

- Starting at the Pipeline, Industry will need to get involved at school level to create more interest amongst learners in the Maths and Science subjects.
- Completion of a lower entry level into the labour market with specific focus on “qualifications” such as Linesmen etc. This can capture the drop out rate between grade 10 and 12, which is currently unemployed. This will encourage the learners that are dropping out to become artisans.
- Identification of possible skills programmes that will give current employees without the required academic qualifications, credits and mobility towards qualifications. Skills Programmes have been registered for Artisan assistant, and Artisan levels in both Construction and Distribution environment.
- Set up focus groups to develop an environment conducive to attract technical instructors to the Training environment. An instructor should be regarded as a specialist and subject expert that will transfer skills and competencies to learners.
- Create partnerships in the public sector and specifically in the SOE, e.g. Eskom, Transnet, Local Government, SANDF, FET training centres. These partnerships should be focussing on optimisation and co-operation rather the amalgamation to maximise the resource capacity.
- Creating Training hubs throughout the country where the Assessors, Instructors Assessment centres can be accessible to the industry at large.
- Create Contractor Training academies where Contractors and Suppliers in the SME and BWO environments can be trained. Seek support and establishment of such academies as an Institute of Sectoral and Occupational Excellence (ISOE). Every SETA must identify and support at least five ISOE’s within the public sector. Negotiations have already started with the EWSETA to possibly recognize and support the Contractor Academy as an ISOE.
- Establish Public and private sector partnerships within the private sector to train artisans, whether it is company linked training facilities, private training providers or the former regional training centres. In the event, where insufficient capacity exists within the EDI, linkages could be explored with the private sector.

- Research indicated a potential shortage of over 120 technical instructors across government and SOE's. Various options could be explored to rectify the situation:
 - In the short term, re-employing former artisans who took packages during the restructuring of SOE's and local authorities to be trained up as Instructors, Mentors, Coaches and assessors.
 - Investigate and develop strategies to attract and train more experienced existing artisans in the organization to become instructors. Identify and use best practices to draw such resources.
 - If there is a well defined strategy to building the capacity in the industry consideration can be given to the importing of instructors for a short period to deal with the current backlog. Such an approach would require very specific conditions around a skills transfer arrangement.
- To ensure that experiential learners will get the required workplace training and exposure it is proposed that the same strategy is followed as in the Construction environment with the establishment of an Employment Skills Development Agency (ESDA) to manage the legal and administrative hurdles of placing learners with multiple workplaces to ensure access to appropriate training as required. The flexible ESDA model, by acting as a lead employer and coordinating workplace experience, can ensure that individuals are moved across projects and are able to have continuity in learning, and in this way develop the required experience and competence.
- Creation of "Centres of Excellence", where research on applied Technology can be done.
- Support the ASGISA Project by providing job opportunities to learners within the industry.
- Develop strategies to build capacity in areas that are currently critical to ensure a successful creation and sustaining of the REDS:

Planning and Design	<ul style="list-style-type: none"> • Network Master Planners • Design and Project Engineers • Surveyors • Design Draughts persons
Primary Plant	<ul style="list-style-type: none"> • Artisan • Linesmen • Switchgear specialists • Cable specialists • Live Work
Training	<ul style="list-style-type: none"> • Technical Instructors • Line Coached • Line Mentors • Live Work instructors
Capital Expansion	<ul style="list-style-type: none"> • Project managers • Project co-ordinators • Clerk of Works
Secondary Plant	<ul style="list-style-type: none"> • Protection planning, Design and co-ordination • Protection and Metering field execution • SCADA system support • SCADA field execution
Quality of Supply and Reliability enhancement	<ul style="list-style-type: none"> • Plant engineers • QOS engineers
Network Management	<ul style="list-style-type: none"> • Network Controllers • Network Outage schedulers

6 Conclusion

Studies by different groups revealed; "...there is a lack of the physical infrastructure but a bigger contributing factor is the low level, and uneven spread of training intellectual capacity (instructors), updated equipment and funding. In view of this, it is critical that mechanisms be explored to firstly, consolidate resources, which exist (instead of seeking to create new ones) in a way that maximizing existing capacity and thereafter, engagement around alliances and partnerships. One of the biggest impediments however, is resources to drive such processes. *Recapitulating the state: Locating government's training capacity. Renee Grawitzky*

"Challenges relating to the skills pipeline cut across the education, training and workplace arenas. The problem is not merely to equip new entrants with skills, but to ensure that they gain the appropriate workplace experience to consolidate their craftsmanship, supervisory and professional capabilities. A further challenge is the predominance of an aging skill population which needs to be replaced without compromising quality and performance". *CIDB Skills for infrastructure delivery in South Africa the challenge of restoring the skills pipeline discussion document*

7 Acknowledgements

- Renee Grawitzky - Recapitulating the state: Locating government's training capacity (May 2007)
- Rodney Milford - CIDB (Construction Industry Development Board)
- Andrew Merrifield - Demand for Skills: an analysis of the proposed infrastructure spending programme (July 2006)
- Thabiso consulting - Current and potential skills in the infrastructure sector (July 2006)
- Eskom - ASGISA Steerco
- Eskom one university report -
- Exxaro - The War For Skills (March 2007)
- Bhorat H. Scarce skills, the NSDS and funding windows. June 2006
- CIDB Report A Review of Supply and demand for Infrastructure development Draft 2006. Integrated by C. Marock and B. Soobrayan
- Department of Labour: SETA Support Directorate (with assistance from the GTZ) Learning Programme Types Matrix. August 2005.
- Department of Labour Skills development for PGDS /ASGI- SA Initiative. Guidelines for applicants responding to the request for Proposals: Strategic projects. April 2006
- Engineering Council of SA [ECSA] Some Blockages and Solutions for Engineering. May 2006.
- JIPSA Secretariat Training Pathways for Intermediate and artisanal skills. Working document. June 2006
- Merryfield A. Demand for skills and analysis of the proposed infrastructure spending. June 2006
- Mjoli Z. State-Owned Enterprise Skills. Submission on behalf of Eskom and Transnet. June 2006.
- Lawless A. Submission to JIPSA. May 2006
- Lawless A. Numbers and Needs. SAICE. Johannesburg 2005
- SAQA Pathways to qualified artisan status and usage of the different trades. June 2006
- University of Pretoria Faculty of Engineering. Engineering as a Scarce Skill. June 2006

- Vaal University of Technology Work placement overview of students in Universities of Technology and Comprehensive Universities. June 2006
- Capacity Assessment of Municipal Training Centres, prepared by ECIAfrica Consulting, November 2005 for LG Seta
- Eskom Learning Integration Project, preliminary report, November 2006.
- Institutes of Occupational and Sectoral Excellence in South Africa, concept paper, commissioned by GTZ, November 2005 Increasing the Supply of Artisans by 50 000 in 4 Years: A JIPSA Programme of Action
- Kraak, A: Convergence of public and private provision at the further higher education interface, August 2002, HSRC
- Kraak, A: Free versus co-ordinated market regulation? An overview of South African industrial training practice and policy, 1981 - 1996. A paper commissioned by the International Labour Organisation as a contribution to the Comprehensive Labour Market Commission, February 1996.
- Lawless, Allyson: Increasing the pool of artisans in local government. Prepared for LG Seta, October 2006
- Local government Seta (LGSETA) Sector Skills Plan: 2005-2010
- National Skills Development Strategy (2004): 1 April 2005 – 31 March 2010. Department of Labour
- The status of public nursing education, 2006, prepared by the National Department of Health.