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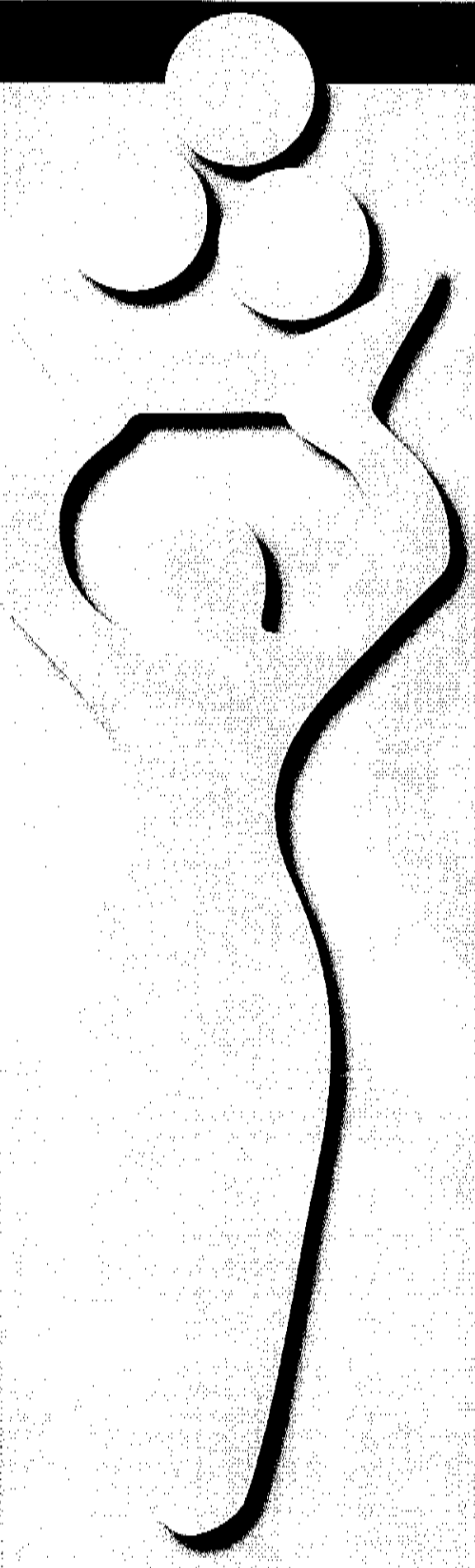
July 2006



Women in the Information and Communication Technology (ICT) Sector in South Africa

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Tina James (editor)
Ronel Smith
Joan Roodt
Natasha Primo
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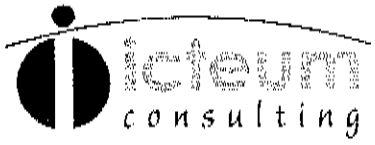

Funded by the Embassy of Finland, South Africa

This document forms the second part of a study on stimulating the participation of women in high-level ICTs in South Africa.

The three documents are listed below and may be found on the following website:

http://women-in-ict.meraka.csir.co.za

Document 1: Exploring Mechanisms to Stimulate the Increased Participation of Women in Science, Engineering and Technology: International Experiences

Document 2: The Situation of Women in the Information and Communication Technology Sector in South Africa

Document 3: A Manual of Possible Interventions to Improve the Situation of Women in High-Level ICTs in South Africa

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ACKNOWLEDGEMENTS

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University of the Witwatersrand
Vodacom GPFT
Womens'Net
SET4Women Reference Group

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THE SOUTH AFRICAN RESEARCH TEAM

Nicole Beeby

Nicole Beeby is currently an intern at Women'sNet. She is a recent journalism graduate from the University of Johannesburg. She is primarily responsible for researching and writing content for the Womens'Net website and the Women'sNet Quarterly Publication, called Intersections. She also participates in various projects that Women'sNet is engaged with.

Nina Evans

Nina started her career as a Chemical Engineer after graduating from the University of Pretoria in 1982 and registered as a professional engineer (PrEng) through Iscor in Pretoria. During the next few years she completed the Higher Education Diploma (HED) and a Diploma in Datametrics at the University of South Africa. She then accepted a position as a lecturer in Computer Science at Technikon Pretoria and completed the BSc (Hons)(Computer Science) Cum Laude from the University of Pretoria. She was appointed Head of the Department of Computer Technology at Technikon Pretoria and completed an MTech(IT) on *The profile of the Knowledge and Information Technology worker in a changing organisational environment and its impact on the Technikon Information Technology training programs.* In January 2000 Nina was awarded a bursary by Mr Nelson Mandela and the Australian government to enrol for an MBA degree at Bond University and she completed the degree with distinction. Her interest evolved towards the people, business and leadership issues in technical environments and she completed a PhD degree in Organisational Behaviour at the University of Pretoria. In her dissertation *A framework for creating fusion in the business-IT relationship* she focused on the promotion of fusion in the business-IT gap. Nina is currently head of the department of Business Informatics at Tshwane University of Technology where she manages the teaching and research activities of the department. Nina balances the academic world with consulting activities and is an associate of the consulting firm ThinkingFusion. She currently participates in a project on leadership, focusing on leadership for women.

Lauren Fok

Lauren Fok is currently the Women'sNet Office Manager but has a long history of collaboration with Women'sNet and has managed a number of projects within the organisation. Formerly, she served as the marketing officer for SANGONet and assisted Civicus in establishing their Johannesburg office. She has extensive experience working in NGO's and the Labour movement and is a dedicated human rights and gender activist.

Tina James

Tina James has more than 23 years experience in various aspects of ICTs in developing countries (particularly Africa). Work undertaken to date has drawn on her wide range of expertise in the management of multidisciplinary projects, strategic planning, programme design, and facilitation of participative processes. Specific experiences include: an Africa-wide initiative on ICT policy advocacy; development of ICT policies and strategies at

regional and national levels; numerous studies on the ICT sector in South Africa and other African countries, including e-readiness studies. She has edited two books - an *Information Policy Handbook for Southern Africa* and one African School networks. Additional experience includes research on gender and ICTs, community telecentres, universal access, the use of ICTs to support entrepreneurs in developing countries, and monitoring and evaluation of ICT-related projects.

Tina was Senior Programme Officer and Senior Advisor to the Canadian International Development Research Centre's Acacia Programme. She served a two-year term on the Economic Commission for Africa's African Technical Advisory Committee for the African Information Society Initiative (AISI). She has operated as an independent consultant since 1997, prior to which she held various ICT-related management positions at the South African Council for Scientific and Industrial Research (CSIR). She is an associate lecturer of the University of the Witwatersrand's LINK Centre in Johannesburg, South Africa, on gender and ICTs.

Veronica Moutloutsi

Veronica Motloutsi completed her National Diploma in Information Technology in 2001 from Tshwane University of Technology; she received an award as Best Student in Information Technology. She then studied a Bachelor of Technology in Information Technology at Central University of Technology; currently she is completing a Master Degree in Business Information Systems. Veronica is also studying towards a Programme in Financial Management with the University of South Africa, Centre of Business Management.

She worked for the National Department of Agriculture, Free State Department of Local Government and Housing, and National Energy Regulator of South Africa. She has more than five years experience in System and Business Analysis including Business Process Reengineering, System Development, Project Management and Change Management. She will be joining Sasol Technology Pty Ltd as a Business Information Consultant with effect from 1 August 2006.

Veronica was nominated as a Chairperson of Service Excellence Award Committee, NERSA. She also participates in LinuxChix South Africa.

Natasha Primo

Natasha Primo is the Executive Director of Women'sNet, an NGO based in Johannesburg South Africa that implements projects which seek to build women's and girl's capacity to use ICT strategically to advance gender justice. Currently, she is the also Chair of the Executive Board for the global network of organisations that implement project and advocate for the ICT use to promote social justice and development - the APC. She is a long standing activist for (women's) human rights and the value of communications in the development process. She is also active on the governance structures of two Africa-based communications-focused NGO structures that promote a human rights approach to development. Natasha was heavily involved in WSIS, in particular the Geneva phase, where she played a leading role in gender advocacy spaces (the WSIS gender caucus and the NGO gender strategies working group) and the African caucus.

Joan Roodt

Joan Roodt is a chief researcher in the research programme, Education, Science and Skills Development (ESSD) at the Human Sciences Research Council (HSRC) and has a master's degree in Communication Management with 24 years of research experience. She was involved in projects for various clients relating to the labour market such as, *inter alia,* trends and future workforce needs; an investigation into the demand for and supply of high-level human resources for the telecommunications industry; skills needs in the tourism industry and various other industries. She was also involved in projects relating to the development of the employment services sector; statutory regulation of professions in the built environment; national research and technology audit; benefits of ICTs; ICT penetration in South Africa: Mapping indicators of ICT access; and ICT skills at the intermediate level in South Africa. As project leader she has done an analysis of supply and demand in the ICT sector; remuneration of graduates; and self-employment of graduates.

Ronel Smith

Ronel Smith is a project manager at the Meraka Institute and has fifteen years experience in the ICT environment on both the technical and management sides. She has recently completed her MBA at the University of Pretoria with distinction. Her other qualifications include: a BA Hons (Biokinetics), University of Pretoria; Diploma Datametrics (with distinction), University of South Africa; post-graduate diploma in Business Management and Finance (with distinction), University of the Witwatersrand as well as a number of other technical qualifications. Her areas of interest include high speed networking as well as the application of ICT in rural areas of developing countries. One of her projects won the Stockholm Challenge Award for innovative use of technology to improve access in rural areas. She is passionate about promoting the role of women in ICT. Ronel has presented at various national and international congresses.

GLOSSARY OF ABBREVIATIONS

AAICT	Africa Advanced Institute for Information and Communication Technologies
ABET	Adult Basic Education and Training
AISI	African Information Society Initiative
APC	Association for Progressive Communications
ASGI-SA	Accelerated and Shared Growth Initiative (South Africa)
ASSA	Actuarial Society of South Africa
BBBEE	Broad-Based Black Economic Empowerment
BMR	Bureau of Market Research at UNISA
BOSMEs	Black-Owned Small and Medium Enterprises
BOT	Businesswomen of Tomorrow initiative
BPO	Business Process Engineering
BWASA	Businesswomen's Association of South Africa
CASME	Centre for the Advancement of Science and Mathematics Education
CBO	Community Based Organisation
CECS	Community Education Computer Society
CEO	Chief Executive Officer
CESM	Classification of Education Subject Matter
CGE	Commission on Gender Equality
CHIETA	Chemical Industries Education and Training Authority
CITI	Cape IT Initiative
CM	Chamber of Mines of South Africa
CNCI	Cement and Concrete Institute
CSIR	Council for Scientific and Industrial Research, South Africa
CSC	Computer Sciences Corporation
CSSA	Computer Society of South Africa
DFID	UK Department for International Development
DOC	South African Department of Communications
DOE	South African Department of Education
DST	South African Department of Science and Technology
DTI	South African Department of Trade and Industry
ECD	Early Childhood Development
ECDL	European Computer Driving Licence
EIG	Empowerment Investment Group
ESSD	Education, Science and Skills Development Programme, HSRC
ETQA	Education and Training Quality Assurance Authorities
FEST	Foundation on Education, Science and Technology
FET	Further Education and Training
GCIS	Government Communication and Information Services
GFP	Gender Desks or Focal Points
GPFT	Graduate Programme for Females in Technology
GET	General Education and Trainin
GTZ	German Technical Co-operation
HDI	Historically Disadvantaged Individual
HED	Higher Education Diploma

HEI	Higher Education Institution
HEMIS	Higher Education Management System
HET	Higher Education and Training
HSRC	Human Sciences Research Council
ICASA	Independent Communications Authority of South Africa
ICDL	International Computer Driving Licence
ICT	Information and Communication Technologies
ISETT SETA	Information Systems, Electronics and Telecommunications Technologies Sector and Training Authority, established in terms of Section 9 (1) of the Skills Development Act, Act 97 of 1998
ISPA	Internet Service Providers' Association (South Africa)
ISSA	Institute for Satellite and Software Applications
IT	Information Technology
JMC	Joint Monitoring Committee on the Improvement of Quality of Life and Status of Women
LDOE	Limpopo Department of Education
LFS	Labour Force Surveys
MBA	Master's in Business Administration
MERSETA	Manufacturing SETA
MST	Mathematics, Science and Technology
NACI	National Advisory Council on Innovation
NEPAD	New Partnership for Africa's Development
MIE	Minimally Invasive Education
NLRD	National Learners' Records Database
NQF	National Qualifications Framework
NRF	National Research Foundation
NSF	National Skills Fund
NSI	National System of Innovation
OECD	Organisation for Economic Cooperation and Development
OHS	October Household Surveys
OSW	Office on the Status of Women
PAMO	Pan Africa Mathematics Olympiad
PNC on ISAD	Presidential National Commission On Information Society and Development
PSETA	Public Sector Education and Training Authority R&D Research and Development
REDIBA	Research Development Initiative for Black Academics (NRF)
RiT	Researchers in Training
RSC	Regional Services Council
SAASTA	South African Agency for Science and Technology Advancement
SADC	Southern African Development Community
SAGEM	Southern African Gender and Media Network
SAITIS	South African IT Industry Strategy
SAPEA	South African Petroleum Industry Association
SAPSE	South African Post-secondary Education Information System
SAQA	South African Qualifications Authority
SARB	South African Reserve Bank
SARG	South African Reference Group (for women in SET)
SARS	South African Revenue Services

SAWEN	South African Women Entrepreneur' Network
SAWID	South African Women in Development
SA WISE	South African Women in Science and Engineering
SEDA	Small Enterprise Development Agency
SET	Science, Engineering and Technology
SET4WRG	SET for Women Reference Group
SETA	Sector and Education Training Authority
SIC	Standard Industrial Classification Code
SITA	State Information Technology Agency
STDs	Sexually Transmitted Diseases
TDP	Teacher Development Programme
Thedti	South African Department of Trade and Industry
TWIB	Technology for Women in Business
UNISA	University of South Africa
VAW	Violence Against Women
WCED	Western Cape Education Department
WICT	Women in ICT
WIIT	Women in IT
WiR	Women in Research programme (NRF)

1. INTRODUCTION TO THE STUDY

This study was commissioned by the Embassy of Finland in South Africa as part of a larger study to investigate mechanisms for stimulating the increased participation of women in high-level ICT skills in South Africa. This report forms Part 2 of three documents and presents a snapshot of the situation of women in high-level Information and Communication Technologies (ICTs) in South Africa. The findings are based primarily on desktop research carried out during the period February to July 2006, strengthened by consultations with selected South African experts and key players.

The objectives of the study were:

- Develop a better understanding of the specific needs of the ICT community to attract more women;
- To undertake preliminary research to assess why some ICT-related interventions have been more successful than others and to capture the best practices that could be replicated from other disciplines and countries;
- Develop a strategy and implementation for innovative interventions that will significantly increase the interest and participation of women at all levels of ICT research and innovation, including in the private sector; and
- Develop and strengthen the research networking between institutions in South Africa and Europe.

The outputs of the full study consist of three parts:

- The development of *two position papers*, the first being an overview of the situation of women in high-level ICTs in South Africa (presented here); and a second paper on international practices in stimulating the involvement of women in ICTs and the Information Society;
- A *series of consultative workshops and meetings* to determine the areas of need and possible opportunities for interventions. This included participation and contributions from South African participants; partners of the WomenIT programme based at the University of Oulu, Finland; and the UK Resource Centre for Women in Science, Engineering and Technology;
- The final part of the study consisted of the development of a manual of possible implementation projects to address the need for increased participation of women in high-level ICTs.

The inclusion of areas not usually considered in studies of this kind, for example, early learning, have been influenced by international experiences and collaboration on this project with the WomenIT programme in Finland. Good practice elsewhere seems to suggest that it is not enough to tackle the situation only in the classroom and workplace, but that many of

the factors associated with women adopting non-traditional careers are taught in society – in the family and in early childhood situations. This lifecycle approach is one which should be looked at more closely in South Africa and which will require more in-depth research than could be carried out for this study.

2. BACKGROUND

During South Africa's recent past women of all races were barred from achieving their full economic potential due to both legislative and non-legislative discrimination. As a result few women hold senior positions in government and industry. In 2002 women accounted for only 9 percent of all directors in South Africa and 21 percent of management. This trend was also evident in the ICT industry, where only about 20 percent of the current ICT work force is female. Only 0.9 percent of IT industry managers are African women with coloured and Indian women accounting for 0.6 percent and 1 percent respectively. A more recent ICT skills audit, conducted in 2005[1], indicates that there has been very positive movement in changing the demographics of available human resources in the ICT sector. It is however of concern that the numbers of degreed professionals and those with higher tertiary qualifications are declining. Likewise the demographics at managerial and supervisory levels in the ICT sector still continue to show large discrepancies between men and women, and a predominance of white males.[2]

Addressing this imbalance in order to ensure full participation of women in ICT is crucial - the ICT industry is seen as one of the key drivers of the South African economy and the ICT sector has been identified as one of the key sectors by the South African government through its various national initiatives. There is also a common understanding that the current access to and the use of ICTs are directly linked to social and economic development in the future. These factors together with government efforts to promote Science Engineering and Technology (SET) excellence and gender equity, make it imperative to understand what the barriers are that hinder women's full participation and advancement in the ICT industry and what can be done to remove those barriers.

Not only is the low participation of women in high-level ICTs a problem for women, but also for the industry and the country. Women are missing an increasing number of technology-related job opportunities and run the risk that technological developments will not be relevant to their needs. A country cannot compete in an increasingly global ICT market if half of its talented citizens are not participating. It is important that women should be in the position to influence and direct the ICT sector. Continued exclusion of women from ICTs implies that women will have few opportunities to influence the ways in which these technologies develop and affect their lives. Moreover, the ICT industry is losing the talent of skilled women who can bring to it a richness and diversity of thought and perspective and can help alleviate the shortage of skills, which is exacerbated by their lack of participation. Without women as an integral part of the workforce, the ICT industry is bereft of many potential contributors to the formulation of government and research policy and the development of technology that benefits communities as a whole; it is also deprived of a broader set of perspectives in the design of critical information systems.

[1] Department of Trade and Industry and ISETT SETA (2005). An Analysis of the ICT Skills Audit for the dti and ISETT SETA. Vukanikids.

[2] ibid. p58

It is imperative that South Africa stimulates the contribution made by women in SET, and in particular ICTs. The worldwide growth in ICTs and the need for countries to move towards knowledge-based economies has resulted in ever-increasing concerns that the required skills base will not be available in the future.

The South African government has adopted a strong gender equity approach in many of its policies and implementation strategies. The reality however is that in many of the technology sectors, and particularly in the ICT sector, much has to be done to encourage girls and women to pursue a career in this direction. A recently completed review of the scarce skills situation in South Africa devoted a chapter to ICT and associated professionals. Several significant remarks can be quoted:

> *"..the ICT sector in South Africa is growing, but this growth is focussed mainly on domestic consumption rather than export, and is mainly in communications and IT services, rather than in software development and, to an even lesser extent, hardware supply."*
>
> *"The qualifications profile of ICT workers is particularly illuminating..... The data suggest that the high number of workers with intermediate ICT skills is reflective of an ICT economy that has limited expertise in R&D and technological development. The ratio of high-level to intermediate skills corroborates the economic picture of the South African ICT sector as being more involved in ICT services and application of systems, than in the development of new products or utilities."*

In South Africa the need is to move towards a broader skills base that strongly reflects the demographics of the country and that will stimulate the participation of previously disadvantaged individuals, especially women, in SET. Although an increasing number of graduates are women, they still represent a minority in many of the science disciplines.

3. DEMARCATION OF THE ICT SECTOR

ICTs have emerged as a major driver of employment in the developed world - they are increasingly seen as an important pillar for economic growth in South Africa. To plan human resources required for the ICT sector and to address gender equity, it is necessary to measure human resources as accurately as possible. This chapter presents an overview of the definitions, classifications, categorisations and methodologies used to determine the demarcation of the ICT sector, the ICT workforce and demand for and supply of human resources in the ICT sector.

3.1 Introduction

South Africa has a well-developed urban infrastructure, is an acknowledged leader in the application of ICTs, and has one of the most advanced economies in Africa. Growth and prosperity in South Africa's economy has, however, not been realised to its full potential due to a lack of meaningful participation by the vast majority of black South Africans and women in the national economy and particularly in the ICT sector.[3] The digital divide needs to be bridged by promoting more equitable access to ICTs.

Most countries are experiencing a skills gap due to demand for ICT skills outstripping supply, but South Africa faces the additional challenge of skilling previously disadvantaged individuals and including them in the ICT job mainstream, as well as bridging a gender-based digital divide. South Africa has an established, but relatively small base of highly skilled, predominantly white, male ICT professionals although a more demographically representative workforce does appear to be emerging, particularly at the lower end of the ICT skills spectrum. Women still make up a disproportionately small percentage of management (between 18 – 20%) and still earn much less than men.[4]

The quality and quantity of ICT skills within South Africa's population is a key factor in determining the effective use of ICT in the economy. The ICT sector is probably in a better position than other sectors to address the gender imbalance in the short term, because participation in the labour market does not necessarily depend on having a computer-related degree and persons with secondary or some tertiary education can do short ICT courses to gain initial access to the profession. Once employed with additional informal and on-the-job training, as well as formal training, there is opportunity for rapid career progression in the ICT sector[5]

The challenge in South Africa is to obtain accurate and timely labour market information to inform decision-makers regarding employment and skills development in the ICT sector. Labour market statistics in South Africa are scattered and inconsistent; ICT sector statistics are even more problematic, because of the difficulty in demarcating the sector as a result of

[3] Draft Black Economic Empowerment Charter for the ICT Sector, 2005

[4] ITWeb's 2003 - 2006 salary surveys http://www.itweb.co.za/ Accessed April – July 2006

[5] Hodge and Miller, 1997

rapid technology developments and changing occupational categories. Convergence, which is the ongoing fusion of content with connectivity, leads to blurring of sectoral boundaries. Definitions as a result become outdated and do not always reflect changes in the ICT field. Because of the lack of an agreed definition, multiple terms are applied to the ICT sector which contributes to low levels of comparability across time and between data sets.

This chapter therefore provides an overview of the current definitions and systems in place in South Africa to measure human capital resources in ICTs. This should be useful for decision-makers to take into consideration when implementing indicators for the ICT sector, and particularly the possibility of data disaggregation by gender and race.

3.2 Definitions, Classifications And Categorisations In Measuring Human Capital Resources In ICTs

In the past decade, ICTs have emerged as a major driver of employment in the developed world, but ICTs alone cannot sustain competitive advantage. An appropriate combination of ICTs and human resources is necessary to leverage the potential advantage that lies latent in these technologies[6]. To plan human resources required for the ICT sector and to address gender equality, it is firstly necessary to measure human resources as accurately as possible. The accuracy of measurement depends on the definitions, classifications, categorisations and methodologies used to determine the demarcation of the ICT sector, the ICT workforce and demand for and supply of human resources in the ICT sector.

Presented below is an overview of the various terms and categorisations that are presently in use.

Information and Communications Technology (ICT)

ICT refers to the combination of manufacturing and services industries that capture, transmit and display data and information electronically[7]. This definition excludes the industries which create the information, the so-called 'content' industries. ICT is thus a means of obtaining content, such as education, information, and entertainment. This definition refers to the following South African Standard Industrial Classification (SIC) codes:

[6] Molcke, Paterson and Roodt, 2003

[7] OECD, 2002: p18; SAITIS, 2000:p3

Table 3.1 Standard Industrial Classification Codes for the ICT Industry

SIC Code	Description
Manufacturing	
35791	Manufacture of alarm systems
Services	
75200	Telecommunication
75201	Wire telecommunication carriers
75202	Television broadcasting, television and radio signal distribution
75203	Cable networks and programme distribution
75204	Telephone
75205	Wireless telecommunication carriers except satellite
75209	Television broadcasting
75210	Telecommunications
75211	Telecommunications and wired telecommunication carriers
75212	Paging
75213	Cellular and other wireless telecommunications
75214	Satellite telecommunications
75215	Other telecommunications
75216	Security systems services except locksmiths
75217	Office automation, office machinery and equipment rental, leasing including installation and maintenance
86000	Computer and related activities
86001	Software publishers
86002	Computer systems design and related services
86003	Computer facilities management services
86004	Electronic and precision equipment repair and maintenance
86005	Computer retail and leasing
86006	Computer programming services
86007	Other computer related activities
86008	Call centre systems development and installation activities
86009	Computer systems design services and integrated solutions
86010	Consumer electronics repair and maintenance
86011	Computer and office machine repair, maintenance and support services
86012	Communication equipment repair and maintenance
86013	Other electronic and precision equipment repair and maintenance
86014	Repair and maintenance of electronic marine equipment
87142	Research and development of electronic equipment and systems
87143	Information technology import and product integration of pre-manufactured electronics IT and telecommunications equipment
87146	Research and development in the physical and engineering sciences
87147	Electronics importation and product integration of pre-manufactured electronics IT and telecommunications equipment
87148	Telecommunications importation and product integration of pre-manufactured electronics IT and telecommunications equipment
96131	Providing radio and television transmission signal
96133	Installation, maintenance and repair of tracking devices for cars

Source: Government Gazette, March 2005

Excluded in the table above are manufacturers of ICT equipment and value-added resellers of ICT goods and services. Electronics companies that are primarily involved in manufacturing belong to the manufacturing SETA (MERSETA). According to the ISETT SETA

the ICT sector only comprises companies with *Information Systems, Electronics and Telecommunications* as their *core* business.

The ICT Sector

Policy makers and analysts have expressed an interest in understanding and measuring the importance of the ICT sector. In the absence of a standard definition, it has been very difficult to monitor its development and make comparisons to develop appropriate policies.

There are presently three broad but overlapping categorisations in use in South Africa. Each of these is described in more detail below.

ISETT SETA [8]

The ISETT SETA is the Sector and Training Authority (SETA) established for the Information Systems, Electronics and Telecommunications Technologies Sector. SETAs were established in terms of Section 9 (1) of the Skills Development Act, Act 97 of 1998.

The South African ICT sector is defined through the work of the ISETT SETA and comprises three distinct but interlinked sub-sectors, specifically the *information technology (IT)*, *telecommunications* and *electronics* sub-sectors.

- *Information Technology (IT)* – a field that deals with computer systems design and integrated solutions, programming, hardware and software engineering;
- *Telecommunications - a* field that deals with wired telecommunication, cellular and other wireless telecommunication, paging, television and radio network signal distribution and satellite telecommunications;
- *Electronics - a field that deals with Electronics equipment. Excluded are* electronics manufacturing which belongs to the manufacturing SETA (MERSETA). [9]

The ISETT SETA adopted a definition used by the Organisation for Economic Co-operation and Development (OECD), which defines the ICT sector as:

> ...a combination of manufacturing and services industries that capture, transmit and display data and information electronically.[10]

[8] ISETT SETA www.isettseta.org.za Accessed 24 June 2006

[9] Department of Trade and Industry, 2005: p141

[10] OECD, 2002: p18; SAITIS, 2000: p3

The Department of Trade and Industry

The ICT sector is defined as the industries that produce the products (goods and services) that support and maintain the electronic display, processing, storage, and transmission of information[11]

The Draft Black Economic Empowerment (BEE) Charter for the ICT Sector[12]

The ICT Charter refers to the following *activities* as performed by employers and employees in the ICT sector:

> Marketing, manufacturing, assembling, servicing, installing, maintaining and/or repairing systems, software, equipment, machines, devices and apparatus, whether utilising manual, photographic, optical mechanical, electrical, electrostatic or electronic principles or any combination of such principles, that are primarily intended for the recording and/or processing and/or monitoring and/or transmission of voice and/or data and/or image and/or text or any combination thereof for use in any one or more of the following:
>
> Accounting, calculating, data processing, data transmission, duplicating, text processing, document reproduction, document transmission, record keeping and record retrieval, broadcasting or transmission for entertainment or information purposes of voice and/or image and/or text or any combination thereof and/or; the provision of services relating to the above.

The ICT sector as defined by the OECD, the Department of Trade and Industry / ISETT SETA and the ICT Charter all include the *manufacturing* and *service* industries which manufacture *goods* (machines, equipment etc.) and/or provide *services* (install, support, maintain equipment etc.) by using *electronic* principles (according to all three definitions).

The ICT Charter, on the other hand, assumes a far broader definition by also including the use of *photographic, optical, electrical, manual etc.* principles in order to *capture, display, transmit, store, record,* etc. information (voice, data, image, text or a combination of these). The ICT Charter further includes the analyses and manipulation of information and content, and/or value addition e.g. accounting, calculation, etc., which are excluded from the OECD and DTI definitions.

The ICT Workforce

Defining the ICT workforce is complicated for a number of reasons:

- ICT workers are found in companies operating as ICT industries, whose primary or core business purpose is ICT work;

[11] Department of Trade and Industry, 2005: p141

[12] ICT Empowerment Charter Working Group http://www.ictcharter.org.za/ Accessed 27 June 2006

- ICT professionals work in other sectors and industries of the economy which include ICT departments and ICT support staff inside the companies of these various sectors;

- Definitions of ICT occupations are not standardised and definitions vary from one company to the next. ICT occupations vary for instance according to the technical and other skills they require within companies. Within the various ICT occupations there are a number of different qualification profiles. A computer programmer could for example have a BSc degree, obtained over a number of years at a university or only have a six-month training certificate from a private training provider. It is clear that the field of programming contains a wide variety in depth and range of knowledge and capacity;[13]

- New types of jobs emerge quickly in the rapidly evolving ICT sector and occupational titles do not always reflect all new ICT jobs;

- Various types of ICT managers are not always differentiated from managers with other core functions in the available data sets; and lastly,

- ICT end-users are those individuals who work with computers in their day-to-day activities, although they are not involved in ICT core work and they work in all sectors of the economy.

Core ICT Workers

Core ICT workers are... persons engaged primarily in the conception, design, development, adaptation, implementation, deployment, training, support, documentation and management of information technology systems, components, or applications.[14]

Core workers are, therefore, responsible for the design, building and maintenance of computer systems to support the needs of end users.[15] Like doctors and engineers, core ICT workers must master the body of knowledge relating to their area of specialisation, i.e. the mechanics of the way in which the technology operates.

End-users

ICT end-users are employees that use a computer as an integral part of their daily job functions in any sector. ICT end-users are those individuals who work with computers on a daily basis and in all sectors (not only the ICT sector), but are not involved in ICT core work. ICT end-users refer to those whose core function is to *support business process operations* in any of the economic sectors, be it the financial sector, manufacturing sector or other. Strictly then, *excluded* from the term 'ICT end-user' will be those computer end-users whose *main* focus is *not* the use of ICTs (although they do use ICTs in order to perform their work), but who have another specific core function in a specific sector. In the financial sector, for example, auditors and chartered accountants have a *financial* core

[13] Bibby, 2000

[14] United States National Research Council, 2002

[15] Faculty Training Institute, 2003

function as opposed to an ICT core function and should thus be excluded from the term ICT end-user. A data processing clerk in any sector, on the other hand, has the *core function* of using ICTs for processing data and is therefore considered to be an ICT end-user. Professionals and managers in other sectors (except those in the ICT sector), are thus to be excluded as ICT end users, as their *core* specialised function pertains to the specific sector in which they function.

Employment Equity

Employment Equity is defined in the Employment Equity Act (1998) as the promotion of equal opportunity, fair treatment in employment through the elimination of unfair discrimination; and implementation of affirmative action measures to redress the disadvantages in employment experienced by designated groups, in order to ensure their equitable representation in all occupational categories and levels in the workforce. The policies are in place, but the extent of progress in providing opportunities for women in the workplace and especially the ICT sector, needs to be determined.

The National Qualifications Framework (NQF)

The National Qualifications Framework (NQF) is the system of objectively assessing various levels of occupational skills and competencies. The eight levels are grouped into three bands, corresponding to respective levels of completed education:

- Higher education and training (HET) includes levels 5 to 8 (skills and competencies at diploma / occupational certificate to Doctorate level);
- Further education and training (FET) includes levels 2 to 4 (skills and competencies from Grade 10 / N1 to Grade 12 / N3 level); and
- General education and training (GET) includes levels 0 to 1 (skills and competencies from Grades 3 to 9 / Adult Basic Education and Training (ABET) 1 – 4 level).

Table 3.2 Breakdown of the National Qualifications Framework by NQF Levels and Types of Qualification

NQF Band	NQF Level	TYPE of qualification
Higher education & training	8	Doctorates
	7	Honours / Master's degree
	6	First degrees / Higher diplomas
	5	Diplomas / Occ cert.
Further education and training	4	Matric / N3
	3	Std 9 / Gr 11 / N2
	2	Std 8 / Gr 10 / N1
General education and training	1	ABET 4 (Std 7 / Gr 9)
	0	ABET 3 (Std 5 / Gr 7)
	0	ABET 2 (Std 3 / Gr 5)
	0	ABET 1 (Std 1 / Gr 3)
No qualifications		

Demand for ICT Employment

Demand for labour relates to the number of jobs that are available as a function of the compensation that employers are willing to offer for those jobs.[16] When demand exceeds supply in a particular occupation, compensation tends to rise relative to compensation in other occupations that require similar education, effort, and working conditions.

The labour market in South Africa has responded well to the demand for ICT skills, because of the good employment opportunities and salary premiums compared to other professions, low barriers to entry (i.e. no specific degree requirements and low initial training requirements) and the relatively short training period required.[17]

Estimates of the ICT workforce depend on:[18]

- The definition of "ICT worker" used. For example, estimating the number of *core* ICT workers would yield a very different result than would estimating the combined total of *core* ICT workers and ICT *end-users*. Similarly, estimating the number of individuals in software occupations would be a different exercise from estimating the number of individuals in both software and hardware occupations;
- The data set used in the analysis;
- The occupational categories in that data set used which is of critical importance; and
- Whether the analyst focuses on the number of individuals employed, the number of individuals in the labour force (employed plus unemployed who are seeking), or the number of positions a firm has (filled or vacant) in a particular occupational category or set of categories.

Supply of ICT Labour

Supply of labour relates to the number of people willing to work as a function of the compensation that employers are willing to offer.[19] If there is a great demand for labour, supply usually increases as a result. However, despite the rapid growth in ICT professionals, there still exists a shortage of such skills in South Africa. This can be seen from the salary premiums paid in relation to other professions, the much more rapid career progression, high vacancy rates and high staff turnover.[20]

Computer Literacy

The quality and quantity of ICT skills within South Africa's population is a key factor in determining the effective use of ICTs in the economy. This also depends on the ability among different groups to access ICTs.

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[16] United States National Research Council, 2002

[17] Hodge and Miller, 1997

[18] United States National Research Council, 2002

[19] United States National Research Council, 2002

[20] ITWEB Salary Survey, 2004 - 2006

The most important indicator of the population's ability to use ICTs is computer literacy. Computer literacy is required in order to access ICTs. South Africa, however, has a low overall level of ICT access. In spite of the South African government's policy of affirmative action, black women are still the poorest and most marginalised members of society. A recent household survey carried out in 1 743 households (and 6 700 individuals) in South Africa[21] showed that only 5.7% of South Africans have an email address. Most public access points are available through work or schools, but home connections account for only 20% outside urban areas and none in rural areas. Access to cybercafés is so limited and so expensive that the survey could not draw any significant conclusions on usage. This is also borne out by 2004 figures that the country only has about 981 collective access points such as telecentres, multipurpose community centres, cybercafés and digital villages.[22]

School System

Mere ICT literacy and education does, however, not in and of itself close the gender gap. Schools can be a catalyst for change in gender relations if appropriate attention is also given to curriculum content and the retraining of those who deliver it.[23] An in-depth discussion is presented in **Chapter 5.**

Formal Education and Training

ICT training and education within the formal educational system is but one component of all ICT training. Universities and universities of technology are critical to the training of ICT workers, although they produce only a small proportion of graduates. Universities and universities of technology are constrained in efforts to increase the supply of high-level ICT professionals, as there is a limited pool of students with a good academic record in science and mathematics, who in any case may not necessarily choose ICT as a career. The pool of women available for the ICT sector is thus very small. To increase the availability of women entering the ICT sector, socialisation in the community, school mathematics, and tertiary education need to be addressed. Private ICT training is an option for initial entry to the ICT sector as strict entry requirements are not set. Systems and curricula at universities and universities of technology are further outpaced by rapid changes in technology.

Private ICT Training

With rapidly changing technologies and products, continual training is a necessity in ICT, both for ICT core workers and end-users. Private training providers offer short ICT courses to gain initial access to the ICT sector as well as product specific courses that are adapted according to changes in the market. Private ICT training is, however, fragmented and accreditation procedures and quality assurance controls through the ISETT SETA require more attention. Viewed positively, private training providers keep open the opportunity for

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[21] Gillwald, A. (Ed) (2005). *Towards an African e-Index: Household and individual ICT Access and Usage across 10 African countries*. Research ICT Africa

[22] Thomas, R (2004) as quoted in Gillwald (2005): p 133

[23] World Economic Forum, 2005

almost anyone to enter the ICT-labour market, as strict entry requirements are not required and allow for responsiveness to changing skills needs in the Industry.

3.3 Overview of Existing Systems Used in South Africa For Classifying and/or Measuring Human Capital Resources in ICTs

3.3.1 Systems for Measuring Demand for ICT Employment

Because ICT is a broad term encompassing computer and communications technology for data, voice and image, there is no direct measure for demand in the ICT sector. All sectors in the economy are involved in computer and communications technology.

The definition used for ICT, ICT sector, and ICT occupations determines the estimation of employment in the ICT sector.

Estimates for the ICT workforce depend on the definitions and the occupational categories used in the various data sets. Total employment in the ICT sector has been estimated since 1990.[24]

According to the 2005 Labour Force Surveys (LFS 12)[25] the total ICT ***workforce*** comprises 1 090 044 ICT workers comprising:

18 691	ICT ***managers***[26]
193 425	***Core*** ICT workers (93 454 are high-level core ICT workers)
877 928	ICT ***end-users***

This is in comparison to the most recent analysis of the ICT sector by the dti / ISETT SETA[27] where ***core*** ICT workers comprise 130 356 (as opposed to the 193 425 ***core*** ICT workers in the LFS12 dataset). The skills audit shows a further sector breakdown as follows:

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[24] SAITIS, 2000

[25] Statistics SA, LFS 12, 2005

[26] The ICT managerial component for LFS data was calculated according to the ratio of managers to professionals in the general workforce. The ratio of managers: professionals in the general workforce is 20:80 in the LFS datasets and the number of ICT professionals (*high level* core ICT workers) was 74 764. As there was no separate codes for all ICT managers (except computing service managers), the number of ICT managers was calculated according to the number of professionals (74 764) multiplied by 0.2 and divided by 0.8 which gives a number of 18 691 ICT managers. The total of *high-level core* ICT workers (ICT professionals plus ICT managers) in 2005 was thus 93 454).

[27] Department of Trade and industry/ISETT SETA, 2005

Sector	Sub-sector				Total	% of Total
	IT	Telecomms	Electronics	Unknown		
ISETT	22 907	91 623	15 826	0	13 0356	57.2
Non-ISETT	22 451	64 249	10 506	338	97 544	42.8
Total	**45 358**	**155 872**	**26 332**	**338**	**227 900**	**100.0**
% of total	19.9%	68.4%	11.6%	0.1%	100%	

According to various sources the *high level core* ICT workers (professionals plus managers) ranged between 45 000 and 82 000 between 1991 and 2001.[28] Data varies as a result of categories and methodologies used. In the Labour Force and October Household Surveys (OHS) there are for instance no separate SIC codes for electronics technologists, telecommunications technologists and other physical science technologists. In the case of the Manpower Surveys (now discontinued), however, there were separate codes for these categories. The percentage that electronics technologists and telecommunications technologists made up among the other physical science technologists in the Manpower Surveys (22%) could be used to calculate and determine the percentage for these categories in the OHS and Labour Force Surveys (LFS). However, for more recent years these ratios no longer apply and it is perhaps more correct to use the supply ratios from training institutions in order to determine ratios for certain occupations that do not have separate codes in the LFS.

South African Primary and Secondary Data sources for Measuring Demand in the ICT Sector

Primary data sources:
Manpower Surveys (1990 – 1995) (discontinued in 1996)
October Household Surveys (OHS) (discontinued in 1999)
The Labour Force Surveys (LFS)
SA Reserve Bank (SARB)
South African Revenue Services (SARS)
Chamber of Mines of South Africa (CM)
Private research houses
Actuarial Society of South Africa (ASSA)
Bureau of Market Research (BMR) at UNISA
Regional Services Councils (RSCs)
Council for Scientific and Industrial Research (CSIR)
Cement and Concrete Institute (CNCI)
South African Petroleum Industry Association (SAPEA)
Government departments (various)
Development agencies (various)

Secondary data sources:
Breakwater Monitor (Bowmaker-Falconer, 2000)
SAITIS (2002)
The Labour Market Trends survey[29]
Global Insight's Regional Economic Focus (REF) provides a consolidated platform of integrated databases and draws together different sources
Quantec

[28] Moleke, Paterson and Roodt, 2003
[29] Whiteford, van Zyl, Simkins and Hall (1999)

3.3.2 Systems for Measuring Supply of ICT Labour

There are various data sets available to measure output from training providers - from the Department of Education, the South African Qualifications Authority (SAQA), the ISETT SETA and from various private training providers. The categories in the various data sets, however, do not always correspond with each other, neither with the categories in the various labour demand data sets, which makes comparisons and trends a challenge. Furthermore, public training institutions provide a breakdown of data by race and gender, but most private training providers as yet do not provide this although with compulsory registration, this will be required.

The Department of Education

The South African Post-secondary Education Information System (SAPSE)

The SAPSE dataset provides information on output from universities of technology and universities for the years *1991 up to and including 1998*. The data set is made up of 22 main fields of study, each with sub-fields, known as the Classification of Education Subject Matter (CESM) categories. The CESM categories do not correspond exactly with labour market categories in the various labour demand data sets, neither with the new Higher Education Management Information System (HEMIS) dataset which makes it difficult to calculate accurate trends over time. In terms of understanding the 'leaky pipeline' for women in ICTs, this creates very real challenges.

The following SAPSE CESM categories can be identified as ICT sector categories:

Computer Science and data processing (0600)
Computer Engineering and Technology (0805)
Electrical Engineering and Technology (0806)

The Higher Education Management Information System (HEMIS)

The HEMIS dataset provides information on output from universities and universities of technology for the years *1999 up to and including the most recent year.* The data set is made up of 22 main fields of study, each with sub-fields, known as CESM categories. The CESM categories do not correspond exactly with labour market categories in the various labour demand data sets, neither with the previous SAPSE CESM categories, which makes it difficult to calculate accurate trends over time. The following HEMIS CESM categories can be identified as ICT sector categories:

Communication Technology (0504);
Applications in Computer Science and Data Processing (0601);
Computer Operations and Operations Control (0602);
Computer Hardware Systems (0603);
Computer Hardware (0604);
Information and Data Base Systems (0605);
Numerical Computations (0606);
Programming Languages (0607);
Programming Systems (0608);
Software Methodology (0609);
Theory of Computation (0610);
Educational, Societal, and Cultural Considerations (0611);
Other Computer Science and Data Processing (0699);
Computer Engineering and Technology (0807);
Electrical Engineering (0808);
Computer Operations and Operations Control (0602);
Computer Hardware Systems (0603);
Computer Hardware (0604);
Information and Data Base Systems (0605);
Numerical Computations (0606);
Programming Languages (0607);
Programming Systems (0608);
Software Methodology (0609);
Theory of Computation (0610);
Educational, Societal, and Cultural Considerations (0611);
Other Computer Science and Data Processing (0699);
Computer Engineering and Technology (0807); and
Electrical Engineering (0808)

As the telecommunications sub-sector requires the services of especially electronic engineers, it is important to also include the electrical engineering category to calculate the output of telecommunications candidates from tertiary institutions. Information obtained from Prof F.W. Leuschner at the Department of Electrical, Electronic and Computer Engineering at the University of Pretoria revealed that about 35% of the Electrical Engineering and Technology category used in the SAPSE and HEMIS datasets could be included in the output for the ICT industry. The supply of electrical engineering graduates from tertiary institutions to the ICT industry can thus be calculated by obtaining 35% of the extracted figure.However, it is not only ICT qualified graduates that follow careers in the ICT industry. It is thus very difficult to determine the exact supply for the ICT industry.

Further Education and Training (FET) Colleges

Data on FET colleges is not readily available according to race and gender breakdowns. A special request must be made to the Department of Education, as this data is not published in the regular FET publications. More detail is presented in **Chapter 6** of this report.

South African Qualifications Authority (SAQA)

SAQA captures and stores information on unit standards and qualifications registered on the National Qualification Framework (NQF), as well as the educational achievements of learners in terms of these unit standards and qualifications. The first information on learner achievements included in the database was historical information on the achievement of learners at universities which had previously been stored by the Human Sciences Research Council (HSRC) in the Register of Graduates. The Register of Graduates was a comprehensive electronic database that captured its first information in 1965 when it was established by the National Department of Education (some of the information went back as far as 1914). The HSRC maintained the database from 1965 to 2001 when it was handed over to SAQA for incorporation into the National Learners' Records Database (NLRD).[30]

[30] South African Qualifications Authority (SAQA), 2004

New information on learner achievements is normally received by the NLRD from the various Education and Training Quality Assurance Authorities (ETQAs). An exception is information on achievements in the Public Higher Education System which is received from the Department of Education's HEMIS. The NLRD will monitor South Africans - from school qualifications to the last qualification achieved in higher education or through learnerships, or through formal skills programmes offered by ETQA-accredited training institutions, or in the workplace.[31]

In 2004 SAQA published *Trends in Public Higher Education in South Africa 1992 to 2001,* which is in essence based on a combination of information from the HSRC's Register of Graduates, HEMIS and SAPSE. The demarcation of the fields of study or categories do not correspond exactly with the SAPSE, HEMIS or Register of Graduates data sets, but were defined to relate, as far as possible, to the world of work to determine the extent to which the education system meets the needs of the labour market. In comparing different data sets with different classification systems it is crucial to be consistent in the use of the qualification and course classification systems over the various years. In future data in the NLRD will be more uniform and standardised.[32]

Private ICT training providers

Around three-quarters of ICT workers hold intermediate post-school qualifications from private training institutions.[33] Supply information from private ICT training providers is, however, not easy to obtain as private training providers were not previously required to register. Registration is now taking place through the ISETT SETA on an ongoing basis - the ISETT SETA website lists 30 accredited private training providers, and an extensive list as provisionally accredited and approved. A breakdown of data according to race and gender is currently not available from private training institutions.

Private training providers provide courseware for candidates with various needs, such as: those who require product-specific training, and application-specific training; those who do not qualify for university or university of technology training and seek intermediate skills; those who cannot afford higher education fees; those who can study only part time; those who wish to specialise in a particular area of ICT; and those who wish to upgrade their skills base. Most courseware offered by private ICT-training providers is presented at NQF Levels 4 and 5, the equivalent of a post-school qualification. Less than one per cent of all courses at private ICT training institutions are equivalent to a higher education qualification such as at an undergraduate degree level.

[31] ibid.

[32] Ibid.

[33] Roodt, 2003

3.3 Conclusions

In conclusion, there is an urgent need to find a more consistent, integrated and workable classification and measurement system for ICTs, which will allow more accurate assessment of supply and demand, and with particular emphasis on race and gender disaggregated data at all levels. Recommendations for further research are mapped out in detail in the accompanying Manual of Possible Interventions, the third part of this study.

It is heartening that there are moves afoot to integrate the educational system's databases so that a learner can be tracked through the system from entry point to exit, but further work will be required to track progress in the workplace in terms of race and gender interventions.

4. GOVERNMENT STRUCTURES, POLICIES AND STRATEGIES ADDRESSING GENDER

This chapter provides an overview of the structures, policies and strategies that have been put in place at the national, provincial and local levels of government to address gender, either specifically or as part of a broader focus on empowerment. Although these are not specifically geared towards women in the ICT sector, they do provide the framework within which any present and future interventions for women have to take place.

Although numerous structures exist, there has been varied success in their implementation and the impact they have had. It is not the function of this position paper to do a full analysis of these structures but the question does need to be asked whether the outcomes of the various instruments, and the concomitant costs associated with creating them, has resulted in significant progress in promoting and mainstreaming gender.

4.1 The South African Gender Machinery

The Gender Machinery comprises of a set of coordinated structures within and outside Government which aims to achieve equality for women in all spheres of life, be it political, civil, social, economic and cultural. The aim of the Gender Machinery is to achieve the Government's national and international commitments to gender equality. These national machinery structures are located in the Executive, Parliament, and in civil society.

The National Coordinating Committee is regarded as government's hub for the effective coordination of the National Gender Programme. It is located in the Presidency, and aims to guide and mobilise ministries, provinces and local government towards integrated programme delivery. The objectives of the coordination framework include gender mainstreaming, setting goals and objectives for the national gender programme, establishing clear lines of communication and accountability, and developing a dynamic Management Information System that facilitates informed implementation. The Office on the Status of Women (OSW) chairs this committee and its members cut across all national ministries, provinces, local government structures and organs of civil society. The committee's functions include providing guidance on gender analysis, developing a national gender action plan and designing, implementing and evaluating cross-cutting programmes such as poverty alleviation, with Ministers and Director-Generals.

4.1.1 Structures at the Executive Level

Two structures exist at the executive level:

The Office on the Status of Women (OSW)

The OSW is located in the Office of the President. It is the principal coordinating structure for the national machinery on gender equality. One of its main functions is to develop national gender plans and national strategies to implement them. Its tasks include initiating policy and action-oriented research pertinent to gender mainstreaming; developing key indicators for measuring national progress towards gender equality; working with ministries and Departments, provinces and publicly funded bodies in mainstreaming gender in policies, practices and programmes[34]. Regular meetings are held with staff from the national, provincial and local gender focal points, as well as with civil society. The OSW has provided a useful networking opportunity for those involved in gender activities, but perceptions are that more could be done to provide assistance, guidance and training on implementation.

Gender Desks or Gender Focal Points (GFPs)

The Gender Focal Points (GFPs) are based in national government departments. Their main task is to ensure the effective implementation of National Gender Policy at an operational level. GFPs are responsible for the formulation and implementation of effective action plans to promote women's empowerment and gender equity in the work of national government departments. Success of the GFPs has been varied.

4.1.2 Gender Structures in Parliament

The Women's Parliamentary Caucus

One of the functions of this multi-party caucus includes the creation of fora in which women in Parliament can discuss and debate gender issues and provide capacity-building initiatives for women in Parliament.

Joint Monitoring Committee on the Improvement of Quality of Life and Status of Women (JMC)

The Joint Monitoring Committee (JMC) was initially established as an ad-hoc committee but became a permanent committee in 1998. The functions of this Committee are to, among others, ensure that legislation before Parliament is gender sensitive and to encourage the public, particularly women, to participate in the law making process. The JMC was established among other things, to monitor the State's obligations to the Convention on the Elimination Discrimination Against Women and the Beijing Platform for Action, as well as other applicable international instruments. The JMC is required to monitor the work of Government Departments in meeting the objectives of gender equality and equity.

[34] Parliament of South Africa, 2002

4.1.3 Independent Statutory Bodies

A number of independent statutory bodies have been established that are involved in gender issues. These include the Commission on Gender Equality (CGE)[35], the Human Rights Commission, the Independent Electoral Commission, the Public Protector, the Public Service Commission, the Youth Commission, the Land Commission, and the South African Law Commission.

The CGE is an independent statutory body established to monitor the progress and achievements towards gender equality, with offices throughout the country. There have been numerous changes in leadership and the appointments of Commissioners within the CGE, which has given rise to problems in terms of direction and delivery.

None of these bodies has placed any particular emphasis on ICTs.

4.1.4 Women's Organisations in Civil Society

These organisations play an important role, as the national machinery of a country cannot make effective contributions on its own and set public policy agendas for women. The national machinery has a responsibility to provide women's organisations with education and training as well as information and resources. A more detailed description of the main women's organisations is presented in **Chapter 9.**

4.2 National Policies and Frameworks Which Address Gender

4.2.1 National Policy Framework for Women's Empowerment and Gender Equity – "Gender Policy"

The national Gender Policy was adopted by Cabinet in December 2000. The policy framework outlines South Africa's vision for gender equality and sets out how it intends realising its gender goals. It establishes guidelines for South Africa to remedy the historical legacy of racism and sexism by recommending an institutional framework that facilitates equal access to goods and services for both women and men. Its aim is to place gender issues at the centre of the transformation process within all structures, institutions, procedures, practices and programmes of government, its agencies and parastatals, civil society and the private sector.

The Gender Policy outlines three main areas of intervention that Government Departments can make in gender mainstreaming. These interventions relate to external and internal gender transformation encompassing the following:

[35] Commission on Gender Equality http://www.cge.org.za/ Accessed 14 June 2006

- Promoting women's empowerment and gender equality in their service provision (external transformation);

- Raising public awareness about gender in their interactions with clients and stakeholders in the private and community sectors (internal and external transformation); and

- Promoting women's empowerment and gender equality in their employment policies and practices (internal transformation).

4.2.2 National Gender and Race Equity Policy for Science Engineering and Technology (SET)

A Gender and Race Equity policy is presently under development for the Department of Science and Technology, through the SET4Women Reference Group (SET4WRG). The intention is that the policy framework will guide institutions forming part of the National System of Innovation (NSI). The policy framework addresses SET for women, but also looks at guidelines for the development of SET products and services which will benefit women living in poverty.

Although the policy does not specifically address ICTs, the broader SET framework should set the direction for any future strategies addressing gender equity in ICTs.

Supporting research was carried out in 2004 - 2005 to provide the knowledge base for the formulation of the gender equity policy for SET. Four relevant publications are:

- *Facing the Facts. Women's Participation in Science, Engineering and Technology;*[36]

- *Women in the SET workplace: Exploring the Facts, Experiences and Opportunities* (see also **Chapter 8** for further information);[37]

- *Looking at SET through Women's Eyes*, which consolidated the outcomes of a series of national consultative fora for women in SET;[38] and

- *A Monitoring and Evaluation Framework to Benchmark the Performance of Women in the National System of Innovation (NSI).*[39] The framework proposes nine constructs with detailed descriptions of the indicator categories that will be required for each construct (**Table 4.1** below). From a Women-in-ICT perspective, the lack of accurate and readily available data will require urgent

[36] www.dst.gov.za/publications/reports/sarg_booklet.pdf

[37] Tara Research and Equity Consultants & FeedbackMetrics (24 October 2005)

[38] Unpublished report

[39] Centre for Research on Science and Technology (December 2005). A Monitoring and Evaluation Framework to Benchmark the Performance of Women in the NSI. University of Stellenbosch, South Africa.

action if progress is to be measured within the proposed Women-in-SET framework.

Table 4.1 The Proposed Monitoring and Evaluation Framework for Benchmarking the Performance of Women in the National System of Innovation (NSI)

1. SET Potential
   - Leakages in the pipeline
   - Distribution across broad study fields
   - Size and potential of SET and R&D pool
2. SET Labour Force
   - SET human resource capacity
   - Horizontal distribution across SET occupations
   - Absorption of SET graduates
3. R&D Workforce
   - R&D human resource capacity
   - Horizontal distribution across sectors
   - Absorption of SET graduates
4. Fairness and success in funding
   - Access to funding
   - Distribution of funds
   - Funding amounts
5. Rank and Employment
   - Vertical distribution within sectors
   - Permanent appointments and promotions
6. Scientific Agenda Setting
   - Distribution of executive and senior managers across sectors
   - Representation on scientific boards and councils
7. Scientific Recognition
   - Recognition by peers
   - Distribution of reviewers for scientific journals and funding agencies
   - Membership profiles of science academies
   - Citation ratings
8. Scientific Output
   - Authorships and publications
9. Scientific Collaboration and Networking
   - Co-authorships
   - Collaborative research projects
10. Conferences and sabbaticals

4.2.3 The Broad-Based Black Economic Empowerment Framework (BBBEE) and Act

The Broad-Based Black Economic Empowerment Framework (BBBEE) focuses on the economic empowerment of all black people including women, workers, youth, people with disabilities and people in rural areas through diverse but integrated socio-economic strategies. These include:

- Increasing the number of black people who manage, own and control enterprises and productive assets;

- Facilitating ownership and management of enterprises and productive assets by communities, workers, cooperatives, and other collective enterprises;

- Human resource and skills development;

- Achieving equitable representation in all occupational categories and levels in the workforce; and

- Investment in enterprises that are owned or managed by black people.

The only specific reference in the framework to women relates to the proposed new financial incentives for BEE enterprises and specifically to the *Empowerment Investment Grant (EIG)*. The objective of the EIG is to assist Black-Owned Small and Medium Enterprises (BOSMEs) who have difficulty in accessing finance. The programme should effectively deal with " ...the exclusion of black persons and women from the mainstream of economic activity". It seeks to achieve the following strategic objectives:

- Generation of opportunities for the growth and development of BOSMEs with a special focus on enterprises owned by black women, the youth and people living with disabilities;

- Integration of BOSMEs into the mainstream industry with regard to trading - providing goods and services to the attractive mainstream markets as well as - membership of mainstream business associations; and

- Integration of the HDI-owned SMMEs into the mainstream financial institutions with regard to capability to leverage finance through the "normal" means rather than extraordinary interventions.

The framework gave rise to the Broad Based Black Economic Empowerment Act 53 of 2003 (BBBEE Act) and government's Black Economic Empowerment Strategy. The latter aims to address past imbalances through a process of industry self-regulation and the development of 'charters' for industry outlining the broad basis of black economic empowerment in industry as a whole. One such charter is the ICT charter, which is discussed in more detail below.

4.2.4 The ICT Charter

The Draft Black Economic Empowerment Charter for the ICT sector[40] was drawn up by a representative group from labour, civil society, the Independent Communications Authority of South Africa (ICASA), government, industry representatives from the ICT sector and representatives from the ICT Working Group. The final draft Charter was submitted to Government for consideration and publication as a sector Code of Good Practice in terms of Section 9 of the Broad-Based Black Economic Empowerment Act 53 of 2003. At this stage, it has not yet been approved.

[40] ICT Charter Website http://www.ictcharter.org.za/content/ICTbeechartor04may2005-Minister.pdf 24 June 2006

The ICT Charter requires companies to:

- Achieve a target of 50% black people in senior management positions with 30% black women being a percentage of the former;
- Achieve a target of 65% black people in other management positions with 30% black women being a percentage of the former;
- Commit to a target of 60% black people in the governing body with black women comprising 50% of the former; and
- Commit 2% of payroll in addition to the current skills development levy for investment in the skills of black people, black women, black youth, and black people with disabilities.

The word "women" is mentioned 22 times in the charter document of May 2005, but always in the context of black women - no mention is made of white, Indian and coloured women specifically.

The term 'black engendered enterprise (black women owned enterprise)' as used in the charter refers to an entity with at least 25.1% representation by black women within the black equity and management portion.

4.2.5 Employment Equity Act

The Employment Equity Act (as amended in 2006) has no specific gender perspectives. Women are included under the category "designated groups". Persons with disabilities are the only group specifically singled out. The reporting forms to be submitted by employers do however make provision for reporting on gender per race group.

4.3 National Research and Development Policies and Strategies

4.3.1 National Research and Development (R&D) Strategy

The national R&D strategy recognises that human resource (HR) development in science and technology is not being adequately developed and renewed. Key indicators show that an insufficient number of black and women scientists, technologists and engineers are entering the academic ranks, both at undergraduate and postgraduate levels. The Strategy proposes a highly targeted approach towards increasing excellence in mathematics and the sciences among black matriculants and young women. New Centres of Excellence are to be established to draw young people towards sustainable careers in scientific research. Special programmes for the promotion of women in science are proposed. Specific interventions include:

- Increased support for school-based activities in mathematics, science and computing, particularly for black matriculants and girls so as to increase the numbers who matriculate successfully;

- Incentivising schools to produce more black and more female mathematics and science matriculants at the higher grade by, for example, providing education subsidies to private schools that successfully produce higher-grade mathematics and science matriculants from designated groups;

- More prominent media, public engagement and promotional programmes to make science attractive, accessible and relevant;

- Enabling mechanisms for women to enter tertiary studies in science, engineering and technology;

- Increasing post-graduate participation in SET;

- Policies that are not punitive for the career development of women; and

- Strengthening international SET networks and connections by paying particular attention to participation by women researchers and students.

A well-balanced human resource development approach for SET will also require a clearly defined gender perspective, collection of gender-disaggregated statistics; the consolidation of current women's polices into an empowerment programme for women.

Two of the positive outcomes of the R&D strategy have been 1) the establishment of the SET4Women Reference Group (SET4WRG) as part of the National Advisory Council on Innovation (NACI). The SET4WRG consists of women stakeholders and representatives of organisations with an interest in the progress of women in science. It serves to monitor and advise the Department of Science and Technology on relevant issues; and 2) the National Research Foundation which was tasked to set up an R&D capacity-building programme for Historically Disadvantaged individuals (HDIs) - one of these is the Thuthuka Programme for Women (refer to **Chapter 9.3.1** for more details),

4.3.2 National ICT R&D strategy

A national ICT R&D strategy has been drafted and is currently under review by the South African Cabinet. No definitive information is available at this stage on the content of the strategy or specific gender inclusions. A large part of the strategy does however address human capital development, which includes attention to gender equity.

4.4 Implementation at the National and Provincial Government Levels

4.4.1 Gender Focal Points (GFPs)

Most national government departments have established GFPs, which are generally staffed by one to three or more persons. These GFPs may be mainstreamed into the department structures, located in HR departments, or as separate units. The rank of GFP coordinators varies with most being appointed at assistant director level. This implies that most coordinators are not equipped with the skills and level of experience as envisaged by the Gender Policy.

According to the JMC,[41] many departments focus on internal implementation projects and programmes such as employment equity issues, recruitment and selection practices and internal policies. External activities are mostly centred on the commemoration of calendar events such National Women's Day (16 June) and the 16 Days of Activism.

The Gender Policy recommends that the general principles of the national model be followed in the provinces. This includes the establishment of an OSW in the Premier's Offices of the nine provinces, gender desks and GFPs in all provincial Departments, a women's caucus in provincial legislatures and support for the establishment of civil society structures. OSWs exist in all the provinces except for Gauteng where the Social Development Directorate performs this function. The provincial OSW is responsible for developing a provincial gender policy and action plan that is in line with the National Gender Policy and for coordinating the activities of other role-players and stakeholders.

4.4.2 National Government

A number of key national government departments and agencies have specific programmes and activities to support the participation of women in ICTs. These are listed in **Table 4.2** below:

[41] Report of the Joint Monitoring Committee on the Improvement of Quality of Life and Status of Women, on hearings held with the National and Provincial Gender Machinery on 21 November, dated 16 September 2005

Table 4.2 Overview of National Government Department Initiatives that Specifically Address Women in ICTs

Science and Technology	Human Capital Development Programme	• Identify impediments to progress in SET • Identify needs/deficits of the SET sector in attracting and retaining women • Analyse the impact / lack of mentoring and coaching roles of senior women researchers and businesswomen in the technology sector as role models and high achievers. • Identify and develop appropriate rewards and recognition systems • Monitor survival and progress at institutions
	SET4Women Reference Group	The SARG has undertaken • Equity audit of Science Councils • South African Women in Science Awards • Research project on Gender Equity in Science and Technology (in Science Councils and Higher Education Institutions (HEIs)) • SARG website and on-line discussion forum • Poverty relief programme
	Women Scientist Scholarships	Created for women who are currently in full-time postgraduate study or research leading towards a PhD and who have two years post Masters' research experience. These fellowships recognise outstanding ability and promise in research
	Women in Science Awards	Several awards in 2006: • Distinguished Woman Scientist Award • Distinguished Scientist Award for contribution to the Improvement of the Quality of Life of Women • Best Emerging Young Woman Scientist Award • Two L'Oréal South Africa 2006 Fellowships for Women in Science • Three Women Scientist Fellowships
Public Service Administration	SITA Internship Programme	The State IT Agency (SITA) falls under the Department of Public Service Administration - This Programme aims to close the existing skills shortages in the ICT sector in the country by targeting 51% female and 4% disabled persons, with the intention to reach a national target of 54%.
Education	Dinaledi	Seeks is to produce by 2008 at least 50 000 mathematics and science graduates at the Senior Certificate level See **Chapter 5** for a detailed description of the activities of the Department of Education
	Technology Camps for Girls Policy on ICTs in Education	See Chapter 5 for a detailed description of the activities of the Department of Education
Communications	Gender Desk[42]	Addresses gender within the Department. Engendering of all policies and standards and to institutionalise gender into all policies and programmes of the Department of Communications and its operating partners

[42] Department of Communications Gender Desk http://www.doc.gov.za/

	Universal Service Agency	Incubator support for five women to plan and install telecentres.[43] Has partnered with the State IT Agency (SITA) to establish learnerships, including for women. Numerous Telecentres (13), School Cyberlabs (235) and Community Digital Hubs (21) have been established. ICT training was offered to teachers, which included women.
	ISSA (Institute for Satellite and Software Applications)[44]	Has run various post-graduate training programmes for B.Sc graduates. Strong emphasis on participation of 50% women on courses. Past achievements include 1) the establishment of Qhubeka Phambili Network Technologies (QPNT), which was 100% owned by a group of 24 women graduates; and 2) two incubation companies owned by 16 other women graduates. (2003)
Presidential National Commission on Information Society and Development (PNC on ISAD)	Women's Mutingati	An annual conference for women and the Information Society, first held in August 2005. Used as preparatory meeting for the WSIS meeting in Tunis, November 2005.
Trade and Industry (the dti)	Small Enterprise Development Agency (SEDA)	There are currently no specific initiatives in SEDA addressing ICTs for men or women. A new appointment was recently made to address ICTs for SMMEs and to develop a strategy for SEDA
	ECITI (Eastern Cape IT Initiative)[45] Incubator	The ECITI incubator is based in East London in the Eastern Cape and serves to foster the growth of the knowledge economy by stimulating and promoting the IT and Communication industries. Number of women entrepreneurs is not known.
	SoftstartBTI[46] Incubator	SoftstartBTI is a Gauteng-based business and technology incubator that supports a large number of high potential ICT businesses. It is housed at the CSIR in Pretoria. There are no women entrepreneurs (May 2006)
	South African Women Entrepreneurs Network (SAWEN)	Network for women entrepreneurs. No specific focus on ICTs but has identified the need for ICT development to bridge the gap between new enterprises and established businesses[47]
	BEE ICT companies database[48]	Black Economic Empowerment database with about 800 entries on companies in IT, Telecommunications and Electronics Industry. The database includes a category for engendered companies reflecting level of women's ownership. Last updated in 2004

4.4.3 Provincial Government

To our knowledge, none of the provincial structures have a specific focus on women and ICTs, although two provinces, Gauteng and the Western Province, have focused activities in ICTs – the Innovation Hub, which is part of the Blue IQ project in the Gauteng Province; and the Cape IT initiative (CITI), which is an industry association promoting ICT companies in the Western Cape (see **Chapter 9.1.5** for more details).

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[43] http://www.usa.org.za/capacity.html Accessed 17 July 2006

[44] http://www.issa.org.za Accessed 17 July 2006

[45] http://www.eciti.co.za/ Accessed 22 July 2006

[46] http://www.stp.org.za/bodibeng1.html Accessed 22 July 2006

[47] South African Women Entrepreneurs: a burgeoning force in our economy. A Special report 2005: p11 http://www.dti.gov.za/sawen/SAWENreport2.pdf

[48] http://www2.thedti.gov.za/BEECompanies/ Accessed 10 July 2006

5. THE EDUCATION SYSTEM

Gender equality issues in education provide the broader context in which many girls find themselves in the education system. Current initiatives to promote women learner's participation and performance in the Mathematics, Science and Technology (MST) fields have to be seen in the light of the types of problems girls face.

The chapter reviews efforts to bridge the gender digital divide in the South African education system, including initiatives targeted at both learners and educators to transform the education sector.

Underpinning this chapter is an argument for a lifecycle approach when implementing programmes that promote access to and effective use of ICT. The long-term interest of such an approach is to boost the pipeline of young women who enter into and remain in ICT careers. As part of the broader focus of a lifecycle approach to education, this chapter introduces a discussion on Early Childhood Development as well as the GET and FET bands in the education sector.

5.1 Gender Equality and Education

Educational statistics for 2003 to 2005 show that more girls than boys are enrolled in the South African school system. This trend relates to higher drop out rates for young men than young women, with young men often absorbed into unskilled and semi-skilled labour markets. The higher enrolment of girl-learners is also expressed in higher numbers of girl learners who register for the senior certificate examinations. Young women also routinely out perform young men at the senior grades, and the proportion of young women with merit passes and distinctions is higher than for young men.

Nevertheless, a key concern is the values and prejudices that teachers bring into the classroom, and the potential impact on the mathematics and science performance of girl and boy learners. There is little evidence of training for educators on how to deliver a curriculum while also delivering a gender-aware education devoid of sexist notions of what is appropriate behaviour – and by extension, subject and career choices – for female and male learners.

In its Country Report on the Development of Education delivered at the 47th International Conference on Education held in Geneva in 2004, the national Department of Education noted its concern about the levels of sexual harassment and sexual violence directed at girl learners by both male teachers and learners. This issue was again raised by the South African Human Rights Commission in its Report on Public Hearing into the Right to Basic Education, launched in June 2006. During the public hearings, some learners painted a picture of rampant sexual harassment and sexual violence with teachers extorting sex from girl learners in exchange for food or to be allowed onto the school premises. This impacts on girl-learners' performance in different ways through causing emotional and behavioural difficulties, diminished performance, interruptions to schooling, increased exposure to sexually transmitted diseases (STDs) and HIV infection,

and/or the danger of unwanted pregnancies and pregnancy discrimination. A 2001 Human Rights Watch Report, *Scared at School: Sexual Violence Against Girls in South African Schools*, noted that in many cases the incidents of sexual violence remain hidden.

There is some evidence that the education authorities are addressing gender discriminatory attitudes and behaviours that negatively impact on the educational experiences of girl-learners. To date however the approach is to skill the children, rather than the perpetrators.

In March 2003, the Gender Equity Directorate in the Department of Education initiated a Girls Education Movement (GEM) programme, in partnership with UNICEF. The programme is now implemented in all nine provinces through the provincial offices that deal with girls and education. The main thrust of the GEM programme is to focus on girl-learners with a view to, among others, instil life skills that will allow them to resolve conflicts that may expose them to violence in their communities, their homes and in school.

In 2005, the Gender Equity Directorate also initiated a Boys Education Movement (BEM) to address sexist and gender discriminatory behaviours among boys towards girls. Through these 'boys indabas' the programme seeks to address the same issues as the GEM training for girl-learners.

With respect to girl-learners and the national need for more and better skills in MST fields, the Gender Equity Directorate in the DoE and its provincial staff have committed to the following objectives:

- Provide equal access to education for girls and boys;
- Eliminate sexual harassment and gender discrimination in learning sites;
- Facilitate schooling for pregnant adolescents;
- Provide special funding for programs in maths, science and technology to advance opportunities for girls;
- Develop curricula and training that is gender sensitive; and
- Enable girls to actively participate in extracurricular sports.

5.2 Early Childhood Development: Context and Concerns

Since 2001, there has been a significant paradigm shift in the approach to the development of young children, moving from an 'educare' approach to Early Childhood Development (ECD). This shift brings with it an expanded focus, moving from

programmes for the 0 - 6 year cohort, to now including children from birth to nine years.

The ECD approach refers to the processes by which children under nine years of age develop intellectually, socially, physically, emotionally and morally. In this new approach, the South African Department of Education (DOE) encourages an integrated cross-sectoral approach to child development that includes health, nutrition, education and psychosocial factors.

In terms of developing an integrated strategy, White Paper 5 on ECD establishes a national system of provision of Grade R - the reception year - for children aged five. This was launched in May 2001. The medium-term goal is for all children entering Grade 1 to have participated in an accredited Grade R programme by 2010.

A 2001 audit of ECD provisioning[49] in the country yielded insights that suggest the need for concerted efforts to transform the ECD landscape, otherwise there is a very high risk of reinforcing old race-based patterns of privilege and disadvantage. More than 23 000 ECD centres and service-providers were surveyed. The results revealed that the ECD field is dominated by the NGO sector. Only 20 percent of ECD educators were adequately qualified according to the DOE regulations, while 10 percent have no training at all.

One of the key concerns is there is no formalised curriculum for the ECD 0-5 age cohort. There is an expectation that the Grade R curriculum will prepare children adequately for entry into the formal school system in Grade 1. The guidelines of the ECD curriculum include, among others, pursuing an interactive approach to learning that stimulates curiosity and develops confidence in basic linguistic and cognitive skills. The current discrepancies in ECD provisioning could potentially compromise the DOE plans on facilitating a quality ECD service.

Furthermore, there is some cause for concern around the impact of parental cultural beliefs on their daughters' ability to gain exposure to activities that build their understanding of mathematics and science concepts. COUNT is a South African not-for-profit organisation that runs a Family Maths and Science (FMS) Programme with historically disadvantaged communities in all nine provinces. The FMS programme was first developed by the Lawrence Hall of Science, an outreach project of the University of California Berkeley. FMS programmes are run by registered partner sites in countries throughout the world. COUNT was the first organisation to become a registered FMS site in South Africa. Anecdotal evidence[50] from COUNT suggests there is resistance from some parents to their young girl children learning maths and science concepts, based on culture-based notions of its gender appropriateness.

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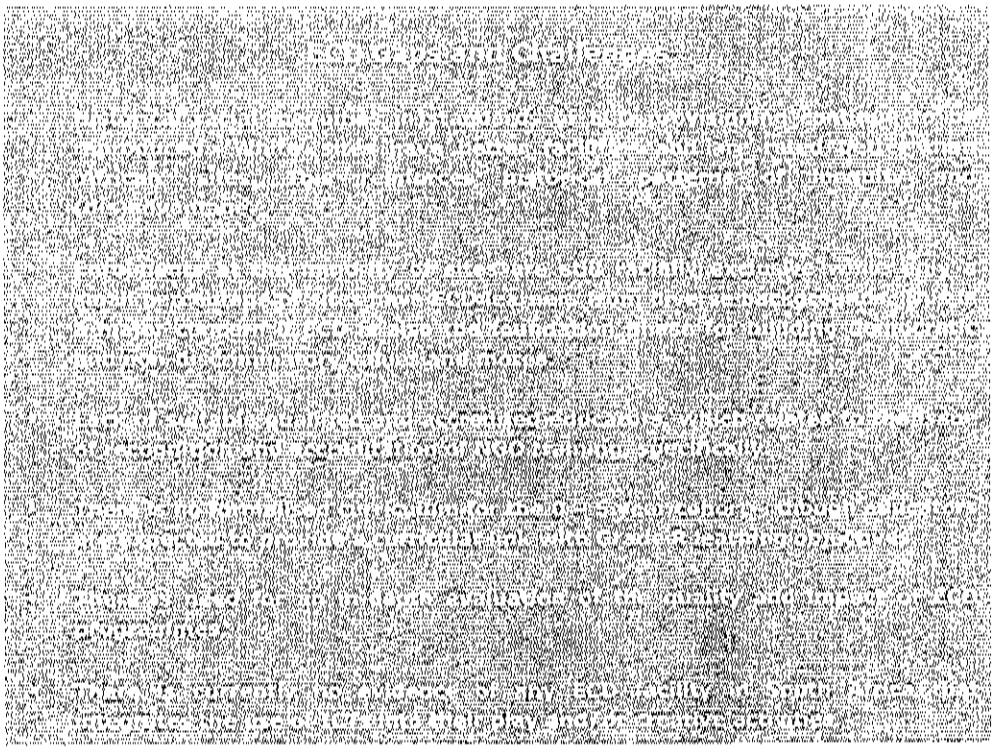
[49] Williams T and Samuels, ML (2001). *The Nationwide Audit of ECD Provisioning in South Africa*, Department of Education, South Africa.
http://www.education.gov.za/dynamic/dynamic.aspx?pageid=326&dirid=3

[50] Telephonic interview, Mirna Lawrence, COUNT project coordinator, 24 May 2006

The need remains to break down recalcitrant notions of gender-appropriate play and skills - held by both parents and some teachers - that reinforces gender differences in the use of technology and tools.



5.3 Fact and Figures for Secondary Schools

The poor mathematics and science pass rates in schools[52] [53] are a major problem in advancing SET (and ICTs) in South Africa. Increasing the success rate at the matriculation level is seen as a critical success factor for the entry of more women and black students into SET (and ICT) fields of study. Mathematics is a major stumbling block for entry especially into computer and electrical engineering courses.

Since there are over half a million matriculants annually, the number of students passing with higher-grade maths (28 305 in 2005) is totally inadequate. Potential medical, natural sciences, financial, business, law and ICT students are drawn from this very

[51] Williams T and Samuels, ML (2001). *The Nationwide Audit of ECD Provisioning in South Africa*, Department of Education, South Africa. http://www.education.gov.za/dynamic/dynamic.aspx?pageId=326&dirid=3

[52] Human Sciences Research Council http://www.hsrc.ac.za/media/1996/11/19961124.html. Accessed 26 May 2006.

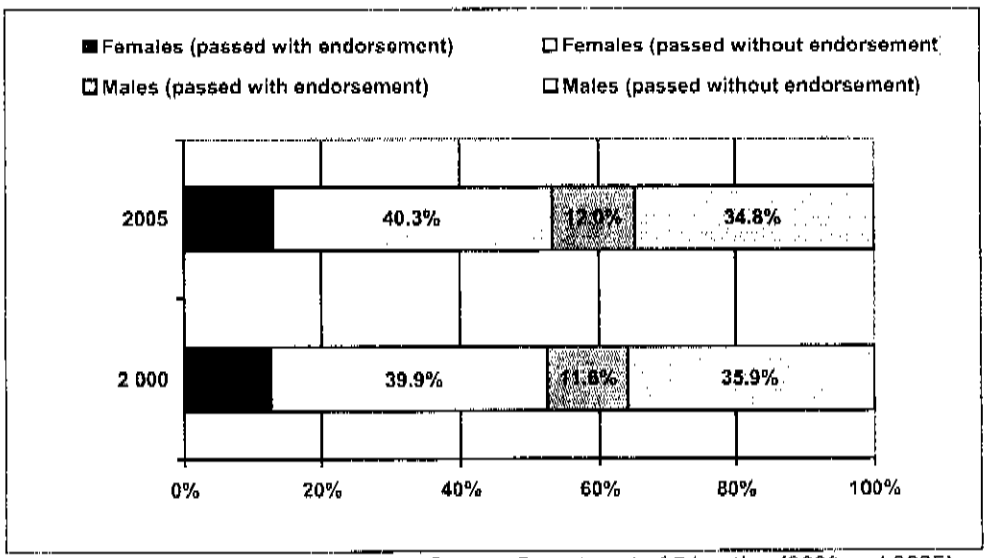
[53] Human Sciences Research Council http://www.hsrc.ac.za/media/2004/12/20041214_1.html. Accessed 25 May 2006

small pool. Less than half of those that pass higher-grade maths, pass with A, B or C symbols.[54]

In terms of achieving gender targets, there is little difference in total matriculation (Senior Certificate) pass rates between male and female, although male matriculants still perform slightly better than female matriculants. In 2005, 69.7% of all male learners who wrote the matriculation exam passed and 67.2% of all the female learners passed. For male matriculants there was an increase of 6.0 percentage points in the pass rate since 2001 and for female matriculants 7.1 percentage points since 2001. Among the male matriculants, 17.8% of them passed with exemption (endorsement) and 16.4% of all the female matriculants passed with exemption in 2005.

The ratio of males and females who passed matric has not changed much between 2000 and 2005. Of those who passed with endorsement (exemption) in 2000, 12.6% were women and 11,6% were men; in 2005, 13.0% were women and 12.0% men.

Figure 5.1 Matriculation pass rates by gender, 2000 and 2005



Source: Department of Education (2000 and 2005)

The number of both men and women who passed mathematics at matric level in 2005 has increased since 2001. However, a smaller percentage of all those that passed

[54] To study a computer *engineering degree* course at university, a higher-grade mathematics symbol of A, B or C is required and for most universities of technology a minimum of a C symbol standard grade mathematics is required. In order to study other *ICT degree* courses at university, a higher- grade mathematics symbol of D or standard grade C is required and for most universities of technology an E symbol higher grade or D symbol standard grade mathematics is required.

To study *certificate or diploma* core ICT courses at university and most universities of technology, a higher-grade mathematics symbol of D or E is required or standard grade C or D is required, although for some certificate or diploma courses only a pass in mathematics is required. These criteria present a challenge.

mathematics in 2005 were women (47.6%) than in 2001 (49.6%). Of those that passed mathematics in 2005, 52.4% were men while in 2001 this was 50.4%.

Although more women passed mathematics at the Higher Grade (HG) in 2005 (12 408) than in 2001 (3 267), compared to men, only 43.8% were women in 2005, while 48.3% were women in 2001. Of all those that passed mathematics at HG in 2005, 56.2% were men while in 2001, 51.7% were men.

At school level, more males (58.8% in 2005) than females (41.2% in 2005) take computer studies (other than computyping) as a matric subject. This ratio has not changed much since 2001 (56.7% males and 43.3% females).

5.4 Mathematics, Science and Technology Education (MST)

A number of different MST initiatives are taking place, targeted at all learners in the GET and FET bands in the school system, and some specifically targeted at girls. There is however a marked lack of evaluation of any of the programmes and the lessons to be learned regarding the improvement of teaching practice.

5.4.1 School based FET courses in ICT/IT

At Grade 10-12 levels, two new subjects have been introduced to build ICT skills. This includes courses for grades 10-12, in computer applications technology as well as information technology with the purpose of "(i) equipping learners with knowledge, skills, values and attitudes to create, design and communicate information in different formats, to different sectors of society,[55] and (ii) to enable learners to understand the principles of computing through the use of current programming languages, hardware and software, and how these apply to their daily lives, to the world of work and to their communities."[56]

5.4.2 The Dinaledi Initiative

In 2001, a National Strategy for MST – Dinaledi - was launched following on a national consultative conference involving the Departments of Education, Arts and Culture, and Science and Technology. Dinaledi is an initiative to develop the mathematics and science skills base in the country, through a programme that is implemented at both national and provincial levels. The overall aim is to double the number of successful passes in higher grade mathematics and sciences at the Grade 12 level by 2008. It seeks is to

[55] Department of Education, 2005, National Curriculum Statement Grades 10-12 - Computer Applications Technology, Accessed 13 June 2006, http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=9&category=Policies

[56] Department of Education, 2005, National Curriculum Statement Grades 10-12 - Information Technology. Accessed 13 June 2006, http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=9&category=Policies

produce, by 2008, at least 50 000 mathematics and science graduates at the Senior Certificate level.[57]

The initiative - meaning 'stars' in Sesotho – originally targeted 102 schools, spread across the nine provinces. Since inception, it has continued expanding. In 2006, the number of Dinaledi schools will increase from 102 to 400 and to 529 by January 2007. Over the next three years, this will be expanded to 1 000 schools.

The Dinaledi Schools initiative has also built into its goals and objectives a specific interest and commitment to build girl-learners' skills and performance in mathematics and science. The Department of Science and Technology (DST) sponsors a 'best girl learner' award and draws competitors from the Dinaledi schools. One of the outcomes is that the participation and performance of girl learners in mathematics and science has shown consistent improvement. The existence of the award is credited both with encouraging the entry of more girls into MST studies, as well as driving better support from mathematics and science teacher for girl learners.[58] One way in which provincial education departments are providing support to girl learners is through the implementation of girl-only MST camps. The camps are often targeted at girl learners in the FET band, and schools are instructed to select one of their top girl learners to attend the camps.[59]

In April 2006, the Minister of Education invited private sector companies to adopt Dinaledi schools across the country, a request that is reported to have been received favourably.[60]

For now, it is impossible to reflect on the success of the programme and whether targets to improve the participation and performance of girls in the Dinaledi programme are being met. The evaluation report of the first phase of the Dinaledi programme (2001-2004) was written only this year, and is not yet available to the public.[61]

5.4.3 SAASTA Programmes for Young Learners

The South African Agency for Science and Technology Advancement (SAASTA) implements a number of projects of behalf of other agencies, including the national Department of Science and Technology (DST). One of these is *Primary Science Day*, which is devoted to promoting science in primary schools and is intended to address

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[57] Thapelo Sakoane, 2006, *Soweto schools to help produce maths, science graduates*, http://www.allafrica.com/stories/printable/200605240757.html. Accessed 13 June 2006.

[58] Address by the Minister of Science and Technology, Mr Mosibudi Mangena, at the NSTF Awards 2004 in Johannesburg, 2004, Department of Science and Technology, Pretoria, http://www.dst.gov.za/media/speeches . Accessed 13 June 2006.

[59] Mpumalanga Education Department, 2005, Circular N0 29/2005, FET Maths, Science, Technology Girls Camp: 27th September to 1st October 2005.

[60] SouthAfrica.info, 2006, *Business backs Dinaledi schools*, http://www.southafrica.info/

[61] Telephonic discussion with the Office of Mr Mosuwe, Deputy Director-General: Department of Education, Pretoria, 13 June 2006.

directly the weak international ranking of South African mathematics and sciences, especially in younger learners.

The second initiative of SAASTA, with similar aims, is the *National Science Week* event which, amongst others, aims to excite youth about science from an early age and to encourage them to develop an interest in studying mathematics and science subjects. National Science Week is typically implemented at provincial level. Some of the key activities include interactive exhibitions, science shows, workshops, theatres, and career information sessions hosted at provincial venues throughout the week. Schools are encouraged to take their learners on excursions to participate in the National Science Week activities.

SAASTA also coordinates the National Science Olympiad, which ran for its 41st year in 2005. The Olympiad aims to promote the participation of Grade 10-12 learners in the sciences with the aim that these learners will be encouraged to pursue careers in the science fields. The Olympiad comprises four components - general knowledge, physics, chemistry and biology. The Olympiad includes the administration of an examination, the hosting of a Science Week, an Awards Ceremony for top performers and the sponsorship of a few learners to attend the International Youth Science Forum in London.[62]

A review of the different SAASTA programme descriptions suggests that there is currently is no discernible focus on or specific activities targeted at girl learners.

5.4.4 Mathematics and Science Camps for Girls

There are a number of initiatives – often *ad hoc* and not always consistently implemented - to build girl learners' mathematics and science abilities, and to encourage their entry into SET fields. More often than not, the initiatives take the form of girls' camps to create an environment that allows for intensive engagement with science and maths concepts:

Girls' camps are run by the DOE, DST and the Chemical Industries Education and Training Authority (CHIETA). The DoE camps are often implemented in partnership with initiatives such as Technology for Women in Business (TWIB)[63] and UNICEF's Global Girls Education Programme.

The Gender Equity Directorate of the DOE runs activities under its Girls' Education Movement (GEM), a programme designed to targeted young girls in South Africa.

[62] SAASTA Web site, http://www.saasta.ac.za/aboutus/activities_prog.shtml. Accessed 13 June 2006.

[63] See also **Chapter 9.3.5** for more details

5.4.5 South Africa Mathematics Olympiads

The South Africa Mathematics Foundation runs the annual Mathematics Olympiad to stimulate interest and excellence in mathematical skills, and develop the capacity of mathematics teachers in the process. The competition is targeted at junior and senior learners in the school systems, and the top seniors are sponsored to complete in the Pan-African and – depending on their performance – the global Mathematics Olympiads.

South Africa's performance in the Pan Africa Mathematics Olympiad (PAMO) has improved significantly over the past few years. In 2003, the South African team won overall first place, claiming one gold, two silver and one bronze medal as well as awards for the top student and the top girl participant.[64] Increasingly participants in the Pan African Mathematics Olympiads are also drawn from the historically disadvantaged communities and schools that participate in the Dinaledi programme.

5.4.6 ICTs in Education

The Department of Education has initiated policy processes to promote the use of ICTs in education. In 2003, it published the Draft White Paper on e-Education in which it defined the value of ICTs for teaching and learning, and set the policy goal that every learner in the general (GET) and further education and training (FET) bands will be ICT literate by 2013. The policy paper also established a framework for collaboration between the Department of Education and the Department of Communications with respect to the provisioning of computers in schools for the purposes of teaching and learning.

5.5 Teacher Development

Practically all the initiatives targeted at learners in the GET and FET bands in school include parallel activities to build teachers' skills in mathematics and science teaching. The provincial and national government initiatives are amplified by the sponsorship of private foundations and trusts. Some examples are listed below.

5.5.1 Centre for the Advancement of Science and Mathematics Education (CASME)[65]

The Shell Science and Mathematics Resource Centre Educational Trust seeks to improve learners' performance through professional development support for mathematics and science educators. The Shell initiative operates under the name of Centre for the Advancement of Science and Mathematics Education (CASME), a Section 18(a) non-profit educational trust. In KwaZulu-Natal, Free State and the Eastern Cape, the Dinaledi programme took off with the help of CASME – with financial support from corporate

[64] South African Agency for Science and Technology Advancement http://www.saasta.ac.za/media/2004_04.shtml . Accessed 26 May 2006

[65] Centre for the Advancement of Science and Mathematics Education, http://www.jula.org.za/Section.asp?Section_Name=About Accessed 26 May 2006

social investment funds. CASME runs a number of separate but related initiatives, in which it partners with a cross section of private sector foundations. These initiatives include:

- Producing and disseminating the Jula newsletter for Mathematics and Science educators;
- Running the CASME Outstanding Teacher Award;
- Running the CASME Mathematics Advancement Project in KwaZulu-Natal to encourage teachers and learners who traditionally do not participate in the National Mathematics Olympiad. Through this initiative, CASME will provide workshops to the mathematics teachers who have learners participating in the Mathematics Olympiads; and
- Supporting ten Resource Centres for teachers that are spread across KwaZulu-Natal.

5.5.2 SchoolNet South Africa

SchoolNet South Africa[66] has been very actively training teachers to integrate ICTs into teaching and learning activities. SchoolNet South Africa has three major teacher development programmes to boost teachers, ranging from basic ICT skills to supporting teachers' roles as educators, ICT integration planning that improves learning activities, and building ICT leadership capacity. The SchoolNet South Africa support is organised through three programmes:

- The Educators Network which is a CD-based distance learning programme with over 7 000 teachers in the network;
- The Intel Teach to the Future programme, which is part of an international teacher development programme focused on designing ICT integrated projects; and
- The Microsoft Partners in Learning programme which is focussed on materials development ranging from entry-level skills to advanced skills for teachers while also including ICT materials for mathematics and science teachers.

Approximately 12 000 educators were trained in SchoolNet South Africa programmes in 2005. Unfortunately there is gender breakdown for those who participated in the SchoolNet South Africa training activities, as this was not been identified as a priority issue. However, as most of the programmes target teachers at the primary school levels, the majority of participants in the SchoolNet South Africa programmes have been female educators.[67]

[66] SchoolNet South Africa, http://www.school.za/programmes/index.htm. Accessed 25 May 2006.

[67] Telephonic discussion with Janet Thompson, Executive Director of SchoolNet South Africa, Friday 21 July 2006.

In the history of SchoolNet South Africa's programme implementation, the approach has not included gender issues. As an activity with the 2005 campaign for 16 Days of Activism against Violence Against Women, SchoolNet South Africa hosted its first women-only workshop to teach female educators basic ICT skills with a thematic focus on Violence Against Women (VAW).

5.5.3 Mindset Network

The Mindset Network[68] is a non-profit organisation which is primarily involved in developing materials for educators to integrate into their teaching practice. The organisation was launched in 2003 with a R225-million multimedia satellite television network.

The organisation uses a variety of avenues for delivering content to teachers including broadcasting on satellite television, CD-ROM, the organisation's website, as well as a monthly *Mindset Learn* insert in The Sunday Times Magazine. The materials are curriculum based and cover English, Physical Sciences, Mathematics, Information Technology, and Financial Literacy (or Senior Phase Economic and Management Sciences (EMS). The focus of Mindset Networks' materials development is on the school-based FET levels, Grades 10-12.

Apart from delivering content, the Mindset Network also supplies schools with the necessary equipment - including generators in rural areas – so that they can access the satellite broadcasts which run from early morning to late afternoon on week days, allowing for both school and home viewing.[69]

Two of the three solutions in operation target learners and educators in the GET and FET bands.

- *Mindset Learn*: Provides educational content for students and educators for the final three years of high school (Grades 10 -12), and receiving equipment was been installed in over 1 000 schools (content is also available in over 1 000 000 homes through satellite broadcast).

- *Mindset Cabanga*: Provides educational content for students and educators for Primary School Learners (Grades R -7), and receiving equipment was installed in 50 schools in the first phase.

Currently, Mindset Network has no readily available information on the numbers of teachers trained or what the gender breakdown of the participants may be. To date, Mindset Network has reached about 1 000 high schools and another 50 primary schools. For 2006, Mindset Network plans to roll out to an additional 400 schools. This involves delivery of teacher training on the use of Mindset content. Furthermore, Mindset

[68] Mindset Network, http://www.mindset.co.za. Accessed 25 May 2006.

[69] SouthAfrica.info. 2003. *Beaming education to the nation* http://www.southafrica.info. Accessed 13 June 2006

Network is busy researching and evaluating their existing training models to assess quality and impact.[70]

5.5.4 Internet Service Providers Association

During 2001, the Internet Service Providers Association (ISPA) decided to investigate sponsorship options in order to fund an Internet related training project. An ISPA task team was formed to identify the existing needs within the different areas of social development. After deliberation it was agreed to initiate a programme to assist in solving the computer literacy problems currently being experienced in schools. The ISPA Management Committee approved a Social Development Pilot Project, called 'Train the Teachers'.

The first course took place during November/December 2001 over a period of five Saturdays. The trainers reported that the course had been very successful and that teachers had shown enthusiasm and eagerness to learn and were grateful for the opportunity to enhance their skills. An ISPA Social Development Committee was formed and formalised a partnership with UniForum SA, who agreed to contribute an approximate amount of R20, 000 per month to the programme.

ISPA's "Train the Teacher" programme is intended to impart basic PC literacy and desktop applications training to the participants. The training is based on the OpenOffice.org platform which is available in all 11 official South African languages, and was selected with a view to increase the accessibility of the training.

From 2002 to date, more than 750 teachers were trained under the programme.[71] Most of the schools and teachers are located in rural areas with only a few of the participating schools in cities. Schools were included in the programme if they had existing computer infrastructure that the teachers could use at the end of their training programmes. Unfortunately, there is no gender breakdown of the beneficiaries to date and therefore not possible to tell to what extent women teachers have benefited from the PC literacy training.

From 2005, ISPA also instituted a SuperTeachers Award to the teacher who did best to transfer her/his new ICT skills to the local community.[72] Teachers who successfully completed the course are selected to compete for the Super Teacher of the Year award at the annual i-week conference. To date, an award was made to the 2005 competition winner.

5.5.5 Association for Educational Transformation (ASSET)

The Association for Educational Transformation (ASSET) is a non-profit NGO situated in the Western Cape. It seeks to provide opportunities for students from disadvantaged

[70] Personal communication, Shafika Isaacs, 21 July 2006.

[71] Personal communication, Tinka Saunders, 21 July 2006.

[72] ISPA web site, http://www.ispa.org.za/socdev/index.shtml Accessed 21 July 2006.

communities to realise their full educational potential, and to contribute to the process of educational transformation in South Africa.

The organisation targets teachers for development, in addition to the bursary and learner-oriented programmes it implements. The teacher development programme (TDP) was initiated in 1999. It seeks to build teachers' capacity to operate effectively in a changing educational environment. The programme provides in-service courses for teachers in Mathematics, Science and Language.

The TDP works in close cooperation with the Western Cape Education Department and has focussed, since inception, on teachers of Mathematics, Physical and General Science, Biology and English. The TDP runs afternoon workshops in the first three terms of the school year. Each module is ten hours in duration, comprising four sessions of 2½ hours each. Workshops are conducted by three part-time facilitators.

5.5.6 Provincial Education Department Initiatives

There are also a number of initiatives that are spearheaded by the provincial education departments. Below is a selection of programmes that target teachers in the employ of the provincial departments.

North West Provincial Education Department: Africa Drive Project (ADP)

The ADP was initiated by the North West Department of Education in a public-private partnership involving a number of stakeholders: the North West University, German Technical Co-operation (GTZ), SAP Research, CEC Pretoria, eDegree, North West Department of Finance and Duxbury Networking, among others.[73]

The programme is designed to alleviate the shortage of suitably qualified teachers in MST. The programme adopts a range of teaching and learning methodologies, including e-learning, to improve the competencies of educators so that they in turn can provide students with relevant, quality education.

Objectives of the Africa Drive Project

- To develop innovative new learning strategies to improve the knowledge, skills and competencies of secondary school educators in the areas of Physical Science, Mathematics, Technology, Business Studies, English Communication Skills and Computer Literacy;
- To test, introduce and integrate Information Communication Technology into learning;
- To address the role of the educator with regard to social issues such as HIV/AIDS, TB and conservation;
- To bridge the digital divide by introducing technology to both teachers and students;
- To develop relevant learning, technology and cost models on which the rollout of blended learning in a developing society could be based; and
- To create new business opportunities related to the education-training sector, such as content development, learning facilitation, technology maintenance and support.

[73] Africa Drive Project, http://www.adp.org.za/adp_adp.html . Accessed 13 June 2006.

Limpopo Province Education Department - Khanyisa Project

Khanyisa is a seven-year programme, funded by the British Department for International Development (DFID), and located in the Limpopo Department of Education (LDOE).

The Khanyisa Baseline Evaluation is a critical element of the programme as it will provide a reference for future evaluations to measure the programme's impact as it progresses. The study entailed the collection of qualitative management data from a sample of 24 schools in the Sekhukhune and Vhembe Districts of Limpopo. The evaluation will link data on socio-economic status, school management, classroom teaching, support services provided by provincial and district offices and learner performance in mathematics and language.

Western Cape Education Department (WCED) - The Khanya Technology in Education Project

In April 2001, the Western Cape Education Department launched the Khanya Technology In Education Project – deriving from the Xhosa word 'ukukhanya' which means 'enlightenment'. The project seeks to assess how technology can address the deepening shortage of educator capacity in schools, and to explore alternatives that will address the steady decline of the number of educators. Specifically, it seeks to find ways to use information, communication and audiovisual technology to improve teaching and learning – or curriculum delivery - within the schools.

Some of the secondary objectives of the project include:

- Increase educator capacity and effectiveness by means of technology;
- Harness the power of technology to deliver curriculum;
- Providing an opportunity for learners to benefit from a variety of learning styles;
- Integrate appropriate and available technology into the curriculum delivery process as different technologies mature;
- Use technology to assist all disabled learners to maximise learning;
- Improve Senior Certificate and FETS results, as well as learner outcomes in all grades, in terms of number of passes and quality of results;
- Increase the number of learners taking Mathematics and Science on the higher grade and coping successfully;
- Improve numeracy and literacy in lower grades in order to build a stronger foundation for future matriculants;
- Prepare all learners for the Information Age;
- Narrow the digital divide;
- Create a technology rich province; and
- Provide all educators and learners in the province with an e-mail address[74]

The Khanya Project has been highly acclaimed locally and internationally. In September 2004, it won the Standard Bank Centre for Public Sector Innovation Award in the

[74] See http://www.khanya.co.za/projectinfo/?catid=32 , Accessed 23 July 2006.

category Innovative Service Delivery Institutions. The project's achievements as at March 2006 include:

- 490 schools have been helped to use technology effectively;
- Another 134 schools are in various stages of preparation for the next wave of implementation;
- A total of 18 306 computers are used in Khanya schools. Of these 10 561 have been funded by Khanya or its donor partners, and the balance of 7 745 have been procured by the schools themselves;
- 13 034 Educators are being empowered to use technology optimally for curriculum delivery; and
- 432 460 learners are already reaping the benefits of the project.[75]

The Cape Academy of Mathematics, Science and Technology

The Cape Academy of Mathematics, Science and Technology is a project of the WCED and was established to provide specialised schooling for learners with the potential to excel in these subjects in the Senior Certificate examinations. The Academy actively recruits participants from all backgrounds, and especially targets learners from previously disadvantaged communities.

5.6 Conclusions

The ideas presented in this chapter highlight that there is an urgent need for focussed interventions on girls interested in MST, and potentially SET / ICT careers. Some efforts are underway but the principle of cascading projects to targeted communities means that often the implementation of projects is uneven, spread across a number of government departments, and not well-coordinated. One of the key challenges is the availability of skills, competencies, and financial resources at the provincial level to launch initiatives with the regularity and on a scale where they will make significant impact. The eventual impact of the current disjointed approaches is therefore likely to be less effective and non-sustainable in the longer-term.

The current ICT initiatives by the DOE, the DST and their private sector partners are too narrowly focussed on the school-based FET band (Grades 10-12), to the detriment of earlier education levels. Both the materials development and teacher professional development initiatives are mainly for those in the GET and FET bands in the schools

[75] See http://www.capegateway.gov.za/eng/directories/projects/14997/16586#2, Accessed 23 July 2006.

system. This goes counter to international experiences[76] in adopting a lifecycle approach to increasing the participation of girls and women in SETs.

Lack of infrastructure and equipment is one of the leading factors hampering progress in terms of getting more female learners to participate in MST programmes, although there are moves in a number of provinces to provide schools with ICTs.

There are few to no facilities or resources that focus on building educators' capacity to effectively integrate of ICTs into the ECD curricula and teaching practice. Currently there are materials for teachers to help them integrate ICTs into a select number of subjects. The task is to develop materials that will aid the integration of ICT across the curriculum in all subjects and all levels of education.

Language of instruction and educational materials remains an issue. The challenge is to build educational ICT toys and technical tools in a range of languages that will improve all young learners' grasp of the tools at earlier stages of their development and reduce the dependence on English-only materials.

Monitoring and evaluation of projects is not consistently undertaken and there are few reports highlighting the lessons learned from these initiatives. This makes it difficult to monitor and evaluate progress against national goals or for projects to learn from each others' successes and failures.

While there is anecdotal confirmation of workshops with teachers to address gender issues, this does not appear to be structured. This is completely inadequate, as indicated by the continuing high levels of sexual harassment and violence in schools perpetrated by male educators and male learners.

Research indicates that ICT careers are negatively associated with anti-social behaviour, among others – and detract from young women's interest to consider IT as a career option. Currently, there is little capacity in schools for up-to-date career guidance that will support a massive shift of young female and male learners' into non-traditional occupations. There is a need for identifying role models of women in non-traditional careers as well as exposure of career guidance practitioners to non-traditional as well as new and emerging career options for young women and men.

[76] Refer to **Document 2** of this study which highlights international experiences in adopting a lifecycle approach.

6. FURTHER EDUCATION AND TRAINING (FET) PROVIDERS

Chapter 6 presents gender-disaggregated date for FET training providers in South Africa. Data is provided on the pass rates for mathematics and computer-related subjects between 2001 and 2005. In addition data is provided for private ICT training institutions, the fastest growing training provider for ICT skills.

6.1 Further Education and Training (FET) Providers

There are 50 FET colleges with 185 college campus sites across the nine South African provinces. FET colleges train learners at the intermediate level (NQF Level 2, 3 and 4). FET colleges offer six main fields of study:

Business Studies
Engineering
Art and Music
General Education
Utility Industries
Educare/Social Services.

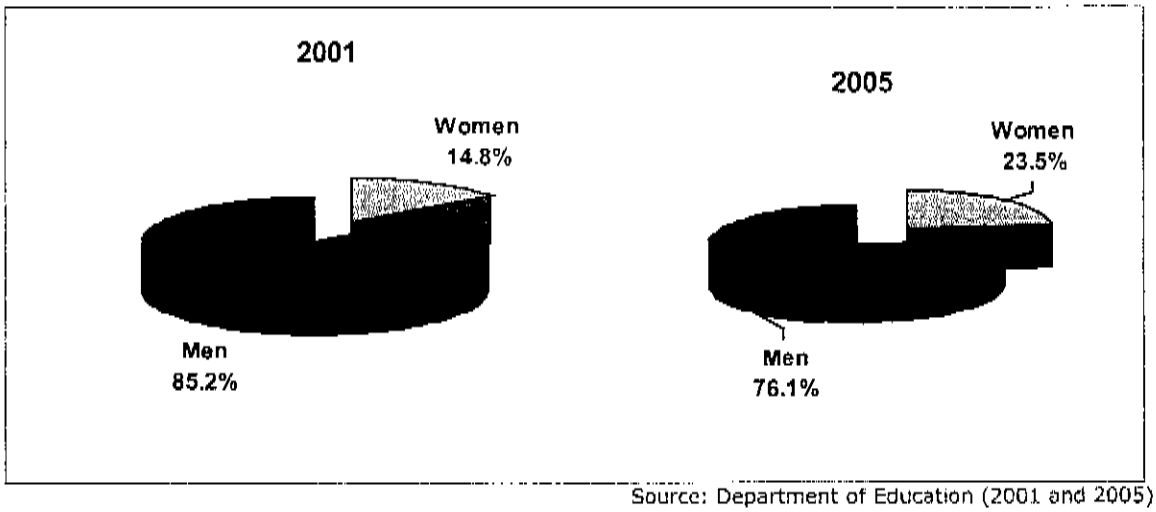
Information Processing is one of the sub-fields of study under Business Studies. Computer Technology and Telecommunications is one of the sub-fields of study under Engineering[77].

At further education and training institutions, learners can obtain qualifications at NQF level 2 (Grade 10 and N1), level 3 (Grade 11 and N1) and level 4 (Matric and N3). Some qualifications, however, are also obtained at NQF level 5 (N4, N5 and N6) which fall in the HET band (Refer to **Table 3.2**).

In 2005 there were 9 089 learners that passed matric level mathematics at FET colleges which represents an average annual growth of 14.3% from 2001. Of those that passed matric level mathematics at FET colleges in 2005, 23.5% were women and 76.1% men, as shown in **Figure 6.1**. Very positive is that the female pass rate in matric mathematics represent an average annual growth of 28.2% and the male pass rate an average annual growth of 11.1% between 2001 and 2005. The average annual growth in the number of women who passed mathematics with A, B and C symbols was 13. 6% between 2001 and 2005 while the average annual growth in the number of men who passed with A, B and C symbols was 5.2%. The number of women who passed matric mathematics with D and E symbols had an average annual growth of 31.4% since 2001 and for men 13.0%.

[77] Department of Education, 2004

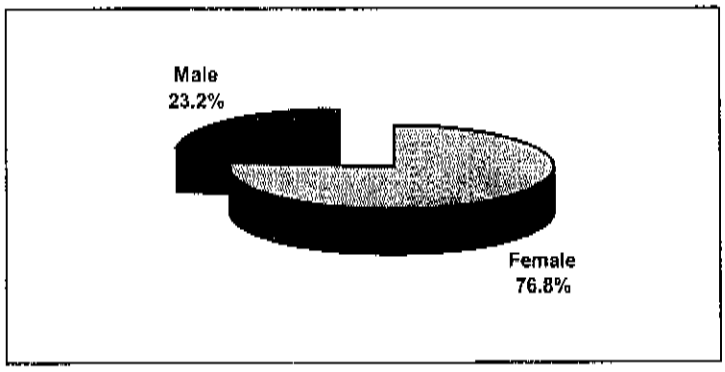
Figure 6.1 Matric mathematics pass rates at FET colleges by gender, 2001 and 2005



Source: Department of Education (2001 and 2005)

More women than men follow ICT **end-user** courses at FET colleges. In 2005 76.8% of those that passed information processing at FET colleges were women and 23.2% were men, as shown in **Figure 6.2**. However, there was an average annual decline of -7.9% in the number of women who passed information processing between 2001 and 2005 and only a -1.5% decline in the number of men who passed information processing over the same period.

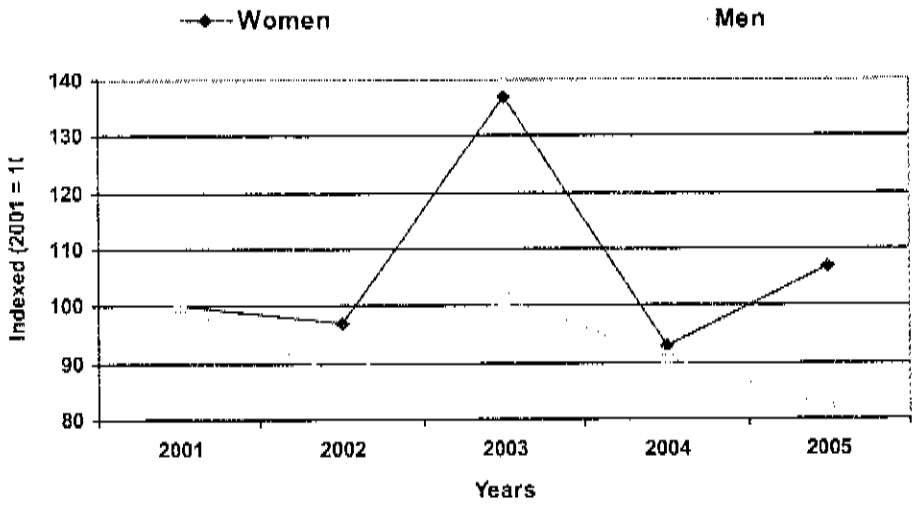
Figure 6.2 Ratio of men to women who graduate in information processing at FET colleges, 2005



Source: Department of Education (2005)

The reverse situation applies with **technical computer** related courses at FET colleges. In 2005, 23.6% of those that passed technical computer related courses at FET colleges were women and 76.4% were men. Very encouraging is that there was a 1.8% average annual growth between 2001 and 2005 in the number of women who passed technical computer related courses. Over the same period there was a -4.9% average annual decrease in the number of men who passed technical computer related courses, as indicated in **Figure 6.3**.

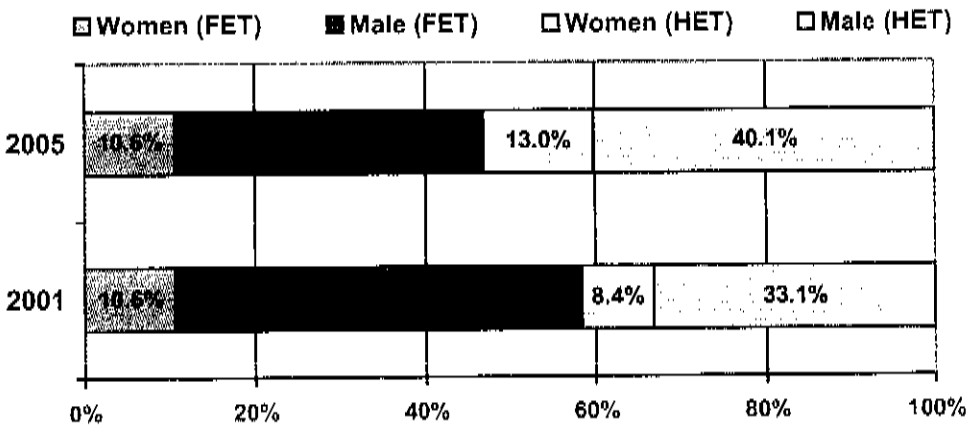
Figure 6.3 Growth in the number graduates in technical computer related courses at FET colleges by gender, 2001 to 2005



Source: Department o Education (2001, 2001, 2003, 2004 and 2005)

Very positive also is that the number of women who passed technical computer related courses at the HET level (N4, N5 and N6 courses) increased from 4 353 (8.4%) in 2001 to 5 824 (13.0%) in 2005, as shown in **Figure 6.4**. This represents a 7.5% average annual growth in the number of women at the HET level while the number of men increased only with a 1.2% average annual growth at the HET level in technical computer related courses between 2001 and 2005.

Figure 6.4 Graduates in technical computer related courses by NQF band and gender, 2001 and 2005



Source: Department of Education (2001 and 2005)

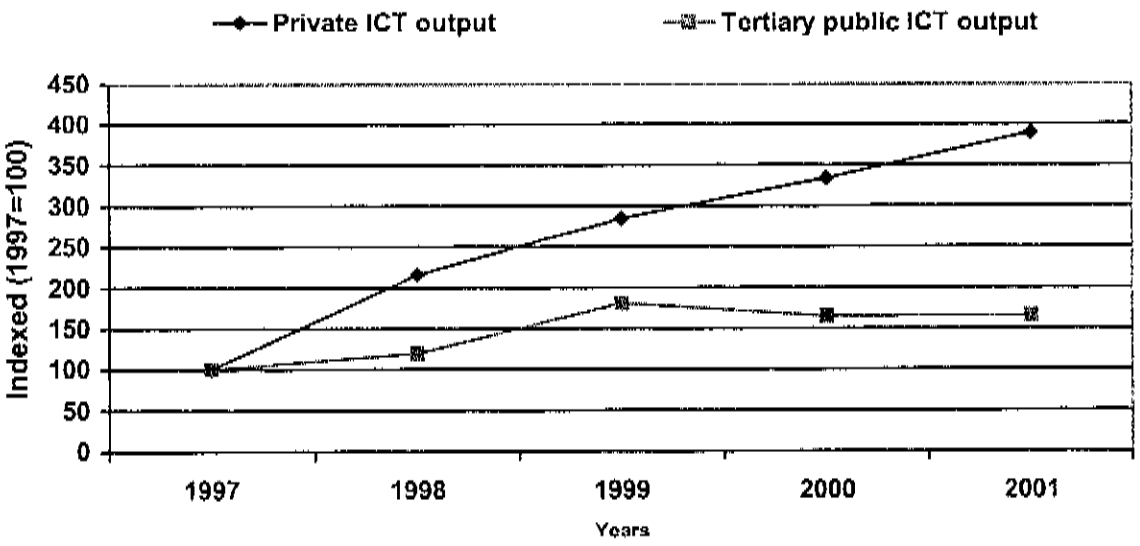
6.2 ICT Training at Private Institutions

Systems and curricula at universities and universities of technology are often outpaced by rapid changes in technology. Continual training is therefore a necessity in ICT, both

for ICT professionals and end-users. Private training providers offer short ICT courses to gain initial access to the ICT sector as well as product specific courses that are adapted according to changes in the market. Private ICT training is, however, fragmented and accepted accreditation procedures and quality assurance controls have only recently been introduced. Viewed positively, private training providers keep open the opportunity for almost anyone to enter the ICT-labour market, as strict entry requirements are not required and allow for responsiveness to changing skills needs in the industry.

The expected Y2K problem resulted in more students enrolling for ICT courses at private ICT training institutions especially between 1997 and 1999. Although there was a slower growth in ICT course enrolment with the Y2K problem solved, ICT qualified output from private training institutions is still increasing at around 17% per annum. Output from tertiary public training institutions also picked up between 1997 and 1999 in anticipation of the Y2K problem, but dropped nearly 10% from 1999 to 2000 and stayed stable from 2000 onwards, as indicated in the Figure below.

Figure 6.5 Supply of ICT graduates from private and public training institutions, 1997 to 2001



Source: Roodt (2003)

The above trend is confirmed in the 2005 dti/ISETT SETA skills audit,[78] which reports that more than 77% of ICT students were registered for lower level and short courses. Data in end-user computing, for example, shows that the racial and gender

[78] Department of Trade and Industry and ISETT SETA (2005). An Analysis of the ICT Skills Audit for the dti and ISETT SETA. Vukanikids. p. 29

demographics appear to be fairly equal across all the race groups except Whites, where is a slight predominance of women. [79]

Private training providers plan future courses around new software that comes on the market. Most courses at private ICT training institutions are presented at NQF levels 4 and 5, which represent 97% certificate courses and 2% diploma courses. Less than one percent of courses are at a degree level.[80] This underscores the fact that private ICT training institutions in South Africa do not pose a threat at this stage to public ICT training institutions, as was also found in the study by Subotzky.[81] Public and private ICT training institutions each have their unique role to play. Private ICT training institutions can provide more specialised and product specific training, while public training institutions can provide a broader foundation and training for future researchers and educators that can prepare quality training materials.[82]

According to Subotzky[83] enrolments at private training institutions are still skewed into traditional gender patterns. This, however, applies mainly to technical computer related courses (core ICT courses) where two thirds of enrolments are men and one third of enrolments are women. In ICT end-user courses (e.g. information processing and graphic design) around three quarter of enrolments are women and one quarter of enrolments are men.[84]

[79] Based on 2003 figures with a total of 148 631 registered students (48 672 students for post-matric qualifications).

[80] Roodt, 2003

[81] Subotzky, 2002: p15

[82] Castro, 1994: p437

[83] Subotzky, 2002: p16-18

[84] Informal interviews with private training providers, 2006

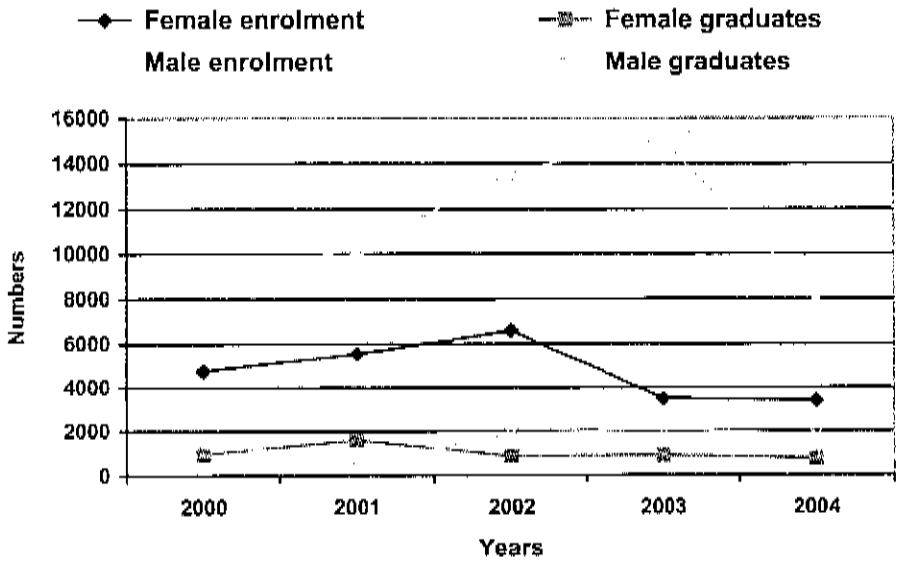
7. UNIVERSITIES

This chapter provides facts and figures on the gender situation in universities and universities of technology in South Africa. Understanding the potential pipeline of SET and ICT graduates is important if the country is to ensure adequate planning for future SET growth and innovation.

7.1 Facts and Figures – Universities

Although secondary school results do not differ much for men and women, the situation is quite different at universities. The vast majority of female high achievers at school are attracted by medicine, business, finance and law. Enrolments for both men (-2.8% average annual growth) and women (-8.0% average annual growth) dropped significantly at universities between 2000 and 2004, as shown in **Figure 7.1**. Alarming is that women graduations decreased with a -5.6% average, while men graduations increased with 4.8% average over this period.

Figure 7.1 University ICT course enrolments and graduations by gender, 2000 to 2004

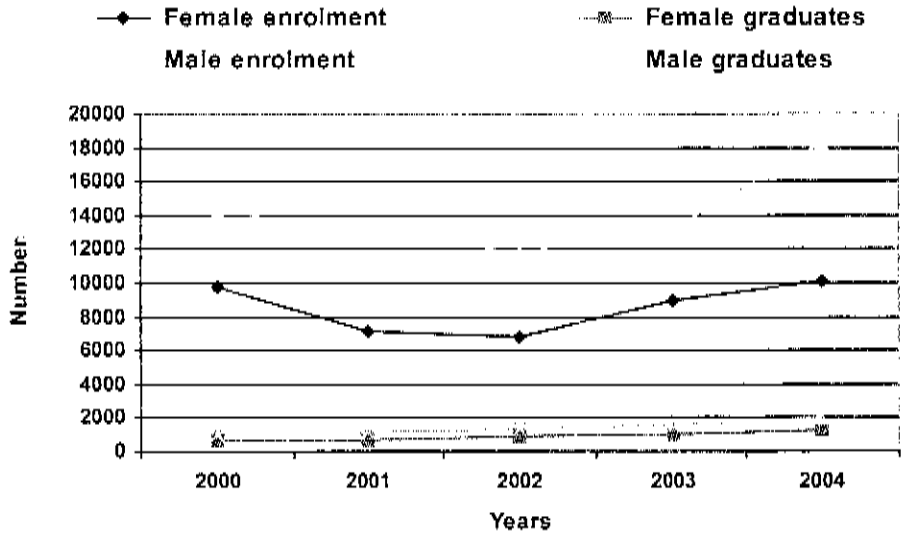


Source: Department of Education (2000 - 2004)

Encouraging is that enrolments at universities of technology increased for both men (6.3% average annual growth) and women (0.8% average annual growth) between 2000 and 2004, as shown in **Figure 7.2**. Even more promising is that the graduations

of women (18.4% average annual growth) increased slightly more than that of men (17.8% average annual growth) over this period.

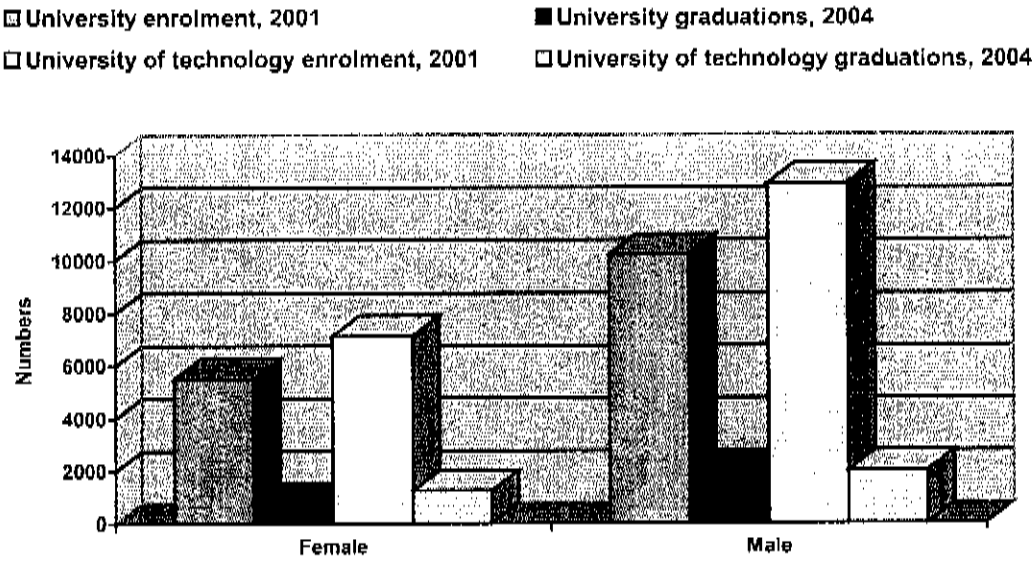
Figure 7.2 University of technology ICT course enrolments and graduations by gender, 2000 to 2004



Source: Department of Education (2000 – 2004)

Enrolment and graduation figures, however, cannot be compared for the same year, as students only complete their studies in three to four years. The method of comparing enrolments and graduations four years later to determine throughput is not totally correct either, as first-year enrolments will include those who are repeating, and final-year graduations will include those who are graduating after five or more years of study. **Figure 7.3** is useful from a comparative point of view.

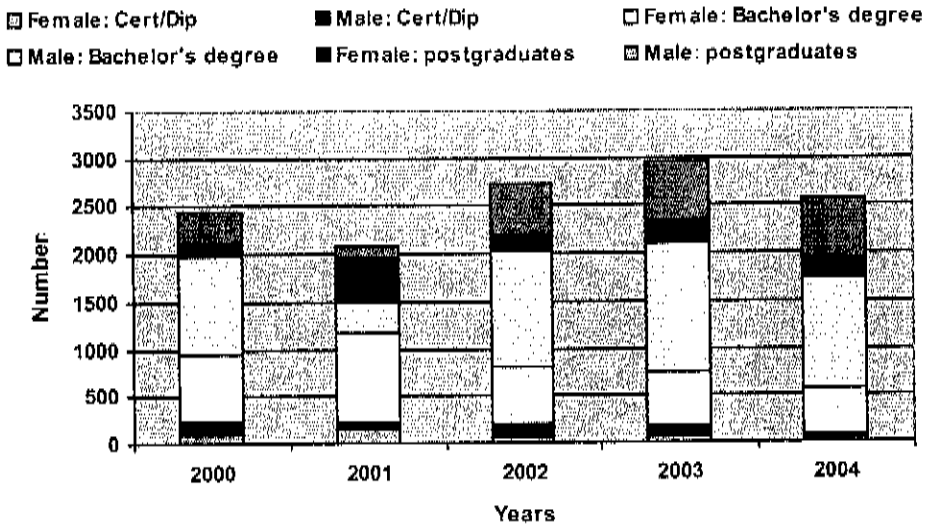
Figure 7.3 Graduations four years after enrolment for ICT courses at universities and universities of technology by gender



Source: Department of Education (2000 - 2004)

There has been a decrease in the number of male (-33.3% average annual growth) and female (-15.0% average annual growth) graduates with ICT certificates and diplomas at universities between 2000 and 2004, as indicated in **Figure 7.4**. Discouraging is that female graduates with bachelor's degrees decreased with -8.8%, while male graduates with bachelor's degrees increased with a 3.3% average annual growth over this period. Very positive is the increase in both male (16.4% average annual growth) and female (11.9% average annual growth) postgraduates over this period.

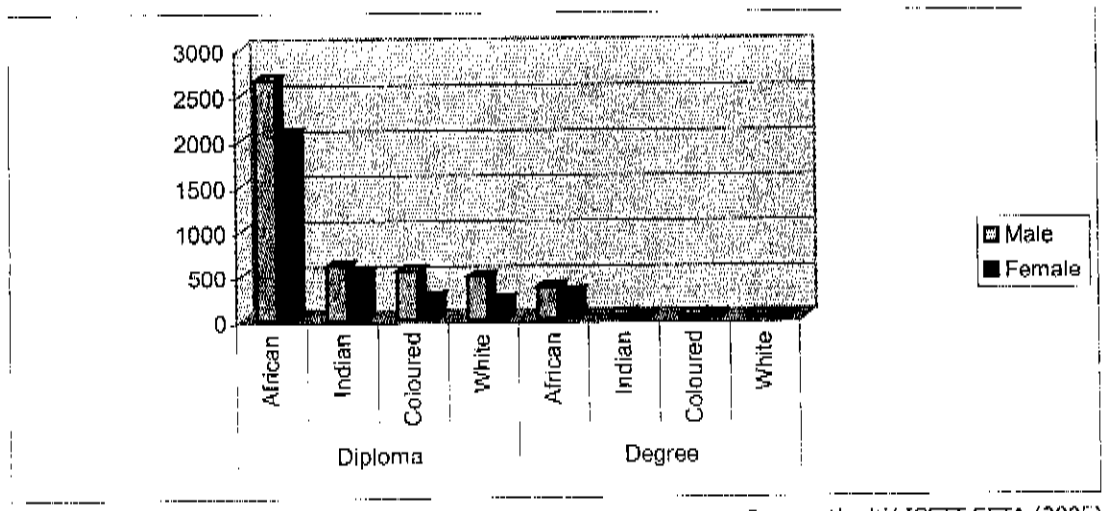
Figure 7.4 University ICT qualifications by gender, 2000 to 2004



Source: Department of Education (2000 – 2004)

The recent dti/ISETT SETA skills audit[85] also reveals definite improvements in the demographics of registered student populations from prematric to postgraduate levels (**Table 7.1** below). The report does not however reflect race and gender breakdowns for students who have actually graduated. It must be assumed that the figures will also reflect an increased number of Black, Indian and Coloured graduates.

Table 7.1 Registered students for ICT Degrees and Diplomas by qualification level, race and gender (2003)



Source, thedti/ ISETT SETA (2005)

[85] Department of Trade and Industry and ISETT SETA (2005). An Analysis of the ICT Skills Audit for the dti and ISETT SETA. Vukanikids. p. 23-27

Of concern are the discrepancies between the data available from the Department of Education and those reflected in the dti / ISETT SETA audit. The latter source indicates a strongly positive trend towards demographically representative student numbers emerging from the universities and private training institutions, in terms of gender and race. This appears to contradict the results presented in this chapter. It once again points to the need for consistent and integrated ICT classification systems, indicators and reliable datasets.

8. THE ICT WORKPLACE

This chapter provides an overview of the ICT workforce in South Africa and particularly the situation regarding men and women. Two surveys were carried out recently (2005) on the ICT workforce and the results are presented here in summarised form. The data does not always correlate well, largely because different methodologies and classification systems have been used. This is reflected in the discrepancies between the datasets, and raises concerns about the levels of confidence that can be assumed regarding the accuracy of the data.

Overall, the sector still shows a predominance of male workers, particularly in the core ICT workforce and at the more senior levels. There does however seem to be evidence for a more demographically representative ICT workforce emerging at the end-user level.

The numbers alone cannot truly reflect women's experiences in the workplace. The chapter therefore includes an extensive section on perceptions of women in ICT leadership positions and the common barriers, constraints and challenges that need to be addressed to reach a more equitable representation of women at all levels in the workplace.

8.1 Women in the Workforce

Women make up 52% of the adult population of South Africa and 41% of the working population.[86] Since the first democratic elections in South Africa, the influx of women into the labour force, together with the political, social and economic effort to advance gender equity in the work place, is resulting in increasing numbers of women occupying positions of leadership in South Africa.[87] Disproportional under-representation of women still occurs in all areas of the workforce, becoming more marked as one moves up the ranks of the working population. There has however been a significant increase since 2004 (**See Chapter 8.3** for a discussion on women in management and leadership positions).

Statistics released by the Department of Labour in 2003 highlight the staff profiles of South African companies.[88] **Figure 8.1** shows various graphics depicting the breakdown of the workforce by race and gender. Women are under-represented in the workforce as a whole, including in managerial positions at various levels (**Figure 8.2** below). Women workers are more likely to be appointed on a temporary basis. South Africa follows world trends in that traditional industries, such as clerical and administrative work and the service and sales industries, show higher numbers of women.

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[86] National Census (2001). Employment figures are contentious as the total depends on the definition which is adopted for 'being employed'. For example, the Labour Market Survey (2003) quotes a total figure of 27% for those in formal employment - See **Figure 8.1**.

[87] Booysen, L. (2000). *Challenges facing black and white women managers in South Africa.* Management Today. June 2000, pp.22-28.

[88] South African Department of Labour (2003). *Labour market supply.*

Figure 8.1 The Status of the South African Labour Market (2003)

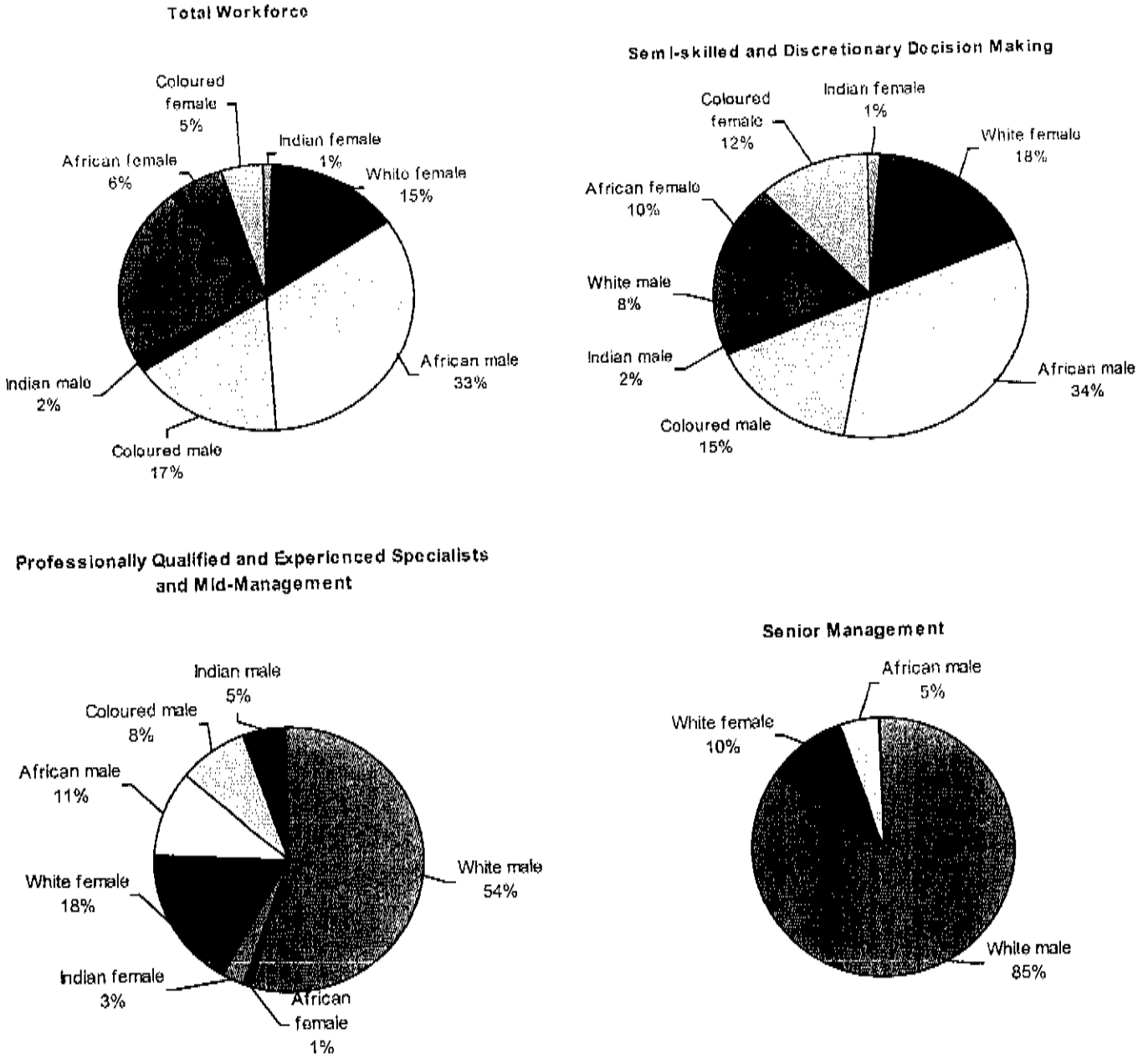
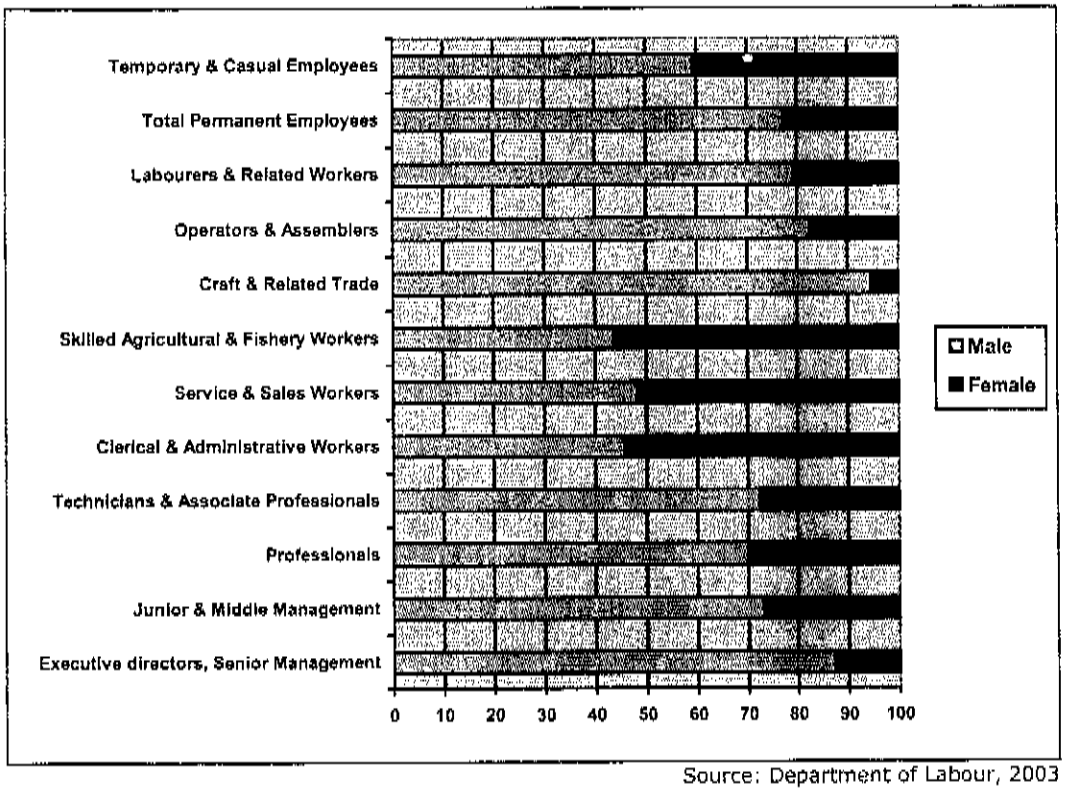


Figure 8.2 Staff profiles in South African companies (2003)



Source: Department of Labour, 2003

8.2 Women in Management

Women are generally under-represented in management and corporate leadership positions in all sectors, although they are more likely to be managers in fields where there are proportionately more women below managerial level. This is particularly true in the so-called 'male' environments such as ICT.[89]

The annual survey on women in corporate leadership positions, derived from analyses of South African listed companies,[90] reflects the following situation in 2005:

- Women held 306 directorships out of a total of 2 851, 81 (2.8%) as executive directors and 225 (7.9%) in non-executive positions. Black women hold 48.37% of these directorships (See **Figure 8.3** below).

- The size of the industry (as measured by market capitalisation) seems to affect woman director representation and is indirectly proportional to the size of the industry in most cases. The largest (and oldest) South African industries have the lowest proportion of women directors, while more 'new economy' industries such as the IT industry, have a greater inclusion of women (**Figure 8.4** below, where the IT

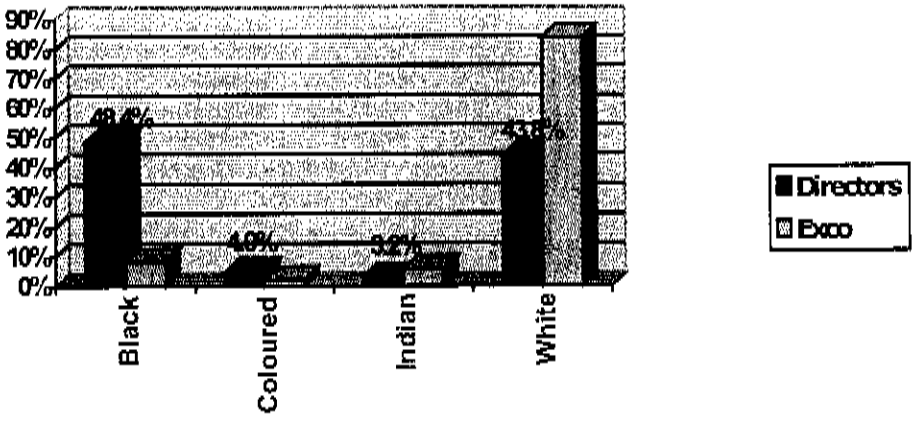
[89] Smith, R. 2003. *Investigating the barriers to managerial positions for women in information and communication technology*. Unpublished MBA, thesis, University of Pretoria.

[90] South African Women in Corporate leadership. Census 2004 and 2005. Businesswomen's Association, South Africa

industry includes companies in computer hardware, semi-conductors, computer services, software and Internet; and

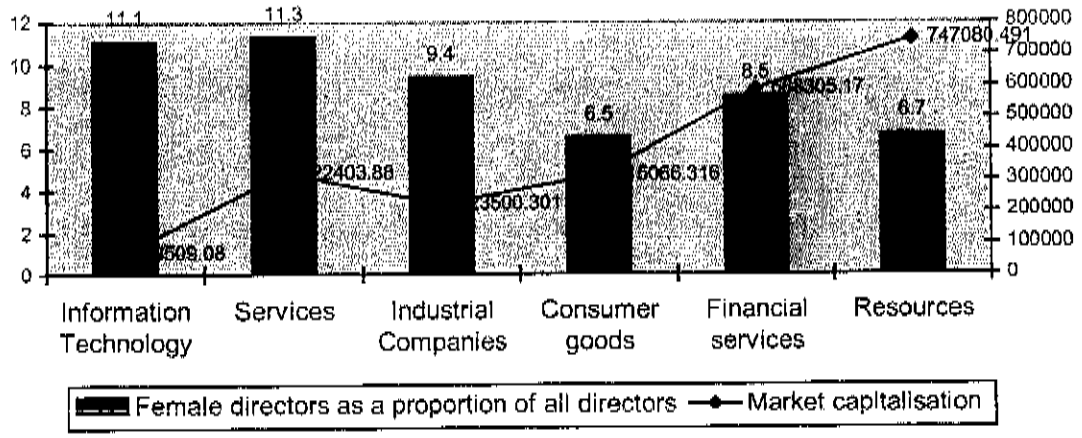
- 11.8% (18.3%) of South African boards have two or more female directors, while almost 60% (53.3%) have no women directors at all.

Figure 8.3 Race Distribution of Women Directors and Executive Managers – 2005



Source: Businesswomen's Association of South Africa, 2005

Figure 8.4 Women Director Representation Relative to Industry Size



Source: Businesswomen's Association of South Africa, 2005

8.3 Women in the ICT Workforce

The status of women and men in the ICT sector is reflected in the results from two recent surveys: 1) the Labour Force Surveys (2000 and 2005) and 2) the dti/ISETT SETA skills audit (2005). These two surveys differ radically in terms of the conclusions reached on size, composition and available skills levels in the ICT sector. The Labour Force Surveys consistently show that ICT work is genderised, with marked differences between men and women core ICT workers. The dti/ ISETT SETA skills audit, on the other hand, seems to reflect a normalization of the race and gender demographics. The results of the two data sources are therefore reflected separately in this chapter. What this does illustrate is the urgent need to develop reliable data for the ICT workforce and to find consistent indicators across the various surveys so that decision making can be undertaken with consistent data that truly reflects the current ICT situation in the country.

A third survey, the ITWEB annual salary survey,[91] uses an online questionnaire methodology. It is a useful source of information on salaries in the ICT marketplace as well as for tracking shifts in ICT skills supply and demand. Its respondents do tend to be young, and there is an inherent bias in the outcomes due to the reliance on voluntary online inputs. It has been running for the past eight years and does provide useful data on trends in the ICT marketplace. More recently limited gender-disaggregated data has been included.

Race and Gender in the ICT workforce – the ITWEB 2006 Salary Survey

The 2006 figures, based on 4234 respondents, reflect that women made up 18% of the sample, with an increase at the strategic management positions from 8% (2005) to 12% in 2006. Women constituted 18% of operational management. The white ICT workforce has been shrinking from 75% in 2004 to 66% in 2006. At the strategic management level the share occupied by white respondents dropped to 81%, compared to last year's 83.5%.

Black respondents increased to 13% from last year's 12% and are mostly on staff level (19%), with 8% at mid-management level and 5% at the top strategic management level.

Indian respondents increased to 11% from last year's 8%, with 12% at staff level, 10% at operational management and 8% at strategic management.

8.3.1 The Labour Force Surveys (LFS) – Statistics South Africa

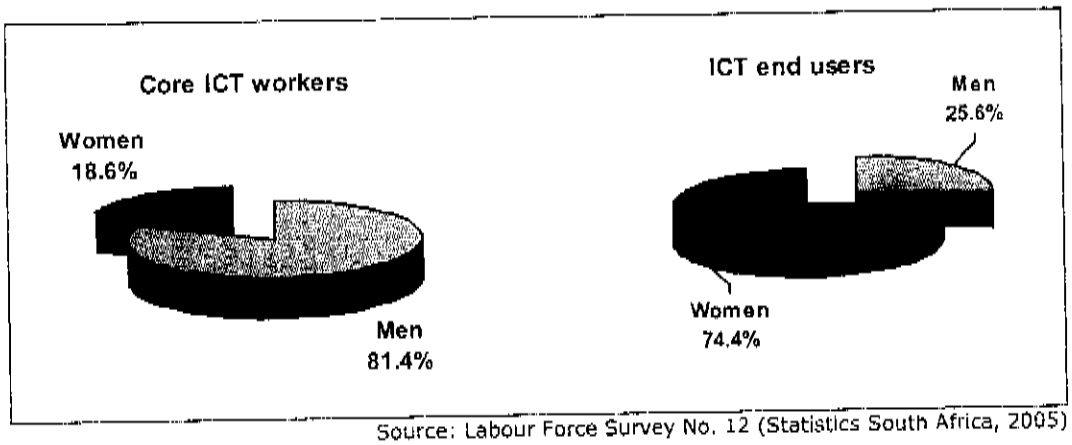
According to the LFS, the ICT labour force is strongly genderised. **Figure 8.5** shows that core ICT work was still very much a male domain in 2005. More than 81.4% of those doing core ICT work were men and only 18.6% were women. 'The legacy of women staying away from things technical, both in career choice and in everyday use, still prevails in South Africa.[92] The converse, however, applied to the ICT end user component of the ICT workforce where 74.4% were women and 25.6% were men performing administrative support and secondary ICT work activities.

[91] 2006 ITWEB Salary Survey

http://www.itweb.co.za/surveys/Salary/2006/sample/survey060502.asp?S=Salary&A=SUS&O=FRGN Accessed 14 July 2006

[92] Terry Annecke, Microsoft SA, ITWEB, 2004

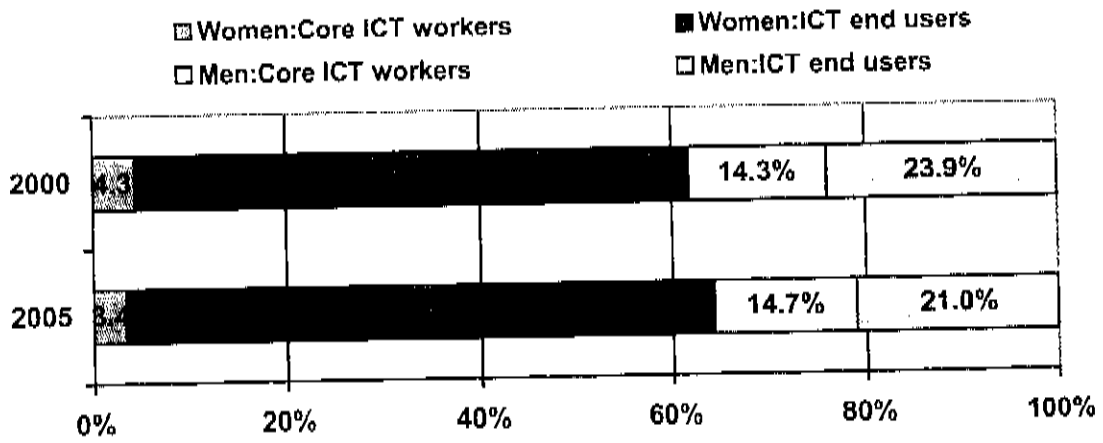
Figure 8.5 Gender in the ICT workforce, 2005



Source: Labour Force Survey No. 12 (Statistics South Africa, 2005)

A slight change occurred in the ratio of men to women in the ICT workforce between 2000 and 2005. In 2000, the total ICT workforce comprised 61.8% women and 38.2% men while women constituted 64.4% and men 35.7% of the total ICT workforce in 2005 (**Figure 8.6**). However, the core ICT component among men increased while the core ICT component decreased among women over this period. The female end user component grew by 3.5% while the male end user component decreased with 2.9% between 2000 and 2005.

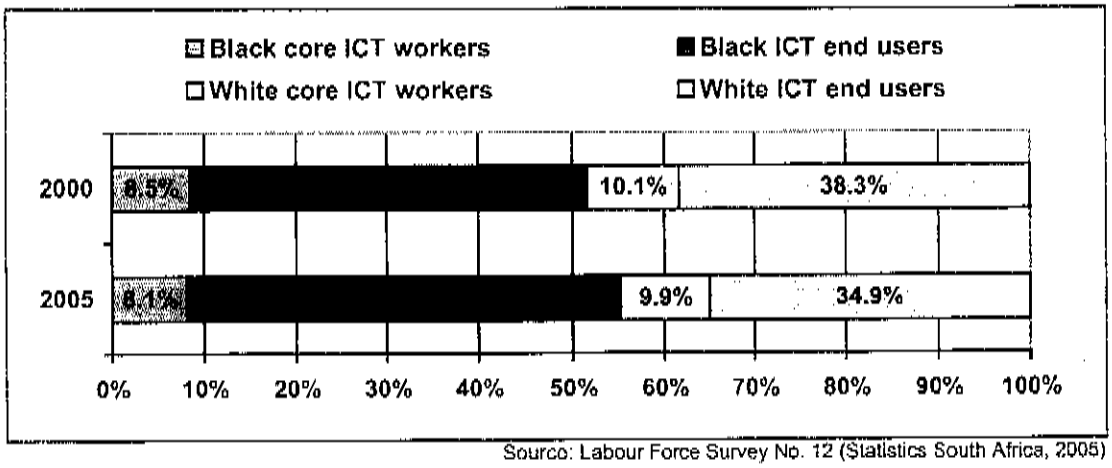
Figure 8.6 The ratio of core ICT workers to ICT end users, according to gender, 2000 and 2005



Source: Labour Force Surveys No. 2 and 12 (Statistics South Africa, 2000 and 2005)

As with gender, there were also small changes in the *racial* combination in the ICT sector from 2000 to 2005, as shown in **Figure 8.7**. In 2000, whites constituted 48.4% and blacks 51.6% of the ICT workforce. In 2005, whites constituted 44.8% and blacks 55.2% of the ICT workforce. Whites decreased in both the core ICT and end user components, while blacks decreased in the core ICT component and increased in the end user component. Further changes in the racial composition of the ICT workforce can be expected with the new ICT Charter's emphasis on the development of skills in the sector as one of the major catalysts for transformation.

Figure 8.7 Change in the racial composition of the core ICT and end user components of the ICT workforce, 2000 to 2005



Source: Labour Force Survey No. 12 (Statistics South Africa, 2005)

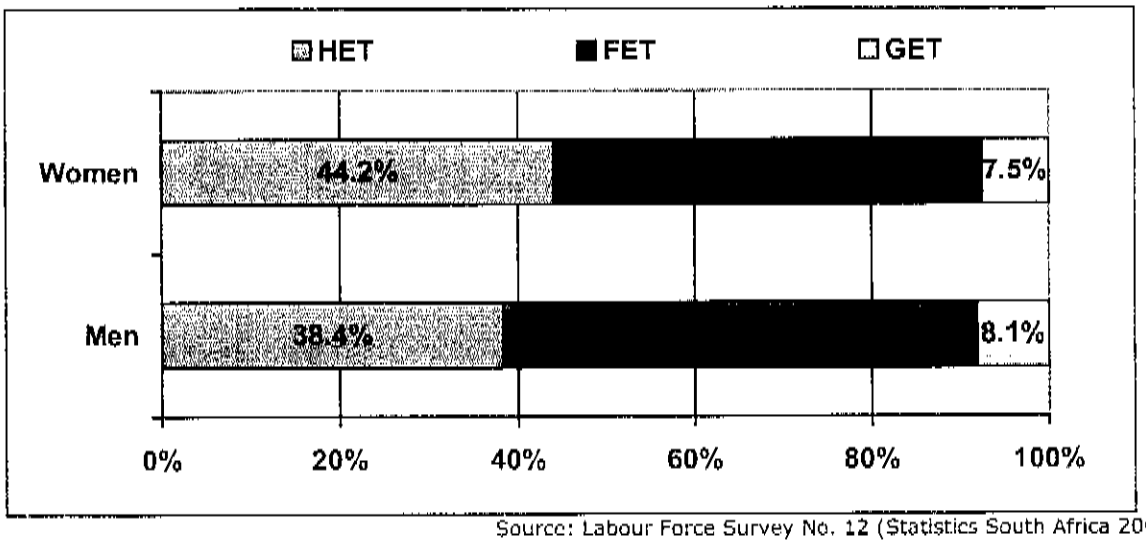
Qualification Levels of Core ICT Workers

Higher education and training (HET) workers are defined as those with qualifications at NQF levels 5, 6, 7, and 8.[93] NQF level 5 includes diploma and occupational certificate qualifications, level 6 includes first degrees and higher diplomas, level 7 includes Honours' and Master's degrees and level 8 includes Doctorates. Further education and training (FET) includes qualifications such as matric (Grade 12), Grade 11 and Grade 10. General education and training (GET) includes no qualifications and qualifications up to Grade 9.

Most core ICT workers (52.6%) had FET level qualifications, just more than a third (39.5%) had HET level qualifications and 7.9% had GET level qualifications in 2005. Among the women core ICT workers, 44.2% had HET qualifications, as opposed to 38.4% of the men in 2005, as shown in **Figure 8.8**. Nearly half (48.3%) of the women core ICT workers had FET qualifications, while more than half (53.6%) of the men core ICT workers had FET qualifications. Only a few men (8.1%) and women (7.5%) core ICT workers had general education and training (GET) qualifications.

[93] Refer to Chapter 3 (**Table 3.2**) for an explanation of the National Qualifications Framework levels

Figure 8.8 Qualification levels of core ICT workers by gender, 2005

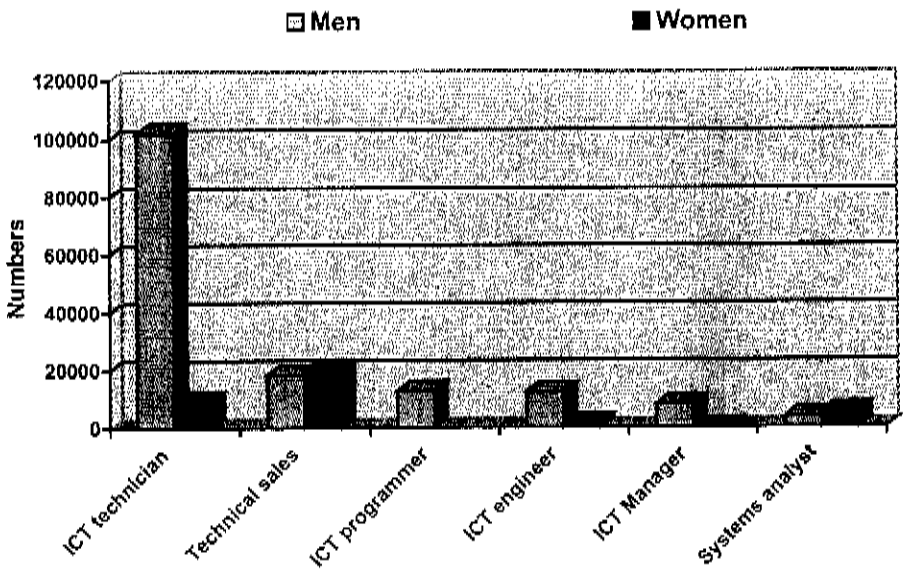


Source: Labour Force Survey No. 12 (Statistics South Africa 2005)

Core ICT Occupations by Gender, 2005

Although women core ICT workers had predominantly HET qualifications in 2005, very few women, compared to men, were employed as ICT managers, engineers, programmers and technicians. Women make up the majority in ICT technical sales and systems analyst occupations, as shown in **Figure 8.9**. The ICT manager component by gender, however, does not reflect all ICT managers, as there are no separate codes for all ICT managers (except for computing service managers) in the LFS. ICT managers were only calculated according to the manager: professional ratio to determine the total high-level core ICT component in the ICT workforce (refer to **Section 3.3.1**).

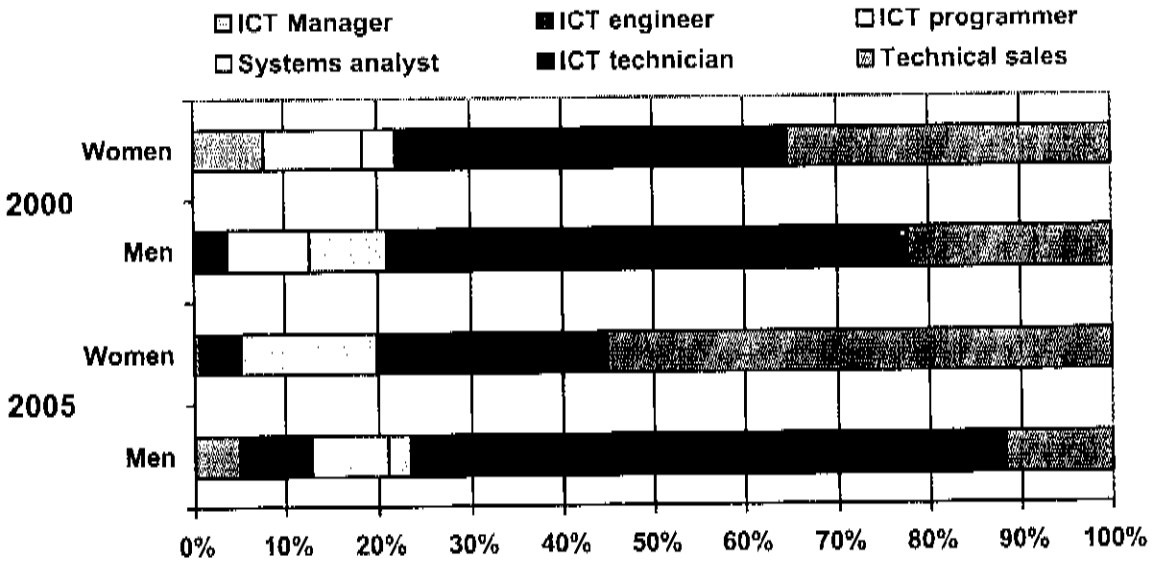
Figure 8.9 Core ICT workers by gender, 2005



Source: Labour Force Survey No. 12 (Statistics South Africa 2005)

There has been a significant decline in women ICT managers (-43.1% average annual growth) and an increase in male ICT managers (73.4% average annual growth) between 2000 and 2005, as indicated in **Figure 8.10**. However, as has been indicated, *not all ICT managers are reflected in these calculations and in previous years the capturing of ICT managers was even less accurate.* Very positive is the increase in women ICT engineers from none in 2000 to 1 605 in 2005, as well as male ICT engineers from 5 516 in 2000 to 12 305 in 2005. Women system analysts have also increased with a 26.3% average annual growth from 2000 to 2005 while male system analysts have decreased with -22.2% over this period. Alarming is the absence of women ICT programmers in 2005 while there were 5 077 in 2000.[94] Male ICT programmers have also decreased by -2.0% between 2000 and 2005. There has also been a decrease of -14.8% in women ICT technicians and an increase in male ICT technicians over this period. In technical sales, women increased with 3.6% while men decreased with -12.1% between 2000 and 2005. These occupational figures must be used with caution, as occupational categories in the LFS are not very pure and one code in the dataset combines a number of occupations.

Figure 8.10 Core ICT occupations by gender, 2000 and 2005



Source: Labour Force Surveys No. 2 and 12 (Statistics South Africa 2000 and 2005)

As has been indicated, 39.5% of all core ICT workers had HET level qualifications and the majority among both men and women had FET level qualifications in 2005. **Table 8.1** provides qualification levels according to occupation and gender for 2005. The majority of male ICT managers (64.4%) had FET level qualifications and all women ICT managers had FET level qualifications. Most male ICT programmers (88.0%) had HET level qualifications and 12.0% had FET level qualifications. More than half of the male technicians had FET level qualifications; almost a third HET level qualifications and

[94] Note that the Labour Force Surveys are based on a 10% sampling methodology. This may explain unusual discrepancies such as the absence of women programmers from the sample. This is not borne out by the experience of the research team.

11.8% GET level qualifications. More than half of the women technicians had FET level qualifications, 16.1% had HET level qualifications and a quarter had GET level qualifications. All women systems analysts and 80.6% of the male systems analysts had HET level qualifications while 19.4% of the male systems analysts had FET level qualifications. The majority (88.3%) of male technical sales people had FET level qualifications, 7.7% HET level qualifications and 4.0% GET level qualifications. Almost two thirds of the women technical sales people had FET level qualifications, more than a third had HET level qualifications and 2.0% had GET level qualifications.

Table 8.1 Core ICT workers by qualification, gender and occupation, 2005

Occupation		Qualification level							
		HET	FET	GET	Total	HET	FET	GET	Total
ICT managers		2829	5116		7944		220		220
		35.6	64.4		100		100		100
Computer programmer		11300	1534		12834				
		88.0	12.0		100				
ICT technician		30350	56110	11614	98073	1459	5286	2297	9042
		30.9	57.2	11.8	100	16.1	58.5	25.4	100
Systems analysts		12930	3116		16046	6918			6918
		80.6	19.4	0	100	100			100
Technical sales		1427	16254	736	18417	7550	11926	406	19882
		7.7	88.3	4.0	100	38.0	60.0	2.0	100

Source: Labour Force Survey No. 12 (Statistics South Africa 2005)

8.3.2 The dti / ISETT SETA Skills Audit

The Department of Trade and Industry (thedti) and the ISETT SETA jointly commissioned a study in 2005 to assess the supply and demand of ICT skills in South Africa.[95] A representative sample was selected from ISETT SETA levy contributors (912 respondents) and non-ISETT SETA companies (539 respondents) (See also **Chapter 3.3.1** for a breakdown of the ICT workforce). The study estimates that the total number of ICT workers (core and non-core) make up 2.43% (227 900) of the total workforce. Most workers are employed in the Telecommunications sector (68.4%) followed by IT (19.9%) and Electronics (11.6%). The study does not provide a gender breakdown for the ICT workforce.

8.4 Challenges for Women in the ICT Workforce

The first part of this chapter presented the facts and figures for women in the (ICT) workforce. What the numbers do not reveal, however, are the reasons for the low numbers of women at the staff and leadership levels. This section therefore presents some perspectives on the challenges that women face when entering and progressing in the ICT workplace.

8.4.1 Barriers and Constraints

There are many barriers that keep women from being promoted to management and executive positions.[96] Most relate to misconceptions that women do not show leadership potential and behave differently from traditional male leaders in ways that would be detrimental to themselves and an organisation.[97] Smith (2003)[98] investigated the barriers preventing women from advancing to leadership positions in the ICT sector. Although women described their experiences as female managers in the ICT industry in many different ways, some common themes emerged:

- 34 % of the respondents indicated that they had to prove themselves continually through above average delivery, remaining on top of new trends, being better qualified and informed than their male counterparts and by working harder and longer hours.

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[95] Department of Trade and Industry and ISETT SETA (2005). *An Analysis of the ICT Skills Audit for the dti and ISETT SETA*. Vukanikids. p. vii

[96] Smith, R. 2003. *Investigating the barriers to managerial positions for women in information and communication technology*. Unpublished MBA thesis, University of Pretoria, South Africa

[97] Booysen, L. 2000. *Challenges facing black and white women managers in South Africa*. Management Today. June 2000, pp.22-28

[98] Smith, R. (2003). *Investigating the barriers to managerial positions for women in information and communication technology*. Unpublished MBA thesis, University of Pretoria, South Africa.

- A number of women did indicate that once they had proved themselves, they were accepted and respected by their male peers and other colleagues. Others felt that their opinions were disregarded / did not count as much as those of their male colleagues.

- Some of the women indicated that it was necessary to adopt many different approaches to ensure that they were taken seriously. Descriptions of their experiences as a women manager included words such as exasperating, exciting, challenging, frustrating, rewarding, tough, stressful, demanding, a long hard struggle, frustrating, competitive and difficult. Although it was clear that women enjoyed their work and roles as managers in the ICT domain, they were frustrated by the barriers they encountered on a daily basis.

The table below summarises the sixteen identified barriers that were perceived as preventing women from entering and progressing in the ICT industry. Each of these barriers is briefly discussed in descending order of importance.

Table 8.2 - Barriers to Women Succeeding in the ICT Sector

Variable	Mean
Lack of role models	4.194
Masculine nature of ICT	3.768
Salary inequity	3.541
Lack of influence to choose ICT as career	3.396
Work-family conflict	3.305
Cultural issues	3.208
Valuing women and tokenism	3.183
Perception & stereotyping - ICT	3.176
Perception & stereotyping - general	3.170
Management style	3.111
Working time constraints	3.086
Career development opportunities	2.898
Old boys' network	2.874
Lack of confidence	2.632
Education	2.628
Access to computers	2.465

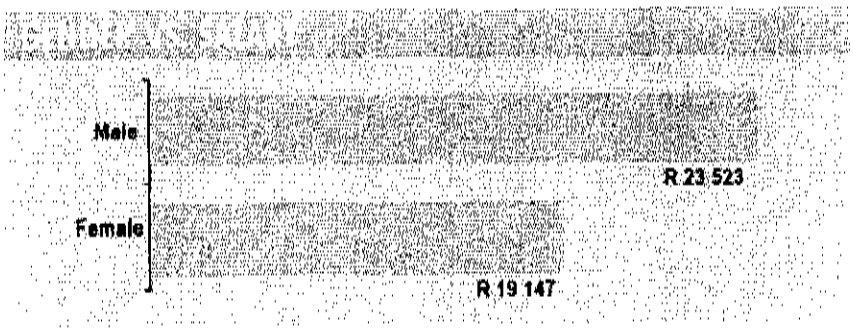
NOTE: Issues listed in red were regarded as barriers, while those in dark red were not regarded as barriers

1. **Lack of role models.** Female role models were regarded as being very important and the lack of role models was demonstrated to be the most important barrier to women in ICT. These findings agree with the literature. Unfortunately, management positions are still dominated by men, which make female role models difficult to come by.

2. **Masculine culture of ICT.** The masculine culture of ICT was regarded as a significant barrier to women in ICT. The majority of women indicated that there is still a gender bias in the IT industry. The women felt that men saw ICT as their domain and that it has long been seen as a male preserve. This view has been informed and strengthened by beliefs and perceptions about what is acceptable employment for men and women.

> *"I am successful because I am regarded as "one of the boys" and therefore am somehow not regarded as a threat."*
>
> Executive in education & training

3. **Salary inequity.** Salary inequity was seen as the third most important barrier to women in ICT. Women face persistent salary inequities in the ICT industry and are paid less for the same type of work than their male counterparts. Women must also have considerably more experience to achieve the same earnings as their male counterparts. The ICT industry is the one industry in which the pay gap between men and women is increasing[99]. In 2001 Bennett reported that this gap was 35 - 40%. ITWEB[100] reports in their 2005 salary survey that the average income for female respondents was R19 147 per month (R18 130 in 2003), while the average for men was R23 523 (R22 090 in 2003). This represents a gap of about 19%.



Source: ITWEB Salary Survey, 2005

4. **Lack of influence to choose ICT as career.** Lack of influence to choose ICT is also a barrier. Women are not encouraged to enter ICT as a career and the absence of influences leading women to ICT prevented them from entering the industry. There are not enough successful women in the ICT industry to motivate girls to choose an ICT related career.

5. **Work-family conflict.** Family responsibilities conflicted with their chances for career advancement and women are forced to focus either on family or career. Women reported that their chances for advancement would suffer if they took a break from their career to have a child, Women felt that the long hours they have

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[99] Bennett, J. (2001). *Women lose out in the equity stakes*. Sunday Times Business Times, August 26, 2001, p.2

[100] ITWEB Salary Survey (2005) Accessed 10 March 2006

to work negatively impacts on their family lives and that juggling work and family responsibilities is difficult, causing stress which has a negative impact on women managers.

6. **Cultural issues.** The culture of a country can play an important role in preventing women from entering ICT careers as can the culture of a specific group. Cultural and societal attitudes are perceived as discriminating against women's participation in the ICT industry.

> *"I face challenges from a managerial perspective in that male subordinates completely reject performance management from a female manager."*
> Executive level manager at one of the largest SA telecommunications companies

7. **Valuing women and tokenism.** Women reported that they felt additional pressure to perform because they were women and that they had to work harder than their male counterparts to be recognised. The respondents felt very strongly that women in high positions are more highly scrutinised than their male counterparts.

> *"I work twice as hard and achieve much more, yet have to spend hours collating info and facts before my ideas are accepted whereas my male counterparts simply verbalise a request and get immediate approval."*
> Senior manager at a telecommunications operator

8. **Perceptions and stereotyping - in ICT.** Societal perception and stereotyping of women in ICT do act as barrierw to women in that ICT is generally regarded as a career for men. Women felt strongly that ICT is an appropriate career for women. They agreed that the general perception was that men have more scientific minds than women and that women are perceived as less knowledgeable in the ICT field than men.

9. **Perception and stereotyping – in general.** General societal perceptions of women are also perceived as a barrier to their advancement in the ICT industry. With respect to leadership, men are generally seen as leaders but there is ambivalence on whether women themselves see women as leaders. Consistently exceeding performance expectations is important for women managers.

10. **Management style.** Management style was regarded as somewhat of a barrier to women in ICT. Women reported that they had to be aggressive in order to be taken seriously. They were of the opinion that they had to develop a professional style with which male managers would be comfortable and that women adopting a feminine managerial style ran the risk of being viewed as ineffective.

11. **Working time constraints.** Being unable to work flexible hours impacts negatively on women's advancement opportunities. Women felt strongly that they could give quality time to both their families and their careers.

> *"It was hard work, dedication, will, tenacity and a strong team that lead to my personal success. I sacrificed my personal life in order to be successful at this level."*
>
> CEO of large company

Additional barriers that were identified, through an open question in the Smith study, were societal perceptions and stereotyping, corporate barriers and family life and related commitments:

12. **Societal perceptions and stereotyping.** Perceptions and stereotyping were identified as the most important barriers. Women confirmed that the following perceptions are still impacting women's advancement in ICT negatively: the belief that men are better at computer work than women and also better managers and leaders; women are users rather than planners, developers, analysts, investors or managers in the ICT industry; women cannot work with computers; women are inferior in technical careers; women are more suitable for office administration / soft skills (marketing / communications / secretarial / back office) work; women are inferior in intellect and capability; women cannot be successful in both career and family; women are better at detailed stuff and as a result men get to deal with the big issues.

> *"My experience is ambiguous. Society is changing and views are changing. Sometimes the fact that I am a women works for me. At the same time it can work against me. It is this duality that is exhausting at times. There are definitely perceptions around me that are different to perceptions about the men doing the same type of job."*
>
> Senior manager in ICT

13. **Corporate barriers.** Various corporate factors play an important role in forming a barrier to the advancement of women in ICT. These include the unfairness in reward system – men earn more than women counterparts in the same position and with the same responsibilities; successful women try to keep other women out; irregular, long, non-flexible work hours; resistance from organisations to affirm women and give opportunities for advancement in the ICT industry; women not having the same access to opportunities and networking; gender discrimination resulting in ability not being enough; women's output having to far exceed expectations in order to receive same recognition; glass ceiling higher up the corporate ladder; women remaining in middle management and not moving to executive management because they are more focused on getting things done than on creating the networks / building relationships / strategising which is required at executive level; lack of proper control from the upper echelon to check that these injustices are not practised in their organisations and men in positions of power tending to appoint/favour other men (even of different culture, race, etc) above women.

14. **Family life / commitments.** Factors contributing to this barrier include the need to balance family and career building; starting with a family; the current

requirement that women utterly compromise their family responsibilities in the interest of their careers; the belief that women will always put their families first even in a crisis situation; chances of advancement are limited if all of your time is not committed to work and the biological fact of bearing children.

> *Working mothers tend to have to choose between single-mindedly pursuing a career versus "having a job".*
> Junior manager, financial management company

Recruitment and Retention Strategies in the SET Workplace

According to the Women in the SET workplace study, approximately 15% of the respondents indicated that recruitment and retention strategies were in place in order to benefit women. Approximately 10% of respondents indicated that attempts to get the senior management of their organisations more representative in terms of gender were underway and about 8% indicated that general policies of non-discrimination were followed. Preferential funding for research, mentoring and internships and other special programmes were only mentioned by fewer than 5% of the respondents.

More women (10%) than men (0%) indicated that attempts to transform the profile of senior management in their organisations were underway as an intervention to impact the recruitment, retention and promotion of women. More women (5%) than men (0%) also mentioned mentoring and internships as current interventions. The fact that men were less likely to mention initiatives than women is probably only a result of women being more aware of the initiatives that could impact them positively. The difference between the men and women is, however extremely modest.

About 20% of the respondents from academia and industry recognised retention and recruitment as a positive strategy whilst less than 5% of the science council participants mentioned it. This probably indicates that there is more room for this in all institutional contexts, but particularly in science councils. White women (20%) more than black women (10%) spoke about retention.

8.5 Synthesis and Conclusions

ICT work is genderised – there are fewer women than men in the industry and they tend to work in the more traditionally feminine sub-sectors of the industry such as sales and marketing; women are paid less and work longer hours; women are less likely to be found in senior management and leadership positions and have to prove themselves to a far larger extent to reach the same levels of advancement. The working environment is not perceived as particularly friendly to women and there are many barriers that have to be, and can be, overcome. The 'drive to succeed' appears to the strongest reason why successful women in ICT believe they have succeeded.

On the positive side, there appears to be some positive growth in women managers overall, but it is still very much a 'man's world' in the ICT sector, with women only accounting for 10 – 12% of total management.

Critical Success Factors for Succeeding in ICT leadership – Views from Women Leaders in the ICT Sector

127 women leaders were asked to identify critical success factors for women in the ICT sector. The women were sampled from ICT companies of varying size and business focus.

- 48% were in senior and executive management positions and 33.1% in middle management;
- 69.3% had a partner and 67.7% had children;
- 45.7% of the participants have a national diploma or a B degree. 38.6% have postgraduate qualifications. Only 6% have no post-matric qualification;
- 71% were White, 18% Black, 8% Coloured and 2% Asian.

The following factors were identified as the ten most important factors (in descending order of frequency)

Success factor	Frequency
1. Determination/Drive to succeed	50
2. Hard work/Persistence/Perseverance	45
3. People skills/Relationship skills/Leadership skills	32
4. Willingness to learn/Role models/Support from other people	25
5. Results/goal orientation	21
6. Passion/interest for the field of work	15
7. Intellect/Creativity/Innovation/Talent/Aptitude/Technical ability	11
8. Service orientation/Customer focus	10
9. Efficiency/Attention to detail/Perfectionist	6
10. Reliability/Trustworthiness/Credibility/Honesty/Integrity	5

The most important success factor was '*wanting* to succeed', followed by '*doing something*', *relating* with people around you and - apart from working hard and being busy - to *produce a result*. Attitude (*passion*) was regarded as more important than aptitude (*ability*).

Nina Evans (2006) Unpublished research

Racial differences appear to be showing movement in the ICT end-user workforce with a more demographic distribution in evidence. Black representation is increasing as is gender representation at the lower and upper levels of the ICT workforce, at the level of end-users and directorships.

9. SUPPORT SYSTEMS FOR WOMEN IN ICTs

When this position paper was conceptualised, it became apparent that there were a number of independent initiatives already running or being initiated to support women in ICTs, in the private sector, public sector and through the activities of NGOs and not-for-profit associations. The work of these entities can generally be divided into three broad areas - 1) efforts to counsel and encourage girls and young women to enter and excel in the mathematics, science and technology (MST) fields; 2) designing and providing career development opportunities for women already in the sciences and IT industry, and 3) efforts that build the use and benefit that ordinary users who are not in the IT industry may derive from ICTs. This chapter therefore presents an overview of a number of the institutions and associations that are already doing good work in supporting women in ICT studies and careers, through bursary schemes for girls and women, mentorship programmes, technical training, leadership development and specific recruitment strategies, and training and support for ordinary women in the use of ICTs. There is however a far greater need for 'massification' and coordination of these various efforts.

9.1 Support Interventions by the Private Sector

9.1.1 Businesswomen's Association of South Africa (BWASA) [101]

The Businesswomen's Association of South Africa is the largest association of business and professional women in South Africa, with corporate sponsorship for its activities. The Association undertakes various activities to support women in industry, although no particular emphasis is given to women in ICTs.

Some of its activities include:

- The annual Women in Corporate Leadership census, which assesses the status of women in companies listed on the Johannesburg Stock Exchange;
- The Businesswomen of Tomorrow (BOT) Initiative which was launched in June 2006. This initiative targets disadvantaged Grade 8 – 12 girls who will be invited to attend training in business and life skills. The BOT initiative will have a strong industry focus with emphasis on entrepreneurship development;
- A Career Day is planned for later in 2006, which will emphasise areas where women are under-represented, e.g. Science, Engineering and Technology; and
- A mentoring programme, with women role models in industry volunteering their time, is planned as a next phase.

[101] Businesswomen's Association of South Africa http://www.bwasa.co.za/ Accessed 4 July 2006

9.1.2 Women in IT (WIIT)

Women in IT[102] was launched in September 2005 as a networking initiative between women IT students, tertiary institutions, South African IT professionals and corporates. Microsoft SA heads the initiative, with support from various South African ICT companies such as Bytes Technologies, Futurex and Vodacom. Its activities consist of the creation of formal and informal networks as well as a bursary and mentoring scheme for financially disadvantaged women studying IT. In its first year (2006), WITT awarded a R20 000 bursary (each) to two young women in their final year of undergraduate study. WITT intends to offer the bursary on an annual basis. It is of concern that only two of a possible seven bursaries were awarded due to the lack of suitable candidates who applied.

Microsoft also runs an internal Women in IT Forum which is active in four areas – a parenting forum, development training for women IT employees, workshops on assertiveness training and conflict resolution for women employees, support for the national *Bring a Girl Child to Work,* and a network within the company for non-IT related community outreach.

To date, the career development support for WITT members is mainly encapsulated in its mentorship programme. The WITT website includes a database of women mentors in the IT industry, including an overview of their core skills and what they can offer as mentors.

WIIT's efforts are quite small scale and targeted. For its life-span, it has however shown a capacity to deliver rapidly on its objectives.

9.1.3 Vodacom, South Africa - Graduate Programme for Females in Technology

Vodacom (Pty) Ltd is the operating company responsible for the construction and maintenance of Vodacom's GSM cellular network. Vodacom had no specific programme for women and therefore introduced a three-year Graduate Programme for Females in Technology (GPFT) in April 2006. The GPFT programme is designed to develop aptitude on a wide range of technical skills, engineering know-how and business acumen which to support Vodacom's mobile telecommunication systems. The ultimate goal is to increase the number of females in the core business positions to ensure that Vodacom meets the requirements of the ICT Charter and Employment Equity.

The group of 10 female candidates who were selected to this graduate programme have completed either a Bachelor of Science (B.Sc) or Bachelor of Commerce (B.Com) degree in Mathematics, Science, Engineering or Information Technology, and are interested in working in the telecommunications sector.

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[102] Women in IT http://www.womeninit.co.za , Accessed 7 July 2006

9.1.4 Computer Science Corporation (CSC), South Africa

The Computer Science Corporation (CSC) launched a bursary programme five years ago, which currently funds the studies of 12 students, of which 7 are women. It provides hands-on work experience during university holidays. Two male students have already graduated via the CSC scheme, both with Bachelor of Commerce degrees in Information Systems from the University of the Witwatersrand. One of the two will be doing his Honours Degree in 2005 while the other plans to complete a post-graduate diploma in Management Studies.

In addition to its external bursary programme, CSC provides 10 graduates with an eight-month IT internship through the ISETT SETA learnership programme. The programme gives these previously unemployed students with the opportunity to hone their technical skills and to acquire business skills

9.1.5 Cape IT initiative - CITI

CITI is a Cape-Town based industry body that acts as a regional trade association, networking body and a promotion agency for the ICT industry in the Western Cape Province.[103] This includes ICT cluster marketing, networking and business development. Since 2000, CITI has operated a business incubator for the ICT industry called the Bandwidth Barn. This presently consists of 65 companies. Six of these companies are owned or run solely by women.

Recently, CITI has called on women ICT achievers to participate in a schools outreach programme in which they were asked to talk to female Grade 8 – 12 learners in selected schools. The idea is to raise the prominence of women role models for the ICT industry with schoolgirls.

CITI launched a new initiative in June 2006, in which it will mentor and nurture one female ICT entrepreneur with an existing ICT business.

9.1.6 The Innovation Hub - Blue IQ (Gauteng Province)

The Innovation Hub[104] is part of the Gauteng Province's Blue IQ initiative to create a 'smart' province. It is the only internationally benchmarked science park in Southern Africa, and is located in Pretoria. Companies operate in a selected group of technology-led and research-based sectors – these include ICT, biosciences, electronics, and advanced materials and manufacturing. The Innovation Hub houses the maxim Business Incubator[105], which presently has 10 small high-tech companies. Of these, only one is totally owned by women and one partially owned by a woman. The companies are focused on skills competency assessment and e-learning respectively.

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[103] http://www.citi.org.za/ Accessed 20 June 2006

[104] http://www.innovationhub.co.za/ Accessed 4 June 2006

[105] http://www.innovationhub.co.za/maxum.cfm Accessed 4 June 2006

The Entrepreneur Programme focuses on helping start-up companies establish themselves and grow. The Development Programme places special emphasis on assisting previously disadvantaged individuals and female entrepreneurs.

9.1.7 Survey on Existing Interventions for Women in ICTs

As part of the research for this South African report, an email questionnaire was circulated to more than 300 IT practitioners and managers private sector ICT companies to determine the interventions underway to recruit and retain women in ICT positions. Ninety-nine participants responded, of which 53 (53.5%) indicated that their organisations do have interventions in place to recruit and retain women. Details of the methodology are included in **Annex I.**[106]

Table 9.1 Positions of Respondents in Companies (n = 99)

Position in Company	%
Managing Director	12
Director	10
CEO	10
HR Manager	6
General Manager	3
Other (Consultant, business owner, analyst, project manager, software engineer, IT architect, trainers, etc.	59

The results were as follows:

Table 9.2 Support Interventions for Women in non-IT positions

Interventions (IT positions)	% n=53
1. Informal/in-house training	14
2. HR policies/initiatives (e.g. equal pay, recruitment strategies)	12
3. Learnerships/internships	12
4. Formal training courses	11
5. Mentorship programme	11
6. Coaching	10
Support programmes (e.g. flexible working hours, crèche facilities, discussion group)	10
Leadership development programmes	7
Bursary scheme (please identify type of recipient)	5
School recruitment/road shows/adopt-a-girl	6
Support to re-enter job market	4
Other (please specify)	1
No interventions	0

[106] The intention is to pursue this research more fully in the future so that a full investigation can be done on available support interventions in the private sector. Some research is presently being done by Veronica Moutloutsi from the Tshwane University of Technology.

Table 9.3 Support Interventions for Women in IT positions

Interventions (non-IT positions)	% n=53
1. Informal/In-house training	**29**
2. HR policies/initiatives	**27**
3. Formal training courses	**24**
4. Learnerships /internships	**23**
5. Coaching	**23**
6. Mentorship programme	**20**
Leadership development programmes	18
Support programmes (e.g. flexible working hours, crèche facilities, discussion group)	18
School recruitment/road shows/adopt-a-girl	16
Bursary scheme	13
Support to re-enter job market	8
Other (please specify)	4
No interventions	1

Anecdotal evidence supporting the findings can be obtained from the comments made and other interventions mentioned:

In the Technology Group, of the 16-person development team we currently employ two women who do software development. Both are on flexible working packages. One operates a home office out of Nelspruit.

In the Technology Group, of the 16-person development team we currently employ two women who do software development. Both are on flexible working packages. One operates a home office out of Nelspruit.

Programme for woman only, who completed an IT/engineering degree that will train them for one year (internal training) and then employ them.

XXX have created a 'Women in IT' initiative to encourage women to join the ICT industry; also to provide networking and mentoring. We also have a Women's Forum locally and there is also an International XXX Women's forum.

We believe in mentorship, in house training and coaching. We offer flexible working hours where it is possible.

Our business is wholly owned by women and 80% of our employees are female. Our focus has always been on developing women from all walks of life in our industry. As a female run business the issues around women in the workplace is top of mind.

There is a Women's Leadership Initiative which is a task force specifically focused on developing women in business and creating a conducive environment.

Favouring appointment of women in all spheres, top management is 80% women, 100% in ICT and Finance. The company seeks to align itself with government initiatives, and women feature strongly in the ownership and directorship level.

Respondents in this spot survey indicated that further research is necessary and timely. Specific recommendations mentioned by respondents included the following:

- Women in ICT need support such as study tours made available to them or financial incentives for participation in empowerment initiatives (partnership ventures etc).

- I spent many years in the corporate world and held a senior position in a multinational ICT company. I left 2 years ago to join a small locally owned company which offered me a lot more flexibility in the work environment than my previous position held.

- There is a need for a campaign for ICT alertness in our country.

9.2 Support Interventions by Academic Institutions

9.2.1 Universities

A cursory survey of IT departments suggests that there are very few universities – and specifically information technology departments – that have specific measures in place to encourage women students to enter the field or to retain bright women students for postgraduate study, for example. It appears that – in spite of the low number of women students in the IT field – women academics in IT departments have to date not been able to sway their colleagues to make a positive effort to increase gender parity in their student intake.

The culture of many of the university-based IT departments has not shifted from its masculinist overtones and validation of the "cult of the (male) geek" where – for example – students are encouraged to spend long hours at their computers – a work style and culture that many women students do not embrace and often reject. Hence, alternative ways to engage with IT and computer technologies – which does not involve anti-social behaviour and long hours in front of the computer – are not recognised or encouraged by (predominantly male) teachers in IT departments.

9.2.2 South African Women in Computing[107]

This initiative is a useful web-based information service about women and computing in South Africa, which is maintained from the University of the Witwatersrand's Department of Computer Science. The website includes references and statistics relating to women in computing, as well as to literature written on South African women and computing.

9.2.3 Association of South African Women in Science and Engineering (SA WISE)

The Association of South African Women in Science and Engineering (SA WISE)[108] is a loose association open to all those who support the idea of strengthening the role of

[107] http://www.cs.wits.ac.za/~sawic/ Accessed 2 July 2006

women in science and engineering in South Africa. A large proportion of its membership is based at South African universities. The network celebrated its tenth anniversary in 2005 by celebrating South African women in science and their contributions to national development. The activities of SA WISE include representing women scientists and engineers, conducting potential projects to benefit women involved in science and engineering, and collecting data on women engineers to bolster SA WISE's advocacy and lobbying efforts. SAWISE also conduct workshops that seek to build the confidence of women scientists in order to operate more effectively in male-dominated workplaces.

There are no specific activities that target women in the IT industry. Its potential contribution to building women's participation in the IT industry lies mainly in its ability to persuade more female learners to enter into the SET fields.

9.3 GOVERNMENT AND PARASTATALS

9.3.1 National Research Foundation

The National Research Foundation was established in 1999 under the NRF Act. It is the South African national agency responsible for supporting and promoting basic and applied research, as well as innovation. Its goal is '*to support and promote research through funding, human resource development and the provision of the necessary research facilities, in order to facilitate the creation of knowledge, innovation and development in all fields of the natural and social sciences, humanities and technology.*'[109]

Two programmes in particular are relevant to women in the field of ICTs - the ICT and Information Research Focus area and the Thuthuka programme.[110]

The ICT and Information Research Focus Area

The aims of the ICT and Information research focus area are to:[111]

[108] Association of Women in Science and Engineering, http://www.sawise.org.za Accessed 7 July 2006. No response could be obtained from SA WISE via phone calls or emails so its activities could not be verified.

[109] www.nrf.ac.za

[110] http://www.nrf.ac.za/thuthuka/

[111] http://www.nrf.ac.za/focusareas/ict/

- Create and maintain a critical mass of ICT research specialists who can effectively contribute to the information needs of industry and society;
- Grow a strong training and research base in academia to make South Africa an attractive international training ground for ICT;
- Generate, design, and apply new information and communication technologies in an innovative way;
- Ensure that entrepreneurial skills are supported by research based knowledge;
- Enable South Africans to be response the fast-moving changes and developments of this field;
- Form appropriate partnerships to strengthen ICT capability through research capacity building, as well as facilitating redress in all sectors;
- Raise the status and understanding of ICT and the use and management of information in all sectors;
- Encourage the private sector, through partnerships and co-funding to invest in scholarships and chairs;
- Make special provisions to attract post-doctoral students in ICT to uplift the capacity for research at HEIs; and
- Promote collaboration between science and engineering and social sciences in ICT.

There is no particular focus on women and all proposals for grants will be allocated on the merit and quality of the submitted proposals. There are currently discussions underway to review the strategy and focus.

The data below, disaggregated by race and gender, reflects the status for research support from 2002 – 2005 for the ICT research focus area.

Table 9.4 NRF-Supported Researchers in the ICT Focus Area

Year	Black Male	Black Female	Total Black	White Female	White Male	White Total	Total
2002	1	0	1	10	28	38	39
2003	0	0	0	9	30	39	39
2004	2	0	2	9	29	38	40
2005	4	0	4	9	31	40	44
Grand Total	7	0	7	37	118	155	162

Source: National Research Foundation (2006)

Points to note regarding women in ICTs are that no female black ICT researchers were awarded grants during the period 2002 – 2005, and that about 23% of all grants were allocated to women, in this case only white women.

The number of allocated grants per year to white women and men (77%) has remained almost static during this period, but there have been marginal growth in the number of black male researchers (but off a very low base).

Thuthuka Programme

The Thuthuka programme, launched in 2006, is a newly-formed programme initiative that was specifically created to support women and black[112] researchers at post-doctoral level, and individual researchers at historically disadvantaged institutions at both the pre-doctoral and post-doctoral level. Its goal is to produce larger numbers of established researchers who will qualify for research ratings from the NRF. Changes are being proposed to the framework but for 2007, the situation as described below will still apply, with the exception that white males may apply for the RiT programme.

Specifically Thuthuka aims to:[113]

- Build the individual capacity of women, blacks and individuals from disadvantaged institutions;
- Address the skewed staff distribution at Higher Education Institutions;
- Build the pool of post-graduates in order to supply the needs of the academic labour market;
- Assist in identifying, and mobilising resources that will eliminate barriers which had an adverse impact on designated groups;[114] and
- Develop highly qualified researchers who in turn will be involved in the training of researchers from the designated group through targeted capacity building interventions.

The Thuthuka programme applies to candidates 45 years and younger, and who are employed fulltime at universities, museums and science councils. At this stage, the programme does not make provision for individuals who may not be employed outside of such institutions, but the intention is to address this gap in the future.[115] The programme makes provision for support in mentoring, attendance of international and

[112] Black refers to African, Indian and Coloured individuals

[113] Thuthuka Framework 2007: Developing and Advancing Excellence in Researchers. http://www.nrf.ac.za/thuthuka/

[114] This refers to women, blacks and people with disabilities

[115] Personal Communication, Katiso Molefe, NRF, June 2006

national conferences, development of proposal writing skills and project management skills.[116]

The programme also specifically states that the involvement of women, black students and disabled students is encouraged in its three sub- programmes.[117] These are the following:

- **Researchers-in-Training (RiT).** RIT aims to develop entry-level researchers so that they will be able to compete more effectively with more established researchers for NRF funding. The programme aims to develop more PhDs as well strengthening of training capability of participating researchers.

- **Women-in-Research (WiR)[118].** The WiR sub-programme aims to support women researchers in advancing their research careers, and to ensure better representation and increased participation in research.

- **Research Development Initiative for Black Academics (REDIBA).** REDIBA aims to prepare black South African researchers for positions of scientific and academic leadership.

9.3.2 The South African Reference Group on Women in SET (SET4Women Reference Group)

The South African Reference Group on Women in SET, known as SET4Women Reference Group,[119] was established in 2003 as a direct outcome of recommendations emerging from the South African R&D strategy (See **Chapter 4.3.1**). It is a permanent sub-committee of the National Advisory Council on Innovation (NACI) and is appointed by the Minister of Science and Technology and approved by the South African Cabinet. SET4W has as its main objective the development of public policy for mainstreaming gender in SET and innovation. It is also responsible for monitoring and evaluation of these activities.

SET4W is in the process of drafting a Gender Equity Policy for the SET sector and recently embarked on a countrywide consultation process to assess the specific barriers and challenges to women, particularly in SET research. This consultation process has included ICT academics but does not have a specific focus on the ICT sector. It has published several reports on women in SET, as well as a monitoring and evaluation framework for women in SET (See also **Chapter 4.2.2**).

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[116] Thuthuka Programme. Developing and Advancing Excellence in Researchers. 2007 Manual, p. 8-10 http://www.nrf.ac.za/thuthuka/

[117] Thuthuka Programme. Developing and Advancing Excellence in Researchers. 2007 Manual, p.8 http://www.nrf.ac.za/thuthuka/

[118] Thuthuka Programme. Developing and Advancing Excellence in Researchers. 2007 Framework p. 21. http://www.nrf.ac.za/thuthuka/

[119] http://www.sarg.org.za/pdfs/s4w_pamphlet_2005.pdf

9.3.3 Council for Scientific and Industrial Research (CSIR) – Meraka Institute

There are eight science councils in South Africa, of which onlythe Council for Scientific and Industrial Research (CSIR) [120] [121] has a national research centre focussed on ICTs – this is the Meraka Institute, also known as the African Advanced Institute for Information and Communication Technologies (AAIICT).[122] Its major thrust is on Human Capital Development in the ICT disciplines. It is not however a Higher Educational Institution (HEI), but works with existing educational establishments to promote and sponsor the education and training of sufficient people (especially those from disadvantaged backgrounds) to help to meet the needs of industry, the country and the continent.

The CSIR, like all other Science Councils, reports into the Department of Science and Technology (DST) and has to operate within the frameworks laid down by the DST. Its outputs are managed by a Balanced Scorecard framework and key performance indicators include gender and disability reporting. The Balanced Scorecard is included in **Annex 2** as it illustrates the comprehensive level of gender mainstreaming required of the Science Councils.[123]

Gender and race disaggregated data could not be made publicly available for the Meraka Institute, but relevant data for the CSIR as a whole, as at 31 March 2005, reveals that:

- There has been only a gradual improvement in the representivity of black male and female researchers in the total SET base. The proportion of black female staff in the SET base has risen from 9.5% in 2001/2 to 13.2% in 2004/5. Black male staff has similarly risen from 21.7% to 22.9% over the same period; and

- In terms of gender equity, the proportion of female researchers in the SET base has risen only 2% (from 30% to 32%) over this period. Career Stages II, III and IV[124] remain disproportionately white and male. To some extent, the CSIR's potential progress in this regard is limited by the availability of suitably qualified and experienced SET individuals.

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[120] The Human Science Research Council (HSRC) does undertake research activities on the ICT sector but this is done within the context of research on the South African labour market, education system, etc. They also have an Gender Evaluation Unit but this does not have any specific sectoral focus.

[121] http://www.csir.co.za

[122] http://www.meraka.org.za/

[123] Department of Science and Technology Balanced Scorecard Framework: p.12 – 14. http://www.oecd.org/dataoecd/30/9/34243230.pdf

[124] Career Stage I refers to researchers who are learning to do the job and work under supervision; Career Stage II = competent contributors within a specific field; Stage III is supervisor, mentors and integrators across fields; and Stage IV provides direction to the organisation and represents it.

Table 9.5 CSIR Staff Breakdown by Race, Gender and Career Level, 2004/2005

		Managers and Executives	S&T Base Career Stage[c]				Non S&T Professionals	Support Staff	Total[d]
			I	II	III	IV			
Female	Black[a]	13	86	94	3		56	140	392
	White[b]	36	47	199	20		110	119	533
Male	Black[a]	31	144	154	20		41	242	632
	White[b]	76	55	493	156	5	37	13	750

Notes

a. *Black includes any person of African, Coloured or Indian origin who was disadvantaged under the apartheid system, i.e. those formerly known as Africans, Coloureds and Indians.*

b. *White includes any person not designated, discriminated against under the apartheid system.*

c. *The CSIR applies a four stage career model, particularly to its research staff. It is described in footnote 2.*

d. *The totals differ slightly from those in the breakdown of employees by age and qualification given in previous table because the following groups are excluded in this table. CSIR undergraduate bursars, staff on special study leave for more than six months, full-time post-graduate students and students undergoing in-service training.*

Reproduced from CSIR Annual Report (2005)[125]

9.3.4 South African Agency for Science and Technology Advancement (SAASTA)

The South African Agency for Science and Technology Advancement (SAASTA) [126] is an agency of the National Research Foundation (NRF) and is the institution responsible for advancing public awareness of science, engineering and technology in South Africa. It receives its funding from the NRF.

It has three main areas of activity: 1) developing the quantity and quality of mathematics and science outputs at school level; 2) raising interest in SET, particularly in poorer communities; and 3) bridging the gap between science, scientists and the public.

Specific projects relating to girls and women are discussed in **Chapter 5.3.3**.

9.3.5 South African Women Entrepreneurs Network (SAWEN)

The South African Women Entrepreneurs Network (SAWEN) is a South African network for the advancement of women entrepreneurs that is supported by the dti. It recently presented a strategy to the government for engendering the Accelerated and Shared

[125] CSIR Annual Report 2004/2005: p.58

http://www.csir.co.za/websource/ptl0002/pdf_files/arep/2005/s&t_1-7.pdf

[126] http://www.saasta.ac.za/ Accessed 18 July 2006

[127] http://www.dti.gov.za/sawen/sawenmain.htm Accessed 22 July 2006

Growth Initiative (ASGI-SA).[128] There is no specific focus on ICTs but the strategy does propose a sector specific initiative for women in Business Process Outsourcing (BPO). It recommends that the Department of Communications provide training in business opportunities, project management and appropriate skills development. In addition it recommends that the reduction of the cost of telephony should be addressed.

9.3.6 TWIB

Technology for Women in Business (TWIB) [129] was established in 1998 by the Department of Trade and Industry with the mandate to accelerate the growth of women-owned businesses which use science and technology to deliver innovative business solutions.

The Council for Scientific and Industrial Research (CSIR) is contracted by the dti to administer the TWIB programme, and also to provide leadership in identifying technological innovations for various TWIB initiatives.

TWIB has an annual award for women entrepreneurs in various sectors, including one for ICTs. The awards are for women-owned / managed companies with more than 50% women employees.[130]

In 2004, TWIB spearheaded the establishment of a women's IT academy in Port St Johns in the Eastern Cape, with the dti, the DST and the CSIR, among others, entering into the partnership. TWIB's plans are to replicate the initiative across the country, and to link these facilities to other IT training activities in the provinces to develop a strong network of IT training facilities. The IT academy will also feed the IT sector by offering courses for the Cisco CCNA certificate. [131]

TWIB also includes a 'techno-girl' project to encourage schoolgirls to take science and mathematics and follow careers in these fields by exposing them to role models, information and learning programmes in these fields. TWIB also coordinates girls-only mathematics and science camps for girls, in collaboration with different provincial education departments.

9.3.7 Information Systems, Electronics and Telecommunications Technologies Sector and Training Authority (ISETT SETA)

Sector Education and Training Authorities (SETAs) were established in 1998 to address the need for accelerated skills development in each of the 25 South African economic sectors. The SETAs are funded through payroll levies of companies in a specific sector.

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[128] http://www.dti.gov.za/sawen/ASGISAPROPOSEDSTRATEGY06.pdf Accessed 22 July 2006

[129] http://www.twib.co.za/ Accessed 7 July 2006

[130] http://www.dti.gov.za/sawen/TWIBNOMINATIONFORM06.pdf Accessed 7 July 2006

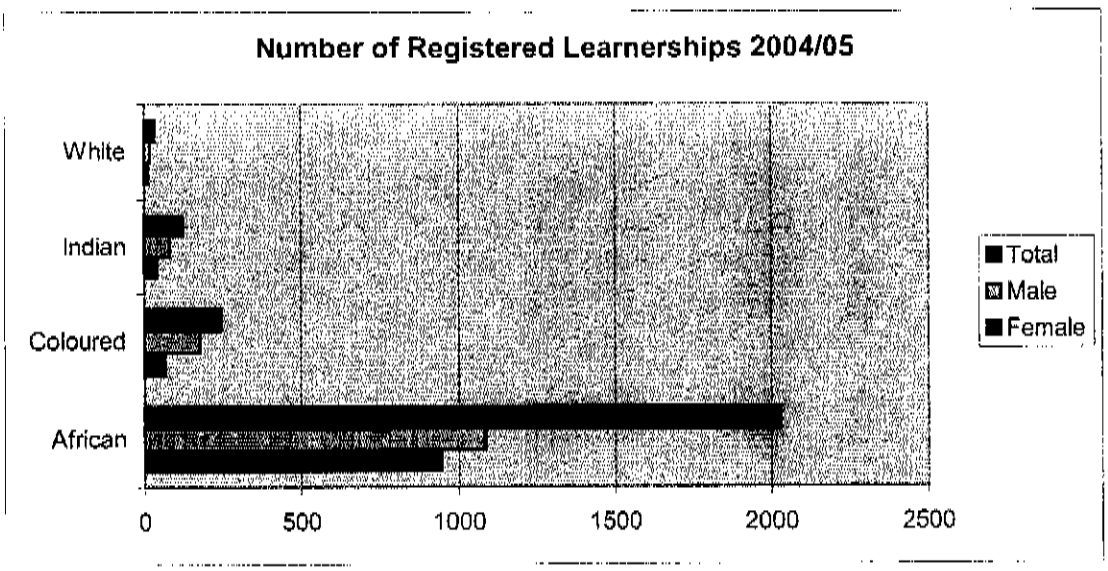
[131] *Rural women get up and IT*. SouthAfrica.info: The official Gateway, 30 June 2004, http://www.southafrica.info/ Accessed 23 July 2006.

This funding has been used, in the case of the ISETT SETA, to develop skills for the ICT sector, one of the most pervasive and complex of all the sectors. Skills development activities have been focused predominantly on the implementation of a learnership programme, where a learnership is defined as

> "...a vocational education and training programme. It combines theory and practice, culminating in a qualification that is registered on the National Qualifications Framework (NQF). A person who successfully completes a Learnership will have a qualification that signals occupational competence and is recognized throughout the country."[132]

According to the 2004 Annual Report,[133] 3 381 learners were registered in 2004/05. Of these learnerships, two programmes were completed - Technical Support NQF Level 4 (117 learners) and Telecommunications Practitioner NQF Level 4 (40 learners). 117 learners intended continuing their studies and 40 learners were guaranteed permanent employment by their employers. 44% of these students were women.

Figure 9.1 Number of Registered Learnerships by Race and Gender



Source: ISETT SETA Annual report 2004

The ISETT SETA, in partnership with the Department of Communications (DOC), instituted a high-level skills development programme at the Institute for Satellite and Software Applications (ISSA) in the Western Cape. In 2003, 112 learners were sponsored at the ISSA facility, of which 106 graduated. 51 (48%) of these graduates were female and all were African and Coloured.

[132] Learnerships definitions:
http://www.isett.org.za/incASP/frame.asp?theSection=/about/default.asp

[133] http://www.isett.org.za/incASP/frame.asp?theSection=/about/default.asp

9.3.8 State Information Technology Agency (SITA) Youth Internship Programme

SITA was established in 1999 to consolidate and coordinate the State's information technology resources in order to achieve cost savings through scale, increase delivery capabilities and enhance interoperability. SITA is the IT business for the largest employer and consumer of IT products and services in South Africa – the Government. It falls under the Department of Public Service Administration.

The Youth Internship Programme was launched in 2004. The Programme is a partnership between SITA, Umsombomvu Youth Fund and the Public Sector Education and Training Authority (PSETA), to assist in building an ICT skills base in the country by providing training annually to individuals from historically disadvantaged background.

The Programme aims to close the existing skills shortages in the ICT sector in the country by targeting 51% female and 4% disabled persons, with the intention to reach a national target of 54%. Unemployed graduates get additional grooming in personal and work ethics, computer literacy training and IT professional training best suited to their qualifications. Thereafter workplace experience is gained in a government department, SITA department or a private company. This enables the interns to seek employment, having gained work experience that affords them greater marketability. In addition, a course in Entrepreneurship has been included in the training curriculum as a separate module. This is done to cater for learners who have ambitions to start their own businesses.

9.4 NGOs AND NOT-FOR-PROFIT ORGANISATIONS

Within the non-profit sector entities, the interventions to encourage young women to enter into the SET fields and supporting those in these fields are often tackled as parallel strategies to impact on the gender profile of the industry. These interventions are markedly different – in content though not necessarily in spirit - from those designed and delivered to current and potential women users of ICTs.

Initiatives targeting women in SET / ICTs

Sections 9.4.1. and 9.4.2 highlight the activities of two non-profit organisations and networks that target female learners in ICT with a view to building performance and to retain and build current capacity in the IT industry.

9.4.1 LinuxChix Africa

LinuxChix Africa[134] was launched in February 2005 to provide an online community for African women to share ideas on the building and growth of Free and Open Source

[134] LinuxChix Africa http://africalinuxchix.org Accessed 13 July 2006

Software (FOSS) in Africa. The members of LinuxChix Africa are individuals (women from anywhere in Africa) or organisations committed to the empowerment of African women through Information and Communication Technologies (ICT). National chapters have been established in numerous countries, including South Africa.

9.4.2 WICT

WICT[135] was started by a number of women in the ICT sector in recognition of the personal challenges they faced and the need to find strategies – long and short term - to mitigate the various obstacles. The WICT founders started with an analysis of the factors that contributed to the success of top executive women in the corporate South Africa, and explored how these success strategies might be replicated to support women who want to advance in the South African IT industry. A key element of this strategy is to build a critical mass of women in the IT industry – and therefore to ensure that more female learners see IT as a career for them. The pillars of the WICT programme combine activities that target a) women working in the IT sector; b) female learners who study mathematics, sciences and technology subjects, and c) women as users of technology.

Building (rural) women users' ICT skills

This section reviews the work of a number of NGOs that seek to build ICT capacity at the community level and/or with organisations and networks that provide social services to communities. While some of these capacity building initiatives provide word-processing, web design, or Internet training to women, the majority of IT and gender initiatives led by NGOs are devoted to promoting women's use of the Internet as a communication, advocacy and networking tool. Women'sNet, for example, is a web portal that serves as a resource base for information on gender issues and women's empowerment in South Africa, including information pertaining to women and IT in South Africa. NGOs have a particular approach to education in ICTs that focuses either on building basic ICT user skills and/or building local content on a range of select issues of relevance to women's empowerment.

9.4.3 SAWICT Rural ICT Capacity Development Programme

This programme seeks to ensure that rural women throughout the country will have access to information and be able to make informed business decisions. The training is intended to impart skills that will enable the women participants to administer their projects using technology and/or enhance their employability. Further, the programme is intended to support the creation of sustainable jobs in telecentres.

The SAWICT programme is structured around the idea of reviving ailing telecentres in rural areas. Two telecentres in each province were identified for the project. These telecentres had been operational and were shut down for several reasons. WICT's aim is to ensure these centres resume operations and become sustainable. The pilot projects are currently being conducted in the Eastern Cape, Free State and KwaZulu/Natal regions in the first financial year. SAWICT's project partners include the government and

[135] Women in ICT, http://www.wict.org.za, Accessed 7 July 2006.

the Universal Service Agency (USA). The government's role is in facilitating a policy environment in which the telecentres can become sustainable operations while the USA continues to play a crucial role in supporting the telecentres they were instrumental in setting up. A third partner, the ISETT SETA provided a grant to support the pilot project in the first financial year.

9.4.4 South African Women in Dialogue

The South African Women in Dialogue (SAWID) is a network of South African women's organisations and networks that was launched following the South African Women in Dialogue Conference held in 2003. The conference was hosted by the Spousal Office in the Presidency, and the SAWID network operates under the patronage of Zanele Mbeki.

The 2003 conference identified the need for South African women to unite under a common vision and to speak with a unified voice, before they gather to share peace-making experiences with other African women. Sixty percent of the delegates of the 2003 SAWID Conference came from rural areas, and the subsequent conferences in 2004, 2005, and 2006 have sought to maintain the attendance of and active participation by rural women.

SAWID does not as yet have a dedicated ICT for development focus but they have made some attempts to provide ICT training to women who attend their conferences and workshops. In this, they approached Women'sNet to provide basic ICT skills to women who have never before touched - and sometimes never before seen – a computer.

The impact of such training interventions are bound to be minimal as the likelihood of these women to have sustained contact with computer and ICT capacity development in negligible – unless they launch ongoing training interventions for SAWID members.

Nevertheless, the SAWID requests for ICT training for its members stem from recognition of the potential value of ICTs for women's empowerment. This is something to note as – globally – the women's movement has been slow to recognise the potential of ICTs to support its women's empowerment and women's rights campaigns – especially as it relates to the economic empowerment of socially and geographically marginalised women and their communities.

Under the SAWID banner, community-based initiatives that are women-led and women-only are being established as these structures develop action programmes that include ICT training for their mainly mature and elderly members. The challenge will be to stimulate their interest beyond the basic skills and interest them in seeking ways to maximising development dividend of ICT4D.

9.4.5 Women'sNet

South Africa's active civil society abounds with NGOs and community-based organisations (CBOs) conducting education and job training programmes for women and

girls. One of these is Women'sNet. Women'sNet[136] was launched in March 1998, as a joint initiative of South African Non-Governmental Organisation Network (SANGONeT) and the Commission on Gender Equality (CGE). For four years, Women'sNet existed as a project of SANGONeT. In January 2003, Women'sNet formally registered as a Section 21 company (a not-for profit organisation, in terms of South African company law).

In the early dialogues to establish Women'sNet, the participating NGOs agreed that Women'sNet's mandate would be to train other women's NGOs to use ICTs. Women'sNet works with women's NGOs and networks to deepen their organisational capacity to use ICTs more strategically for research, advocacy and lobbying, and/or information sharing and networking. Several NGOs – especially those in the violence against women sector and others focussing on women and media - benefited early on from training by Women'sNet and now their own run successful online campaigns and news platforms.[137]

Since its inception, Women'sNet has implemented a number of projects as part of its mandate to support South African women in harnessing ICTs to facilitate women's empowerment through networking and special projects. The Women'sNet approach rests on three pillars: (i) *content generation and facilitating information flows* linked to (ii) *networking* and (iii) *capacity building in technical skills*. Women'sNet activities routinely combine technical skills development with the development and online publication of locally relevant content that relates broadly to women's empowerment. In addition, the Women'sNet portal also runs a number of databases with information on services for women and girls, with a view that these will help stimulate South African women's use and benefit from the Internet.

Women'sNet's capacity building activities are targeted at women's organisations and networks, and - through the Girls'Net project - at girls and young women of the ages 12 to 19. The Girls'Net project is implemented in the three poorest provinces - Limpopo, KwaZulu-Natal, and the Eastern Cape - as well as Gauteng. Girls'sNet takes girls between the ages of eleven and nineteen and train them in the use of multimedia skills, and provides them with websites that they are responsible for populating with content of their choice. The technical training is supplemented with life skills and leadership training for the girls. The project started by training 20 girls from specific communities, with the expectation that they will recruit and share their skills with other young women into the Girls'Net clubs they formed. The training has so far reached about 150 girls in four provinces. Girls'sNet also collaborates with the Department of Education's Girls Education Movement (GEM). The next phase is to replicate Girls'Net in the remaining five provinces and then scale up to include more communities in the project. The selection of communities depends on the availability of a telecentre where the participating young women can access the Internet.

Since 1998, Women'sNet has been training women's NGOs and networks in the strategic use of ICTs for advocacy, information sharing, and networking. Among others,

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[136] Women'sNet, http://www.womensnet.org.za , Accessed 7 July 2006

[137] This includes NGOs such as the Gender Advocacy Project (GAP), NISAA, and Agenda, the Feminist Media Project.

Women'sNet has trained women's NGOs, networks and gender activists in the area of ICTs for advocacy on Violence against Women (VAW), ICTs for women's economic empowerment, as well as training women politicians at national and local government level to use ICTs to network with their respective constituencies. Women'sNet plans to deepen its ICT training activities targeted at women in rural areas and those operating small and micro enterprises.

9.4.6 Gender Links and the CyberDialogues Initiative

CyberDialogues was a multi-stakeholder initiative in South Africa that involved, among others, the national Department of Correctional Services, the Government Communication and Information Services (GCIS), the City of Johannesburg, and women's organisations such as the Network on Violence Against Women, Women'sNet, Southern African Gender and Media Network (SAGEM), Gender Links, as well as IT companies e.g. Microsoft and Telkom. The project was initiated by Gender Links.

This project used ICTs as a tool for raising awareness and changing gender discriminatory behaviour in South Africa, as part of the global Sixteen Days of Activism on Gender Violence. The CyberDialogues for the *Sixteen Days of Peace* campaigns was first conducted in South Africa in 2004. In 2005, 369 people were trained in basic ICT computer skills to allow them to participate in the online discussions. The training was conducted across 18 sites in all nine provinces of South Africa - at two telecentres in each province. The cyber dialogues combined facilitated, interactive dialogues on the ground with a link to a central hub at the national level where experts and decision-makers were available at a fixed time each day to answer questions in a live online chat-room. The interactive process featured a bulletin board to which individuals could post messages and a daily exchange of information between countries in Southern Africa, as well as a video link-up between all those who participated on the last day of the campaign.

The training-related achievements include:

- IT training with 262 women and 107 men in nine provinces of South Africa (71 percent women and 29 percent men);
- IT training with 119 women and 75 men in 10 southern African countries (68 percent women and 32 percent men);
- 16 Days plans of action developed and implemented in 16 sites in South Africa and in 5 City of Johannesburg local regions; and
- 16 Days plans of action developed and implemented in 10 Southern African countries.

The information, education and awareness raising achievements were considerable with 12 daily regional electronic newsletters sent to 1500 people via a mailing list.[138] In addition Gender Links published 31 commentaries through its GEM Opinion and Commentary Service written by people who have experiences of gender violence and experts on different themes during the sixteen days. These were picked up by 64 media outlets across Southern Africa resulting in extensive media coverage.

One of the difficulties of the process stemmed from the use of telecentres. Many of these facilities are severely under-resourced with slow Internet connections (when they are operational), not all computers have an Internet connection, and often the computers terminals are out of order, as was the experience of some trainers for the CyberDialogues Campaign. These difficulties necessitated that participants – women and men – double and triple up at the computer terminals. In such situations, technical-skills building is uneven and fragmented as time on the keyboard is interrupted.

9.4.7 NEPAD e-schools

The New Partnership for Africa's Development (NEPAD) is a vision and strategic framework for Africa's renewal and development. Its primary objectives are to:

- To eradicate poverty;
- To place African countries, both individually and collectively, on a path of sustainable growth and development;
- To halt the marginalisation of Africa in the globalisation process and enhance its full and beneficial integration into the global economy; and
- To accelerate the empowerment of women.

ICTs have been selected for fast-tracking delivery as part of the NEPAD programme. The NEPAD e-schools initiative is a key programme within the ICT focus. It involves establishing an Africa-wide satellite network that will a) connect schools to the Internet; and b) to points within each country from which educational content will be fed to the schools on a continuous basis. The initiative also involves ICT training of teachers and students, content and curriculum development. Across the continent, the project is currently in a year-long demonstration/pilot phase. In South Africa, the pilot phase will end in April 2007.

Six schools will participate in the demonstration phase in each of the participating countries.[139] In South Africa, six schools were selected in Mpumalanga, KwaZulu-Natal, Free State, Eastern Cape, and NorthWest Province. Implementation is currently underway in five schools, while additional funds are being raised for a second pilot

[138] See www.gemsa.org.za to see examples of the daily newsletter.

[139] These include Algeria, Burkina Faso, Cameroon, DRC, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Mali, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, South Africa, and Uganda.

school in Mpumalanga. Implementation is being undertaken by a consortium of service providers which includes Hewlett Packard, Oracle and Cisco Systems. Each services two schools with IT infrastructure – including networked copiers/printers, interactive white boards and satellite television, software, basic ICT training, as well as educational software. The content is assessed and vetted by the provincial departments of education. There are also plans to facilitate community involvement and participation through the establishment of 'health points'. So far, there are plans to provide additional basic ICT skills training to members of the school governing bodies. It is envisioned that the schools will operate as public access points and that learners and teachers will develop the capacity to eventually train members of the local community.

In South Africa, no data are currently collected on the breakdown of male and female teachers and/or learners who participate in and benefit from the project – either in the country or on the continent.[140]

The Digital Doorway

The Digital Doorway is an innovative project using minimally invasive education (MIE) to develop computer literacy and associated skills in Africa. MIE holds that everyone has the inherent cognitive ability to teach him- or herself computer skills without formal external intervention, provided computers can be made easily accessible to potential learners and an environment can be created in which they can learn through experimenting.

Almost 100 robust four-terminal Digital Doorway computer systems have been deployed in communities throughout the country, allowing community members to learn through experimentation. A massive rollout plan is currently under planning for 50 more sites.

A recent unpublished assessment and evaluation of existing sites found that female users form a smaller percentage of the total users than their male counterparts. The researchers ascribed this to the fact that females are denied access on several levels by social circumstances, physical access and by design cues. The lack of female users seems most profound in urban areas, improving in peri-urban and rural areas. In addition females fared worse than males in the ICT literacy tests. Specific recommendations have been made to address the gender divide:

- Establishing a gender program that pilots and tests less costly initiatives specifically aimed at females;
- Clear communications that the Digital Doorway is available for both boys and girls;
- Creating a weekly "girl time" gender slot and monitor performance;
- Designing the application environment to have preset gender and age profiles;
- Deploying applications on the Digital Doorway that subscribe to Hiescox's (1995) model for female games that are focused on achieving meaningful goals or that require iteratively changing an environment e.g. Ronda;
- Creating screen backgrounds showing girls playing on the Digital Doorway;
- Altering the colours on the rest of the centres from blue to a more neutral colour;
- Creating one very "female centric" workstation within the four centre configuration; and
- Ensuring a gender balance in local champions.

[140] The Department of Education project contact person did however invite a proposal for the project evaluators, the Commonwealth of Learning, to incorporate and monitor for gender impact.

9.5 Summary and recommendations

There are a wide range of growing initiatives underway to develop the career possibilities of women in the ICT industry with involvement from diverse players within the private sector, government and NGOs. South African employment equity legislation of South Africa has provided added impetus within private ICT companies to piggyback onto and spur on women's own efforts to strengthen their career prospects within the ICT sector. It is however difficult to estimate the impact of these small-scale interventions and how and to whom you attribute impact, especially where a number of different actors and entities are involved

Where the current efforts fall far short is in providing access to ICT skills and meaningful use of the technology to the ordinary woman - in the peri-urban and rural areas, the woman farmer, the woman trying to improve her livelihood strategies but who does not have access to information about where best to market her goods. The lack of exposure to ICTs skills, particularly in rural areas, will also have a negative effect on any longer-term efforts to bring more girls from rural and poor areas into the ICT fold. There is enough evidence of women farmers in rural areas using ICTs to access agricultural information to improve their livelihood and incomes, or women becoming ICT entrepreneurs selling information and connectivity to the information poor and unconnected. It is imperative that where public facilities exist, effort is made to train women and girls in the use of ICTs. Where these facilities - such as telecentres and Digital Doorways - are established with public funds, this must be used to leverage better and sustained access for women and girls to facilities. Infrastructure roll out - including sustainable public access facilities remain a challenge and must be a priority. South African policy has also paid insufficient attention to how to bring marginalised communities into the information society. There is therefore need for a concerted advocacy campaign around affordable and accessible ICTs for all.

10. CONCLUSION

This report on the situation of women in ICTs in South Africa provides a wide-ranging overview of the various efforts and undertakings of diverse players from government, the private sector, civil society, and research and academia. What is obvious from the deliberations is the extent to which gender has been placed on the government agenda - through numerous sectoral policies and specific gender-related policies, strategies that are being put in place, and projects that are being implemented. The political will and intent to address gender issues is firmly in place and the government can be commended for its achievements in this arena over the past 12 years. Likewise the ICT sector appears to be increasingly undertaking a number of activities that are likely to see stronger support for women in the ICT sector, both young women entering the sector and those who wish to advance their careers. The adoption of the ICT charter is also likely to drive stronger efforts to recruit more black women into industry.

Numerous efforts have been undertaken through various government departments (education, communications, trade and industry, communications and science and technology). All appear to be intent on improving the situation of women through focused interventions. The need for massive improvements in the size of the pool of potential school-leavers with the necessary proficiency in mathematics and science has been identified and several concerted efforts are being made to address this through the education system. Additional activities are being funded through science expos, technology camps and school-based projects. Most of these are however focussed on Grades 10 – 12 whereas international experience suggests that this is too late and that interventions need to start as early as possible, even at the kindergarten level if long-term changes in the SET pipeline are to be achieved. The challenge however lies in implementation. The many small efforts do not seem to be resulting in the impacts needed to make a large difference in the country. The efforts of the government need to be better synchronised and coordinated so that the disparate and, in many cases, commendable efforts can build and feed on each other. Combined activities, across governments, are more likely to yield noticeable impact. Private sector efforts need to be brought more prominently into the national picture so that there is a clear national effort to grow the number of women entering ICTs. Likewise, the numerous efforts of NGOs should be better understood and a roadmap developed, which includes all players, to map out how a better-coordinated effort can be effected on a national scale.

Cultural and societal norms determine that SET (and ICTs) are not perceived as good career options for women. Much needs to be done to work with educators, parents and in the workplace to change perceptions. Gender-sensitivity training needs to be included in training for educators, both at the school and higher education levels. Workplace conditions need to be more conducive for the advancement of women's careers.

Underpinning all of these focused interventions is the urgent need to find a more consistent, integrated and workable classification and measurement system for ICTs. Without such a system, we can only guess at the effectiveness of policies and strategies, and the impacts of implementation. The more accurate assessment of supply and

demand, and the need to monitor progress with reliable and accurate data is essential. A positive move is the proposed integration of the educational system's databases so that a learner can be tracked through the system from point of entry point to exit. It will be imperative though to ensure that the system will allow race and gender disaggregation as a matter of course.

Little research capacity exists in the country on gender and SET/ICT research. There is a need to develop a multidisciplinary approach to women-in-ICT research and increase the number of researchers in the country who can contribute to the small body of knowledge in this area. This, together with an improved system of measurement, and a solid monitoring and evaluation framework against which to measure progress, will greatly enhance the ability of decision makers to develop sound strategies to grow the number of women in SET and the ICT sector.

The contents of this report should provide another step forward in terms of consolidating available (if not always reliable) data and information on what has been done. Hopefully the work presented here will allow others to build on this knowledge base and to take the initiative to conduct research to fill the knowledge gaps and/or undertake interventions that will move the country and the ICT sector forward in terms of increasing the number of women contributors. To this end, we have developed a manual of possible interventions, as a separate document, which outlines six possible programmes. Some have already been initiated by a variety of ICT players. What is missing, though, is a more coordinated approach to ensure maximum impact of these diverse, and laudable, efforts. The manual sets forth a plan of activities for each of the six programmes, and also makes suggestions on possible partners in the planning and implementation of specific projects.[141]

A. Establishing a South African Resource Centre for Women in ICTs

B. Strengthening the Research Capacity in Women and ICTs

C. Developing a Workable and Integrated System for Measuring ICT in Working Life and the Education System

D. Training Programmes for Schoolteachers

E. Training Programmes for Girls and Young women

F. Dissemination and Awareness Raising Activities

As a final point, what has emerged strongly throughout the study, is that women themselves are not aware of many of the available interventions - efforts are needed to make them far more visible to the women who will benefit from them.

[141] http://women-in-ict.meraka.csir.co.za

INFORMATION SOURCES

Africa Drive Project, http://www.adp.org.za/adp_adp.html. Accessed 13 June 2006

Association for Educational Transformation (ASSET), http://www.asset.ac.za Accessed 13 June 2006

Bibby, A. (2000). *Tackling the skills gap: The shortage of IT specialists in Europe.* http://www.andrewbibby.com/pdf/tackling-skills-gap.pdf Accessed 1 April 2003.

Bennett, J. (2001). *Women lose out in the equity stakes.* Sunday Times Business Times, August 26, 2001, p.2

Booysen, L. (2000). *Challenges facing black and white women managers in South Africa.* Management Today. June 2000, pp.22-28.

Bowmaker-Falconer, A. (ed) (2000). *Breakwater Monitor: Monitoring Employment Equity in South Africa,* Report 2000/1, Cape Town: Breakwater Monitor.

Businesswomen's Association of South Africa (2004 & 2005). South African Women in Corporate leadership. Census 2004 and 2005.

Cape IT initiative. http://www.citi.org.za/ Accessed 20 June 2006

Castro, C. De M. (1994). *Training: what do we do now?* RBE Rio De Janeiro, Des. 1994, Vol. 48, No. 4, 421-441.

Centre for Research on Science and Technology (December 2005). *A Monitoring and Evaluation Framework to Benchmark the Performance of Women in the NSI.* University of Stellenbosch, South Africa.

Centre for the Advancement of Science and Mathematics Education, http://www.jula.org.za/Section.asp?Section_Name=About Accessed 26 May 2006

Commission on Gender Equality http://www.cge.org.za/ Accessed 14 June 2006

Council for Scientific and Industrial Research (CSIR). http://www.csir.co.za Accessed 23 July 2006

COUNT, http://www.count.org.za Accessed 13 June 2006

Department of Trade and Industry (2005). *An Analysis of the ICT Skills Audit for the dti and ISETT SETA.* Pretoria: Department of Trade and Industry. http://www.isett.org.za/downloads/ICT_Skills_needs.pdf

Department of Communications. Gender Desk www.doc.gov.za

Department of Education (1991-1998). South African Post-Secondary Information System (SAPSE), annual databases, Pretoria.

Department of Education (1999-2003). Higher Education Management Information System (HEMIS), annual database, Pretoria.

Department of Education (2004). Quantitative Overview of the Further Education and Training College Sector, April 2004. Pretoria.

Department of Education (2004). *The Development of Education: Country Report of South Africa*. Delivered at the 47th International Conference on Education 8-11 September 2004. http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=10&category=Reports

Department of Education (2005). *Educational Statistics in South Africa at a Glance in 2003*. ISBN 1-77018-047-8. pp 41.

Department of Education (2005). *Senior Certificate: Report on the 2005 Examination Results*. Pretoria, South Africa. pp 31 + Annexures.

Department of Education (2005), *National Curriculum Statement Grades 10-12 - Computer Applications Technology*, Accessed 13 June 2006, http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=9&category=Policies

Department of Education, 2005, National Curriculum Statement Grades 10-12 - Information Technology. Accessed 13 June 2006, http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=9&category=Policies

Department of Labour (2003). *Labour market supply*.

Department of Science and Technology (2004). *Facing the Facts: Women's Participation in Science, Engineering and Technology*. www.dst.gov.za/publications/reports/sarg_booklet.pdf

Department of Science and Technology (2004) Minister of Science and Technology, Mr Mosibudi Mangena, at the NSTF Awards 2004 in Johannesburg, 2004, Department of Science and Technology, Pretoria. http://www.dst.gov.za/media/speeches . Accessed 13 June 2006.

Department of Science and Technology (2005). *Women in the SET workplace: Exploring the Facts, Experiences and Opportunities*. Tara Equity Consultants and Feedback Metrics.

Department of Science and Technology Balanced Scorecard Framework: p.12 – 14. http://www.oecd.org/dataoecd/30/9/34243230.pdf

Department of Trade and Industry and ISETT SETA (2005). *An Analysis of the ICT Skills Audit for the dti and ISETT SETA*. Vukanikids

Department of Trade and Industry. BEE ICT Companies Database. http://www2.thedti.gov.za/BEECompanies/ Accessed 10 July 2006

ECITI Incubator http://www.eciti.co.za/ Accessed 22 July 2006

Faculty Training Institute (2003). http://www/fti.co.za/Careers/careers.htm#1 Accessed January 2003.

Gillwald, A. (Ed) (2005). *Towards an African e-Index: Household and individual ICT Access and Usage across 10 African countries*. Research ICT Africa

Girls Education Movement, http://www.gem.gov.za Accessed 13 June 2006

Hodge, J. and Miller, J. (1997). *Information technology in South Africa: The State-of-the-art and Implications for National IT Policy*. Cape Town: University of Cape Town.

Human Rights Watch. 2001. *Scared at School: Sexual Violence Against Girls in South African Schools*. ISBN: 1564322572. http://www.hrw.org/reports/2001/safrica/

Human Sciences Research Council (2006). *Shocking state of maths and science education in SA schools unveiled,* http://www.hsrc.ac.za/media/1996/11/19961124.html. Accessed 26 May 2006.

Human Sciences Research Council, *Performance scores in international maths and science study reflective of South African inequalities.* http://www.hsrc.ac.za/media/2004/12/20041214_1.html . Accessed 25 May 2006

ICT Charter Steering Committee (2005). *Draft Black Economic Empowerment Charter for the ICT Sector, 2005*. Pretoria: Government Printer

ICT Charter Website http://www.ictcharter.org.za/content/ICTbeecharter04may2005-Minister.pdf 24 June 2006

Institute for Satellite and Software Applications http://www.issa.org.za Accessed 17 July 2006

ISETT SETA www.isettseta.org.za Accessed 24 June 2006

ISPA web site, http://www.ispa.org.za/socdev/index.shtml Accessed 21 July 2006.

ITWEB (2003, 2004, 2005, 2006). ITWeb Salary Surveys. http://www.itweb.co.za http://www.itweb.co.za/surveys/Salary/2004/salaries/survey040430.asp Accessed: 8 September 2004, 14 July 2006.

ITWEB (2004). *IT's no longer a man's world.* [Interviews] Terry Annecke. < http://www.itweb.co.za/sections/search/search.asp Accessed 8 September 2004.

Joint Monitoring Committee (2005). *Report of the Joint Monitoring Committee on the Improvement of Quality of Life and Status of Women*, on hearings held with the National and Provincial Gender Machinery on 21 November, dated 16 September 2005

Kgasi, Themba (2003). *National Gender Machinery. Ensuring Implementation of Gender Equality.*
http://www.cge.org.za/userfiles/documents/gendermachienary.pdf

Khanya Project. http://www.khanya.co.za/projectinfo/?catid=32 , Accessed 23 July 2006.

LinuxChix Africa http://africalinuxchix.org Accessed 13 July 2006

Meraka Institute, CSIR http://www.meraka.org.za/ Accessed 23 July 2006

Mindset Network, http://www.mindset.co.za . Accessed 25 May 2006.

Moleke, P., Paterson, A. and Roodt, J. (2003). *ICT and Associated Professionals.* (In HSRC. 2003. Human Resources Development: Education, Employment, and Skills in South Africa: Review 2003. Pretoria: Human Sciences Research Council).

Mpumalanga Education Department (2005). *Circular N0 29/2005, FET Maths, Science, Technology Girls Camp:* 27th September to 1st October 2005.

National Research Foundation. www.nrf.ac.za

OECD (Organisation for Economic co-operation and Development) (2002). *Measuring the Information Economy Report.*
http://www.oecd.org/sti/measuring-infoeconomy Accessed 30 May 2003.

Roodt, J. (2003). *Survey of Industry Standard courses in Information and Communication technology.* Pretoria: Human Sciences Research Council.

SAASTA Web site, http://www.saasta.ac.za/aboutus/activities_prog.shtml. Accessed 13 June 2006.

SAITIS (South African Information Technology Industry Strategy) (2000) *SAITIS Baseline Studies: A Survey of the IT Industry and Related Jobs and Skills in South Africa*, Funded by CIDA and IDRC, Pretoria.

SAITIS (2002). *ICT diffusion and ICT applications in usage sectors.*
http://www/milless.co.za/downloads/ICT%20Diffussion%20-%International%20Scan.pdf Accessed June 2002.

Sakoane, T. (2006). *Soweto schools to help produce maths, science graduates,* http://www.allafrica.com/stories/printable/200605240757.html . Accessed 13 June 2006

SAWEN (2005). South African Women Entrepreneurs: a burgeoning force in our economy. A Special report 2005: p11.
http://www.dti.gov.za/sawen/SAWENreport2.pdf

SA WISE. South African Women in Science and Engineering, http://www.sawise.org.za Accessed 7 July 2006.

SA Women in Computing. http://www.cs.wits.ac.za/~sawic/ Accessed 2 July 2006

SchoolNet South Africa, http://www.school.za/programmes/index.htm . Accessed 25 May 2006.

SET4Women Reference Group. http://www.sarg.org.za/pdfs/s4w_pamphlet_2005.pdf

Smith, R. 2003. *Investigating the barriers to managerial positions for women in information and communication technology*. Unpublished MBA, thesis, University of Pretoria.

SouthAfrica.info (2003). *Beaming education to the nation,* http://www.southafrica.info. Accessed 13 June 2006.

Softstart Incubator http://www.stp.org.za/bodlbeng1.html Accessed 22 July 2006

SouthAfrica.info (2006). *Business backs Dinaledi schools* http://www.southafrica.info/

South African Agency for Science and Technology Advancement Web site, http://www.saasta.ac.za/aboutus/activities_prog.shtml. Accessed 13 June 2006.

South African Agency for Science and Technology Advancement. *South African learners to participate in Pan African Mathematics Olympiad (PAMO) 2004,* http://www.saasta.ac.za/media/2004_04.shtml . Accessed 26 May 2006

South African National Government (1998). Employment Equity Act, No. 55 of 1998. Pretoria: Government Printer.

South African National Government (2005). Skills Development Act (97/1998): Amalgamation of Sector Education and Training Authorities established under section 9. *Government Gazette,* 27445, March 2005. (Regulation Gazette No. 8203.)

South Africa Human Rights Commission (2006). *Report of the Public Hearing on the Right to Basic Education*. South African Human Rights Commission. 52pp. http://www.sahrc.org.za/sahrc_cms/downloads/RBE_Report.pdf

South African Qualifications Authority (SAQA) (2004). *Trends in Public Higher Education in South Africa 1992 to 2001.* Pretoria: South African Qualifications Authority.

Statistics South Africa (2004). *Labour Force Survey September.*

Statistics South Africa (2005) *Labour Force Survey LFS12*

Subotzsky, G. (2002). *A Quantitative Overview of Private Higher Education in South Africa.* Paper prepared for the HSRC Colloquium: Understanding Private Higher Education in South Africa.

Technology for Women in Business (TWIB) http://www.twib.co.za/ Accessed 7 July 2006

The Innovation Hub. http://www.innovationhub.co.za/ Accessed 4 June 2006

United States National Research Council (2002). *Estimating the Size of the IT workforce. Building a Workforce for the Information Economy.* Appendix B. Pre-publication. October 2000. http://books.nap.edu/html/IT_workforce/ Accessed February 2003.

Universal Service Agency http://www.usa.org.za/capacity.html Accessed 17 July 2006

Webchek (2000). Internet Inequality. http://www.webchek.co.za/about_press%20inequality.html Accessed March 2006.

Whiteford, A., Van Zyl, E., Simkins, C. and Hall, E. (1999) *SA Labour Market Trends and Future Workforce Needs 1998-2003,* Pretoria: Human Sciences Research Council.

Williams, T. and Samuels, M.L. (2001). *The Nationwide Audit of ECD Provisioning in South Africa.* Department of Education, South Africa http://www.education.gov.za/dynamic/dynamic.aspx?pageid=326&dirid=3

Women in ICT, http://www.wict.org.za, Accessed 7 July 2006.

Women in IT http://www.womeninit.co.za , Accessed 7 July 2006

Women'sNet http://www.womensnet.org.za , Accessed 7 July 2006

World Economic Forum (2005). *Women's Empowerment: Measuring the Global Gender Gap.* Geneva: World Economic Forum.

Annex 1:

Survey of Women's Interventions in the Private Sector

There has been a general shift in Information Systems / Information Technology (IS/IT) research away from technological to managerial and organisational issues, which led to an increasing interest in qualitative research. The qualitative data consists of comments made by the respondents and serve as anecdotal evidence to support the findings. An online questionnaire was designed with the PeopleSurveys software (www.peoplesurveys.co.za) and posted on the Internet. An invitation to participate in the survey was distributed to potential participants on databases from previous research projects and industry contacts. The invitation contained the Internet address where the questionnaire could be accessed. The advantages of using an online survey for this project include faster project turnaround, substantial cost savings compared to other methodologies, the use of drop-down menu responses to questions create an uncluttered instrument, the fact that responses are immediately entered into an Excel spreadsheet and that it is easier to share the results with the respondents via email or a website. The disadvantages of online questionnaires are mostly related to connectivity and access to the Internet. None of these problems were encountered in this project, probably due to the technological orientation of the target audience. Technical support was available at all times for people experiencing problems to complete the questionnaire.

The first question determined whether the participant's company has interventions relating to the appointment, promotion/growth, support and retention of women specifically? Only if they answered 'Yes' to this question, were the following questions asked and additional information requested on the choices indicated:

> Please identify and shortly describe the current interventions in your company, relating to the appointment, promotion/growth, support and retention of women in ICT positions.
>
> - School recruitment/road shows/adopt-a-girl
> - Bursary scheme (please identify type of recipient)
> - Learnerships /internships
> - Formal training courses
> - Informal/in-house training
> - Mentorship programme
> - Coaching
> - Leadership development programmes
> - Support programmes (e.g. flexible working hours, crèche facilities, discussion group)
> - Support to re-enter job market
> - HR policies/initiatives (e.g. equal pay, recruitment strategies)
> - Other

Annex 2:

Balanced Scorecard Key Result Areas for South African Science Councils

Balanced Scorecard Key Result Areas

Key Result Area/ Critical Objective	KPI
Stakeholder perspective	
Fulfilling of the Council mandate	• Narrative, probably as part of the CEO's report (should include a gender perspective) • Recommend using application of funds table (see text) (demonstrate the impact or outcome relative to improving Quality of Life of women or involvement of women in wealth generating activities).
Support of the NSI/R&D Strategy goals	• Narrative, possibly using table format below (include engendered perspective)
Ensuring quality of policy / decision making (if relevant)	• Narrative, possibly using table format below • Gender sensitive policy development to be highlighted.
Financial perspective	
Financial sustainability	• Sources of income (see text) • Ratio of contract income to total
Organisational perspective	

Overhead efficient	• Ratio of overhead cost to total cost • Proportion of researchers to total staff ❖ Proportion of women researchers to total staff ❖ Proportion of women researchers to total researchers ❖ Proportion of disabled researchers to total staff. • Salaries to total expenditure
Best practice (if available)	• Results of Quality Audit (e.g. Baldridge measures) ❖ Relevance of research within an engendered audit i.e. how does this research improve Quality of Life of men and women ❖ Gender disaggregated data to show beneficiaries with regard to partnerships joint ventures cooperative agreements.
Customer service/ Quality	• Results of customer service measures, customer surveys (e.g. CSIR's Moment of Truth)
Efficacy of funding decisions (for councils which disburse a significant amount of funding)	• Number of applicants • Number of successful applicants • Time to review • Number of appeals • Number of appeals upheld ❖ All the above data (excluding time to review) must be gender disaggregated.
Learning and growth	
	• Scientific reports, in particular refereed journal articles ❖ Include women and the disabled within table on scientific outputs

	• Masters and PhD level researchers ❖ Disaggregated data for women and the disabled within table format, including info on patents, etc. • Evidence of codified versus public knowledge Anecdotal evidence of intellectual capital. Would include patents, proprietary software.
Development of Scientific Capacity (if relevant)	• Students and staff enrolled in Masters and PhD programmes ❖ Gender and the disability disaggregated data - Narrative if specific support / developmental programs in place ❖ To include in future: - Gender disaggregated remuneration equity.
External relations (if relevant)	• Number of international keynote addresses • Number of international awards won • Projects with external collaborators • Publications of external collaborators ❖ Gender disaggregated data for all above indicators
Transformation	
Organisational demographics	• Employment Equity Demographics (table) • Percentage of black researchers and managers • Percentage of women researchers and managers ❖ % of disabled researchers and managers