



UNIVERSITY *of the*
WESTERN CAPE

ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

by

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DECLARATION

I, Olwethu Ntolwana, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the University of the Western Cape.

Signed

Date



ABSTRACT

Information and Communication Technology is a mixed set of technological tools and resources used to create and manage information. It involves technologies such as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer (network hardware and software) as well as the tools and services associated with these technologies. ICT is increasingly seen as a major enabler of efficiencies and a catalyst for innovations. With adequate skills to effectively use ICT, it can also prove to be a foundation upon which sustainable socio-economic developments can be built.

The problem in South Africa, however, is that of a severe shortage of technical skills in the ICT sector. The paradox is that despite the efforts at national, provincial and organisational levels to redress the shortage of skills, the problem persists. The aim of this study thus, was to understand the magnitude of skills shortages in under-developed areas of the Eastern Cape, so as to inform corrective measures. The Actor Network Theory (ANT) was used mainly as an analytical framework to analyse the problem of e-Skills shortages in South Africa. ANT helped in framing the context of the problem. It offered useful lenses of viewing the e-Skills development phenomenon as a network of stakeholders (actors), subjects (actants), processes and a determinant of information flows within the e-Skills development network. The study was mostly descriptive (and partly explanatory), seeking to clarify the status quo, the causes, and ultimately, to explore appropriate solutions. The interpretive approach was followed to conduct qualitative research. In this instance, a purposive sampling method was used to draw participants mainly from un/employed grade 12 (grade 12) graduates of 26 participants, consisting of 18 to 35 years of age. Participants were also drawn from high-level management in the training and development organisations and local employers of ICT graduates of Centane and Butterworth villages in the Eastern Cape. Content analysis technique was used to analyse and interpret data.

Findings do reflect a severe lack of basic ICT skills, with causal factors varying from a lack of awareness about ICT careers, to a lack of access to ICT tools, with the majority of the affected grade 12 graduates neither being employed nor doing any tertiary studies. It is therefore recommended for the government to revisit the e-Skills policy and its implementation structures in rural areas. The Department of Education (DoE) in the Eastern Cape should also create educational networks that will provide remote schools with low cost, but high performance Internet access. A re-look into the general quality of education in rural areas is also urgent.

Key words: ICT skills, Skills shortages, ICT sector, Access, Use, Career aspirants, Under-developed Area

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LIST OF ABBREVIATIONS

ANT	- Actor Network Theory
ASEAN	- Association of South East Asian Nations
AsgiSA	- Accelerated and Shared Growth Initiative for South Africa
CBO	- Canada Business Ontario
CPUT	- Cape Peninsula University of Technology
DoC	- Department of Communication
DoE	- Department of Education
DOL	- Department of Labour
DST	- Department of Science and Technology
DTI	- Department of Trade and Industry
EIU	- Economist Intelligence Unit
ETS	- Educational Testing Service
FET	- Further Education and Training
G5	- Group Five
GFI	- Gold Fields Information
GIS	- Geographical Information System
HOD	- Head of Department
HR	- Human Resource
IBM	- International Business Machines
ICT	- Information and Communication Technology
ICTSETA	- Information and Communication Technology Skills Education Training Authorities
INSITE	- International Science, Innovation Technology Exhibition
ISETT SETA	- Information Systems, Electronics and Telecommunications Technologies Sector Education Training Authority
MDG	- Millennium Development Goals
MIS	- Management Information System
NEDPA	- New Partnership for African Development
NRF	- National Research Foundation

NSW	- National Science Week
OECD	- Organisation for Economic Co-operation and Development
OPP	- Obligatory Passage Point
PC	- Personal Computer
SAGI	- South African Government Information
SET	- Science, Engineering and Technology
SET	- Science, Engineering and Technology
STEM	- Science, Technology, Engineering and Maths
UCT	- University of Cape Town
UN	- United Nations
UNESCO	- United Nations Education, Scientific and Cultural Organization
UWC	- University of the Western Cape
WBG	- World Bank Group
WSU	- Walter Sisulu University
WWW	- World Wide Web



DEDICATION

This dissertation is dedicated to my son Prince Maqhawe Ntolwana.



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GLOSSARY

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CHAPTER ONE

1 INTRODUCTION

1.1 Introduction

This chapter introduces the thesis: it emphasizes the subject of investigation, its nature and the purpose of the research, outlining the research problem, research questions, aims and objectives of the study, as well as the clarification of key concepts and the structure of the thesis.

In this endeavour, the thesis opens with an introduction to Information and Communication Technology (ICT) in sections 1.1.1, 1.1.2 and 1.1.3. The main argument in these sections is that ICT has become a significant part of almost all aspects of modern living, becoming a significant enabler of efficiencies in economic, social and educational faculties of the information age. Obviously, the issue of relevant skills – which is also introduced and discussed in section 1.2, is fundamental to a successful use of ICT in all life disciplines. For this reason, focus is placed on ICT skills in this thesis. A background to the research problem is presented in section 1.3, together with the problem statement in section 1.4 and the research problem in section 1.5. The research objectives are presented in section 1.6 followed by the research question and a definition of research terminology in sections 1.7 and 1.8 as well as the contribution of the study in section 1.9, delineation of the research in 1.10 and ethical considerations in section 1.11. The chapter closes with section 1.12, which describes the structure of the thesis, followed by conclusion in section 1.13.

1.1.1 ICT as a basis of socio-economic developments

Focus on ICT skills in this thesis stems from the belief that ICT is central to all areas of modern economic life. On this basis, skills to effectively use ICT become a forgone necessity. Information and Communication Technology (ICT)¹ plays a transformative role in all aspects of life: in private, societies, institutions, organisations, in government and in national economy (Tlabela et al, 2007). It improves the way we do business, access information and services, the way we communicate with each other and we entertain ourselves (Harris, 2004; Tlabela et al, 2007). For example, ICT (such as mobile phones and computers) allows people to send and retrieve voice mail or email and text messages on single device either a computer or an IP phone. Furthermore, ICT has brought leisure and entertainment facilities through social networks such as Facebook, Twitter and MixIT to make contacts and form relationships with people around the world (Tlabela et al, 2007).

¹ ICT is defined as a diverse set of technological tools, resources, systems and processes (Mlitwa, 2011) used to create, store, manipulate, manage and exchange information (Blurton, 1999). This involves technologies such as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing and electronic mail (Labelle, 2008; Harris, 2004).

The use of ICT can benefit individuals (students, educators and people at home) in various ways. ICT such as computers, the Internet and related software applications increase opportunities for education, communication and permits people to participate in a wider or global society (ICT news & reviews, 2009). With adequate skills therefore, ICT facilities such as email, the Internet, mobile phones, computers, websites and business software packages can also promote better administration and a better business environment that can help to reduce costs and save time in the business sector (Duncombe & Heeks, 2005).

It is for these reasons that ICT and related skills are increasingly seen as the major enablers of efficiencies, a catalyst for innovations and a foundation upon which sustainable socio-economic developments can be based.

1.1.2 The global perspective of ICT for development

Whilst the world has seen massive innovative developments since the end of the industrial era, socio-economic inequalities among world populations remain a major challenge in the information age. As such, intergovernmental institutions, continental structures, international development organizations, and national governments are instituting bold efforts to redress poverty and inequality among world citizens. In this endeavour, ICT is seen as a considerable enabler of development (Ferrer, 2009; Fourie, 2007).

At an international governmental level, 189 world leaders within the United Nations (UN) undertook, in the eight (8) millennium development goals, in 2000 - to reduce world poverty as well as social and economic inequality by half, by the year 2015 (Batchelor et. al, 2003). In this process, eradication of illiteracy and the development of skills are considered a basis upon which sustainable human empowerment could be built. In effect, literacy and skills development initiatives are prioritized in the UN-MDG poverty and inequality redress initiatives. In its second development goal for example, the UN-MDG (Batchelor et. al, 2003) sought to achieve universal primary education mostly through the creative use of ICT (*ibid*).

With a similar motivation, continental structures such as the Association of South East Asian Nations (ASEAN) and the New Partnership for African Development (NEPAD) have initiated continent wide literacy and skills development initiatives to achieve the objectives of the millennium development goals. In this respect, NEPAD's e-Africa Commission initiated the e-School Initiative, whose objective is to deploy ICT facilities and to develop ICT skills in schools across the African continent. In pursuit of the second millennium development goal, the e-Schools initiative sought to advance the level of education through the use of ICT across the African continent. Furthermore, the aim is also to empower African schools, teachers and students with the necessary skills to function in the knowledge economy (NEPAD, 2009). In addition, the initiative seeks to provide teachers with skills to use ICT as a tool to improve teaching, learning and to make every learner knowledgeable (*ibid*). The significance of ICT in basic education is seen not only as a mediator of efficiencies in

teaching and learning, but also as a basis upon which further technical skills can be developed (DoE, 2003). In this respect, international development organizations are also contributing towards literacy and technical skills development in the developing world.

An organization like the World Bank has put an effort into increasing cooperation with the UN and IMF (WBG, 2010). As at the end of 2009 for example, the World Bank was involved with 1800 projects to improve living standards across the developing world. In this process, the bank provides resources, enhances the sharing of knowledge and capacity building through the development of partnerships between the public and private sectors (*ibid*). At present, the World Bank had developed a new strategy towards the integration of ICT into development programs across economic sectors (WBG, 2011). The goal of the bank is to increase support for the use of ICT, so as to unleash innovation and to improve efficiency across development programs in supported countries (*ibid.*). In the field of education, the World Bank collaborates with entities such as the United Nations Education, Scientific and Cultural Organization (UNESCO) to advance the quality of education and lifelong learning initiatives. In this area, ICT is used as tool to enhance teaching and learning and make every learner health literate. In similar educational initiatives, ICT is considered a significant enabler, and is (ultimately) found at the centre of almost all these development initiatives. For example, UNESCO mobilizes scientific knowledge particularly by building inclusive knowledge societies through the creative use of ICT. These organisations attempt to eliminate poverty, improve literacy and advance economic development across all economic disciplines of member countries (UNESCO, 2009).

It is clear therefore, that ICT is central to almost all socio-economic development initiatives. However, without adequate skills to use ICT however, success in these endeavours will/is likely to be limited.

1.2 The Case for Promoting ICT Skills

ICT skills strengthen the ICT sector, boost innovations and in time, contribute towards economic growth. Technological innovations, which are largely dependant on the quality of technical skills available, are the building blocks of economic development and growth. For instance, South Korea is a free market, democratic and developed country; it is the world's most innovative technology sector, it has an economy deemed to be the fastest growing in the world in the years 2007 – 2010 (EIU, 2009). Over this period, South Korea had the super-fast Internet, advanced broadband for cell phones and fixed networks, which simplified connectivity and the operation of, the government policies that promoted development. It is easy for South Korea to develop and export new technologies because they have technical skills and ICT resources (Forsberg, 2005). For example, South Korea has various companies producing different products such as Samsung cell phone, TV's, computers, etc., with the ICT sectors accounting for exports of \$75 billion (*ibid.*).

A direct link between technical skills, innovations, and economic growth is further supported by trends in India and China. In terms of skills, India offers a large pool workforce that is, educated, highly skilled and IT literate. Because of these skills, American companies are outsourcing outbound and inbound call center services in India (Axiom, 2008). The outbound call center includes product/service promotion, marketing research, sales, marketing and voice broadcast. The inbound call center entails customer service, remote receptionist, helpdesk support and technical support (*ibid.*). These call centre facilities help the American businesses to get high quality service and also to stay ahead of the competitors. Organisations such as General Electric, America Express, British Airways and Microsoft are already enjoying the benefit of outsourcing from India facilities. For an example, IBM has a Business Analytics Center of Competency in Bangalore, India (Ashford, 2009). To take advantage of the abundance of technical skills, it also uses Indian software companies to provide offshore solutions to manage their network operations and support systems. Additionally, Bank of America outsourced a computer system that handles a loan program for Hispance from India (Giridharadas, 2007). Technical skills are also a basis upon which technical innovations are built. That is, the highly skilled Indian economy which boasts companies such as Tata Motors and Mahindra that is making strides in the electronics, technology and in the global motor industry (Mishra, 2010). In 2010, India also introduced a new Hyundai Verna 2011, inspired by the Hyundai Fluidic Verna Sedan car (Ashford, 2009). India and China are using three (3) emerging innovation models; the first one is process innovation – this entails, wiring everyone to the same network and leveraging the cost, talent, and volume of an integrated global economy (*ibid.*). Second one is creating pint-sized products and services sold cheaply to masses of poor people. A third is innovating through local partnerships and networks to get around external hurdles (business week, 2006).

Without adequate skills in the ICT sector however, enterprises will not be productive, innovative and profitable enough to be competitive in the (globalising) [global] economy. The lack of ICT skills has a major effect on, business productivity, and it affects the feasibility of a business's operations (Schofield, 2009). On this point, Thloaéle (2008) argues that “*the lack of skills at the right place will cost the economy*”, implying that if any company lacks relevant skills, it may end-up producing poorly finished and poor unsalable products. If organisations cannot contribute towards the improvement of ICT skills in their workforce, then economic participation may not be achieved, nor will they be contributing to the solution of the unemployment problem. The local companies are competing for skills that are wanted by international organisations, and the problem in South Africa is that organisations lack those ICT skills (Breier & Erasmus, 2009). As a result, the companies are importing skills, or outsourcing their job requirements from other countries (*ibid.*). In the end, because the skills are expensive, the cost of delivering the technology becomes expensive. For example, when companies either import skills, or outsource functions, local human capital development is

undermined, and domain unemployment prevails as the industry is populated by foreigners (Mawson, 2010).

ICT skills therefore, are a significant component of innovations, development, economic growth, and as such, their development should be prioritized if sustainable development is to be attained. With this realization, national governments such as the government of South Africa are initiating programs to develop technical skills (including ICT skills), from the basic national education sector, which includes public schools, to technical training organizations (SAGI, 2009).

1.3 Background of the Research Problem

As set out in detail in chapter two of this thesis, the South African government has set up many programmes and policies to advance the development of technical skills in South Africa. Despite these initiatives, media, government and academic reports are rife on the continued shortage of critical skills. Scarce professionals include chartered accountants, scientist, Engineers and IT specialists (Calldo, 2007). To this effect, the Department of Labour (DoL) predicted in 2008 that by 2012 there would be a shortage of “*over 34,000 engineers, technologists, draughtspersons and technicians...*” in South Africa (DoL report, 2009). The 2007 and 2008 survey results for ICT skills shortage estimated a further 20% skills shortage by 2010 (Schofield, 2009). In addition the Information Systems, Electronics and Telecommunications Technologies Sector Education Training Authority (ISETT SETA) also anticipated that in 2009 the demand for ICT skills would exceed the supply by 24% (Dhlamini & Rodney, 2009).

Whether this prediction had been confirmed in 2010 had not been established during the time of writing this thesis. What is clear, however, is that ICT skills development programmes remain highly important in the national employment creation and socio-economic development drive. Therefore, a continued urgency towards the development of ICT skills is apparent. It is reported that South Africa is producing around 1400 engineering graduates per year (Star, 2009) by comparison to a predicted deficit of 34,000 engineers in 2008. Estimates were even worse for the ICT sector: it is reported that South Africa was facing a shortage of over 70,000 IT professionals in 2009 (Mitrovic, 2010). The paradox is that whilst the schooling system is expected to produce trainable graduates, the pass rate in science and mathematics (the major subjects needed to qualify for studies in computer science, electronics and engineering degrees) had dropped in 2009 (Mawson, 2010). By implication, South Africa will have an even smaller supply of entrants into the technical academic training stream in the near future where more technical graduates are needed. Another concern is that more than half of all graduates with ICT qualifications are leaving the country within a year of their qualification, which in turn escalates the shortage of skills (DTI, 2009).

1.4 Problem Statement

Without access to ICT, and ultimately, ICT skills, it is difficult for the adversely affected citizens to benefit from life-improving efficiencies offered by ICT. Despite the efforts to develop ICT skills, a lack of access and limited use of ICT among the majority of South African citizens persists, with adverse implications on equitable development and growth (Seymour & Fourie, 2009). Unfortunately, South Africa continues to experience a high rate of unemployment, limited access to ICT facilities and ultimately, a shortage of ICT skills among the majority of the poor, especially in rural areas (Schofield, 2009).

1.4.1 The problem of limited access to ICT

Access refers to *“the ability to gain reliable physical access to ICT resources at reasonable levels”* (Alao, 2010:p.13). Access to ICT then means that a person is able to use the cell phone, computer and other technologies as a common individual working tool. Access to the Internet enables the user to take advantage of a range of communication, information seeking, interactive or educational activities (Tlabela et al, 2007). Lack of access to Internet denies a person the opportunities offered by these benefits (Bridges.org, 2005). For example, if a person has a computer but does not have access to the Internet, there are very slim chances of using it and it cannot be used to obtain information from elsewhere, for example on current affairs, weather conditions or entertainment.

Further, a business without broadband, wireless networks, instant messages, desktop search software and online banking will not be efficient. If this situation exists in a large proportion of the business community it could have a negative impact on economic growth rate and GDP. Additionally, any business without integrated communication systems will experience communication break down (communication will be slow) with both customers and staff, which will result in bad customer service (Cilliers, 2009). As an illustration, if the business has a project and the employees do not know its goals and objectives, the project will fail since the communication has not been clear. On this point, the problem is that if the society does not have access to TV, community radio and an Internet connection, it remains difficult for them to get useful information about community services, developments and new knowledge.

Whilst access to ICT is clearly a basic requirement to building ICT skills, it is unfortunate that the majority of South Africans in underdeveloped areas lack access to computers and Internet. In effect, *“even though the current emphasis is on the new ICTs such as computers, Internet and mobile phones, most rural areas still have no access to even the old ICTs such as television and radio”* (Chilimon, 2008: 293). Further, a study by Morolo (2007:30) reveals that *“the vast majority of South Africans, living in developing and rural areas do not have access to computers and are therefore mostly computer illiterate”*. As if this was not bad enough, Chilimon (2008) and Molawa (2010) also find that access to ICT in certain area of

South Africa is limited: the rural areas are faced with poverty, lack of ICT facilities, and often limited access to power. Some areas do not even have access to basic services. These lacks are also couple with the challenge of low levels of literacy (among people). All these things prevent people having access to information on learning and job opportunities (Flora, 2010). One of the problems encountered in the rural areas of KwaZulu-Natal is that even if institutions have telephones, they are frequently out of order and because of this situation some of the clinics do not have access to the intranet (*ibid.*).

One of the biggest problems in South Africa is limited availability of computers at home and at schools, though the magnitude of the problem varies according to the area and context. For example, "*the majority of schools in rural areas lack basic resources such as classrooms, desks, and ICT resources*" Mlitwa et al (2009: 2). There is also "*a lack of hardware and appropriate software, insufficient training and lack of support, computer courses that are irrelevant for the learners, and negative attitudes towards computers*" (Asah, 2010:1). In particular, rural schools in the Eastern Cape (Evoh, 2009), KZN and Mpumalanga (Ngcobo & Herseman 2007; Nonyane, 2011) lack computer hardware, software and access to basic services such as work opportunities (SA, 2009), electricity (Fourie, 2007) and telecommunication services (Mphindi, 2008; Oyedemi, 2009) among other things. Most of these areas "*still rely on the old fashioned modes of communication like writing letters or word of mouth*" (Ranga et al, 2010:1). For example, "*over 670 000 households in South Africa do not have access to telephony*" in 2006 (Parliament, 2006), and there is frequently limited private access and use of information and computers in public settings such as libraries and telecenters (SA, 2009).

A number of rural citizens have cellphones but they can not access networks easily as there is a limited broadband (Coetzee, 2009). For example, in Transkei, the mobile phone coverage is very close to complete, but one might need to walk up a hill to get a good strong or transmission signal (mybroadband, 2006). An even more disappointing statistic is that "*Internet access in most African rural communities still remains a dream*" (Masonta, 2010:1). The reality is that several rural areas of the Eastern Cape are yet to be connected to electricity, and the broadband availability in this area remains severely limited (Sibanda, 2009). On this point according to the Tlabela et al (2007) report, the best Internet access exists in provinces with highest average income levels. For example, Internet access is widespread in Gauteng (25.2%) and Western Cape (33.8%). Whilst this statistic is much lower by international standard, it is considered to be twice the household access levels of the provinces, which is a disturbingly gloomy reality about the rest of South Africa. The sad part is that the majority of people that do not have access to ICT at present stand little chance of access in the near future. This illustrates the gap in ICT access between urban and rural areas. The chances of personal computer ownership in these disadvantaged rural areas also remain slim.

1.4.2 Limited income and affordability of ICT facilities

Even if people have access to ICT, they also need to have a sustainable income to maintain the ICT resources. There is a great difference between the generally low wage level and the very high costs of equipment and services (Pauw, 2002). For instance, some individuals do not afford to maintain a cell phone, computer or software while they have access to them. In such a case, if a person does not have money to buy airtime that means s/he will not be able to send an sms, an mms or chat on popular social networks. A major concern is that people have the telephones and computers but the Internet usage is extremely expensive to be reachable (Alao, 2010). The cost of computers is still beyond the purchasing power of the majority of individuals in developing countries, even more upgrading as a result of technical development (Alao, 2010). This has a bad impact on people because it does not allow them to enjoy the benefits of ICT.

Affordability is the main issue for those who are still not connected to the Internet by computer or cell phone, because of low incomes earned. Due to poverty and unemployment, the majority of South African citizens cannot afford the high access charges of ICT (McPhie, 2007). The costs of telephone calls is high, it directly hinders the effective use of wired and wireless (mobile) technologies. Even where there is some access to the Internet and broadband (Marais, 2009; ITWEB, 2010), unemployed persons find it difficult to pay for the electricity needed to run their equipment (Dlodlo, 2009), Internet connectivity and its cost present a serious challenge to many people in the country particularly those in rural areas. Moreover, there is the issue of the high costs of sustaining ICT programmes that have already been initiated (Tshabalala, 2010). The research continues to show that there is a lack of ICT investment in the rural areas (*ibid.*) the assumption is that those who do not have ICT facilities and are without any means to generate an income will not benefit from ICT.

It is true that organizations have legal obligations to protect data especially customer data (Tilya, 2007). If an organisation cannot afford to service its ICT equipment such as printers, faxing machines, computers etc., it may lose information and suffer from reduced productivity. Access to telecommunications services is improving in a broad sense in developing countries, thanks to the spread of mobile technologies. However, not having the means to exploit these facilities tends to reduce the potential benefits that might have been gained in poor rural areas (Worldbank staff, 2007). A report by Strydom (2011:1) indicates that the “*cost of bandwidth in South Africa is still extremely high and the infrastructure to grow broadband is sorely lacking*”. Unfortunately, the majority of people in rural areas are unemployed, and they are struggling with poverty, and given the high costs of installation, connectivity and maintenance of information technology systems, it is not surprising that only a few of them can hardly afford computers and the Internet (Flora, 2010).

1.4.3 Limited awareness of ICT, its uses and benefits

Awareness means that people have heard about ICT, and they are aware of, or alert to its benefits. The sad reality however, is that the majority of people in the rural areas are unaware of the socio-economic benefits and incentives that ICT can bring to their lives if they have access to computers and the Internet (Alao, 2010). This situation might be caused by limited information on the availability of ICT facilities and opportunities, perhaps due to the fact that ICT products are not exhibited or advertised in their areas. On the levels of awareness, research by Morolo (2007:11) indicates that “*most of the people in the rural areas did not know what a computer could do or had to offer them*”, with Modimogale (2008) arguing that most of the individuals in rural areas have not heard about ICT. For example, these individuals have a cell phone or a computer but they do not know about the value-added efficiencies it can also offer (*ibid.*). Such a person only uses a cell phone to make and receive calls, being unaware that s/he can send an sms, mms or chat on MixIT, Twitter or Facebook.

Similarly, a study by Nonyane in 2010 found that the majority of unemployed people who lives in rural areas, were not even aware that they can access the Internet from their cell phone to search for jobs (Nonyane, 2011). They were also not aware that they can use their cell phone to access their banking facilities, pay municipal rates and buy electricity electronically: all facilities that would make their lives much easier. Such a person can do electronic banking to transfer money instead of going to the bank and waiting in a long queue. In addition, if they have personal computers they can use a 3G card to access the Internet. Therefore, the majority of people in underprivileged areas are not aware of ICT benefits. For example, there is a limited awareness of the ICT applications and the benefits they offer in saving time and improving operations, management, and marketing (Elbahar et al, 2008). Further, the e-skills summit in 2010, disclosed that there is low awareness and understanding of the potential benefits of ICT services in rural communities (Tshabalala, 2010).

1.4.4 Limited skills to use and benefit from ICT

Even when a person has physical access to computers and the Internet, can afford it and be aware of various ICT opportunities, without the necessary skill to use these facilities they are still not able to exploit the full benefits of ICT. Having facilities is not enough – one still needs to know how to use them. For example, without computer and Internet skills, chances for a person who is registered in a distance education institution, to successfully participate in online distance education programmes are almost non-existent, even if they have full access to networked electronic facilities (Mlitwa, 2011). Without basic skills to use network facilities such as the Internet and the new programmes associated with 3G mobile phones, individuals (people at home, teachers and managers) can be stuck in time consuming traditional and

manual ways of doing banking, or writing letters whilst carrying their sophisticated ICT gadgets with them (Nonyane, 2011). It is very probable that they would still not exploit the benefits of electronic banking, the use of e-mails or use the Internet to access e-Health, e-Government or e-commerce services. Further, a person without ICT skills is least likely to get an ICT related job due to a lack of competency, even if a multitude of ICT related jobs are available. Worse still, is that a lack of basic ICT skills can hold people back from progressing to higher levels of learning, and from accessing related career opportunities (*ibid.*). In effect, most tertiary courses and jobs in the business world require some knowledge of the use of computers and the Internet. Thus, in this global information age, it is very difficult for someone who is not computer literate to successfully complete his or her tertiary studies in or out of the ICT field or find ICT related jobs.

This means that it is important for people to have adequate ICT skills because in most cases it is a requirement for ICT related jobs. For example, in the banking sector, high school graduates need to have an International Computer Driving Licence (ICDL) and mathematics skills to become a bank teller. Even the non-sophisticated ICT require a formal level of literacy and training in order to yield proficiency on the part of the worker, and a lack of such skill puts matriculants in a disadvantaged position career-wise. It also has negative implications in terms of the supply of basic skills for the sector.

The insufficiency of ICT skills is compromising the South African ICT education training programs (Nonyane, 2011). For instance, the South African education system itself provides low level opportunities of access to ICT skills (Akoojee at al, 2007). Only about 14 percent of the country's public schools have access to computers as teaching and learning aids (*ibid.*). As a result, the supply of ICT skilled students to the higher education sector is limited. A bigger problem is that the relevance of skills output in tertiary institutions is also questionable. For example, the curriculum and methodology in Universities fall short of meeting industry ICT skills requirements (SA e-skills council, 2008). In effect, the ITWeb report explains that a lot of new graduates are coming into industry with inadequate skills (*ibid.*). The industry is also "*not proactive enough in investing in ICT graduates via bursary programmes*" (Kayle, 2009:1). One of the reasons why, there are few ICT skilled graduates in the country is because the industries prefer to do in-house training than starting from scratch.

If there are fewer graduates, it means that the business operation excellence will not be improved and it will not be possible to sustain the development of the business. As a result, the business may not gain competitive advantage. It will not be innovative (creating new things) because it does not follow the trend as technology advances almost everyday. On this note, if the ICT graduate(s) output does not increase, then a shortage of ICT skills will certainly be experienced in the future. This is likely to perpetuate unemployment, poverty and

economic stagnation. According to Roodt & Paterson (2008: 198) "*the greatest ICT shortage will be experienced as a result of a demand for ICT managers*". However, ICT managerial skills require experience, which is hard to get. Without managerial skills in ICT, there will be less capacity for strategic thinking, which is required to make informed decisions. Also there will be a lack of creativity and innovation in the organisation.

During the period 2006 - 2011, there was very little formal support being channelled into the development of ICT skills in rural areas. At that time, there was also lack of knowledge and skills to utilize new ICT (Ngcobo & Herseman 2007). There was also no local language content in most programs provided on the Internet. There was a lack of fixed-line telecommunications infrastructure (ibid.).

There are huge differences in the quality of education that different classes of people have access to. A study by Tire and Mlitwa (2008) reveals that the education in rural areas is not supported very well as compared to urban areas. For instance, rural areas are not considered as attractive teaching posts even when the schools are new (idea-connection, 2011). There is a need for experienced and skilled teachers, but the quality of output from training centres remains questionable, if not limited (Ranga et al, 2010). The problem is that, the learners do not get practical and creative curricula in primary schools that can help to stimulate learning. This is different from the urban areas where there has been a steady growth in terms of ICT development support (James et al, 2003). And the study indicates that at times rural people lack the ICT skills required by businesses, partly because learning facilities they have experienced are relatively poor when compared to cities.

The majority of the employed population in the Eastern Cape falls within the category of low skilled jobs, which highlights the existence of insufficient skills. However, the use of the modern technologies is not possible without having an appropriate level of skills, e-skill as they are frequently referred to. For instance, some research done by SAFIPA indicates that one of the problems in South Africa is the "*High Rate of illiteracy and the minimum opportunities for exposure*" in ICT field (SAFIPA, 2010). Further, the research also confirms that it is this lack of computer skills that prevents people from using computers and the Internet (Service-publication, 2010). The situation is worse for residents in the rural areas, they lack the basic skills to access ICT platforms (i.e. Internet kiosks) (Oyedemi, 2009:162) and the majority of them have limited resources. As an illustration, the Department of Communication reported that many people do not have the technical skills that are needed to benefit from ICT (DoC, 2011). There is a significant shortage of highly qualified professionals and teachers in ICT to accelerate economic and academic development (Ng'ambi, 2006). In short, the majority of people in rural areas have no skills to operate or even demand ICT facilities such as computers (Oyedemi, 2009).

1.5 Research Problem

Despite the benefits of ICT, the majority of people in economically depressed areas remain excluded. The basic part of the problem is that the majority of people (mostly in rural areas) lack access to ICT, without which, they cannot benefit from its efficiencies. The chances of personal computer ownership and Internet connection in these disadvantaged areas also remain slim.

Secondly, the majority of people in under-developed areas are unemployed and poor. Thus, given the high costs of acquisition, connectivity and maintenance of information technology systems, expense also becomes a major hindrance to ICT usage. Besides this problem however, people still need to be aware and appreciate the potential that ICT offers to their lives if they are to use it. Unfortunately, most of these adversely affected people lack basic awareness and therefore, cannot use that which they are not aware of (even in cases where there is access). For the purposes of this thesis however, access and awareness are secondary to skill. The basic skill is the most significant factor, because unless one has a practical level of skill – one cannot access, use, and benefit from the advantages of ICT (even if access and cost are not a problem). For example, without ICT skills, people cannot use basic tools to improve their lifestyles. They cannot be employed in the sector or generate employment for others and ultimately contribute towards poverty alleviation. Unless the status quo is redressed, the digital divide where the minority enjoys high standards of living (associated with accessing the advantages of ICT), and the majority does not, will remain firmly in place.

Further, organisations in the sector will also lack a productive workforce, with a negative impact on national innovations, economic development and growth. It is on this basis therefore, the challenge of ICT skills shortages in the rural districts of the Eastern Cape, South Africa – are prioritised in this thesis.

1.6 Research Objective

Given the national priorities on ICT skills and the existing skills development initiatives, one would expect a more stable supply of technical skills in South Africa. It is clear from the research problem however, that a lack of skills remains a hindrance to the access and use of ICT among the majority of South Africans. In the light of massive unemployment on the one hand, and the persistent skills shortages in the ICT sector on the other, the aim of this study, is thus to understand the magnitude of skills shortages among career aspirants in under-developed areas of the Eastern Cape. The goal is to identify the gap between policies on skills development and the actual implementations, so as to inform corrective measures. To address this objective, the main research question is presented in section 1.7 below.

1.7 Research Question

What is the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape?

1.7.1 Sub-questions

What is the career status of the post matric graduates?

Are the post matric graduates aware of ICT careers?

Are there any ICT training programmes in the rural areas?

What is the level of skills in the selected rural areas?

Why there is limited access to training opportunities in the rural areas?

How relevant is the skills output from tertiary into the ICT field?

The terminology used in this thesis is defined in section 1.8

1.8 Terminology of the Thesis

1.8.1 ICT skills

In this thesis, ICT is classified as any communication or electronic devices such as radios, televisions, cellular phones, computers, networks, satellite systems and related software, among other things. In general, ICT is used to access, develop and exchange various forms of data – electronically (OECD, 2006). Skill is the ability to perform a task to a predefined level of competence (Frogner, 2002). It is like a tool required before any attempt is made to try and fix the problem (Wilson, 2008). Therefore, ICT skill refers to the effective ability (competency) to use ICT devices, systems and tools to develop, manage, store and exchange different forms of data and information, for individual, social and commercial purposes (Nonyane, 2011). For the purpose of this thesis, ICT skill is measured in terms of an individual's ability and level of competency to use ICT tools, applications and systems such as web browsers, electronic Mail (e-mail), a word-processor, a spreadsheet, database, and presentations (Nonyane, 2011). ICT skills can be categorised into three levels of competencies: basic users, intermediate and advanced skills.

1.8.1.1 The basic skill

A basic user has a minimum competency to use a particular tool or system. Minimum skill refers a level where a person lacks adequate training, experience and confidence to use a computer and its related applications. In this case, a person would know how to start and shutdown a PC, and has the ability to use input devices such as the mouse (to interact with elements on the screen) and keyboard (Nonyane, 2011). Moreover, this person has the minimal level of competency to use computer applications such as a word processor, spreadsheet, and PowerPoint/Keynote and database tools to perform daily tasks. In most

cases, such skill is carried out under full supervision of a fully competent person. A person with this level of skills can create a new document, enter text, and save it; open and edit existing documents. But s/he may not be able to send emails, modify, format and use styles in the document.

1.8.1.2 Intermediate user

The intermediate skill is a moderate level of competency where the user has basic ICT skills but still need advanced and specialised skills. This individual has the ability to communicate with others using a computer through electronic mail (email) (Wang & Woo, 2007). Also the user has the functional knowledge of word processing, knows how to use a spreadsheet or database, how to install (software and operating systems), and how to navigate through a computer's file system (*ibid.*). An individual with this level of skills can install computer software, knows how to customize toolbars, import and insert graphs, create templates, modify, use styles and customise them, albeit, under minimum supervision. However, this person cannot perform specialised ICT tasks such as the development, design and repair of ICT tools, software and systems due to a lack of specialised training and in the work place.

The segment of intermediate skills has generated the largest employment opportunities for people in the country (Tlabela et al, 2007). However, the ICT industry cannot employ people unless they have basic and intermediate skills, and even then, a person will still need in-house training for specific ICT programmes so that the job can be done well. The majority of companies depend on intermediate skilled users because they know that it will be easier to train them for training will not have to start from scratch. Both the public and private sector are operating at this level. Intermediate skills play a key role in the process of innovation of the labour market and economy. However, the majority of the intermediate users are not competent enough to use extensive mobility such as (wireless network and mobile technology). In this case, the organisation cannot contribute fully (or as quickly as one dominated by staff with advanced skills) towards economic growth, for the quality of ICT skills boosts innovation.

When it comes to new ICT, it is important for an intermediate user to acquire the capacity to improve his/her skill and become motivated through training and discussions (knowledge sharing) with others to a level where s/he can make decisions about her/his own development. In the case of students, some cannot participate fully in distance learning for they need to work under-supervision. Similarly, in the workplace a person cannot work from home or anywhere using mobile telecommunication technology if that person cannot perform all the tasks independently.

1.8.1.3 Advanced user

The advanced user is more knowledgeable than intermediate user and has excellent understanding of the technical aspects of ICT tools (CIO forum, 2009). The difference is that whilst the intermediate user may be categorised as an apprentice, the advanced user has advanced training and extensive work experience of ICT tasks, to the level of a specialist in terms of her/his competencies in the field (*ibid.*). Further, a person at this level of competence can rectify software conflicts and repair computer hardware, independently (Nonyane, 2011). As a specialist, the advanced user can design, develop, operate and maintain ICT systems confidently. These specialists are usually found in fields such as software engineering, programming, ICT project management, design and architecture (Dwolatzky, 2010; Nonyane, 2011). General ICT technicians also fall under this category (*ibid.*).

The advanced users have the potential to contribute to the economy in ways that may ultimately contribute towards development and reduce unemployment (Alao, 2010). Unless the country has develops technical skills and builds the physical infrastructure needed to accelerate economic growth, the country will not be able to attract more investment, make better use of technology, and reduce unemployment. Innovation is at the root of economic development and growth, and central to maintaining the competitiveness of the nation into the future. However, the organisations cannot be competitive enough if they do not have the experts who do not reach the advanced level of skills. Many organisations are seeking out advanced users because of their competency. In reality, the organisations are highly dependent on skilled and highly skilled labour. Moreover, an organisation without highly skilled individuals cannot be as productive as it would wish, which has a negative impact on its capital.

1.8.2 Skills shortages

Skills shortages “*is an amorphous concept that encapsulates many specific components, but at the heart of the matter is the idea that the demand for certain skills exceeds supply*” (Reay, 2010: 1). In other words, it “*occurs when the demand for workers for a particular occupation is greater than the supply of workers who are qualified, available and willing to work under existing market conditions*” (Shah & Burke, 2003). In this thesis, it refers to a lack of adequately skilled individuals in the labour market and to the short supply of appropriately skilled individuals, due to a poor education system (Breier & Erasmus, 2009). All levels of ICT skills are important to the ICT sector and to the development of the economy in South Africa. However, the major focus in the country is on the technical skills shortages (Nonyane, 2011). For example skills needed include systems analysis; systems design architecture programming or development and engineering. Currently, there is a shortage of graduates in the ICT field (Pandor, 2009). Skills shortages have become known as a key barrier to

innovation in the ICT sector (Ntombovuyo, 2005), which is why this subject is addressed in this thesis.

1.8.3 ICT sector

The ICT sector is defined as “*a combination of manufacturing and services industries that capture, transmit and display data and information electronically*” (Hasan, 2007: 5). It is a cluster of the communications sector, including telecommunications providers, and the information technology sector which ranges from small software development firms to multi-national hardware and software producers (Kramer, 2007). It is largest sector employer of ICT professionals.

1.8.4 Access

In order to understand the benefits of ICT, one of the necessities to be provided is access. According to a Dictionary (2008:1) access is to have “*a freedom to approach, reach, enter, or make use of something*”. Access can be recognized in terms of physical access to an ICT device (Olatokun, 2009:482). In this thesis, access refers to the hardware and the underlying communications (Nyirenda et al, 2010). It is defined as the right to obtain, retrieve and manipulate (information) from a storage device (Dictionary, 2008). It is seen as an opportunity to use, and to have ICT tools or resources as a basic in everyday use. This means, these affordable ICT tools should be available at anytime to everyone (students, educators and people at home) when needed. Access is to “*know about and knowing how to collect and/- or retrieve information*” (ETS, 2007:12). Therefore, it leads to innovation, teaching each other, transferring of skills and also to participation in the knowledge economy. For instance, access to email offers better business opportunities.

1.8.5 Use

Use is the ability to exercise or manipulate something. For the purpose of this thesis, use refers to the practicing ability of a person to fully operate a computer, phone, radio and television. Also, it refers to a person who is actually utilizing an ICT tool (Olatokun, 2009). The use of computers and the Internet has turned into a common requirement for students and workers in the field of ICT. For example, the use of Internet in rural areas can enhance the ability to communicate with other communities about social and economic advancement in the country.

1.8.6 Career aspirants

A career aspirant is a person who can articulate a cluster of needs, motives and behavioural intentions with respect to different career fields (Reid et al, 2009). It also refers to people’s dreams or desires for future employment and their wish to accomplish achievements in a particular field (Ramashamole, 2010). In this study, career aspiring individuals refer to grade 12 people who are ready to work and enter university to pursue their careers.

1.8.7 Under-developed area

An under-developed area is defined as an “*area that has a low level of economic productivity and technological complexity within the contemporary range of possibility; improperly or insufficiently developed*” (Dictionary, 2008:1). In this research, an under-developed area is characterised by very high levels of socio-economic deprivation (Pyle, 2006). This area has a large poor population, a low level of unemployment and the people have poor or non-existent ICT skills. Under-developed areas are found particularly in rural areas.

1.9 Contribution of the Research

The contribution of this research is envisaged as (but not limited to) the following:

This research contributes by expanding the conceptual, theoretical and practical understanding of factors related to ICT skills shortages in South Africa (and the Eastern Cape in particular), for the benefit of stakeholders across academic, policy and development circles. For example, it could help by advising those who wish to improve government policies in this area. The research could also inform practice in the area of introducing and developing ICT facilities in order to build an inclusive Information Society in rural areas.

1.10 Delineation of Research

This research was conducted in the Eastern Cape Province (Centane and Butterworth location) – thus findings were limited to that area -thus minimising generalisation. The population of this research consists of employed and unemployed grade 12 graduates of 18 to 35 years of age, high-level management in the training and development organisation and the local employers of ICT graduates.

1.11 Ethical Considerations

In line with the ethical code of behaviour, approval was obtained from the university to conduct research with social subjects. Maximum effort was made to comply with ethical practices in a number of ways. Firstly, participants were clearly informed of the aim and process of research. Participants were informed of their right to pull out from the study, should they no longer feel comfortable to continue with the interview, though none of them found a reason to exercise this option. They were also assured of the confidentiality of their identities, in the publication of information they provided. In this respect, the names of participants are withheld in the findings. No participant was coerced, deceived or subjected to inhumane experiences during the investigation. To the best of my ability, I therefore declare the current study to have been fully compliant with ethical code of behaviour in research.

1.12 Structure of the Thesis

Chapter One: Introduction

Chapter Two: Literature Review

Chapter Three: Theoretical Framework

Chapter Four: Methodology

Chapter Five: Discussion of Findings

Chapter Six: Conclusion and Recommendation

1.13 Conclusion of the Chapter

This study, including a motivation, the problem and questions are introduced in this chapter. The main point of discussion is that ICT is a significant aspect of all areas of modern living. It enables efficiencies in communication, and is a catalyst for innovations. With this realisation emerges the significance of the skills component, in that without the know-how, it is difficult for anyone to exploit the benefits of ICT, be it for private, social, work or educational purposes. Technical skills are a building block of innovations and without them, the national productivity and innovative capacity remains threatened. Building on this insight, the related literature is reviewed in chapter 2.



CHAPTER TWO

2 LITERATURE REVIEW: THE MAGNITUDE OF ICT SKILLS SHORTAGES

2.1 Introduction

This chapter reviews literature on the state of ICT skills shortages in the rural areas of the Eastern Cape in South Africa. It also identifies gaps between national policies on skills development and actual implementations. Rural areas are “*characterised as information poor and information provision has always been a central component of rural development initiatives*” (Ngcobo & Herseman, 2002:715). For example, people from rural areas have often been under-informed of their rights, government schemes and of extended services available (Akinsola et al, 2005; Carnegie UK trust, 2007). A lack of access to information, ICT resources and a lack of ICT skills in many rural areas are cited as major factors of this challenge (Balanskat et al, 2006; Akinsola et al, 2005).

2.2 ICT Skills Shortages

It is argued in chapter one that skills shortage is “*a difference between the skills available and the skills that would be available if all persons developed their skills optimally from a macro point of view by education, training and experience*” (Borghans et al, 1997:47). Clearly, a high demand for ICT skills, and a low supply of ICT skilled people in the South African (SA) labour market (Roodt & Paterson, 2008; Didero, Husing & Korte, 2009), suggests a shortage of ICT skills in SA. ICT skills in demand include those required for the following positions: business analyst, systems analyst, software developer, project managers, business intelligence, knowledge management, programmers, and systems design/architecture networking and infrastructure, testers, DBA/Support, Web Design/Development including engineers (Roodt & Paterson, 2008).

In 2008, the South African First National Master Scarce Skills List found that over 37565 ICT workers were needed in the ICT field in South Africa (Du Toit, 2008:1). ICT skills identified were “*6675 ICT managers; 3 025 call or contact centre managers; 710 ICT trainers; 4320 ICT sales professionals; 5 555 ICT business and systems analysts; 35 multimedia specialists and Web developers; 6185 software and applications programmers; 95 database and systems administrators and ICT security specialists; 6050 ICT network and support professionals; 3790 ICT and telecommunications technicians; 1125 ICT sales assistants*” (*ibid.*). According to a career junction report (2011) about 60% of software developers, 13% of system and network administrators and 11% of business analysts were needed (CJI, 2011 & Muller, 2011). This means that developer skills are highly in demand in South Africa (GBN, 2011), which, without reliable supply, perpetuates the ICT skills shortages, with a negative impact on the potential and growth of the ICT industry. In desperation, companies had even turned to advanced social media to advertise new jobs. For example, many jobs are

advertised online in what has become known as the open market, though the majority of jobs are found in the hidden job market. Open market – is the web career portal such as Pnet, job space, skills portal, career junction and best job South Africa. In March 2011, more than 150 000 jobs were created in Johannesburg through the public works programmes (Fin24, 2011). Despite these efforts however, organisations were experiencing difficulties in finding the adequately skilled and competent people (skills portal, 2011), due to the scarcity of ICT skills in the local labour market (staff reporter, 2009).

Best jobs in South Africa advertised 2446 jobs in engineering and technical, 1524 computers and telecommunications, 149 arts, design and media. See below Figure 1: Best Jobs South Africa, ICT, Advertisements for Jobs

Oil Rig Jobs South Africa Positions available for people with or without experience. Apply now. www.oil-rig-job.co.za
Get Personal Loans Online We Have Loans From R4,000-R100,000 Compare Quotes & The Best Deals Now www.justmoney.co.za/Pe
Work & Study in Australia Take your Bachelor Degree in Sydney And work 20 hrs/wk while you study Navitas.com/Work-Study-Australia
Eskom Jobs Find Eskom Jobs here, the most complete job site online. indsaad.co.za/Eskom

Job-seekers
 Job search
 Employer search
 Add your CV
 Update CV
 Remove CV
 Set-up job alert
 Modify job alert
 Remove job alert

Employers
 New account
 Employer log-in
 Control panel
 Post a job
 CV search
 Employer F.A.Q.

Resources
 F.A.Q.
 International
 Privacy policy
 Contact us

Ads by Google
[Jobs at Eskom](#)
[Jobs in Durban](#)
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SOUTH AFRICAN JOBS BY CATEGORY

▶ Accounting & Finance	1207	▶ Travel, Leisure & Tourism	186
▶ Arts, Design & Media	161	▶ Logistics & Transport	438
▶ Clerical & Administrative	937	▶ Human Resources	370
▶ Computers & Telecomm.	1593	▶ Legal & Consulting	308
▶ Customer Service	489	▶ Management	1270
▶ Education & University	106	▶ Marketing & Sales	1765
▶ Engineering & Technical	2501	▶ Scientific	170
▶ Healthcare & Medical	883	▶ Skilled labour & Trades	1100
▶ Hospitality & Catering	396	▶ Other	2270

SOUTH AFRICAN JOBS BY LOCATION

Figure 1: Best Jobs South Africa, ICT, Advertisements for Jobs

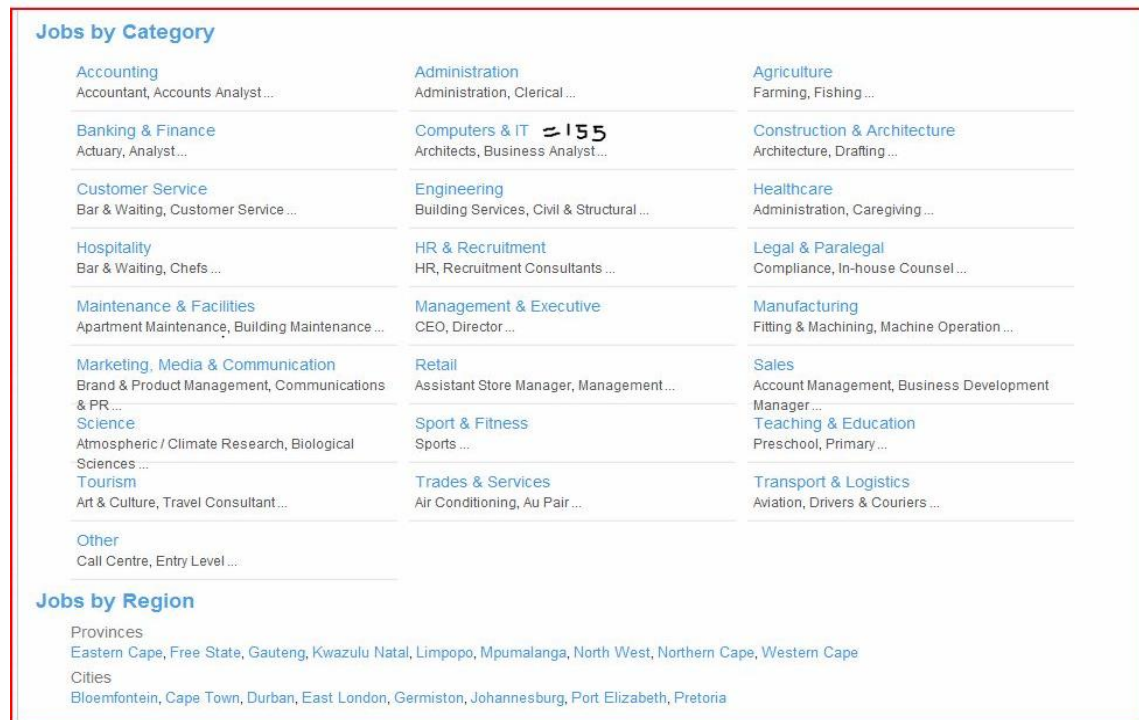


Figure 2: Job Space – ICT Advertisements for Jobs

Furthermore, Job space advertises jobs for different industries. For instance, in August 2011 at job space 155 jobs were advertised in the computer/IT category (Figure 2).

Whilst different categories of jobs are advertised for different industries in most websites, many are ICT related of which the majority, cannot be filled (Harris, 2011). Each month the number of job openings increases, which highlights the urgency. This urgency provides a motivation for an investigation into the level of ICT skills shortages in South Africa.

ICT skills shortage therefore, is a national concern both socially and economically, in a number of ways. Firstly, people who lack skills are unable to exploit employment opportunities, in order to escape from poverty and unemployment. Secondly, lack of skilled labour holds back business productivity, competitiveness and ultimately, economic growth (Graff, 2011). To this effect, the IT industry growth rate keeps on declining because of the decrease in the number of students who are pursuing ICT careers (Harris, 2011). In line with this statistic are reports of an extreme shortage of intermediate skills, mainly artisanal skills (SA Info news, 2011). For this reason, the business, government and labour have put into place training programmes for 30 000 artisans in 2011 as part of skills development and education (Semon, 2011). At the same time, companies are increasingly changing their recruitment strategies, and moving towards electronic media to leapfrog their competitors in the recruitment of the scarce skills. Whilst the magnitude of the problem is clear, scarcity of skills also indicates a growth in the significance of, and need for, IT products and services in society and in the economy. In other words, belief in the promised benefits of ICT and reliance on its potential as a catalyst for innovations in the modern age is undeniably escalating.

An ICT skills shortage in many areas of the labour sector has become an emergency in South Africa. This has been confirmed in the National Skills Authority (NSA) conference in Bloemfontein in March 2013, where several commissions discussed local economic development, skills development, business opportunities for cooperatives, SMEs and youth development (van Wyk, 2013). In the conference, the biggest concern was that some graduates and matriculants were unemployed due to a mismatch of skills (Johnston, 2011; van Wyk, 2013). For example, the report showed that 70% of the unemployed are mainly the youth, and most of them are women. Therefore it is important within the labour market to understand demand and supply. This will help to guide and train South African youth on careers where there is high demand. It will be fast for them to get a jobs and possible to increase the economy.

Some of the South African companies are finding that few graduates have the necessary skills for service occupations. There is a shortage of suitable graduates in the key occupations such as finance, accounting, engineering and business represents a major problem for multinationals in South African companies and countries policy makers (Farrell, Laboissiere & Rosenfeld, 2006; Dongier & Sudan 2009). The shortages of skills mostly occur because of a mismatch between technology advancement and what is taught in training institutions. For example in sophisticated networks, the highly specialised skills such as business analysis and programming may need updating as innovations advance, yet the pace in training may not always be in par with technological development trends (Roodt & Paterson, 2008; Dahlman, 2009).

ICT skills shortages can hinder productivity and growth, or can undermine targets in the provision of education, healthcare or social services. In most cases, such shortages are not caused by an aggregate shortage of labour, but can be attributed to problems of mismatch between labour demand and supply (Fernandes & Mattoo, 2009; Johnston, 2011). Jobs remain unfilled despite high unemployment rates, because workers lack the relevant qualifications or skills, are reluctant to take up work in particular occupations or geographical areas, or have insufficient information about job opportunities. Alternatively (or in addition), employers are unwilling or unable to offer sufficiently attractive salaries or conditions to encourage occupational or geographical mobility (Mashinini, 2008).

In the North West province, there are experiencing a lack of health staff such as doctors, nurses and midwives (van Rensburg et al, 2008). The shortages is not only in health staff but also in disparities in the distribution, poor training capacity, skills and skills mix deficits, and weak management and supervisory systems (van Rensburg et al, 2008). Computerised health information systems can improve treatment of patients, management of health institutions, and provide up-to-date information for policy and decision making (Ruxwana et al, 2010). ICTs have the potential to promote rural development in a number of ways,

however, the level of knowledge and awareness from rural communities are not enough to realise development (Uys, 2006; Ruxwana et al, 2010). This is linked with lack of access to ICT and lack of ICT related skills for producing and using ICTs and ICT services.

In Free State province there is also a shortage of skills in the ICT sector. The Central University of Technology, Free State (CUT) partnered with MerSeta in a skills development project to support government in fighting skills shortages. In supporting this mission, MerSeta invested R10 million for project initiatives in Engineering Development at CUT that will commence from 2014 to 2016 (Skillsportal, 2013).

2.3 Basic ICT Skills as a Basis for Further Learning

The main argument in this section is that basic skills at high school level are a basis upon which the acquisition of the more advanced skills can be built. The key areas of ICT skills shortage are management, engineering, and IT. For instance, at the 2006 South-Africa-Ireland education conference in Dublin, it was mentioned that there is shortage of people who has ICT skills (Pandor, 2006). In this regard, the demand for computer/ICT skills is increasing in South Africa because organizations realize that computers and other ICT facilities can enhance efficiency (Arderne, 2008; Makhanu, 2010). In this era of technology, everyone requires ICT competencies to survive (Calitz, 2010). For example, the ability to use computers effectively has become an essential part of everyone's education. Skills such as bookkeeping, clerical and administrative work, stocktaking, and so forth, now constitute a set of computerized practices that form the core IT skills package: spreadsheets, word processors, and databases (Adomi & Kpangban, 2010). Businesses continually struggle to find qualified and properly trained Information and communication Technology (ICT) staff (Cameron, 2008; Sey & Fellows 2009; Ntetha, 2010).

In this case, the South African National Biodiversity Institute (SANBI) and Groen Sebenza, a Jobs Fund Partnership Project, has got on a major skills development and job creation pilot programme. Groen Sebenza is aimed at developing priority skills in the biodiversity sector to create sustainable job opportunities for 800 unemployed graduates and matriculants (SANBI, 2013). In terms of matriculant's graduates, ICT use allows the individualization of learning, which is a yardstick for growth and development of more advanced skills. The point point in this regard is that adequacy of ICT skills among matriculants would position for entry into ICT careers, and position these graduate to be trainable in further more sophisticated it related professions later on. Research highlights that information literacy skills are most or less addressed by high school graduates (Gullikson, 2006). For example, in schools where new technologies are used, students have access to tools that adjust to their concentration period and provide valuable and immediate feedback for literacy enhancement, which is currently not fully implemented in the rural areas school of South Africa (Cuban & Cuban, 2009). However, it appears that access to facilities does not guarantee the teaching of

complementary skills, but insufficient funds to get ICT tools in the high schools and libraries. For example, there are few of rural areas schools that have library and majority of them lack equipment such as digital video editing tools (Islam, & Murno, 2006). Improved secondary education is essential to the creation of effective human capital in any country (Evoh, 2007). Therefore, there should be collaboration between high school teachers and college educators; this can help students begin to fill the knowledge gap between high school and college curricula (Islam, & Murno, 2006). Without secure foundations of literacy and numeracy, our learners will never obtain the high level skills needed by a nation to address poverty and inequality for development and growth (Bloch, 2011a; Modisaotsile, 2012).

Information Technology (IT) is a subject offered to Grade 10-12 scholars (learners) in South Africa at selected schools. Currently, schools are experiencing problems in offering IT. The main reasons for the problems being experienced are the difficult and over-subscribed curricula, IT staff availability, under qualified staff and costly resources (Calitz, 2010)

2.4 Status of ICT Skills Shortages, Internationally

The increasing of ICT skills shortages are also a big concern internationally. For example, in OECD countries, the STEM (science, technology, engineering and mathematics) and computer science graduates are decreasing continuously. STEM has dropped from 22.7% in 2000 to 20.4% in 2010, this means that there is a short supply in the vast needed science and technology oriented fields (Stelten, 2013). Similarly, the homeland of computers - United States (US) has a shortfall of computing graduates. In 2005 US had output of 4.3% and in 2010 the number dropped to 3.1%. US have a shortfall of ICT skills in the areas like Java, .NET and C++ which may possibly decrease its economic growth. This means that it will take time to fill the vacant post for the ICT fields if the number keeps on dropping. According to Stelten (2013:1), "people with the high-end skills needed to invent and apply new technologies are in high demand the world over". Organisations are looking for people with multi-skilling capabilities including business communications and technical skills (Trevor, 2013). Therefore, US aimed to encourage more students to pursue computer science careers. They also have H-1B program that allows U.S. businesses to employ the foreign IT talent in specialised fields such as scientists, engineers, or computer programmers (Fiorina, 2013). Additionally, in 2012, Grant Thornton International Business Report (IBR) showed that there is a lack of 56% on work experience and 54% on qualifications in the ICT related careers (Hobart & King, 2013). In this issue, Companies such as SAP set up study-programs like Microsoft to increase the number of apprenticeships and internships by 50% over 3 years. And Hewlett-Packard plans to train 500,000 IT-professionals globally by 2015. The concern is that a lack of talent might dampen business productivity, ultimately threatening future growth and profitability (Hobart & King, 2013).

Similarly in Canada, companies are estimated to require between 126400 and 178800 ICT practitioners in a period of 5 years (2008-2015). The assumption is that by 2016, Canada's ICT industries would be in short of more than 100 000 workers because the skill shortages affects as many as 60% of all ICT businesses (Alberto Association, 2013). The same problem is also reported in countries such as New Zealand (NZ) and Australia.

In a recent survey on employers in the ICT sector, 65% of ICT businesses in NZ were found to be having trouble with recruiting experienced technical staff (Shearer & Trewinnard, 2012). The number of New Zealand students completing IT and computer science degrees also fell to 42% from 2240 in 2005 to 1300 in 2010 (*ibid.*). Yet NZ ICT employers were said to be pushing for an increase to over 1850 vacancies by the end of 2013 (Shearer & Trewinnard, 2012).

ICT skills are also in demand in Australia. For instance, in the past 5 years, the recruitment activity rival ICT professionals have been 3 to 5 times greater than all occupation average (Imigrate Australia, 2012). The report also shows that the skills shortage will grow by an additional 21000 by end of 2013 (Van Nelson, 2013). Thus far, there was a 25% decline in the number of ICT skilled migration to this country 2011 (Imigrate Australia, 2012). This gives an indication that ICT skills shortages a common problem, worldwide. The promise of ICT is discusses in detail in section 2.4

2.5 The Promise of ICT

Appropriate use of ICT can benefit individuals (students, educators and people at home) in various ways. A student can use ICT such as a VoIP phone or an instant messaging application on a mobile phone to submit a query about assignments or classes. ICT such as learning management systems or mobile learning platforms and other new ways of learning, and teaching etc., enable students to work on their without time and place constraints (DoE, 2003; Tinio, 2002). For example, a student can submit assignments, write tests online and can engage in discussions with other students over chat-rooms in learning management systems. Without appropriate skills in the respective activities however, access alone becomes almost useless as individuals fail to use and exploit the advantages of ICT. Similarly, educators may use e-Learning/e-Teaching systems to update students and to send notes, load notes or even offer classes online (Alexander, 2006). Teachers can also track the progress of students from the online system, which makes communication, teaching and learning more efficient. The same principle applies to ICT for business processes, healthcare management services, e-government and e-commerce/ e-business conveniences, to mention just a few advantages available from the use of ICT. Appropriate skills however, are a pre-requisite to the effective use of ICT in all social and economic domains.

2.5.1 ICT access for people at home

Social access refers to a scenario where individuals have access to ICT equipment and services, with un-hindered use of its products. People at home can use ICT such as radio, television (TV), cell phone, computer and the Internet for various processes of handling information. With basic literacy, radio and TV allows individuals to reach and access information about things that are happening in the community and in the country. For instance, they can listen to or watch news on either radio or TV so that they can keep abreast with the latest news, with developments in the agricultural field or financial markets, and get weather information, etc (Herselman, 2003). In effect, radio is reported to be the most effective means of communicating with huge and increasingly affluent consumers, especially in rural areas (Roa, 2006). Mobile phones have also grown in significance in the post 3G era, with the convergence of various multimedia services over this device. In case of emergency for example, people at home can use their cell phones instantly, wherever they may be, to get a response at once, because of the mobile phone's portability aspect in comparison with fixed line telephones. Unless a user understands all the features and the variety of offerings in a converged multimedia platform over a mobile phone however, they may not experience all the benefits. Without basic literacy for example, a person with the most advanced mobile phone may still not know how to use it to access the Internet or e-mail, nor for electronic banking or to conclude e-commerce transactions.

Individuals can also use their personal computers (PCs) to access the Internet and search for job-related information, but again, only if they have the skill to do so. In this respect, most young people use PC's for games, homework, exchanging messages and other personal activities (Roberts & Foehr, 2008). Obviously, with relevant skills, people can search, easily access and fill vacancies in ICT fields such as programming, web design, etc., or even use these facilities more innovatively to explore new inventions, thereby reducing unemployment and ultimately contribute towards development and growth (Alao, 2010).

2.5.2 ICT access for people in work places

With an adequately skilled workforce, ICT can improve information management activities including book-keeping, invoicing and stock control, for improved efficiency, with positive spin-offs on productivity, competitiveness and growth (Mlitwa, 2011; Tilya, 2007). Because of the "anytime, anywhere" flexibility aspect, ICT related employees are also able to work flexible hours, and from different locations. Obviously this only applies to adequately skilled personnel who can work independently without needing close personal supervision. Employees such as these can use what is called telecommuting, as they work from home (ICTcoop, 2009). Telecommuting is a work arrangement in which a skilled worker enjoys flexibility in working arrangements, including location and hours (Ntombana & Thomson, 2010). Thus, a software engineer can work from home, coffee shop or from any location

utilizing mobile telecommunications technology to produce the same amount of work they would have done working in a conventional office. Enabled by ICT, telecommuting reduces travelling time, which can then be put to more productive use. Stress associated with commuting (including time in heavy traffic) to and from work is real, and telecommuting offers the relief of an alternative for skilled workers (Bialobrzeska & Cohen, 2005). Adequate skills thus, are of paramount importance, as telecommuting should not; in anyway, reduce the output quality below that which could be produced when working in a physical office space (ICT coop, 2009). In other words skilled technology workers should not only be skilled in their daily routine tasks, but also be competent in utilizing telecommuting tools for reporting and the meeting of deadlines, accurately and timely (Carlson, 2006).

2.5.3 ICT and education

With skilled educators and administrators in education, computers and Internet-based applications are used to improve teaching, learning, communication, student registration and to make time-tables or schedules at schools (Alao, 2010). Details of pupils can be recorded accurately and safely in database systems rather than on paper-based files in bulky steel cabinets (Carlson, 2006; Lindsay, 2007). With basic skills, reports can be produced electronically using a word processor or spreadsheet, which is more time-efficient than the use of traditional typewriters or pen and paper (ICT news & reviews, 2009). Technically skilled educators can also use interactive whiteboards, a projector or on-screen facilities to elaborate on the course content instead of using the traditional dusty chalkboard methods. When correctly understood and competently exploited, the Internet in particular, can facilitate interactions between learners and teachers in different locations. In this process, learners can also search and access information via the World Wide Web (WWW), from any online database, anywhere and at anytime (Hoskins, 2006; Wentzel, 2000). These ICT tools/resources ultimately minimise costs to educational institutions as manual papers are replaced by electronic copiers (Lotter, 2005; ICTSETA, 2011). With adequately skilled administrators, such educational technology facilities can be used correctly with minimum breakage, thereby minimising operational costs whilst optimizing output.

2.5.4 ICT and business organisations

In the business sector, a modern organization needs employees with skills relevant to the ICT dependent processes of the information age (Connor et al, 2002). Not only the typical IT based organizations, but every organization is at the very least, making use of a word-processor, spreadsheets, and the Internet for e-mails or instant messaging (instead of post), including VoIP phones instead of the more costly traditional fixed line telephone (Carlson, 2006). The VoIP innovation in particular, is more cost effective for international calls in a business as the cost is not charged per distance, but per connectivity capacity (Ginindza, 2008). With technically skilled administrators, organizations can do video conferencing

instead of physically traveling to meeting locations (Alexander, 2008). In this way, travelling costs and time can be saved as video conferencing allows interaction between participants, even in different parts of the world, in real-time. However, there is often fear that cyberspace may not be as efficient as it lacks physical form, but when video conferencing facilities are used to the optimum potential, they can bridge the space gap whilst saving costs (Alberta Education, 2006). In this case, meetings can be held more regularly than trips can be planned.

ICT specialists can create e-commerce websites instead of sales catalogues, and use mobile phones instead of Ethernet-bound technology (Nieuwoudt, 2009), making it easy to work whilst on the move (beyond fixed office locations), thereby enhancing efficiency and productivity (Proscan-Mobility, 2009). Supermarkets can use computer & laser scanners over electronic barcodes: a unique identification of all items check digit, used to search the stock control system and for pricing (Langhan, et al 2008). With ICT literate employees, organizations can also use cost-effective platforms such as Skype or Gtalk with as rich the content as is technically possible in a traditional phone call (Modimogale, 2008).

Advantages of new technology (over the tedious paper-based methods) have been enhanced by a convergence of telephony, faxing, scanning, photography, text-messaging and the Internet access over single devices such as a mobile phones or computers (Mlitwa, 2011). Instead of using big faxing machines, which take considerable space, time and effort to accomplish the task, an employee/manager can scan and fax documents straight to emails that are accessible even on mobile platforms. Using Internet faxing services (electronic copies) gives options to recipients - whether to print or use a soft-copy, meaning that paper can be saved. Fax to email is also cost-effective in that businesses can reduce toner, equipment maintenance costs and call charges by integrating them into Internet service costs (Ricoh, 2009; GFI, 2009; Duncombe & Heeks, 2001). Basic ICT literacy is a prerequisite even in this respect.

Further, Internet, emails etc. help the organization to give better customer interactions, for example, in retail companies, it improves supply chain management and helps distribution centres with their receiving and dispatching of goods and services (Tilya, 2007). Additionally, the media and the web have brought suppliers/distributors/retailers closer to each other and closer to the consumer (ICT-teacher, 2009). For example, many organisations exploit text-messaging systems for mass messaging of marketing information (Bosch, 2008; Ellis-Chadwick, Mayer & Johnston, 2009). Through this system, organisations can also categorize their databases and tailor messages according to trade channels and profiles, thereby improving information flows whilst reducing marketing costs.

Whilst cost, time and productivity efficiencies of new technologies are almost undisputed, the most important factor is that of technical skill. Business organizations need technically skilled

personnel to develop, maintain and to put new technology into productive use, if advantages are to be realized. To succeed, skills to operate and maintain these tools without compromising information security, becomes crucial (Mlitwa & Birch, 2011).

The main argument in this thesis is that since ICT is an enabler of efficiencies in almost all aspects of modern life, basic ICT skills should be prioritized in every vocational training programme, including social development, agriculture and farming, and the general field of commerce. ICT is a catalyst for efficient access to information, and an enabler of socio-economic developments. A lack of basic technical expertise among workers in social development projects for example, may see the use of time-consuming systems instead using efficient ICT tools. ICT helps to better govern various aspects of rural development, and it “*facilitates speedy, transparent, accountable, efficient and effective interaction between the public, citizen, business and other agencies*” (Kelles, 2005:2). For farmers, basic ICT skills would empower them to use basic facilities such as e-banking. In effect, e-banking and mobile banking (m-banking) have played a big role on the socio-economic status of farmers, retailers and other companies. In 2007, Kenya introduced M-PESA which allows the customers to transfer money more easily in rural locations (Safaricom, 2011). In this case, rural participants can send money, pay bills and receive money using their mobile phones (Nyirenda, 2010). Similarly, Malawi also initiated a smart-card based on MAKWACHA that allow farmers to receive payments and purchase farm inputs electronically (FMB, 2010). This is not helping the farms alone, but everyone who is able to use this facility, including families in rural communities. For this reason, e-commerce and online shopping can be used to improve operational efficiencies, competitiveness and market access for business organisations in developing countries (Kew & Herrington, 2009). As such, improving competencies (and skills) to use ICT should be central to education and training programmes, and socio-economic development initiatives if socio-economic developments are to be fast-tracked in developing countries such as South Africa.

2.5.5 ICT as a catalyst for efficiencies in business processes

The majority of successful commercial organisations in the 21st century are those that fully exploit effective marketing strategies of which, networked electronics tools are key enablers (CBO, 2010; Itodo, 2011). For instance, organisation can create an extensive information database to store and manage names, phone numbers, emails, contact addresses and website details for potential customers, competitors and business partners.

Geographical mapping is when organisations expand in other countries to gain competitive advantage and to enhance productivity (Dakora et al, 2010). Whilst geographical information systems (GIS) simplify the geographical mapping process, management information systems (MIS) facilitate the planning and management processes for expanding businesses. The majority of retail companies in South Africa are expanding into the rest of Africa, with ICT

playing a significant role in facilitating this (Whitehead, 2010). Whilst it could have been difficult in the pre-technology era to trade outside the national currency and beyond national borders, South Africa's biggest single brand store network, PEP, has extended its southern African store footprint into Angola Africa's fastest-growing economy (Whitehead, 2010). Similarly, the Spar Group is already established in Namibia, Botswana, Mozambique, Swaziland and Zimbabwe (Spar, 2010). Pick 'n Pay has also opened stores in Mozambique, Zambia and Mauritius, with further continental expansion plans for 2012 and beyond (Whitehead, 2010). Woolworths also declared the intention to open 16 stores in other African countries, successfully forming joint ventures in Tanzania and Uganda in 2010 (SAinfo reporter, 2011). Management information systems aid these groups to manage human resources, facilitate merchandise sourcing and sales, efficiently, regardless of currency, language and nationality differences between their retail branches. Whilst the potential of ICT in facilitating development and management efficiencies is almost undisputed, the most important (but under-rated) factor is that of technical skill (competencies) without which, it is impossible to develop, maintain, and ultimately, to put technology tools and systems into productive use.

Web-based marketing is another example of the productive use of networked ICT by business entities, where web-enabled platforms are used to advertise products online (Aaker et al, 2003). Here, the advertising entity can make its products known, anytime and to anyone who has access to the Internet, anywhere in the world. Consumers can also learn about the existence of goods they would otherwise not know about. There is a condition though, it is that individuals can only access these ICT benefits if they are aware of, have access to and most importantly, if they know how to use these technology tools. With access and skill to use networked technology for instance, poor rural farms can access market information, where in they can export and improve revenue at lower transaction costs (Mwakaje, 2010). Farmers can also get information about weather forecasts and to access information about new varieties of crops and, farming techniques (Maritz, 2011). Moreover, Web-based marketing is also used as a communication tool where business (i.e. farms, entrepreneurs etc.) can show their products to achieve improved sales. As an example entrepreneurs in rural communities can use it to communicate directly with their clients and partners anywhere in the world (Akinsola et al, 2005).

2.5.6 ICT as a facilitator of information storage and exchange

Many organisations are using the Internet to store and circulate confidential information, which calls for high-level security measures against unauthorized access and abuse of critical data. In this instance, ICT offers techniques where organisations can apply reliable security measures such as encryption, without compromising process efficiencies. Encryption is *“the process of converting information into a form that is meaningless to*

anyone except holders of a key” (ICTIGCSE, 2009/2011). It is used to protect data in transit, for example data being transferred via networks (the Internet, e-commerce), mobile telephones, wireless microphones, wireless intercom systems, Bluetooth devices and bank automatic teller machines (Deighan, Curran, Lunney and Mc Kevitt, 2009). Encryption also helps to secure data whilst in transit as it is often difficult to physically secure access to all networks (*ibid*). For example, if you want to send documents to someone, you need to generate a secret key that will be known by the recipient, either by using methods such as hashing, symmetric or asymmetric cryptography. Hashing creates a unique fixed length signature of a group of data with an algorithm, and is used to compare sets of data (IBM, 2011). With symmetric cryptography or private-key, to encrypt and decrypt data must remain secure because only those with access to it can read the coded messages (IBM, 2011). Encryption keeps data safe from unauthorised people, both while it is being stored and while it is being sent electronically (Thomson & Pottas, 2006). Obviously, ICT related security which involves more than just cryptography, also improves physical security in more efficient ways. Biometric innovations such as the use of fingerprints, retinal or facial recognition features to authenticate identity and accept or deny access, are useful examples (Bense, 2010). The adoption of usernames and passwords in almost all electronic transactions, as well as user identification cards, fingerprint readers and voice recognition, has become widespread in modern commerce (Gonsai & Soni, 2007).

Whilst the advantage of these innovations in the use of pin-codes for electronic banking transactions, finger-print devices to authorise access to offices, and the use of personal passwords to access one’s computer and network systems – is undisputed, awareness and skill to exploit these innovations determines who does and does not use them.

Whilst the extent to which ICT is relevant to almost all areas of modern is demonstrated in this discussion, the main argument is that the relevant technical skills needed to take advantage of the benefits, are very significant. Clearly, without expertise, it would have been impossible for such technologies to have been invented; it is certainly hard for unskilled people to put them into effective use. Even worse is that given the centrality of ICT in all economic faculties, it is becoming harder for people, without relevant ICT skills to participate in the economic mainstream. These skills are vital for those who wish to be employed in the sector, or to become technologically innovative (producing new artefacts for exports), thereby generating employment opportunities for others and generating foreign exchange. A lack of relevant skills therefore, has a negative effect not only to the national system of innovations, but also to local organisations whose productivity is limited by a lack of relevant skills. Given this level of urgency, public policy on ICT skills and related shortages as discussed in section 2.4, becomes relevant.

2.6 Public policy and ICT skills shortages

2.6.1 Towards technical-skills development in RSA

A technically skilled workforce is the basis of national systems of innovations, which in turn, are a back-bone of innovations, inventions and economic growth. Thus, technical skills development (including ICT skills) is needed. It is on this basis that technical skills development became a priority of the post 1999 general elections, for the government of South Africa (Mlitwa, 2011).

2.6.2 ICT skills development efforts in the basic education sector

Within the basic educational sector in South Africa, the Department of Education (DoE) passed the e-Education policy in the year 2000, with the objective to empower all schools in South Africa with ICT resources and skills (DoE, 2003). The e-Education policy target is that by 2013, every South African learner in the primary and secondary schools should be ICT capable. The goal is to empower future citizens from an early school age, with skills and knowledge to use ICT independently. In this way, ICT skilled individuals will be able to participate in the job market, be economically active and become productive citizens of the global information society (DoE, 2003). To achieve this target, schools are to be transformed into e-schools consisting of a community of competent teachers and learners. The e-schools initiative is designed to improve the quality of education, especially in underdeveloped and rural areas (NEPAD, 2009). The objective in this instance is to contribute towards the development of technical skills needed to accelerate innovations, so as to improve life opportunities of citizens in the information age (Nonyane, 2011).

2.6.3 Technical skills development efforts in industrial sector/s

As Science, Engineering and Technology (SET) are considered key to economic growth, job creation and social upliftment, the development of technical skills in the SET sector in South Africa became very urgent (DST, 2009). With this realisation, the ministry of the presidency initiated a development programme known as the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) in 2006. One of the six (6) key elements of AsgiSA, the education and skills development programme, seeks to address the e-skills challenge (the shortage of professional skills such as scientists, engineers and skilled technicians). The main goal is to reduce the level of unemployment and poverty by half as of the year 2014 (AsgiSA, 2008). Thus, the Denaledi programme within AsgiSA focuses on skills and education projects, with a particular focus on mathematics and science (SAGI report, 2009). The reason for this focus is that these 2 subjects are considered the basis of technical and scientific vocations (Nonyane, 2011).

Because of the urgency of the e-skills shortage challenge, the government also launched the Joint Initiative on Priority Skills Acquisition (JISPA) in 2007. In this instance, the aim was to

fast track the development of critical skills through short technical training programmes. Another component of JISPA was to bring back the retirees. By monitoring the trainee's placement it would be possible to track their development before the target date of the year 2014 (AsgiSA, 2008). Further, both the presidency and the treasury are allocating massive chunks of national budgets towards the development of technology, education and skills in South Africa (Moneyweb, 2011). In his state of the nation address, President J. Zuma put a strong emphasis on developing skills to produce more engineers and technicians, and to increase the number of qualified Mathematics and Science teachers (Zuma, 2011). In the same light, the minister of finance allocated a sum of R9.5 billion towards the improvement of the further education and training (FET) colleges (Gordhan, 2011). The minister of finance further allocated R20 billion and R5 billion to the education sector, to boost the training of authorities and to seed the national skills fund so as to address the shortage of skills including ICT skills and high unemployment among the youth (*ibid*).

Therefore, the Department of Science and Technology (DST) is putting in place initiatives to accelerate innovations (Pistorius, 2008). For example, the DST initiated the International Science, Innovation Technology Exhibition (INSITE) aimed at advancing careers in science, innovation and technology among the youth, to address the shortage of skills in science, engineering and technology (SET) in South Africa. The aim is also to encourage learners to become scientists and innovators (Mhaule, 2009).

The DST also partners with other national departments such as the Department of Education (DoE) and the Department of Communications (DoC) among others, towards the development of scarce skills in South Africa. Firstly, the DST and the Department of Education (DoE) are encouraging women to increase their involvement in SET across the education system through initiatives such as the National Science Week (NSW), and academic research promotion programmes in science – through the National Research Foundation (NRF) (women in science, 2006). Secondly, the DST and the NRF established various training programmes such as internships, skills development and learnerships to deal with skills shortages amongst young graduates in the SET sector in 2005 (NRF, 2010). The aim of these programmes was to attract and retain SET skills from the public and private sector within the NSI. For example, internship programmes give a holistic view and job opportunities of the SET field to graduates, orientating them towards SET careers. As for learnerships, which are linked to Skills Education Training Authorities (SETAs) as well as the government and the corporate sector, the goal is also to create employment opportunities for young graduates, and ultimately, to alleviate poverty (YDN, 2010). Towards this objective, the DST initiated a plan to increase the passing rate of higher grade maths and science student's especially in disadvantaged areas. Efforts such as the youth project called the DST/Thuthuka Maths and Science Development Camps in 2001. This involved exploiting

Science, Technology, Engineering and Maths (STEM) Olympiads², Expos³, Fairs, and Camps activities, where students attended extra classes in schools (Maths & Science), and when they passed grade 12, they received a bursary to further their studies (DST, 2006).

In a broader way, the department of communications (DoC) also wants to provide universal access to ICT services for all South Africans, so as to support the advancement of socio-economic development goals. With this ambition in mind, the DoC launched an e-skills institute in order to offer e-skills education and training programmes. The e-skills institute is devoted to addressing the shortage of technical skills and the strengthening SET business sectors (DoC, 2010). One of the goals of the e-skills initiative is to improve the employment figures for graduates from tertiary institutions (*ibid*). It also aims to increase national productivity and competitiveness so as to increase the return on ICT investment. The e-skills summit which is hosted by the DoC, supports interactions between the business sector, government and other societies to promote awareness about skills development in SA (TISI report on the e-Skills Summit, 2010). After the summit, the DoC launched the e-skills knowledge production and coordination hub through the e-Skills institute in July 2010. The institute has operational categories in five (5) universities – which attend to different aspects of addressing the technical skills shortages in South Africa (DoC, 2010).

Private companies such as the Group Five (G5) are also making efforts towards the development of technical skills in the country. One of the G5 programs for example, is on educating and training people in science, mathematics and technology as well as by providing internships and creating sustainable jobs. For example, in 2010 G5 spent R7, 9 million on these initiatives (G5, 2011). Six other companies: Transnet, Arcelor Mittal, Gold Fields, Anglo Platinum, Eskom and Sasol, formed the Technical Skills Business Partnership, towards the development of SET skills aligned with JIPSA targets (Churchill, 2008). The intention of the partnership is to provide training to the SET groups on both a short and long term basis (*ibid*). Initiatives within this partnership include a four year undertaking by Sasol in 2008, to train 900 people in technical skills including science, mathematics, technology and accounting at a cost of R116 million (Sasol.Investoreports, 2010). At the end of the programme the graduates have acquired an inclusive practical exposure to and experience in their specialist fields of study, such as engineering (*ibid*). By the end of the first year of this undertaking (in 2009), Sasol already had 145 graduates on the graduate development programme. Furthermore, Sasol is working with SETA in different initiatives and also provides scholarships and bursaries to universities. In addition it runs workshops for educators focusing on teaching methods and computer literacy training; the plan is to help the educators to understand the curriculum (Sasol.Sustainability Report, 2009).

²Olympiads are annual competitions for South African school learners to promote a career excellence in science, mathematics and technology. The aim is to encourage hands-on involvement and solve technical problems (NSTF, 2009).

³Expos: are career guidance events for high school learners where tertiary institutions, universities and FET colleges, gather together to provide information.

2.7 Conclusion of the chapter

The significance of ICT as a tool to enhance efficiencies in the development, storage and exchange of different forms of data and information has been clarified in this chapter. The main argument is that stand-alone computers, Ethernet or wired networks and systems, mobile technology as well as various forms of software-based goods and services have become a nucleus of almost all facets of modern life. In effect, ICT is also recognised as a catalyst for socio-economic development, transformation and change. Now that the significance of new technology in facilitating modern efficiencies is undisputed, the argument of this chapter is that technical skills are even more significant, than they ever were before. Clearly, without technical competencies, the existing technologies could not have been invented. At the same time, it takes a trained mind to understand and appreciate the potential of technology, and skills to put that technology into effective use.

The next chapter (chapter 3) discusses the Actor Network Theory (ANT) as a framework for this study.



CHAPTER THREE

3 THEORETICAL FRAMEWORK

3.1 Introduction

A theory is described as “*an orderly, integrated set of statements that describes and predicts behavior*” (Costley, 2006:1). It is a set of statements generalized about a phenomenon, and an explanation of how or why something occurs (Frey et al, 1991 & Kim, 1995). Theories are classified as descriptive, relational or explanatory (Fawcett & Downs, 1986). They guide and give meaning to what we see. For example, when a researcher makes an observation, s/he needs a clear idea of what information is important to collect (Costley, 2006). Within the natural science tradition, theories can be used to inform and predict outcomes, or to formulate and test hypothesis. In social sciences, socio-technical work and interpretive research, theories are used as frameworks to better view and analyse complex research problems (Nonyane, 2011).

This chapter presents an overview of a theory, the Actor Network Theory (ANT) that is used in this study. Following a description of ANT, there is a motivation for its use in this study, as well as the framework, upon which its application is based.

3.2 Actor Network Theory (ANT)

ANT is one of the most commonly used theories in IS research (Nonyane, 2011). It is a sociological theory developed by Bruno Latour (1981) and Michel Callon (1986), and extended by John Law (1999). ANT is defined as a systematic way to consider the infrastructure surrounding technological achievements (Callon, 1991 & Latour, 1992). According to Mlitwa (2011), ANT can offer explanations on how technology is accepted by, and is integrated into societies. The aim of this theory is to explore ways in which the networks of relations are composed, how they emerge, how they are constructed, maintained, and are made durable overtime (Law, 1992). ANT considers all surrounding factors within the network, where each actor is viewed in relation to, and not separately from other parts of the network (Mlitwa, 2011).

A network is conceived as a heterogeneous combination of textual, conceptual, social and technical actors (Ritzer, 2004) – where symmetry between human and non-human actors is also assumed (Mlitwa, 2011). A heterogeneous network is where a network is built upon various social and non-social elements that are channelled in such a way that they can work together. The symmetrical assumption between human and non-human actors in a network assumes some level of balance between roles and relations of actors within a network, meaning that a non-human actor is by no means inferior to a human actor.

An actant is any participant in an endeavour, upon which activities by actors unfold. An actant is defined by what it does, in essence, what function it performs within a discipline. According to Norbet (2011:108) an actant is “*any agent, collective or individual that can associate or disassociate with other agents*”. On the other hand, an actor is any recognizable character who occupies a functional position in relation to events (Cohan & Shires, 1988). An Actor is a person or object that acts such that an activity is granted to it by others. Both actants and actors include human and non-human elements such as people, objects (computer software, hardware, and technical standards), and organizations.

In the Agnosticism, human and non-human actors are integrated in the same conceptual framework and assigned equal value in terms of duties performed. This indicates that a researcher has to be impartial towards all the actors, whether they are human or non-human (Bird, 2009). In this study, none of the actors is superior to the others. Similarly, Free Association requires the elimination of any distinction between natural and social phenomenon. There is no boundary between the two (natural and social), even though at a later stage they can be separated, when they become understood as effects or outcomes (Law, 1999). Whilst actors may act and react differently to circumstances within a network, what is important is to keep all actors intent on pursuing a common purpose, and to let every actor act accordingly.

3.3 Relevance of ANT in this study

The objective of this study is to understand the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape. In line with the interpretative approach in the current study, the Actor Network Theory (ANT) is used as a framework to facilitate the conception and analysis of the e-skills shortages in South Africa.

Just as ICT and related skills are the dominant terms (and non-human actors) in this study, so are human actors (trainers, students and employers). That is, whilst ICT is important, it is not more important than the skill to use it and the skill not more important than the curriculum and programme to produce it. A link between those who seek to develop their skill, those who provide the skill, those who employ the skill and ultimately, those who use the skill to produce outputs, is clear in this study. This situation resembles a certain heterogeneous, but almost symmetrical and interrelated order within an e-Skills network. ANT has been used in similar studies, with great success. For example, Tatnall and Burgess (2004) use ANT to identify factors of e-commerce adoption in SMEs. Similarly, Gao (2005) applies ANT in analyzing the socio-technological construction of China's strategy for telecommunications market transformation. Harty (2010), also uses ANT to trace and unpack the interactions occurring around implementation and use of innovations within construction contexts. Salamat & Hassani (2011) also use ANT to explore the dynamics of ICT related innovations within organizations and rural communities in Mozambique. Therefore, ANT emerges as an

ideal analytical framework to contextualize relations and interactions within the e-Skilling network in this thesis.

3.4 Application of ANT in this Study

A graphical illustration of the ANT application is presented in the form of the ANT theoretical framework in Figure 3.

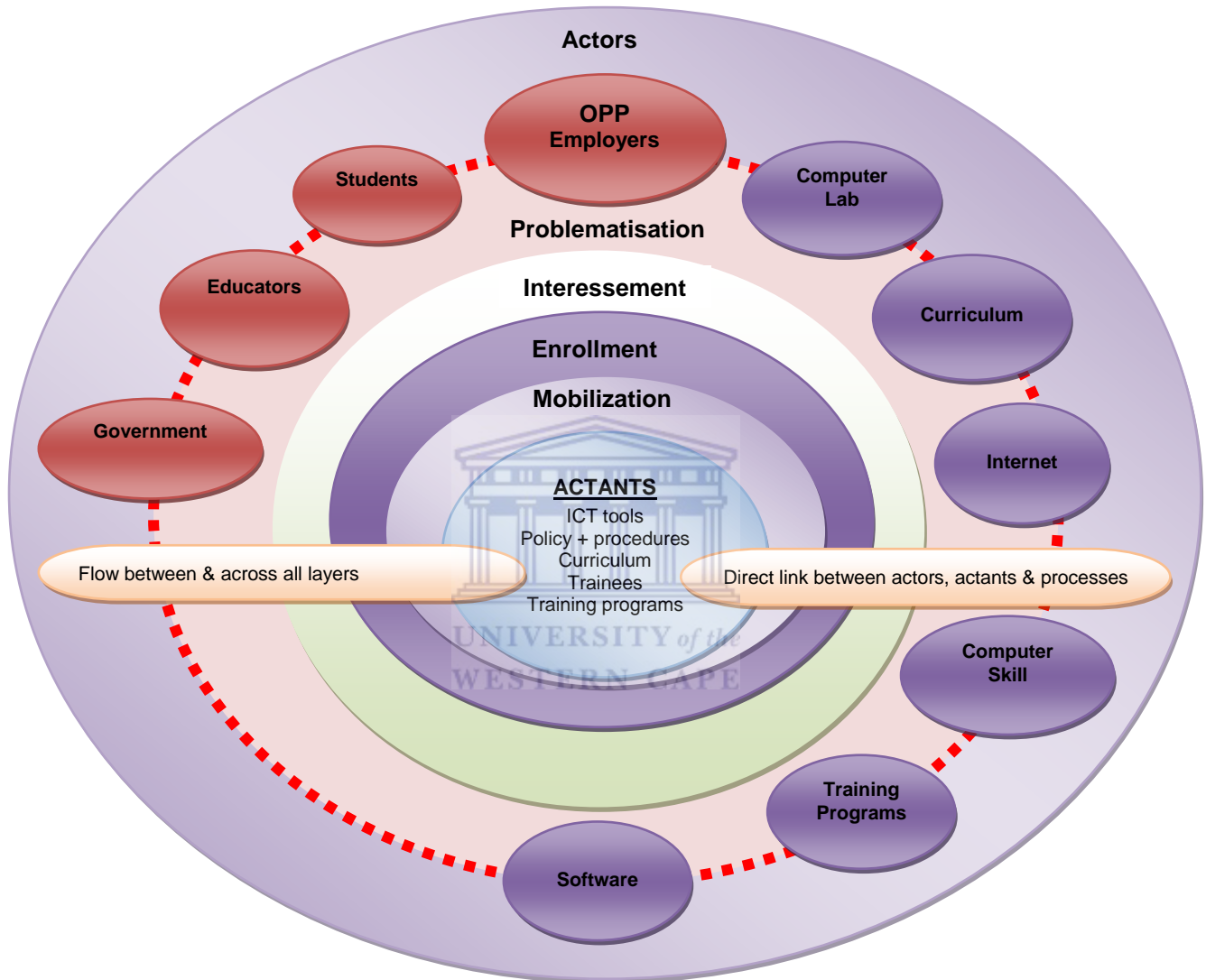


Figure 3: The Actor Network Theoretical Framework on e-Skills

The framework in Figure 3 presents the e-Skills process as a network consisting of actors – both human (including the OPP) and non-human on a red circle, together with actants, objectives and processes.

In this study the actors are trainers (colleges), students and employers (local business organizations). In accordance with the symmetrical assumption between all actors, the human and non-human actors are presented in a non-hierarchical order in the framework. A dotted line is used to signify a link (in no particular order) between all actors. The use of colours only serves to identify human from non-human actors. The assumption in this

framework is that in an ideal e-skills network there will be actors with various roles and interrelated activities that are joined together by a common purpose that is negotiated during the problematisation process (Gunawong & Gao, 2010). A common purpose in the case of this study refers to a drive by employers, government department of education, training institutions and learners to develop specific types of ICT skills. Because of the direct interest of the employer in the quality of ICT skills that are developed, the employer, in the first instance, is considered a focal actor or the obligatory passage point (OPP), in that they define and determine the adequacy of skills needed.

Another critical aspect of ANT is the translation process (Pillay, 2010). According to Latour (1991, p. 25), translation is the “*process during which an actor persuades other actors in the network to try to redefine the goals of other actors and transform agendas*”. Translation involves the process of problematisation, interessement, enrolment and mobilisation (Callon 1986).

Under interessement, the focal actor (the OPP) coordinates the roles of other actors through physical actions, negotiations and convincing them to accept the definitions, recruitment and network practices (Callon, 1986). In this study therefore, employers and educators have to come to an agreement on the balance between industry and academic needs, and on what is expected of students after they graduate. In many circumstances educators prepare students with the necessary ICT skills, and get them ready for employment without consulting the industry. Recruitment agencies will recruit post-matric graduates to participate in these programmes. The government and employers may also need to support public access to ICT so that students do not lose their acquired skill once the training is completed.

Enrolment occurs when the obligatory passage point (OPP) defines the roles that are to be played and the way in which the other actors will relate to one another within the network (Pillay, 2010). The government will enrol educators and other relevant stakeholders to implement computer based training programs for post-matric graduates. Communities will also be involved in ICT development at schools. During mobilisation the network starts to operate and implement the solution proposed in the problematisation (Thapa, 2011). In this study, this is where appropriate skills are produced and graduates are employed in local businesses. Here, the questions concerning quality and the relevance of the curriculum are asked. For example, the focal actor could identify if graduates are under prepared or not for the industry. In this point, the employers would have to send a feedback about performance of students and the relevance of skill in the field to the trainers. The government can also mobilize ICT related training programmes and educational facilities.

Problematisation therefore, involves the balancing of curriculum (by government and training institutions) with the needs of the employer, as well as developing a demand for training among trainees (*ibid.*). Without a potential for employment, there is actually very little

motivation for students to pursue ICT related careers, let alone the pursuit of the attainment of specific standards (Akoojee, 2005; Kabanda et al, 2010). However, since the employer also relies on the buy-in of the curriculum provider, the trainer and learners during the interestment where the government or training institution also plays a leading role in the curriculum, marketing and delivery of a specific course, some roles and activities overlap. Thus, the line between the problematisation and interestment processes also becomes very thin (Harty, 2010). The same argument equally applies to the actors and actants. Whilst training programmes, policies, curricula and ICT tools are identified as non-human actors for example, they also fit the actant role in that they are acted upon by educators and learners. Learners also fit the actant role when they are the subjects of scrutiny by employers, and when they are subjects of training by trainers.

In an ideal e-skills network, enrollment signifies a process where each actor knows and commits to their respective roles (Budhathoki, 2007). Mobilisation on the other hand implies the process of coherent implementation (Macome, 2003). When these processes are ideal, there would be a clear policy and complete agreement between employers, the government and training institutions on a common quality and quantity of skills developed. There is also a balance between the demand and supply of trainees (Kabanda et al, 2010). The framework in the thesis helps to interrogate the links between actors, actants, activities and respective processes in the e-skills development network in South Africa.

3.5 Conclusion of the Chapter

In this chapter, the use of an ANT framework to describe the different phases of e-skills provision and acquisition is outlined, showing a network of individuals, organizations and technology. The ANT framework is applied to frame the context of the study throughout the thesis, and is also used as a guide to the analysis and translation of the findings. A methodology together with strategies and techniques of research used in this study are presented in the next chapter (chapter 4).

CHAPTER FOUR

4 METHODOLOGY

4.1 Introduction

The purpose of this chapter is to discuss the strategy and processes used to investigate the magnitude of skills shortages in under-developed areas of the Eastern Cape. In section 4.2 and 4.2.1 correspondingly, the research philosophy, research paradigms: positivist, interpretative and critical research approaches, and research methodology were discussed. And the design methods of data collection and data analysis were described in section 4.4 and 4.5 respectively. Followed by, the summary of the chapter in section 4.6 and conclusion of the chapter in section 4.7.

4.2 Research Philosophy

Most of the research (would be it quantitative or qualitative research) is based on ontological and epistemological assumptions about what forms a valid research and which research methods are appropriate (Myers, 2009).

4.2.1 Ontology

Ontology is defined as a study of being and existence of the world (Flowers, 2009). According to Lawson (2009), it is to understand how something exists around us. Since ontology is "*the area of philosophy that ask what really is and what the fundamental categories of reality are*" (Neuman, 2011:92), it usually answers the question "what". It deals with questions of - what exist, what it looks like, what units make it up (Flowers, 2009). Ontology for example, pertains to assumptions on whether reality is acknowledged to exist in a physical objective form (realism) or as in a subjective (relativism) form (Flowers, 2009). Whilst the realist ontological presuppositions (in its various levels of extremism) assumes the existence of an objective, physical matter as proof of reality, realism assumes that reality is subjective and contextually constructed (Guba & Lincoln, 1994). Given the objective claims on the nature of existence under realism, this ontology is largely associated with natural science disciplines such as geology, chemistry or engineering, and everything that deal with physical objects under the general laws of physics (Blackburn, 2005).

How the nature of existence is viewed therefore, strongly informs one's assumptions about the way we get to know about reality (Neuman, 2011). Whilst ontology concerns itself with what exists, a way of getting to know about existence is referred to as an epistemology (Holden & Lynch, 2004). An ontology and epistemology are interdependent, with an epistemology largely informed by held ontological presuppositions.

A realist ontological stance for example, would assume that the only way of investigating physical matter (which is the only form of reality), is only through systematic and objective processes (Nonyane, 2011). On the other extreme, relativists would assume that since reality is subjective, it is knowable through the processes that acknowledge the natural and social contexts (*ibid.*).

The purpose of this study was to understand, describe and explain the magnitude of ICT skills shortages in under-developed areas of the Eastern Cape. The phenomena of investigation in this instance are not in the objective hard-matter format, but subject to the context and interpretation of specific conditions and circumstances. Therefore, a relativist (rather than normative/realist) ontology, with a subjective/ interpretive epistemology made logistical sense to this investigation.

4.2.2 Epistemology

Epistemology is a theory of knowledge where people know something exists (Hirschheim, 1985). It studies the basis for knowledge and how any given body of knowledge is supported by facts and assumptions (*ibid.*). Also, requires a knowledge that has a basis that can be justified. It answers the questions “how” and “what”, for instance, it attempts to identify what is truly knowledge and accurately reflects reality (Hirschheim, 1985). As the “*area of philosophy concerned with the creation of knowledge; focuses on how we know what we know or what are the most valid ways to reach truth*” (Neuman 2011:93), an epistemology can best be described as a philosophical approach or paradigm that a researcher adopts in carrying out an investigation. Three dominant epistemologies, and ultimately, a choice of an appropriate approach for this study, are discussed research paradigms below.

4.2.2.1 Research Paradigms

Paradigm is the system of thinking that includes basic assumptions, the key issues, models of quality research, and methods for seeking answers (Neuman, 2006). There are three dominant approaches positivist, critical and interpretative paradigms to understand reality in information systems.

- **Positivist Approach**

Positivism is a philosophical approach (epistemology) that determines casual laws, careful empirical observation and value free research (Neuman, 2006). Positivism is based on the realist ontological assumptions that...“*the universe is comprised of objectively given, immutable objects and structures*” (Hirschheim, 1985:3). The methods of enquiry thus, are based upon values of reason, truth and validity, with a focus on facts that are gathered through direct observation and physical experience (Flowers, 2009). In other words, positivists are concerned with ... “*evidence of formal propositions, quantifiable measures of*

variables, hypothesis testing, and the drawing of inferences about a phenomenon from the sample to a stated population" (Myers, 2009:4), that is mostly aligned with study of physical matter under natural sciences. Contrary to the positivist assumptions however, the current study was focused on the contextual, subjective form of data that cannot be understood separately from the context and social interpretation. For this reason, the constructivist epistemology (rather than positivism) was a more relevant philosophy upon which the current investigation could be approached.

- **Critical Approach**

The critical approach is a "*critical process of inquiring that goes beyond surface illusions to uncover the real structures in the material world in order to help people change conditions and build a better world for themselves*" (Neuman, 2011:108). That is, it focuses on the oppositions, conflicts and disagreements in contemporary society (Myers, 2009). According to Nonyane (2011:33) it "*criticises positivism for not dealing with the way people feel or think*". It is more concerned about evaluating the existing social systems and explores any impediment or repressive social order that may hinder in their structure (Orlikowski & Baroudi, 1991). This project has borrowed from the critical approach to supplement the interpretive framework, so as to critique the phenomenon of skills limitations and the underlying explanations to successes and failures of corrective efforts.

- **Interpretative Approach**

The interpretative approach highlights the significance of social action, socially constructed meanings and value relativism (Neuman, 2006). In other words, it enables "*the systematic analysis of socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at understanding interpretations of how people create and maintain their social worlds*" (Neuman, 2011:102). An alignment with the relativist ontological stance is evident in this description. Relativism according to Nonyane (2011:32) "*...views reality as knowable within its relative context/s*", with assumptions that relative contexts are subject to contextual interpretations. Because of its focus, interpretivism is suitable to understanding phenomena by interpreting meanings that people assign to them (Myers, 2009). As outlined in the research objective, the context of this study is to understand the contextual (and subjective) dynamics of technical skills shortages among career aspirants in under-developed areas of Eastern Cape. The context becomes inter-subjective in that within the same region, individuals experience different circumstances and contexts about the same phenomenon, which makes contextual interpretations significant in such investigations. The interpretative approach therefore, was more relevant to the contextual nature of phenomena under investigation in this study.

4.3 Research Design

Research designs are plans that guide arrangement of conditions for collecting and analysing of data in a manner that aims to combine relevant research purpose with economy in procedure (Blanche & Durrheim, 2006). It addresses the planning of scientific inquiry, designing a strategy to explore, describe and explain phenomena of investigation (Babbie & Mouton, 2001). The research design includes a framework, methods and techniques on sampling as well as the collection, analysis and interpretation of data. However, this study is focusing more on methods because it is an explanatory study. In terms of methods, qualitative data collection methods include direct observations, participant observation (fieldwork), interviews (basic, in-depth and focus group), questionnaires and review of documents (Myers 2009).

The research methodology which is the main component of research design – is presented together with related research techniques in section 4.3.1.

4.3.1 Research Methodology

Research methodology is the basic approach, which encompasses methods and techniques used to conduct research (Pretorius, 2009). Actually, it is often described as “*a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection*” (Myers, 2009: 6). A methodology therefore, is an umbrella term that encompasses techniques, methods and procedures of executing the research (Nonyane, 2011). It is based on the assumptions, theories and perspectives of what forms a good research (Pretorius, 2009). The selection of a research methodology thus, “*...depends on the nature of the research problem, research questions and objectives of the research*” (Nonyane, 2011:34), and it influences the way in which data is collected and analysed data (Pretorius, 2009).

A discussion about a research methodology therefore, encompasses issues of methods, principles and procedures of conducting research. Methods can be categorized into quantitative and qualitative research approaches.

4.3.1.1 Quantitative research method

Quantitative research is a formal, objective, and a systematic process in which numerical data are used to obtain information about the world (Burns & Grove, 2005). Quantitative research methods are “*used to describe variables, to examine relationships among variables, to determine cause and effect interactions between variables*” (Burns & Grove 2005:23), and the testing of hypothesis (Neuman, 2006:151). Quantitative research is often based on the positivist philosophical assumptions about the nature of scientific enquiry. It applies constructed logic, and follows a linear research path (Babbie & Mouton, 2001). Because of

its positivist philosophical alignment, it seeks to redress issues of integrity by relying on objective logic such as precise statements, standard techniques, numerical measures, statistics and replication, largely associated with natural science disciplines (Myers, 2009). Quantitative methods include surveys, laboratory experiments, and statistical analytical methods such as econometrics and other numerical methods (*ibid.*).

Quantitative methods are intended to present summaries of factual rather than contextual data, mostly to support generalisations about the phenomenon under the study (O'Neill, 2006). Basically, quantitative research entails a small amount of variables and numerous cases (*ibid.*). It utilizes a set of measures to ensure validity and reliability using standards. In this case, the research can be replicated, analysed and compared with similar studies (Babbie, 2006). However, this study requires depth descriptive explanations into the shortage of ICT skills in South Africa. This kind of insight requires descriptive and context-based explanatory rather than numerical data. For this purpose, qualitative rather than quantitative research methods would be appropriate.

4.3.1.2 Qualitative research method

Qualitative research is *“an inquiry approach useful for exploring and understanding a central phenomenon”* (Creswell, (2008:7), in particular, the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things (Falconer & et al, 1999). The endeavour of qualitative research is to *“understand social action in terms of specific context rather than to generalize to some theoretical population”* (Babbie & Mouton, 2001:270). It allows a wide understanding of the entire situation, to determine new opportunities when results are interpreted. Under this method, a researcher would collect and analyse qualitative data by observing and interpreting what people do and say (Bryman, 2006). Examples of qualitative methods are action research, case study research and ethnography (Myers, 2009). This method is associated with interpretative research approach. According to Myers (2009:4) *“interpretive research does not predefine dependent and independent variables, but focuses on the full complexity of human sense making as the situation appears”*.

Whilst quantitative research is associated with objective measurements of quantitative forms of data, often within the positivist epistemology, qualitative research that is largely interpretivist, deals with the collection, analysis, interpretation and understanding of descriptive and explanatory forms of data. The advantage of using qualitative method is that it uses subjective information to describe the context or natural setting of variables under consideration (Wolcott, 1990) to produce in-depth information (Bless & Higson, 1995:106).

The aim of the study is to understand magnitude of skills shortages among career aspirants in under-developed areas of Eastern Cape. For this reason, employed and unemployed grade 12 graduates were interviewed to know the current situation in terms of skills

shortages among career aspirants. And they were observed to appropriately describe and evaluate the level of their competencies. The local employers of ICT were also interviewed to understand how business organisations deal with the problem of inadequate skills. Moreover, direct and participant observations were used to get in-depth information about level of ICT awareness, accessibility and affordability in under-developed area. Type of questions asked during the interview focused on specific key items from the sub-questions. The purpose of using interviews (basic, in-depth and focus group) was to acquire explanations about the career status, perceptions, preferences, the level of awareness about ICT, availability, accessibility and affordability of training opportunities, the levels of skill also the quality and relevance of curricula. The open-ended questions were used with the aim of giving respondents the freedom to express their own experiences. Therefore, the qualitative data was collected by the means of in-depth interview and analyzing appropriate reports and ICT related documents.

It is from this context that a qualitative research method found appropriate for this study. The units of analysis, operational definition of the main variable/s (operationalisation), sampling, data collection, data analysis and interpretation techniques are discussed in section 4.3.2.

4.3.2 Operational definition of main variables

Whilst conceptualisation refers to an abstract definition of terms or concepts in a study, operationalisation refers to the articulation and development of practical procedures “*that will result in empirical observations representing those concepts in the real world*” (Babbie & Mouton, 2001: 128). In other words, operationalisation refers to the articulation of dependant and independent variables as well as the indicators or attributes and related measures in a specific study.

Drawing on a research question therefore, ICT skill is a dependant variable in that its magnitude (more or less of it) is dependent on one or more of independent contextual factors. Indicators of a dependent variable (ICT skill) are outlined in Table 1.

These contextual factors or independent variables in this study (a) awareness about ICT benefits and the significance of being competent in its use, (b) access to the physical facilities or tool, (c) sustainable income and affordability of ICT, (d) availability of training opportunities, (e) affordability of training facilities, as well as (f) quality (including relevance) of existing curricula.

Table 1: Operational Definition of Computer Skill (Sub-questions in Detail)

Levels	Skills (Word Processor)	Spreadsheet	Spreadsheet	PowerPoint	Email	Internet
Basic	<p>Whether a person can, albeit with maximum supervision:</p> <ul style="list-style-type: none"> • Create a new document • Open existing documents. • Enter text • Spell check • Save • Navigate in a document • Print documents, envelope& labels. • Access & use help functions 	<p>Whether a person can, albeit with maximum supervision:</p> <ul style="list-style-type: none"> • Create a new document • Open existing file. • Enter, correct and save data • Use menu commands • Format cells, rows & columns • Understand navigation & movement techniques • Use arithmetic formulas& use help functions 	<p>Whether a person can, albeit with maximum supervision:</p> <ul style="list-style-type: none"> • Open a new access record. • Generate& save record • Manage & maintain database • Modify a database structure • Wizard & in Design View &work with them • Create, use & customize forms, tables & reports • Work with Data Access Pages 	<p>Whether a person can, albeit with maximum supervision:</p> <ul style="list-style-type: none"> • Create title & bullet slides • Select a template • Work with text, insert table & drawing tools • Use Slide Show options, add transitions & animation • Run a manual & an animated Slide Show • Print a presentation 	<p>Whether a person can, albeit with maximum supervision:</p> <ul style="list-style-type: none"> • Create & send email, • Retrieve read email • Download attachments 	<p>Whether a person can, albeit with maximum supervision:</p> <ul style="list-style-type: none"> • Connect to the Internet • Open web browser software • Use the browser to find the information that you require • Know where to put a URL • View document

Intermediate	<p>Whether a person can do basic tasks with minimal supervision, and:</p> <ul style="list-style-type: none"> • Select & move text • Search within a document • Format characters, work with tabs, indents, margins, lists, breaks, spacing. • Use autocorrect help tools • Create & edit tables • Work with sections, use styles& customize • Format complex tables & data • Create, sort & filer mail merges • Customize toolbars • Insert graphic elements, run & record macros • Create a web page & add hyperlinks 	<p>Whether a person can do basic tasks with minimal supervision, and:</p> <ul style="list-style-type: none"> • Modify a database • Insert data from another application • Print worksheets/books • Create, modify & format charts • Use graphic objects to enhance worksheets & charts • Perform multiple-level sorting, use sorting options & design considerations • Use mathematical, statistical & financial functions • Un/Group data; perform interactive analysis 	<p>Whether a person can do basic tasks with minimal supervision, and:</p> <ul style="list-style-type: none"> • Edit &sort records • Select Queries, view specific records, do calculations • Create parameter & action queries • Join tables& create cross-tab queries • Organize field placement; control data entry • Use Macros to provide user interaction & automate entry • Customize record functionality &appearance • Use hyperlinks & data integration 	<p>Whether a person can do all the basic tasks with minimal supervision, and:</p> <ul style="list-style-type: none"> • Use ClipArt & WordArt • Create an organization chart and use options • Edit column charts • Work with graphics, animation, sound& multimedia • Work with the Office Suite to create slides from an outline • Customize PowerPoint toolbars and automate the slide production • Use AutoCorrect & Style Checker • Build interactive presentations, hyperlinks, etc. 	<p>Whether a person can do basic tasks with minimal supervision, and:</p> <ul style="list-style-type: none"> • Attach a file or document to an email; • Reply to one or multiple people, • Delete an email • Forward an email 	<p>Whether a person can do basic tasks with minimal supervision, and:</p> <ul style="list-style-type: none"> • Add page to my favorites or bookmarks • Download Adobe Acrobat (PDF) documents • Download software • Save it • Unzip programmes that you download • Use 'save as' to save pictures or pages to hard-drive • Open history view in the browser window • Navigate a website
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Advanced	<p>Whether a person can confidently and independently do intermediate functions and to:</p> <ul style="list-style-type: none"> • Work with advanced styles and AutoFormat features, linking styles • Use graphic effects such as dropped capital letter & clip art, insert WordArt, & draw in a document • Work with very large documents that require a table of contents, footnotes, endnotes & cross-references. • Manage and track document changes, using highlights and comments • Insert multimedia elements in a Web Page. • Manage Macro commands, create dialogue boxes & understand Visual Basic Application programming 	<p>Whether a person can confidently and independently do intermediate functions and to:</p> <ul style="list-style-type: none"> • Customize the work area • Use advanced functions (Names, • Work with Pivot tables • Use spreadsheet Web components • Manage Macro commands: concepts, planning, operations, execution, modification, interruption • Use personalized toolbars • Perform some programming VBA 	<p>Whether a person can confidently and independently do intermediate functions and to:</p> <ul style="list-style-type: none"> • Plan, examine an application & develop a distributed application design • Use one form for two purposes: to add or edit records • Automate a dialog-box form with a Macro group • Create a switchboard or a Splash Screen form • Use Visual Basic to create a public function or event module • Secure a database by using user-level security, document it and distribute the secured application. 	<p>Whether a person can confidently, creatively and independently do intermediate functions, without supervision.</p>	<p>Whether a person can confidently and independently do intermediate functions and to:</p> <ul style="list-style-type: none"> • create a new folder; • Sort emails in alternative folders; • Direct mail into a new folder; • Find specific items in your email folders • Save email in your documents or folder; • Clear deleted mail box 	<p>Whether a person can confidently and independently do intermediate functions and to:</p> <ul style="list-style-type: none"> • Set default home page • Send the page viewing to another person by email • Change security settings of the browser • Use search engine • Use an online discussion forum • Subscribe &unsubscribe to an email mailing lists.
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Operationalisation also involves the articulation of the units of analysis and the units of observation upon which, the measurement of these variables is to be based. These components (units of observation and of analysis) are outlined in Table 2 under the sampling section. In the next section research design has been developed to carry out the study.

4.3.3 Research sampling

Sampling refers to a process of getting a workable and representative sum of participants from a larger research population (Neuman, 2006). In fact, a sample refers to “*a smaller set of cases a researcher selects from a larger pool and generalizes to the population*” (Neuman, 2006:228). There are two different types of sampling, and these are probability and non-probability sampling.

Probability sampling refers to the process of sample selection, where the elements of a research population have an equal probability or chance of being selected into a sample (*ibid.*). In this case, the researcher knows the quantity (number) and specific location of a research population and as such, can randomly select the research sample (Babbie & Mouton, 2001). The research population in this study however, was different to this pattern. Specific locations and quantity of career aspirant grade 12 graduates in under-developed areas of the Eastern Cape are widely scattered and not easy to quantify. Random selection therefore was not practical, hence, only a non-probability sampling technique could be used.

Non-probability sampling involves a process where non-random techniques are used to select representative elements of a research population (*ibid.*). In this case, the researcher has “*limited knowledge about the larger group or population from which the sample is taken*” (Neuman, 2006:220). There are different types of non-probability sampling: quota sampling, convenience sampling or haphazard sampling, snowball sampling and purposive sampling (Bernard, 2000). Due to its assumptions and focus, purposive sampling was found to be the most appropriate technique to draw a sample from a research population of this project.

4.3.3.1 Purposive sampling

Purposive sampling is “*a non-random sample in which the researcher uses a wide range of methods to locate all possible cases of a highly specific and difficult to reach population*” (Neuman, 2006:222). Under this technique, researchers build on the purpose of the study, the type of the population and ultimately rely on their judgement to select the sample that reflects the things they are interested in (Bernard, 2000:176). The use of purposive sampling method in this project is outline in Table 2.

Table 2: The Sampling Process

What is the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape? (Detail to Sub-questions elaborated in Table 1)					
Key Indicators	Sub-Questions	Unit of Analysis (Data Source)	Unit of Observation	Tools	Quantity & Location
Career Status	1.1 What is your preferred career? 1.2 When did you complete school? 1.3 What is your career status? 1.4 If not in your preferred career (or if unemployed), what are the reasons?	Career aspiring individuals	<ul style="list-style-type: none"> • Employed grade 12 graduates of 18 to 35 years of age. • Unemployed grade 12 graduates of 18 to 35 years of age 	Direct interviews	20 participants: <ul style="list-style-type: none"> • 10 from rural Centane; • 10 from the Urban Township of Butterworth.
	ICT career Awareness	2.1 Do you know anything about ICT careers? (please elaborate) 2.2 Which of the computer-related jobs do you prefer (please elaborate why)? 2.3 How did you learn/ hear/ get to know about ICT related careers? 2.4 Why is computer-related work important/ unimportant?	Career aspiring individuals	<ul style="list-style-type: none"> • Employed grade 12 graduates of 18 to 35 years of age. • Unemployed grade 12 graduates of 18 to 35 years of age 	
2.5 What is the organisation doing to alert the people about the ICT? 2.6 Does the organisation offer any ICT training programme for townships? 2.7 What about ICT training programmes for rural areas? 2.8 What strategy do you use to ensure that graduates get access of information that is relevant to their lives?		Training organisations	High level management in ICT department	Direct interviews	2HoD (Head of Department) of IT (1 from King Hintsa College, & 1 from WSU) of local institutions that provide local ICT training services).

<p style="text-align: center;">Level of skill</p>	<p>3.1 Under question 3, respondents will be asked (and tested) to indicate their level of competencies to:</p> <p>3.1.1 Switch on/off of a computer;</p> <p>3.1.2 Use of word processor (scale of 0-5);</p> <p>3.1.3 User of spreadsheet (scale of 0-5);</p> <p>3.1.4 Use of data-base such as Microsoft access (scale of 0-5);</p> <p>3.1.5 Use of a document scanner</p> <p>3.1.6 Use various aspect of the Internet (www);</p> <p>3.1.7 Use email (send, retrieve, download attachments, etc)</p> <p>3.1.8 Respondents will also be asked about the purposes for which they normally use email for</p>	<p>Career aspiring individuals</p>	<ul style="list-style-type: none"> • Employed grade 12 graduates of 18 to 35 years of age. • Unemployed grade 12 graduates of 18 to 35 years of age. 	<p>Direct interviews</p>	
<p style="text-align: center;">Access to training opportunities</p>	<p>4.1 Where do you access/use the computer?</p> <p>4.2 Where do you access/use the Internet?</p> <p>4.3 How do you get to this point of access?</p> <p>4.4 Why don't you use facilities close to home?</p> <p>4.5 What does it cost to use computer/ Internet in these facilities?</p> <p>4.6 How does the cost affect the frequency of use?</p> <p>4.7 How does the distance affect the frequency of use?</p> <p>4.8 If no access, what are the reasons?</p> <p>4.9 If you have used Internet, were you satisfied with the Internet connection speed?</p> <p>4.10 Do you have access to reliable printing facilities?</p> <p>4.11 Ever attended computer training classes (please elaborate)?</p> <p>4.12 In what ways has the training helped you? Such as enable you to get a new job. Give detailed explanations</p>	<p>Career aspiring individuals</p>	<ul style="list-style-type: none"> • Employed grade 12 graduates of 18 to 35 years of age. • Unemployed grade 12 graduates of 18 to 35 years of age 	<p>Direct interviews</p>	<p>20 participants:</p> <ul style="list-style-type: none"> • 10 from rural Centane; • 10 from the Urban Township of Butterworth.

Quality & relevance of curricula	5.1 How relevant is the skills output from tertiary into the ICT field?	Business Organisations	Local employers of ICT graduates	Direct interviews	4 HR managers/IT managers in IT department from 2 private local organisations of local organisations that consume local ICT human capital services: - (2 from Post Office and 2 Standard Bank in Butterworth)
	5.2 Do you think the ICT graduates are ready when they come out of varsity? (please elaborate)				
	5.3 What are the reasons for ICT graduates to be under-prepared for the industry?				
	5.4 How does your organisation deal with this problem (inadequate skills)?				
	5.5 Whose responsibility is it to address the problem of poor ICT skills?				
	5.6 How can this problem be resolved?				



The first item in Table 2 is the key indicator of ICT skills, which are the career status, the level of awareness about ICT, the levels of skills, access to training opportunities, as well as the quality and the relevance of curricula. Data on these indicators was obtained from the samples of career aspiring young individuals in under-developed areas of the Eastern Cape as well as ICT training entities and local business organisations (potential employers). In effect, 20 participants of which, 10 were from the rural Centane and 10 from the Urban Township of Butterworth) were selected from a wider research population of un/employed grade 12 graduates between 18 to 35 years of age. The sample was made up of 10 males and 10 females selected equally between the 2 areas. Relevance of this age-range is that these grade 12 graduates are at their busiest phase of pursuing or trying to advance their young careers, hence they may be directly affected by their levels (or lack, thereto) of ICT skills.

On the sample of organisations, 2 local training colleges (King Hintsa College and WSU) and 2 employers (Post Office and Standard Bank) were selected. In terms of the units of observations, 1 head of department (HoD) of information technology (IT) per college, as well as 2 participants (1 HR and 1 IT manager) from each of the 2 local employers – were selected into the sample. Direct interviews were used to collect data from all research participants. Open-ended questions were used to collect data and recorded through a portable audio-recorder. The recording instrument was useful in that instead of writing responses, it allowed the researcher to concentrate without losing details while doing an interview (Morolo, 2010).

The researcher chose Centane location because it has the largest population, poor and the level of employment is low. Similarly, in choosing Butterworth, the researcher wanted to highlight the differences between the rural areas (Centane) and urban area. It is the biggest township that has high unemployment and poverty rate to qualify as under-developed. The 2 areas were also chosen on the basis of practical convenience in that the researcher is more familiar with the local area and language used, which made it easier to collect data.

4.4 Data Analysis

The data analysis is a component of research methods that helps to explain what procedure to be followed to analyse the data. In addition, data analysis is used to determine the meaning of collected data in relation to the purpose of the study (Babbie & Mouton, 2001). For example, a researcher is able “*to examine, sort, categorise, evaluate, compare, synthesize and contemplate the coded data as well as to review the raw and recorded data*” (Neuman, 2006: 467). There are two types of data analytical methods that can be used; which are quantitative and qualitative data analysis.

- **Quantitative data analysis**

Quantitative data analysis is the process of evaluating data using analytical and logical reasoning to examine each component of the data provided as to increase generalisations (Babbie & Mouton, 2001). The method separates the contextual details including the analysis of variables, as well as statistical information presented in forms of charts, graphs and tables (Neuman, 2006). Quantitative data analysis uses standardised instruments to bring evidence of collected data by the researcher. In this case, a researcher utilizes an “*objective and systematic counting and recording procedures to produce numerical description of the symbolic content in a text*” (Neuman, 2006:323).

The aim of the current study was to understand the magnitude of shortage of ICT skills in the rural areas of the Eastern Cape. This means, the type of data used in this study does not deal with quantitative data such as numerical or mathematical technique and statistics, as a result quantitative data analysis was not used. Therefore, data used in this study was the qualitative data that is descriptive and explanatory.

- **Qualitative Data Analysis**

Qualitative data analysis is the variety of processes and procedures used to explain and understand or interpret collected qualitative data (Taylor & Gibbs, 2010). It involves an interpretive, naturalistic approach to its subject matter (Neuman, 2006) and is used more in the process rather than outcomes (Babbie & Mouton, 2001). Qualitative data is a type of information collected in a non-numeric form (Taylor & Gibbs, 2010). Qualitative data entails text, written words, phrases or symbols describing actions and events in social life (Babbie & Mouton, 2001). Examples are the interview transcript, field notes, video, audio recordings, images and documents (*ibid.*). The process of analysing data depends on the sub-questions to be answered. The basic approach to be used for analysing and interpreting narrative data is the content analysis (Powell & Renner, 2003).

- **Content Analysis**

The content analysis technique was used to identify emerging patterns regarding the importance of ICT skills in the development of the Eastern Cape. Content analysis is “*a technique for gathering and analyzing the content of text*” Neuman (2006:322). It also refers to the study of recorded human communications, such as books, websites, paintings and laws” (Babbie, 2008). Content analysis is used to analyse data that is not numerical, but qualitatively descriptive and explanatory.

The current study works with data that is qualitative, and mostly explanatory, for example, to understand the magnitude of skills shortages among career aspirants in under-developed areas of the Eastern Cape. A number of studies that worked with similar type of data had

used content analysis, with great success. For example, Flora (2010) used the content analysis technique to analyse qualitative and explanatory data on the challenges of access and use ICT by nurses in KwaZulu-Natal healthcare sector. Similarly, Nonyane (2011) successfully used this technique to analyse explanatory data on about ICT skills shortages in disadvantaged areas of Mpumalanga province.

The first step was to transcribe data from the tape recorder, which is the conversion of recorded data from audio into a written text format. In terms of the analysis, a theoretical framework was used to draw themes under which key aspects and patterns of data would be placed. The actor network theory framework that is outlined in Figure 3, in chapter 3 upon which research questions are based was also used to construct data-content themes. Each theme was assigned a specific colour that was then used to code specific patterns of data in the transcripts, from which, similar statements were grouped together to answer research questions. A detailed account of data analysis, interpretation and reporting is presented under the findings in chapter 5.

4.5 Summary of the chapter

This chapter describes the research methodology used in the study. The researcher explains the population, sampling process that is applied and the data analysis process. A qualitative research method was applied because of the exploratory nature of the study. It is linked with words, language and experience rather than measurement, statistics and numerical figures. Interviews were used as the tool to collect data. Further, to analyse and interpret data content analysis was used.

4.6 Conclusion of the chapter

In conclusion, research philosophy and research paradigm were briefly explained. The research design (which includes the methodology, methods and techniques of data collection and data analysis) was also clarified. In this process, tables have been used to demonstrate and expand the understanding of research design. This process has assisted the researcher to conduct the study, to analyse and report the findings as presented in the following chapter, chapter 5.

CHAPTER FIVE

5 FINDINGS

5.1 Introduction

This chapter presents the findings of the study. The use of qualitative data analysis in the interviews - the first step was to select or identify the themes that are answering the main question. Secondly, from the interview responses of the open ended questions, the researcher grouped together text that is the same or similar. Lastly, interpret the data using/following content analysis processes. The chapter opens with a tabular background of 12 sub-question representing key themes. The idea of outlining sub-questions per theme in tables 3 to 8 is to show the number of respondents in each theme – per question. Obviously this section 5.1 presents a mere introduction (rather than a detailed account) of the themes investigated. A more detailed outline of findings is presented in section 5.2, followed by a critical discussion in section 5.3.

Table 3: Career Status Local Grade 12 Graduates

1. What is the current career status of the e/unemployed grade 12 graduates (18 to 35 years) in selected rural of the Eastern Cape?	Total # of participants	Working	Studying	Unemployed
	20	8	2	10
		40%	10%	50%

In terms of the career status of most grade 12 graduates, Table 3 shows that out of the sample of 20 participants only 2 were studying, 8 were working and most disturbingly, 10 which is 50% of the sample, were neither employed nor studying.

Table 4: Success in Career Preferences

2. Are you working in your preferred career?	Total # of participants		Yes	No
	20		1	19
			5%	95%
3. Why not working in your preferred career?	Total # of participants	Temporarily	Wait for better opportunities	Don't know
	20	5	3	12
		25%	15%	60%

Out of the same sample (n) of participants (20), Table 4 shows that 95% of participants (including both the unemployed and the employed) were nowhere near the careers of their choice. In terms of explanations, 5 or 25% of the sample were occupying temporal occupations with some hope that their fortunes may miraculously change for the better in future. The hopeless reality however, is that 60% of participants did not know why they were not accessing careers of their choice. Further, they did not seem to have a clear hope or plan to unlock their career fortunes in the foreseeable future.

Table 5: Awareness about ICT careers

4. Do you know anything about ICT careers?	Total # of participants		Yes	No
	20		5	15
			25%	75%
5. Have you heard that there are a lot of jobs in IT?	Total # of participants		Yes	No
	20		4	16
			20%	80%
6. How did you hear about ICT careers?	Total # of participants	Word of Mouth	Media	At school
	20	8	2	10
		40%	10%	50%

In the case of awareness about ICT careers, only 5 participants (25% of the sample) knew about ICT careers. In fact, 80% of the participants did not even know about the existing IT jobs that are unoccupied whilst only 2 (or 10%) of the participants have heard through the media such as TV or radio, with 8 (or 40%) having heard from friends or family members. On a positive light though, 50% of participants have learnt about ICT careers from schools, except of course, that they never paid enough attention to make use of this information in their own personal lives. It is unclear whether this is related to pre-held attitudes about ICT careers, and in such a case, how can certain attitudes be explained. As outlined in Table 6, perceptual questions on ICT careers were thus raised to the participants

Table 6: Perceptions about ICT careers

7. Do you think computer –related jobs are important or unimportant?	Total # of participants		Yes	No
	20		20	0
			100%	0%
8. Which of computer–related jobs would you prefer to do?	Total # of participants	Given specific IT job	Don't know	
	20	9	11	
		45%	55%	

According to Table 6, all participants 20 (or 100% of n) understand and had positive perceptions about ICT related jobs. Though they believe these to be important, 55% of them did not know the finer details as to which ICT related computer job they would prefer to do. It is indeed strange to have people singing praises about the significance of ICT related jobs, yet not knowing the finer details of what makes up an ICT related job, and which one would one consider. This level of awareness did seem genuine, and could not inspire confidence to the researcher – that participants really knew what they were talking about.

Table 7: Access to training opportunities

9. What are the reasons for lack of access?	Total # of participants	Availability of local facilities	Cannot Afford	Not Aware
	20	2	15	3
		10%	75%	15%

In terms of access to training opportunities, Table 7 only 2 (10% of n) knew of training facilities in their local districts. By implication, this indicates that 90% did not know of training facilities in their local districts. Obviously, not knowing about training institutions locally does not imply complete ignorance about such institutions elsewhere. For example, 15 or 75% of the participants have heard of training institutions elsewhere, but could not afford to pay for tuition fee and ICT tools in respective training institutions. Sadly, 3 (or 15% of n) were completely unaware of any ICT training opportunity, whatsoever. Awareness or lack of, obviously, means very little if one cannot afford or get to the institution (due to distance). Access to training facilities is important, but it is just one of a few significant aspects of ICT skills development factors. Access to basic ICT resources is also important in facilitating a vibrant community of practice.

Table 8: Access to basic ICT Resources

10. Do you have access to ICT in your school at past?	Total # of participants		Yes	No	
	20		8	12	
			40%	60%	
11. Where do you access/use the computer?	Total # of participants	At school	At work	Internet Cafe	Cell phone
	20	5	2	4	9
		25%	10%	20%	45%
12. Do you have access to ICT in your school at past?	Total # of participants		Yes	No	
	20		5	15	
			25%	75%	

In terms of access to basic resources such as computers and Internet, Table 8, only 45% of participants had easy access, meaning that 55% had difficulties in accessing basic ICT. For example, the majority of them were using their mobile phones to access the Internet and search for information whilst 20% were using computers in Internet cafes. The promising aspect however, is that 25% of the participants were able to use computers at local schools. The minority of participants (which is 10% of n) were using computers at their workplace.

5.2 Findings

Findings in this thesis are presented in a specific format where in section 5.2, only the factual (non-critical) description of findings is presented, and discussed under the discussion of findings in section 5.3.

5.2.1 Findings on career status

A research problem of this study was that despite noble skills development efforts at national level a shortage of critical skills such as ICT remain severe in South Africa, with the majority in rural areas being the most adversely affected. The phenomenon of ICT skills shortages is understood to imply the presence of posts, contrasted with a lack of people with relevant skills to fill them (Nonyane, 2011). Thus, a large percentage of unemployment and mostly the youth in poverty-stricken areas of the Eastern Cape means that there are people who need jobs, and these jobs not filled because people lack relevant skills. The first question in this thesis therefore, was to verify the reality of the problem by enquiring about the exact career status of the youth in selected areas, thereafter, to understand the causes with a view to exploring solutions.

According to the findings, the majority of grade 12 graduates are neither working nor studying. Out of 20 un/employed grade 12 graduates interviewed, 10 (50% of the sample) were unemployed. Worst is that 18 (90% of n) were not even studying. Most of them are either looking for a job or planning to further their studies. When asked to describe what they are currently doing for example, one respondent said "... I don't do anything" (AM-R1). On the same question, another respondent described herself as seeking employment, saying: "I'm a job seeker" (SB-R1).

In explaining reason for being idle, most of them said they had applied for jobs but never received feedback from the employers (N-R12). A common concern is that when they drop the CV or during interviews, they are told not to phone back for they will be contacted shortly or be shortlisted (MS-R10). Explaining why he was not working or studying, another student said, after graduating grade 12 "*I wanted to work but I didn't have answers*" (T-R4) from companies where applications were sent. Another dominant explanation is that preferred jobs require work experience and specialized skill which, most of grade 12 graduates lack. As an illustration, the individuals said: "*these jobs need someone that knows a computer*" (NJM-R14) and a person with qualifications such as "*3rd year in a varsity, which is ... diploma and degrees*" (AM-R17) but "*I know nothing about a computer*" (PN-R15). There also seem to be indecision in terms of career preferences. In terms of job preferences, another response said he just wanted any kind of job (SB-R6, MM-R7). Obviously, another group was able to specify fields such as Engineering, IT, Social work and teaching (N-R4, TM-R8 & AM-R10) while others wanted to further their studies (NM-R8 & MB-R7). The main issue at this

point though, is that these grade 12 graduates were not studying at the current stage. Reasons for not studying ranged from those who applied late (AE-R5), to those who did not qualify for university because of poor symbols (TM-R19), which also prevent them from getting bursaries (NM-R8, NM-R7 & YS-R2). However, most of them had dreams of pursuing tertiary studies in future. One respondent for example, said “*next year, I’m planning to go back to school*” (MM-R9). Similarly, another respondent just said she wanted to continue studying in future (PN-R3).

For those who were employed but not in the careers of their liking, 5 out of 20 were working temporarily until they can make it to tertiary institutions (NM-R9, MB-R5, MM-R9, NM-R7 & NN-R1). Another 3 were holding on to the jobs they detested – until they find better opportunities (IP-R1, MP-R2 & YS-R1). Other 12 respondents did not know what career they preferred. The other 9 were aware but lacked funds to pay for university fees.

Others work because they had to get funds in order to further studies. As an example, one respondent who works as a merchandiser at Tiger Brands said, “*I didn’t even dream about that job*” (NM-5), but has to do it until there is enough money to get to a tertiary institution. In the same question respondent who is currently working in a gold mine in Gauteng said he actually wanted to be a sport analyst or sport manager (IP-R6), but had to work underground until he can raise funds to study for his preferred career.

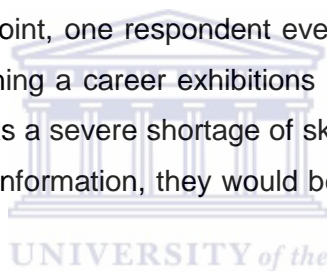
The individuals that are unemployed were asked whether they heard that there are a lot of jobs in IT, for they are frequently advertised over the Internet. 16 (80% of the sample) never knew about IT Jobs and the remaining 20% heard about it. A clear enlightenment on why they never heard about IT jobs was that a majority of them lack computer and Internet access to search for information (PN-R13; MM-R15 & B-R12). One respondent said “*it is not easy to get access of information in the rural areas for there is lack of opportunities*” (YS-R7). Actually, other group mentioned that they do watch TV and listen to radio but never heard about IT jobs. Then, respondents were asked if there are not interested in doing IT. 5 out of 20 interviewed participants said they are interest in doing IT. One thing that worries them, they do not afford the fees and lack experience (T-R12; NJM-R15; N-R5; BN-R18).

5.2.2 Findings on ICT career awareness

Awareness about ICT careers is a significant basis (and a starting point) towards ensuring appreciation and ultimately, effective use of a broader range of life-improving ICT services. Clearly, one needs to have some idea about a career or anything in life for that matter, before they can have interest and aspire to pursue such a career. According to the findings however, most of grade 12 graduates lacked basic insight on ICT careers and related trainings programmes. For example, out of 20 interviewees, 15 (75% of the sample) were not aware of ICT-related careers. On this point for example, one respondent said: “*No, I do not*

even know about IT careers” (BN-R11). Emphasizing such a lack of awareness, another respondent went on to say: *“I do not want to lie; I’m not sure about the IT things, even its field”* (MS-R18). Whilst the aim of the study was to ascertain the status of ICT skills and explanations to limitations, the evident gross lack of awareness about ICT related phenomena among respondents suggest that the causes to be beyond just individual perceptual or preferential issues, to systemic issues of access to information. For example, without minimum awareness about the field, learners do not even have a slight chance of deciding whether they are keen to pursue ICT career.

For the few that had some insight, they were asked to explain how they heard about ICT careers. Responses varied, with 8 out of 20 respondents citing a vague word of mouth as their source. For example one of the responded said, *“There were some people who were doing IT last year. I heard some of them talking about IT ... [that is] why I wanted to do IT. And then they showed me all those things related to IT”* (MB-R12). Another 2 respondents heard from the media such as TV, radio and newspapers (PN-R13, BN-13 & YS-R7). The last 10 individuals were told at school in the career exhibition, but admit to not have paid much attention to it. On this point, one respondent even said: *“yho! I don’t remember”* (AE-R10) anything about such a thing a career exhibitions at school. Having been informed by the researcher that the field has a severe shortage of skills, most respondents felt that if they can be exposed to IT related information, they would be keen to explore such careers (MS-R20).



5.2.2.1 Awareness and perceptions on ICT careers

Despite the limited awareness, the majority of graduates categorize computer related jobs as essential. In other words, they had positive perceptions about the field, though they viewed the field as outsiders, with a belief that it was for those who are more special than them. When asked to give their opinion on whether computer-related jobs are un/important for example, 20 (100% of n) participants thought of computer-related jobs to be important because they simplify and quicken work processes. For instance, one respondent said a computer helps to secure (personal and company) information (AM-R28, TM-R39) and *“allows people not to do a physical work”* (SM-R22), implying that computerized systems automate and simplify tasks.

Uncertainty about ICT jobs of possible interest was, therefore, evident among participants. When asked to indicate a potential ICT related career of preference for example, 11 out of 20 interviewees did not choose any IT jobs. In their explanations, one of them said: *“I don’t even know where to start when it comes to IT”* (N-R25). A similar sentiment was that *“any kind of a job that can be available, I’ll do my best”* (BR-R23). It is clear from these statements that failure to identify a career is not a result of negative perceptions, but strictly related to a lack of information and insight in the selected rural areas of the Eastern Cape (TM-R36). Thus an

informal conversation with the researcher, discussing the very basic ICT related careers offered the minimum insight to the participants. At this point, candidates became both excited and curious about a wide range of possibilities - choosing between call center, teller, software designer; computer engineer, data capture and web-design related jobs (PN-R24, T-R17, NN-R14, YS-R14 & NH-R12). A lesson for the research in this respect was that there is more to a problem of ICT skills shortages than a mere lack of interest or ability of career-seekers, but also the quality of preparatory education, career guidance and access to relevant information among learners in under-developed areas such as the rural Eastern Cape.

5.2.2.2 Perspectives of training institutions on public ICT career awareness

For more clarity on the status quo, further insight was sought from local training organisations. One senior manager of the Department of Technology in each of the 2 local institutions: King Hintsa College, and Walter Sisulu University (WSU) were then selected for interviews. The main focus was to understand the focus of the curricula, structure of the courses offered, recruitment of students and the performance of students in IT/computer courses, quality challenges and how the issues are addressed.

In terms of the courses offered in selected collages, it was clear from respondents that institutions had a variety of courses, which include IT related studies (LM-R2). Of concern on this point however, is that fewer students were enrolled for IT studies by comparison to business or education studies. The respondent of this college made particular reference to the current intake (2011) as a case in point, obviously, with an explanation that the institution did not have enough infrastructures to cater for IT and lacked resources to upgrade the standard and improve their strategy (LM-R3).

In terms of student performance in IT related courses, the respondent said the performance was very poor (LM-R7). To clarify this point, this respondent even said: *“to be honest, they are not doing well at all because the facilitators that we have or lectures if I would say are people that come straight from varsity have not been capacitated that much”* (LM-R7). In justifying his response, he said the institution was still growing and they were experiencing difficulties in term of getting funds to improve their facilities.

This institution (King Hintsa College) had to implement some changes in the programmes offered to cater for government sponsorships. As an illustration, the institution has moved from the Nated Courses (N's) to the National Vocational Certificate (NVC) Programme (levels). This also helped to bridge the gap between what is offered and what the industry wants or expect from graduates, and to create opportunities to get funds (LM-R12).

One of the reasons for poor performance was that the institution was using inexperienced lecturers. The reality is that new employees must be trained so that they can clearly understand the company strategy. In this regard, the respondent confirmed that through the

government-supported budget for staff training, facilitators/lecturers were being trained before they could offer classes (LM-R13). It is clear from the complaints of limited skills from lecturers however, that the training programme has not yielded the required results yet. At the time of the study, confidence on the output of IT students was not certain because the course was still new (LM-R10), though other courses like engineering and hospitality were doing very well (LM-R12).

A shortage of relevant ICT facilities was also cited as a hindrance to the performance of IT students. On this point, the respondent said they do have computer facilities but are not fully functioning, and are not enough to accommodate all students (LM-R18), and that it is more difficult when it is exam time (LM-R16). Nevertheless, the institution is working on improvements with help of suppliers (LM-R18).

A negative correlation between in-adequacy of ICT educational resources in IT subjects in one of the institutions clearly emphasizes importance of adequate facilities in training and in improving the learning outcomes of IT students in training institutions. Thus, managers of ICT departments in both institutions were also asked to describe the main barriers that affect the use of ICT. The leading explanation at WSU was that students were coming from different backgrounds and the majority of them never heard about computers before entering tertiary. In the words of the respondent some of the students were “...*not exposed to these kinds of things, like computers ...*” (LM-R19), which incapacitate them from using ICT resources in their courses. The situation is worsened by wide distance proximity between the areas of residence (which do not have the necessary resources) and the institution where they are studying. So this makes hard for them to stay late and practice the newly learnt ICT skills they need to do well in their courses. In following up, had to know if and how the problem has been addressed in existing government/organizations skills programs/or trainings. Respondents think some effort has been made, but uncertain about the effect of such attempts. One respondent said: “*Yes, skills programme addresses the problem and the main focus are for students to get skills and be employable*” (LM-R20). At King Hintsa, the problem has not been solved yet because they were still battling to train the lecturers/facilitators (LM-R40).

In terms of informing students about IT related careers at King Hintsa College, positive efforts include campaigns by marketing students - to alert community people about the programs that institution has (LM-R25). In the process, the institution was also planning to add more programmes to ensure that the programmes better meets needs of the industry. At the time of the study however, the institution had not got the feedback in terms of the quality of their students (LM-R29), but it is accepted that institution “*needs proper research...*”(LM-R27).

The literature highlighted that there was still a need to train graduates from school, college or university when they get employed. According to graduates, sentiments are that the companies expect too much from students, giving an impression of incoherence between the expectations of the industry and what educational institutions are really offering. On this point, the ICT department manager at King Hintsa College said: *“the college prepares students for 2 things (students to be employable and to be ready to further studies in the high level institutions)”* (LM-R33). On other hand, *“Government is saying people are not employable because they had theory”* (LM-R34). Therefore, the institution had to introduce programmes that will align theory and practical at the same time, and hopefully, this will help students to obtain skills that are more relevant to industry’s requirements and help them know exactly what they need to do when start working.

In terms of the lack of awareness about ICT related careers in rural areas, efforts are being made to inform the public. In fact, King Hintsa College reports to be doing things like ... road show where IT facilitators are part of the road shows to answer complex questions that can be asked by community people with regards IT (LM-R36). The impact of this effort can only be evaluated by comparing a change in terms of public response in due course.

5.2.3 Findings on skill levels

The focus in this study was on the basic ICT skills such as computer literacy. In this respect, particular reference is made to the ability to use the Internet, e-mail, to use the word processor, a spreadsheet, and presentation tools. Respondents were asked to describe their levels of expertise in these basic functions. Their descriptions were then placed into 3 categories: the unskilled, the intermediate, and the advanced levels – as per criteria in Table 1 (in chapter 4).

5.2.3.1 Switching computer on/off

On the skill to handle computer hardware, skill levels ranged from unskilled to intermediate. On something as basic as switching the computer on/off for example, one may expect the whole sample to master this skill. However, only 15 (75%) out of the 20 respondents knew how to switch on/off, with 5 (25%) respondents not confident. Among those with advanced skills responses on how to switch on/off, ranged from statements such as *“you see the computer, there’s a computer screen, there’s a button from left or right which is on/off. You press that”* (BH-AM-R41), statements like: *“okay, when you switch the computer, there’s a standby button in the CPU, together with the monitor there is another button that you see this is a standby button. Your first thing is, when you switch off the computer will automatically tell you that in the monitor there is log off standby button, you have to press the button in the CPU, then the computer will be automatically off”* (BH-MB-R20).

This was a direct contrast to those who did not know how to switch on/off the computer, whose responses ranged statements such as *“I’m not so sure because of, we had computers at school, when we get in will not normally find it on”* (BH-MS-R25), or *“where do I use to press? Firstly there’s an instrument called mouse... but I don’t know how to switch it on”* (BH-TM-R51) because *“Yes, I was using my brother’s computer doing whatever I wanted to do but I used to find it open”* (BH-TM-R53). This case is a bit paradoxical because this student could still explore her brother’s computer when it is on, without knowing how to switch it on/off herself. This raised curiosity in terms of things that such a person would be doing in a computer.

5.2.3.2 Using the word processor, spreadsheet and presentation tools

The logic of this theme is that basic computer skills are a foundation upon which learning in further ICT related careers can be built. Information on skills to use the basic computer tools such as the word processor, spreadsheets and presentation facilities was to ascertain consciousness of these career aspirants to enter basic positions in local organisation. The aim was also to ascertain the level of readiness to be trainable in more advanced but scarce ICT careers such as web-development, software engineering and data base development, etc., in tertiary institutions later on. Respondents were then asked whether they know how to use a word processor. According to the findings, 12 (60%) of respondents had the skill that ranged from intermediate to advanced, with as high as 8 (40%) of respondents demonstrating a complete lack of knowhow on using this tool. Evidence of advanced skill is captured in responses such as *“Yes I know. Click to start, after that the windows will open and go straight to Microsoft and you click there and it will open”* (C-NH-R23). In the same question, another respondent said *“what I know, you type after you go to file, and then you go-save as, and then you write your name or name your file and then you go to save and then you auto save it. And then when you are/ try to open it again, you save on document or desktop go to document and then opened your file, click on the mouse, go to file, and then go to open – open your file”* (C-NN-R26) for the one that is already saved *“You go to--- you open nhe, that one that has saved and then you go open, and go to edit and edit it”* (BH-BR-R41). Though these statements demonstrate clear confidence on the application and use of the tool, there were also those within the 12 (60%) respondents only knew how to type, but needed help when they wanted to save, open exiting document and to highlight or change font, they were clueless (C-YS-R25, C-PN-R40). When asked to elaborate why they unable to action these things, one respondent said she forgot because it’s been a long time not using a computer (C-PN-R42). In supporting the statement another one said *“Teachers, they show us okay you open it like this but; we don’t have time to open it so you came there its already open, they show you how to type... and we normally find them open”* (C- YS-R26).

This makes one question the structure and purposes for which computer facilities are used in schools. Why would the teacher open new word pages and not let a high-school pupil to learn and open a computer on their own?

There were even fewer graduates who could use PowerPoint, spread sheets and document scanners. In fact, only 4 (20%) of respondents knew how to use a spread sheet and presentation tools such as power point. The level of skill was even lower when it came to tasks such as using a printer, with only 2 (10%) of respondents knowing how to print. In explaining this problem, most respondents said they lacked access to these ICT tools and in places where they access a computer they often asked someone to print for them. So, they lacked experience and practice. Once again, it is clear that the root of skills shortages is deeper than the often assumed lack of intellect and creativity, to issues of access to knowledge and to resources. It is clear therefore, that the problem is deeper, and talks to national issues of social justice and equitable development across all areas, both rural and urban. Without access to information, knowledge and the actual resources, it seems unrealistic to expect an increase in the supply of technical skills whose development depends on this missing factor.

5.2.3.3 Using e-mail & Internet

In terms of knowing the e-mail, owning an address and using the facility, only 3 (15%) out of 20 respondents had email address. Those that had email addresses were using it for learning, communication and work purposes. Whilst one of the 3 respondents was using it "...to gain new knowledge and for the business" (C-NN-R41), another one was using it to send school work. She supported herself and said "*The time I was in Cape Town, I did not use it much as I was using it in class to send school work*" (BH-SB-R61).

In terms of the Internet, 9 (45%) out of 20 interviewees were able to use Internet. And they were asked where they access Internet. Most of them use mobile phones to access the Internet that is mostly used for social network tools such as Facebook, Mixit and 2Go. Response gave when asked have you ever various aspect of the Internet (www). One said: "*Mmmhn, like Facebook but I never used those things*" (BN-R49). Another one said: "*I tried to use Google and then Yahoo and Webmail*" (NN-R35).

5.2.4 Findings on access to training opportunities

Findings indicate that some companies do not offer appropriate computer related training to their staff. Asked whether they ever attended computer related training at work for example, some respondents make their own observations on how a computer or machine operates, but others complain of not having received proper training when they joined the companies (YS-R52). On economic grounds though, an organisation may be hesitant to offer ICT related training if the job-description of an employee does not require such a skill and ultimately, to

justify that type of training. Arguably, training people on things they do not use have proved counter-productive in isolated instances where an employee would lack the background to make sense of, and digest the new skill, to the extent of forgetting what they learnt. On this point, some employees who had received some ICT related training at work failed to find relevance in the training they received, to the extent of going as far as to say that it was not the proper training (IP-R62, MM-R59).

The bottom line in this respect then, is to emphasise ICT skills for those who seek to, and are pursuing ICT related careers. So, figuratively speaking, it would not make sense to blame employers of street sweepers for not training their employees on ICT. It would be equally illogical to blame such employers for such employees to end up being street sweepers as the problem may lie elsewhere between political and educational authorities. The quality of curricula the career guidance in schools thus, becomes open to scrutiny in this instance.

5.2.5 Findings on quality of the curriculum

Ideally, students are expected to perform increasingly challenging tasks to demonstrate greater grasp of their learning as they mature. This should help that a person to be employable or to be ready to further tertiary education after completing their final high-school grade. Tertiary institutions offer different courses with different approaches to their methods of offering. Within those courses, organisations can benefit if the quality of curriculum (ICT specific) meets their expectations or requirements.

As local employers of ICT graduates, financial institutions were asked to reflect on role that IT plays in the banking industry. Whilst this may seem a rhetorical question, given the convergence of the banking services with electric innovations in the 21st century, the idea was to ascertain the need for ICT skills in the industry. Predictable responses were that computerized systems are so central, such that a bank cannot function if computers are offline in the branches. In the words of a post official for example, *“if the computer is offline, they first solve the branch for there are core in the business because the post office is very committed in servicing the nation focusing more in serving in the rural areas”* (HRM-J R5). Whilst the same logic applies to banking institutions, the ABSA branch manager also added that they also use computers to cut telephone costs for they communicate via email (HRM-UB-R5).

Given the significance of computers in financial services, it is logical expect bank employees (or applicants) to possess basic ICT skills, at the very least. Thus, the banking industry would need a person with the following school qualifications: grade 12 with maths as well as basic computer skills at the very least, and at most, a specialized tertiary qualification, depending on the position applied for (HRM-UB-R6). When respondents were asked about skills they normally need when they employ a person, one manager said the *“most important is*

mathematics and accounting because we are in a financial field and mathematics and accounting is very important and then customer service skills, people skills we look at that because also we are in retail space working with clients' everyday" (HRM-UB-R6). In the same question, another respondent said: *"we need specialized skills and a person with relevant qualification"* (HRM-J-R6) such as IT, sales, HR and finance (HRM-J-R7). It is where the shortages are, but the entry level for any position is grade 12 (HRM-J-R14). At the very junior level though, the post office would have delivery men some of whom, do not have grade 12, but these are not the type of occupations affected by skills shortages. Without specialized skills however, a delivery man is unlikely to move beyond this occupation, hence the industry encourages learning within the organisation where they supply their employees with bursaries (HRM-J-R6). To get the people to fill the positions, both the bank and the post office advertise internally and externally, though focused more on internal staff (HRM-J-R8; UB-R7). For specialized positions like a Senior Manager or General Manager, they usually advertise externally (HRM-J-R10).

Respondents were also asked to reflect on how they deal with the shortage of skills in their branches. Responses ranged from casual encouragement for staff to take own initiative in getting themselves qualified, to specific internal training programs. On this point for example, one respondent said: *"we encourage employees to study by giving out bursaries"* (HRM-J-R12). A bank manager in another organisation said *"we train people from inside and give them mentoring and coaching"* (HRM-UB-R10). In this instance, the training for tellers and enquiries takes 2 to 6 months but it can take 2-3 years for specialised roles like management (HRM-UB-R12). Also, if there is a need for a specific management skill then the company offer management programmes (ibid.). At this stage, the organisation can decide whether to outsource their IT services. However, the selected banking industries choose to outsource IT specialists from nearby vendors for the branches situated in rural areas (HRM-UB-R16, HRM-UB-R18).

The response showed that in many cases graduates hardly come as a ready-package, but had to be trained when starting a new job. The managers' reason was that they were giving them an exposure into the finance industry for it is a different environment from that of a university (HRM-UB-R13 & HRM-J-R16). On the subject of insufficient skills, dominant response highlighted problems with the quality of background education in schools. According one respondent for example, the problem is that for *"the majority of people, their qualification is more on standard 8 or grade 12 or lesser"* (HRM-J-R17) whilst another respondent believed that skills can be acquired through experience, that is, by working (HRM-UB-R15). In this regard, formal training is seen as a necessary but not sufficient basis for people to achieve an expert level of skill. They also need practical experience, which is lacking on many of the grade 12 graduates who seek to enter the labour market.

In terms of access to ICT tools, workers did not have a problem related to computer access. As one respondent said: “*we’ve got printers, we’ve got scanners, we’ve got Internet, we’ve got computers, we’ve got self-service kiosk, we’ve got (what else, is counted under IT) telephone, TV, not radios*” (HRM-UB-R22), it is clear that access to ICT is not the issue for these workers. This being said however, it emerged in another interview that the presence of facilities in an organisation is not equivalent to access to all these facilities for workers. In the same question for example, another respondent said “*almost everyone in the branch has a computer depending on the job description*” (HRM-J-R20), but access to the Internet is given to managers and consultants (HRM-UB-R25). Clearly, management decides on what workers need and allocate access to them according to the needs of respective job requirements. Nevertheless, workers also receive computer training in preparation for related work tasks (HRM-J-R21). With the exception of internet access in this instance then, access to computers is not an issue for these workers.

5.3 Discussion of Findings

5.3.1 Career status

The ANT framework in Figure 3 presents ICT skills development initiatives as a network of actors who carry out respective activities towards a specific objective. The framework helps to identify the actors, their activities, inter relations between the actors and the process that determine the operational environment in the actor network. Under ideal circumstances, the e-Skills development network is assumed to commence with the problematisation and the interessement, the enrolment and finally, the mobilisation processes. The idea with problematisation is that actors would get to share a common understanding of the problem, and through the enrolment process, negotiate a common purpose upon which the mobilisation of common activities can be based. When these processes are inadequate, a gap between activities, objectives and outcomes becomes highly probable.

In the current study however, the link between actors, actants and the processes seems questionable. Whilst the problematisation, interessement and enrolment phases between the government, training organisations, local employers and industry stakeholders appear to have been fairly attempted in the current network, there is a clear gap in terms of mobilisation (implementation of everything that has been formulated). For example, whilst problematisation is reflected in national and regional conferences and policy drafting processes that include the e-Skills Summit in 2010 (DoC, 2010) and the ICT competency standards for teachers (ICT-CST) policy framework (UNESCO, 2008), success have remained evasive due to poor coordination of implementation programmes. The ANT framework in Figure 3 further suggests that a meaningful career status of ICT skills would be greatly influenced by the availability of basic ICT resources and mutual support and

functional information flows between all actors such as (government and local organisations), actants and activities in a network or community. However, the findings reflect a discrepancy between the policy and implementation, where local organisations are unclear about the skills development agenda at a local level. This is shown by a persistent gap between the demand and supply of trainees from the training institutions and local employers of ICT, obviously, with causes of varying complexities.

Findings show a disappointing trend where grade 12 graduates are idle, either unemployed and or not doing tertiary education. Out of 20 un/employed grade 12 graduates interviewed, 10 (50% of the sample) were unemployed. Worst is that 18 (90% of the sample) were not studying. Most of them are either looking for a job or planning to further their studies. When asked to describe what they are currently doing for example, one respondent said "... *I don't do anything*" (AM-R1). On the same question, another respondent described herself as seeking employment, saying: "*I'm a job seeker*" (SB-R1).

A paradox on high unemployment levels however, is that the IT sector is reported to a multitude of posts but is unable to find suitable workers to fill them. Explanations from grade 12 graduate range from a (1) lack of exposure to IT related courses, (2) a lack of awareness about IT related careers (due to poor career guidance in earlier levels of school), to (3) inaccessible IT training opportunities after grade 12 as discussed in detail under section 4.3.3, (4) under-preparedness to qualify for IT related studies in tertiary institutions (this is discussed in detail under section 4.3.4), and finally, to a (5) lack of funds to pursue post-secondary education.

5.3.1.1 Lack of exposure to IT related courses

In explaining reasons for being idle, most of the grade 12 graduates said they had applied for jobs but never received feedback from the employers (N-R12). A common concern is that when they drop their CV's or during interviews, they are told not to phone back for they will be contacted shortly or be shortlisted (MS-R10). On this point, explaining why he was not working or studying, another student said, after graduating grade 12 "*I wanted to work but I didn't have answers*" (T-R4) from companies where applications were sent. A dominant explanation was that preferred jobs require work experience and specialized skill which, most of grade 12 graduates lack. As an illustration, the individuals said: "*these jobs need someone that knows a computer*" (NJM-R14) and a person with qualifications such as "*3rd year in a varsity, which is ... diploma and degrees*" (AM-R17) but "*I know nothing about a computer*" (PN-R15). There also seem to be indecision in terms of career preferences. In terms of job preferences, another respondent said he just wanted any kind of job (SB-R6, MM-R7). Obviously, another group was able to specify fields such as Engineering, IT, Social work and teaching (N-R4, TM-R8 & AM-R10) while others wanted to further their studies (NM-R8 & MB-R7).

The main issue at this point though, is that these unemployed grade 12 graduates were also not doing any tertiary education. Reasons for not studying ranged from those who applied late (AE-R5), to those who did not qualify for university because of poor symbols (TM-R19), which also prevent them from getting bursaries (NM-R8, NM-R7 & YS-R2). However, most of them had dreams of pursuing tertiary studies in future. One respondent for example, said *“next year, I’m planning to go back to school”* (MM-R9). Similarly, another respondent just said she wanted to continue studying in future (PN-R3).

For those who were employed, but not in careers of their liking, 5 out of 20 were working temporarily until they can make it to tertiary institutions (NM-R9, MB-R5, MM-R9, NM-R7 & NN-R1). Another 3 were holding on to the jobs they detested – until they find better opportunities (IP-R1, MP-R2 & YS-R1). Other 12 respondents did not know what career they preferred. The other 9 were aware but lacked funds to pay for university fees.

Others work because they had to get funds in order to further studies. As an example, one respondent who works as a merchandiser at Tiger Brands said, *“I didn’t even dream about that job”* (NM-5), but has to do it until there is enough money to get to a tertiary institution. In the same question a respondent who is currently working in a gold mine in Gauteng said he actually wanted to be a sport analyst or sport manager (IP-R6), but had to work underground until he can raise funds to study for his preferred career.

5.3.1.2 Lack of awareness on IT-related careers

The principles of problematisation, of enrolment and mobilisation in the ANT framework (Figure 3) promote the clarification of the problem, mapping the common ground and the outline of the plan of action among the actors, including the trainee subjects (grade 12 graduates). These processes talk to (or imply) the significance of the awareness building process (at the very least), among all actors in a network. In other words, awareness is not supposed to be a challenge, and any discrepancy would compromise activities and outcomes in the network. In the current study however, findings show a complete lack of awareness about career possibilities in the IT sector among the youth. For example, unemployed individuals were asked whether they knew of skills shortage (abundance of job vacancies that lacked qualified personnel) in the IT sector, for they are frequently advertised over the Internet. Over 16 out of 20 participants (80% of the sample) never knew about IT Jobs. On this point or example, one of the respondents even said, *“No, I do not even know about IT careers”* (BN-R11). Another one said *“I do not want to lie; I’m not sure about the IT things, even its field”* (MS-R18). In explaining a lack of awareness about career possibilities in IT, respondents cited a lack computer and Internet access to search for information (PN-R13; MM-R15 & B-R12). One respondent said: *“it is not easy to get access of information in the rural areas for there is lack of opportunities”* (YS-R7). Actually, all respondents said they do watch TV and listen to radio but never heard about IT jobs. After clarifying career

possibilities to the participants, they showed great interest in the field of IT. For example, 5 out of 20 interviewed participants said they are interested in doing IT. The concern however, was that they do not know how they can afford training in this field. A lack background experience was also cited as a possible impediment to finding employment (T-R12; NJM-R15; N-R5& BN-R18).

Understanding that there are skills shortages therefore, and that the sector has vacant posts that require skilled people, came as an unexpected surprise to many respondents. This reaction is obviously natural for people with no idea about careers in the IT sector.

Even after the researcher had explained possible IT careers to respondents, such information was too new for them to make informed career decisions in the IT sector. When asked to choose the computer jobs they aspire, only 9 out of 20 respondents were able to choose. The remaining 11 participants had no clue, and as such, could not make any choice. In their explanation, one of them said *"I don't even know where to start when it comes to IT"* (N-R25). Similarly, another one said *"any kind of a job that can be available, I'll do my best"* (BR-R23). Clearly, this is not a useful way to make a career decision. If people are not told about ICT, they will not benefit from it. When asked to explain what the institution is doing to facilitate student access to ICT information, one respondent said marketing students did a campaign to inform the community about their institutional programs (LM-R25). In this venture, IT facilitators were also involved to answer complex questions asked by community people with regards IT (LM-R36). Despite these efforts, and the government's awareness programs, it is not yet effective in the rural community for the people still lack knowledge about ICT.

Lack of ICT career awareness according to the findings, is linked to a lack of related career information, of related guidance at school, distant proximity from reputable training institutions (TM-R36), and a lack of awareness initiatives to remote schools by tertiary institutions and the corporate sector (LM-R37, LM-R40). Feedback suggests that training institutions fail to alert people about ICT (LM-R19). As a result, people end-up choosing courses that they are familiar with.

Lack of awareness about IT careers can also inhibit students from choosing courses that are related to career in ICT, with a negative impact on the supply of skills in the sector. For this reason the e-skills goals target could not be reached. On the other hand, the organisation cannot use advanced ICT tools and follow the trend for technology, which then hinder the business not to grow.

5.3.2 Level of skill among grade 12 graduates

Findings show a high rate of computer-illiteracy, with many grade 12 graduates lacking basic ICT skills such as switch on or off as well as the basic functionalities such as the use of a word processor of a computer.

5.3.2.1 Switching the computer on or off

Out of 20 interviewees for example, 15 (75%) respondents knew how to switch on/off then 5 (25%) respondents did not know. When asked to show or explain how, some of the respondents in the 75% were not sure how to switch on/off because they find computers already open. In addition, one of the respondents said *“I’m not so sure because of, we had computers at school, when we get in will normally find it on”* (BH-MS-R25). Another one said: *“where do I use to press? Firstly there’s an instrument called mouse... but I don’t know how to switch it on”* (BH-TM-R51) because *“Yes, I was using my brother’s computer doing whatever I wanted to do but I used to find it open”* (BH-TM-R53). Clearly, these grade 12 do not have access to basic resources, and they also lack basic insight about basic uses of ICT.

5.3.2.2 Usage of basic tools such as word processors

Respondents were also asked whether they know how to use word processor. Whilst 12 (60%) of respondents knew how to use word processor and to type words on new pages, which is a basic computer application, 8 (40%) respondents did not know how to use this application. That is, they did not know how to save, open existing document, to highlight or change font, and there are clueless (C-YS-R25, C-PN-R40). When asked to elaborate why they were unable to action these things, one respondent said she forgot because it’s been a long time not using a computer (C-PN-R42). In supporting the statement another one said *“Teachers showed us that you open it like this but”* (C-YS-R26)...when you came there the computer is already opened and they also showed them how to type but they normally find word processor open (*ibid.*). Respondents were also asked if they know how to use PowerPoint, document scanner and spreadsheet. On this point, 16 (80%) did not know how to use these facilities. The results were worst on using a printer, where 18 (90%) respondents did not know how to print.

5.3.3 Access to basic ICT facilities

There seem to be a contradiction in terms of policy stipulations, and the actual implementation of policies towards skills development in South Africa. Thus, despite the noble-intentioned e-skills programme of the government, which prioritises skills and literacy development at the schools, where every South African learner in the primary and secondary schools should be ICT capable by 2013 (DoE, 2003), findings suggest a bleak picture in rural areas of Eastern Cape. Explanations from the grade 12 graduates vary from (1) a lack of ICT

facilities (computer, Internet and other ICT tools) to (2) a lack of ICT training courses from the schools.

5.3.3.1 Lack of ICT facilities (computer, Internet and other ICT tools)

The ANT framework in Figure 3 presents e-Skills development initiatives as consisting not only of actors, but also actants – which are the skills, tools such as the technical infrastructure and programmes as well as policies and curricula. The assumption is that since actants are also a significant part of a network, a harmonious link between them, the actors and activities should also be necessary for a network to be meaningful. The point here is that the presence of relevant actants (in reasonable quality and quantity) is expected, secondly, that they must be positively linked with actors and activities. The findings however, suggest that there are limitations in the quality and quantity of the means to enable activities in the e-Skills network. Out of 20 grade 12 graduates interviewed, 12 (60%) of them (10 from Centane and 2 from Butterworth) did not have access to computers. In clarifying this point, one respondent said “*no, I don't have a computer even a phone with the Internet*” (BH-MM-R16), meaning that this person (others like him) in the rural area of Centane (in the Eastern Cape) had limited (if any) access and use of a computer, Internet and a phone (C-IP-R50). Generally, according to the results, only 9 (45%) out of 20 interviewees were using mobile phones to access Internet, which is mostly used to access social networks such as Facebook, Mixit and 2Go (NN-R49, SB-R80 & AM-R52). Some of them access it at home; others at work, Internet café (C-N-R67 and BH-TM-R80) and 8 (40%) of respondents from Butterworth said they access it in local schools. Other respondents are dependent on friends or family members in order for them to use a computer (MB-R25, BN-R40). In explanation, a respondent said “*I asked my brother to save the document for me*” when writing something on word (BN-R40). Even though the 40% of respondents had computers at their high school, they were not using it fully. In fact, one of them said they were restricted to use the computer for research only (BH-MM-R33). In addition, others complain that computers were introduced in lower classes while they were on grade 12 (BH-NM-R27, BH-AM-65 & BH-TM-R75) and some of them did not have money to pay for computer classes (MM-R62, TM-R7 & SB-R74). In terms of the skill, it was disappointing to note that as many as 15 (75%) out of 20 respondents lacked computer literacy, but had not attended any training. The sad part is that 5 (25%) of respondents that had a chance to attend computer courses still did not know how to use computers. When asked to elaborate on what their courses entailed for example, one of them said: “*I don't know – I don't remember it*” (MM-R60). It is clearly thus, that lacking access to computers can make people lose the little knowledge and experience they might have picked up.

The fact that rural grade 12 graduates could not afford to pay for computer classes, clearly limits exposure to experiential-learning. Also, without access to opportunities means that

graduates will have no ICT related skills. They will have limited opportunities in terms of getting employment in the ICT field.

5.3.3.2 Explanations to the Status Quo

Reasons for a lack of resources range from a lack of funds, to a lack of connectivity services in local towns. For example, when asked whether they used various aspect of the Internet (www), one respondent said *“Mmmhn, like Facebook but I never used those things”* (BN-R49). Another one said: *“I tried to use Google and then Yahoo and Webmail”* (NN-R35). 3 (15%) out of 20 respondents had email addresses whilst the whole 17 (85%) of them had none of these privileges. Those that had email addresses were using it for limited purposes, including gaining *“...new knowledge and for the business”* (C-NN-R41). In the same question, another respondent was using email for school purposes. In her explanation, she said *“the time I was in Cape Town, I did not use it much as I was using it in class to send school work”* (BH-SB-R61).

On a lack of access to ICT, over 15 (75%) of respondents could not afford to buy any computer, as *“they don’t have means to get it ... they don’t have the means to get the computer because you must have the money to buy it and you must have the money to get the Internet card so that you get in an Internet”* (C-YS-R39). Another one said: *“I can say it’s because of money; they can’t afford to buy them”* (C-T-R33). When asked how much it costs to use a computer or Internet in the Internet cafe, one respondent said *“It is R15 per hour”* to use an Internet (BH-AM-R70). Another respondent said *“it cost R2 per page”* to print a black and white (BH-MB-R50). In their explanation, majority of them said it was expensive because they had to travel in order for them to access computers (T-R41, N-R66 & NH-R3). For example, one respondent said *“I can say an hour is too little, at least it supposed to cost R5 per hour”* to use computer and Internet (BH-BN-R78).

Access to Internet enables one to achieve a range of communication, information seeking, interactive or educational activities. Without ICT access, it will be difficulty for people to access education facilities and get an exposure to distance learning. In fact, without access to computers even the banking industry cannot operate at its best and ultimately will lack productivity.

5.3.4 Level of skill among educators

A lack of ICT skill and related experience was also cited as prevalent among educators in schools and local technical colleges. For instance, a manager of ICT department in one of selected institutions said *“to be honest, they are not doing well at all because the facilitators that we have or lectures if I would say are people that come straight from varsity have not been capacitated that much”* (LM-R7). A concern about limited experience and skill of educators as well as the negative implications on the quality of their work is clear in these

sentiments. Obviously, learners and their future careers, as well as the supply of skilled work force to the sector – are at stake in these circumstances.

5.3.4.1 Implications to unemployment reduction

Without relevant skills, it is obviously not possible to access or occupy specialized it careers in the labour market. This has negative implications on the reduction of unemployment and poverty reduction. People who lack basic IT skills will also struggle to use basic tools to improve their standard of living. For example, people will not make use of the benefits of electronic banking, the use of e-mails or use Internet to access e-Health, e-Government or e-commerce services. Also, without having an appropriate level of skills it is impossible to use the modern technologies. Even though ICT sector reports show that there is multitude of ICT related jobs are available but for people without skills are unemployable. This then does not solve the problem of unemployment in the country. However, if people are skilled, they can come-up with innovative ideas. For example they could end-up making different products to sell in the foreign countries. This would attract foreign exchange, which would ultimately boost the economy.

5.3.4.2 Implications to skills supply

Moreover, most of the tertiary courses and jobs in the business world require someone with knowledge of the use of computers and the Internet. For instance, if a person is not computer literate it is very difficult to successfully complete tertiary studies in the ICT field for tertiary education is computerized. Also, without computer and Internet skills, chances for a person who is registered in a distance education institution to successfully participate in online distance education programmes are almost non-existent, even if they have full access to networked electronic facilities. When enter into IT disciplines at tertiary it will be difficulty to adapt and learn quickly for they lack basic ICT skills. Also, a lack of basic ICT skills can hold people back from progressing to higher levels of learning and from accessing related career opportunities. For those who want to go straight to work for IT companies, without ICT skills it is not possible to get ICT related jobs due to a lack of competency, even if a multitude of ICT related jobs are available. Equally concerning is that without technically skilled workforce the IT sector cannot be innovative, productive and profitable enough to be competitive in the globalising economy. This will result in low quality service and organisations being behind its competitors, with a resultant threat to the sustainability and continuity of many organizations in the sector.

Explanations to the status quo according to one respondent are that the institution in their area was new and still growing, also lacking funds to improve its facilities. It is even worse that no students had completed IT related courses yet, as the course was still new (LM-R10), though other courses like engineering and hospitality are doing very well (LM-R12).

5.3.5 Training opportunities in communities, and in work-places

5.3.5.1 Training opportunities in rural communities

A lack of proper IT related training programmes is cited as a major problem in rural areas. For instance, when a respondent was asked whether the institution offer any ICT training for township, he said “*no, not yet. We haven't done it*” (LM-R40). Without training opportunities for example, it is not easy to acquire knowledge and skill. In their explanations about lacking technical training, one of them said “*it is very dark when it comes to computer*” (TM-R63). Other respondents said they never touch a computer (NJM-R29; T-R25). However, they are interested to do computer-training courses but because of the above-mentioned hindrances, they are stuck. In supporting this view one respondent said “*it doesn't mean that they are not interested but first of all in rural areas most of people are not working, they are not ... shop to buy computers. But most of them are interested to get the computers but they don't manage because of the lack of money*” (C-NM-R30). For this reason, it is clear that people are considering doing technical training but they lack training opportunities more especially in the workplace.

5.3.5.2 Training opportunities in work-places

Findings also show a lack of appropriate training programmes for the staff in the workplace that uses ICT tools. As an illustration, employed respondents were asked whether they had ever attended computer training at work. One of them said, “*No, I observed how the computer and machine operate*” (YS-R52) because there was no training when joined the company. Whereas, the respondents that were trained were not happy about training because they still cannot use a computer fully (IP-R62, MM-R59). Similarly, respondents that did a computer courses were asked to explain in what way the training helped them. They mentioned that it prepared them to be able to find the job (MM-R66, NH-R43). It also helped them to know the basics of the computer like switching on/off the computer, playing music and games (MB-R53).

Unavailability of ICT skills is compromising the South African ICT education training programs. Without access to training opportunities people will lack skills and eventually increase unemployment rate, and lower productivity as people will take too much time to learn how things are done in the company. If employees are not trained, the organisations may even be forced to end-up outsourcing their services at higher costs. This will lead to lose of potential consumers for they will look for cheaper services elsewhere. Moreover, it can lead to a loss of competitive advantage. Outsourcing the services at higher costs could also lead to the liquidation or sale of the business, and then people might end-up losing their jobs. It also has a negative impact in the country for it will lose revenues, ultimately impact economic growth rate and GDP.

5.3.5.3 Explanations to the status quo

Findings also show that the main barriers for a lack of access to training opportunities, a lack of exposure to ICT courses and a lack of funds to pay for IT tuition. For example, 2 (10%) of the 20 respondents lacked education and an exposure to computer courses. In their explanation, one respondent said the students were not taught anything about ICT related course at high school (C-YS-R40). Similarly, another respondent said: *“people are no exposed to anything to do with computer courses”* (BH-MS-R36). Without exposure to ICT courses, there will be less people who are interested to do it, which could contribute to lack of professionals in the field of ICT. At tertiary institutions, there will be no skills output, meaning that ICT sector will continue having unfilled ICT jobs. This leads to people having less job opportunities and increase in unemployment rate.

Affordability of training is the main issue for those who are still not connected because of the low income earned. For example, out of 20 respondents 15 (75%) lack funds to pay for IT courses. In this point, one respondent said in Centane a six (6) months course costs R2600 but *“I could not do because I’m staying with a pensioner”* (C-AE-R33). Another respondent said *“you pay R300 or more per quarter for computer classes”* (BH-MM-R62), but *“the background doesn’t allow me”* (BH-MM-R66). In explanation why not doing IT related course one respondent said: *“we do not have money to study for it”* (C-AE-R27).

When asked if they did not hear about bursaries and government loans that pay for students’ fees, one respondent said *“at that time, there were no such bursaries, we had what we call TEFSA (Tertiary student fund of South Africa), but it was paying 50% because they said I must pay 50% on my own”* (BH-NM-R10). Another respondent said *“I heard about that, but you know what is going on now, when you want a bursary, you have to have information, how is the easy way to get it...”* (C-YS-R7) but then in rural area, there is lack of opportunities it is not easy to access information about bursaries.

Without funds to pay for university fees prevents post grade 12 not to further tertiary studies. This means, they might end-up staying home doing nothing and others might end-up doing jobs that they do not like.

5.3.6 Relevance of curricula

Findings show a lack of the necessary skills in the ICT sector. For instance, when the respondents were asked which qualifications are needed in the banking industry, one branch manager said *“we need specialized skills and persons with relevant qualifications”* (HRM-J-R6) such as IT, sales, HR and finance (HRM-J-R7). This is where the shortages are, but the entry level for any positions is grade 12 (HRM-J-R14). In the same question, another manager said: *“most important is mathematics and accounting because we are in a financial field, mathematics and accounting are very important and then customer service skills,*

people skills we look at that because also we are in the retail space working with clients' everyday" (HRM-UB-R6). In supporting these views, respondents at post offices complain of having deliverymen, most of whom do not even have grade 12 qualification. However, the industry encourages learning within the organisation where they sponsor their employees to study further (HRM-J-R6). In the face of this challenge, banks advertise both internally and externally, focusing more on the internal staff (HRM-J-R8; UB-R7), though specialised jobs (such as Senior Manager and General Manager) are usually advertised externally (HRM-J-R10). Undoubtedly, the nature of the banking business requires numeracy and basic computer skills.

It emerges in the findings however, that many of ICT graduates are not ready to work in the corporate industry when they come out of university. In explaining this, participants from organisations complain that they still need to re-train these graduate recruits before they can do what is required of them. Sentiments are that the readiness (or lack of) of ICT graduates varies according to the level of a job that a person is applying for. Of major concern generally though, according to one respondent, is that *"They are not ready for they still need to be up-skilled in order for them to perform the job"* (HRM-UB-R29), which calls into question, the relevance of the curriculum to the needs of the industry. This happens more when a person is not successful in the field they studied for. In supporting this view, a respondent said *"when you finish your degree at university you come in the field where you studied and you are unsuccessful, so now you come into the financial field, which is two different worlds. So that person needs to be skilled and up-skilled from day 1 now"* (ibid.). In this case, a concern is that whilst IT graduates seem to be below average in careers they studied for, it becomes worse when they have to be transferred to other indirect careers such as those in financial services. Hence, organisations have considered grooming staff internally. For instance, one respondent said, some of the graduates get on job training (HRM-J-R26), in doing so; they are training that person and giving him/her exposure in a particular job (HRM-J-R29). The main focus is to train those at basic level to be the next managers where skills and expertise are scarce (HRM-UB-R28).

When the selected banking industries recruit graduates, they choose grade 12 graduate over graduates from tertiary institution. On this development, one respondent said: *"I would rather employ a person straight from high school. Because, they are still hungry to work, they want to learn, whereas a person coming from university, they will feel like they already got the degree"* (HRM-UB-R27). The same respondent also complained of a possible lack of loyalty from university graduates by comparison to high school graduates (ibid.). The feeling is that when university graduates start working in the banking industry, they expect to do what they studied for, not basic jobs like being a bank teller (HRM-UB-R27). This clearly shows that graduates and corporate industry expectations are not the same.

On this point, training institutions did not appear to be too confident about the relevance of their curricula - to the needs of the industry. A college representative for example, admitted this uncertainty, saying that: *“when these programmes were developed, we looked at the need of the industry...”* but admitting that the curriculum does *“need proper research”* (LM-R27). However, at the time of this study, local institutions were unsure about the exact area of the courses that needed improvement, citing the fact that the IT branch of the financial sector was still new – to justify their ignorance. At best, the only hope to rescue the problem depended on the anticipated recommendation from the ICT sector (LM-R29). Until then, training institutions will continue with business as usual, with plans to add more programmes that may, hopefully meet industry needs.

5.3.7 Explanations to the status quo

The main reason for ICT graduates under-preparedness was linked to limited exposure to the work-related environment. Arguments are that they did not do internships or in-service trainings to prepare for corporate environment while they were at universities. The core of the problem is that when a *“person has not been given enough exposure in fixing, maybe, computers, because in IT you don’t have only one programme, many programmes that you must install and so forth. And then each organisation has its own ... “what can I say” the security check for, that is why if they come into the organisation they will not know what is the culture, so they will need to familiarised themselves of what is the culture of the organisation and how things had been get done there”* (HRM-J-R28). These sentiments seem paradoxical in the sense that the IT and Information systems departments of local universities of Cape Town (UCT), the Western Cape (UWC) and the Cape Peninsular University of Technology (CPUT) and many other institutions nationally, boast a series of well-developed internship programmes where they send their final year students to do practical training for 6 months (Marambire, 2012). On the other hand, a lack of evidence in the competencies of graduates compels industries to doubt if graduates ever attended any internship programme. This development thus, is an indictment not only to the curricula, but also to associated internship programmes. Clearly, without a coherent balance between the curriculum and the needs of the industry, training institutions cannot produce necessary skills to meet needs of the organisations in the ICT sector.

5.3.8 Gaps in ANT Framework

This diagram shows the gaps and problems that are found in this study.

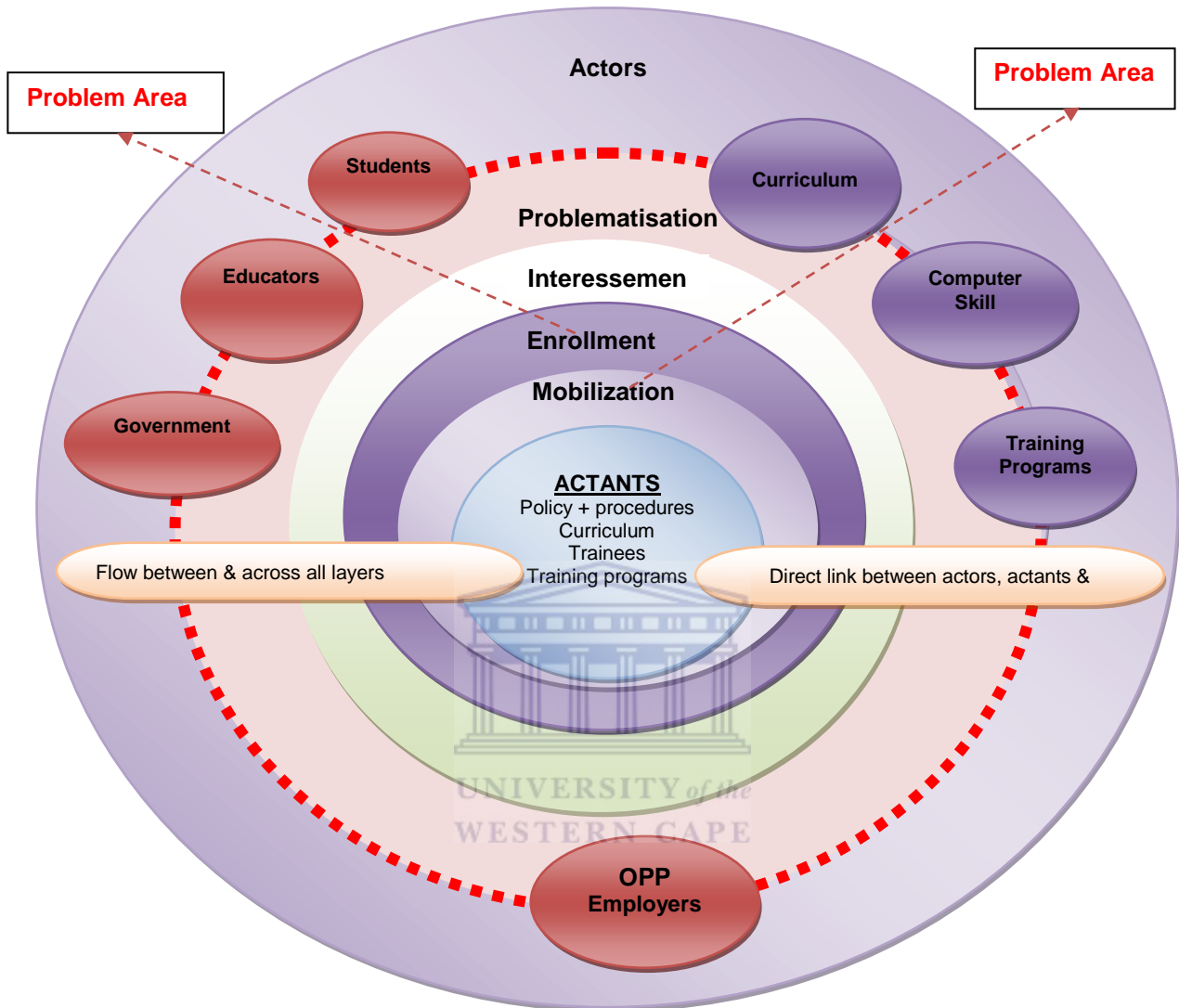


Figure 4: Gaps in ANT Framework

In the diagram, the normal situation is that translation processes should be linked to each other. The main gaps are between enrollment and mobilisation. OPP is put in the bottom center of the circle because it shows that there is no mediator (partnership between corporate, government and education institution) to push through the implementation of skills programmes in under-developed areas.

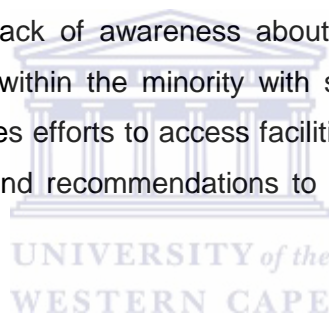
According to the findings, the enrollment is there but it is inadequate. For instance, the problem of ICT skills shortages is known and people are interested to take part in ICT careers however, there is no programme of action to implement skills programmes. Moreover, there is no guidance to students in terms of the careers to choose on, which speaks to “Career exhibition” that is in both enrollment and mobilisation.

Mobilisation process is there but findings shows that it is insufficient in the selected rural areas. For example there is lack of ICT training to educators and a lack of ICT related career awareness campaigns in the rural areas.

5.3.9 Conclusion of the chapter

The aim of the study was to understand the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape. According to the ANT theoretical framework in Figure 3, an ideal e-Skills initiative (conceptualised as the e-Skills network) should consist of actors both (human and non-human), actants, objectives and processes.

A discrepancy in the order and flows between actors, processes, actants and activities is assumed to compromise the entire actor-network process, with adverse effects on sought outcomes. A discrepancy information flows within the e-Skills network in the current is evident in the findings. A negative correlation between this discrepancy and the implementation of e-Skills development initiatives is also evident. Despite the Government's ISETT-SETA and the e-Skills Summit initiative for example, a lack of basic ICT skills in selected rural areas, and a lack of awareness about ICT careers among participants in affected areas persist. Even within the minority with some form of awareness about ICT careers, a lack of funds cripples efforts to access facilities and to pursue ICT related tertiary studies. Thus, a conclusion and recommendations to the status quo are presented in the following chapter, chapter 6.



CHAPTER SIX

6 CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The purpose of the study was to understand the magnitude of skills shortages among career aspirants in under-developed areas of the Eastern Cape. The study was motivated by the work of Nonyane (2011), which found a disappointing lack of basic ICT skills among career aspirants (including teachers in local schools) in rural areas of Mpumalanga province. The thinking of the researcher prior to an investigation in the Eastern Cape was that findings in Mpumalanga may have been specific to the context that province. The question asked is “What is the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape?” It is clear in chapter 5 of this thesis however, that the skills development initiatives are yet to become visible, let alone to bear fruits in rural areas of the Eastern Cape. With this disappointing statistic, it is clear that the problem of ICT skills shortages (and related causes thereto) could be national rather than region specific.

Following a presentation of findings in the previous chapter, the chapter presents a summary of findings in Table 9, followed by explanations, recommendations and a conclusion.



Table 9: Summary of Findings

Theme	ICT Training Institutions			Local employers of ICT graduates			Students		
	Summary of Findings	Explanation	Recommendations	Summary of Findings	Explanation	Recommendations	Summary of Findings	Explanation	Recommendations
Career Status (Grade 12 Graduates)	<ul style="list-style-type: none"> • Courses offered include business studies, engineering studies, utility studies & IT, but very few students who are enrolling for IT courses. 	<ul style="list-style-type: none"> • Poor career guidance in earlier levels of school • Poor symbols to qualify for tertiary • Students chose other courses that they are familiar with 	<ul style="list-style-type: none"> • Organize workshops in the rural areas schools to promote IT related courses • Schools to introduce IT courses from early classes • A re-look into the general quality of education in rural areas can also help accelerate performance in key courses such as maths and physical science. This would in turn improve the quality of marks, so that learners can qualify to access a wider pool of careers. 	<ul style="list-style-type: none"> • Advertised a huge number of posts but few that can fill them 	<ul style="list-style-type: none"> • There are just not enough applicants with relevant skills to fill IT vacancies • Seems that locals lack background in or knowledge to use computers & Internet, or to be easily employed, trained & fast-tracked into IT related positions. 	<ul style="list-style-type: none"> • Employers should interact & collaborate with local IT training institutions to push for relevant offerings & to market IT careers to students in rural areas (to supply them with relevant information). • Employers should offer internships & bursaries to encourage students. They must also sponsor & promote IT related courses; this will help to clarify the employers' skills expectations 	<ul style="list-style-type: none"> • High level of unemployment & students are not studying. 	<ul style="list-style-type: none"> • They lack work experience & specialised skills. • No response from employers about submitted job applications • Under-prepare & not qualifying. • Lack of funds to pursue tertiary education in the IT field. 	<ul style="list-style-type: none"> • Students should attend career exhibitions • Students should attend extra classes specifically maths & physical science subject to qualify for IT related courses. • Students must apply for bursaries so that they can be able to pursue tertiary studies.
ICT Career Awareness	<ul style="list-style-type: none"> • It does not offer any ICT training programme for rural areas. None of students has graduated for IT courses • Lack of ICT resources to upgrade the standard & improve the strategy. 	<ul style="list-style-type: none"> • The institution had recently introduced IT related courses • There is lack of funds to improve the facilities in the training institution. 	<ul style="list-style-type: none"> • Department of education should create educational network that will provide remote schools with Internet access at low cost & high performance. • Local institution should do awareness campaigns about IT course & bursaries • Government should provide funds to meet costs of upgrading ICT facilities. 	<ul style="list-style-type: none"> • IT related Jobs were advertised mainly through the Internet 	<ul style="list-style-type: none"> • Employers feel its the quicker & easy way to publish things • They need more skilled people to fill IT related posts 	<ul style="list-style-type: none"> • Organisations should make use of local radios in advertisement • Local employers collectively with the training institutions should raise awareness of established ICT initiatives 	<ul style="list-style-type: none"> • Unaware of the ICT careers, programmes & trainings. • Computer jobs were cited as important, because it secure company data & quickens the business processes • They do not know which career they prefer 	<ul style="list-style-type: none"> • There is no exposure to IT related courses in rural areas. They heard about IT careers by word of mouth & via career exhibitions • No enough training & awareness programmes in remote schools • There is lack knowledge about IT careers 	<ul style="list-style-type: none"> • Should do ICT centre's in the rural areas that will serve the basic i.e. computer literate training, Internet browsing, facsimile • Organisations should organize training & awareness programmes in remote schools. Also include community throughout ICT projects. • Schools should take students for career exhibitions to nearby tertiary institutions.

Level of ICT Skills	<ul style="list-style-type: none"> Limited experienced and skilled educators 	<ul style="list-style-type: none"> There is a lack of technical support from government in local institutions. Also, institutions do not have funds for training program & for improving its facilities. 	<ul style="list-style-type: none"> Department of education should organize a training for educators to understand educational programs so as to enlarge their usual way of educating 	<ul style="list-style-type: none"> Continuing skills shortages in IT field 	<ul style="list-style-type: none"> Employers prefer to groom internal staff. 	<ul style="list-style-type: none"> Training institutions should train more students in the IT field 	<ul style="list-style-type: none"> Insufficient skills to use and to access a computer. 	<ul style="list-style-type: none"> Students lack of access to basic resources & there is no insight about basic use of ICT. 	<ul style="list-style-type: none"> Government & organisations should introduce ICT skills training & awareness campaign to the rural areas. Also, provide more information technologies i.e. access to computers & Internet.
	<ul style="list-style-type: none"> Students performance in IT courses was very poor 	<ul style="list-style-type: none"> There were using inexperience educators. There is no transfer of skill & knowledge 	<ul style="list-style-type: none"> Training institution should also train educators on how to use a technology & how to integrate it into a curriculum so that it can be easy for them to transfer a knowledge to students 						
Access to Training Opportunities	<ul style="list-style-type: none"> No proper IT related training programmes in rural work places & communities 	<ul style="list-style-type: none"> Only marketing students who did a campaign to promote all courses & institution is planning to do training programmes Inequality to access ICT facilities 	<ul style="list-style-type: none"> Training institutions should form training opportunities that will focus on the applications & benefits for students & educators 	<ul style="list-style-type: none"> Unavailability of computer training for staff Training opportunities are only offered only to old or permanent staff to up-skill them 	<ul style="list-style-type: none"> In most of the time the employers are outsourcing the specialized skilled people, which is why they do not have trainings. Employers expect the graduates to have basic skills when start working 	<ul style="list-style-type: none"> Staff needs to be made aware of the existence of ICT within their own role. The employers should also organize training for inexperienced graduates. 	<ul style="list-style-type: none"> Inaccessible IT training opportunities after grade 12 in rural areas No accesses to basic ICT facilities, at the same time students have interest in IT course. Unsatisfied with the Internet connection speed 	<ul style="list-style-type: none"> Students are in isolated areas where there are no basic ICT resources. There is lack of development infrastructure in the rural areas & un-affordability to buy the ICT facilities & for tuition Lack of exposure to computer courses Internet connection is very slow in rural areas. 	<ul style="list-style-type: none"> Government should allocate computers in a place where everybody can easily access & at affordable price. Government should build libraries in the rural areas & basic infrastructure like electricity should be available Also, government & employers should introduce wide broadband in the rural areas.
	<ul style="list-style-type: none"> Problem of shortage of ICT facilities 	<ul style="list-style-type: none"> Institution has ICT facilities but they are not enough for all students & they are not fully functioning. 	<ul style="list-style-type: none"> Government should supply training institutions with computers facilities & enough funds to improve their infrastructure. 						

Relevance of the curriculum	<ul style="list-style-type: none"> • Irrelevance of the curricula & there is also a lack of ICT infrastructure • No feedback received from employers about their graduates 	<ul style="list-style-type: none"> • IT related courses were new & the institution did not have enough infrastructure to cater for IT • Institution lack of funds to improve its facilities • There is no enough support from the government in terms of the curriculum. 	<ul style="list-style-type: none"> • The institution should integrate IT curricula with information technology • Employers & Government should focus more in sponsoring the local institutions • Government should include local institutions when introducing or set program of study for the institutions. 	<ul style="list-style-type: none"> • Lack of relevant skills output from tertiary into the ICT field • There is also a lack of high-quality of education 	<ul style="list-style-type: none"> • Students had to be trained when enter into working industry. • Employers required a specialized skills & a person with relevant qualification 	<ul style="list-style-type: none"> • Employers should work together with schools so that they close the ICT skills gap. • Government should also work with school educators to re-look at the curriculum so as to improve the quality of education. 	<ul style="list-style-type: none"> • Ready for in-service training & internships but there's a huge gap between curriculum & the employers expectations 	<ul style="list-style-type: none"> • There is no outline or career guidance between employers & tertiary institutions 	<ul style="list-style-type: none"> • To fill the gap between employers & trainers, there should be an agreement where they give career guidance to students.
				<ul style="list-style-type: none"> • Output from tertiary does not match with what the industry wants 	<ul style="list-style-type: none"> • There is too much expectations from employers while they do not know what the training institution offer 	<ul style="list-style-type: none"> • Institution should introduce programmes that align theory & practical so as to cater for industries requirements 			



Table 9 summarises the findings according to the issue (theme) of investigation on the vertical axis, followed by a summary of findings and explanations per theme under each of the data source items or actors (training institutions, Local employers and Students) on the horizontal axis. The first theme in this table is the career status among the affected youth, followed by the level of awareness about ICT careers, then, the levels of skills, access to training opportunities as well as the quality and relevance of curricula. Under each actor, a summary of the findings is presented with answers to the research question on each theme.

6.2 Recommendations per Theme

6.2.1 Career status of grade 12 graduates

On the career status theme, findings indicate minimal availability of the basic ICT courses in ICT training institutions around rural areas. Even within these circumstances, numbers of students interested in these careers (and actually studying in these institutions) are minimal. The cause according to the findings is poor career guidance in earlier levels of school and poor school symbols to qualify for tertiary education.

According to the analytical framework (Figure 3) however, it is not enough to have the actors (including the students) only understanding the significance ICT, and to reflect positive attitudes towards such careers. For students, this should also be supported by their direct participation in ICT related careers, by either attending training or the pursuit and occupation of ICT related careers. In other words, there must be a clear programme of action, and the enforcement of this in the e-Skills development network if the shortage of ICT related technical skills is to be redressed in affected areas. Therefore, it is recommended that the government should revisit the e-Skills policy and its implementation structures in the rural areas. Training institutions in smaller towns along the vicinities of rural areas are also advised to strengthen their offerings (and the marketing of these to rural candidates) in ICT related careers. Marketing campaigns may include workshops, radio, television and newspaper notifications to promote IT related courses in affected areas. It is also recommended for institutions to offer internships, bursaries sponsorships and promote IT related courses to encourage students. Obviously, resolving the problem of poor school results in key subjects leading to technical career need to be promoted. A need to strengthen the general quality of education in rural schools should be prioritized, with emphasis on accelerating performance in mathematics and physical science.

Local employers also have a significant role to play in this process. They should interact and collaborate with local IT training institutions to push for relevant offerings and to market IT careers to students in rural areas (to supply them with relevant information).

Students in particular, are key actors in the e-Skills development network. They should attend career exhibitions to help them gain more knowledge about their career interest. In

addition to this, students should attend extra classes specifically maths and physical science subject to qualify for IT related courses. They must also apply for bursaries and sponsorships so that they can be able to pursue tertiary studies.

6.2.2 ICT career awareness

Findings indicated a severe lack of awareness about ICT related careers among the majority of grade 12 graduates in rural areas of the Eastern Cape. Explanations to the problem range from limited availability of ICT training programmes in rural areas, to non-exposure pupils to ICT related courses in affected areas. The fact that ICT related jobs are mostly advertised on the Internet further makes such adverts inaccessible to the majority that lacks computer and Internet access. In explaining poor marketing and impotent awareness programmes on ICT related careers and training programmes local institutions admit the shortfalls, indicating that shortfalls are linked to under-development of their programmes, due to the fact that their courses are still at infancy levels, and are subject to further development.

As a recommendation thus, the department of education in the Eastern Cape should create educational network that will provide remote schools with Internet access at low cost and high performance. Local training institutions should also promote IT courses, also notifying students about possible bursary opportunities in the field. Additionally, local employers collectively with the training institutions should raise awareness of established ICT initiatives. Local ICT employers and government skills development agencies should also provide ICT centres that will offer computer literacy training, Internet browsing, etc., in rural areas. Local employers should also organize training and awareness programmes about ICT for both trainers and students. The significance of career guidance and computer related academic programmes in local schools are also crucial. When there are career exhibitions from nearby tertiary institutions, schools should send learners so that they can gain relevant insight into ICT related careers opportunities.

6.2.3 Level of ICT skills

Findings in this theme show a continuous lack of basic ICT skills among the career developing high school graduates in rural areas of the Eastern Cape. Explanations range from a lack of awareness of possible ICT careers, being under-prepared in terms of a combination and quality of performance in one's high school outcomes, to a lack of access to basic ICT resources upon which a student can practice and gain experience in key ICT functionalities. Even for those who are attending some form of training in local colleges, complaints are that there is a discrepancy in terms of what graduates know and can offer, and the needs of the industry. A problem of inexperienced educators in training colleges is also cited as one of the limitations in learning outcomes in the quality of IT graduates.

It is recommended therefore, for local training institutions to train educators on how to use technology and how to effectively integrate it into curricula so that it can be easy for them to transfer knowledge to students. Training institutions should market their IT offerings, and train more students from affected areas in the IT field. Employers should go beyond just offering internships to graduates, but embark on awareness campaigns (in partnership with schools), to ignite interest on ICT-related careers among pupils in rural schools. Likewise, relevant government institutions and local organisations should introduce ICT skills training and awareness campaigns as well as traineeships to learners in affected areas. The issue of resources needs urgent redress. A partnership between the corporate sector, the government and educational institutions should be forged to tackle the problem of a lack of access to ICT resources in rural areas.

6.2.4 Access to training opportunities

Findings show that there is no proper IT related training programmes in rural communities and in workplaces. A shortage of ICT facilities and computer training programmes for staff is also cited as a major hindrance in the selected rural areas. Findings also indicate that training opportunities are offered only to old or permanent staff to up-skill, whilst IT training opportunities remain scarce for the youth.

The problem of access to training opportunities is also associated with inequitable access to ICT facilities. One training college for example, has computer facilities but they are not enough for all students and they are not fully functioning. Instead of promoting ICT related careers and to push for internships, employers are turning to specialist organisations to outsource scarce services. A lack of awareness about ICT related careers is a major concern, yet colleges only relegate the awareness campaign only to marketing students.

Therefore, it is recommended that training institutions should form training opportunities that will focus on the applications and benefits for students and educators. Government should supply training institutions with computer facilities and enough funds to improve their infrastructure. Employers should also organize training for inexperienced graduates. Government should build libraries in the rural areas and basic infrastructure like electricity should be available. Also, government and employers should introduce wide broadband in rural areas.

Findings indicate a huge gap between curriculum and the employer's expectations. There is also a lack of ICT infrastructure in local training organisations. To fill the gap between employers and trainers, there should be an agreement where they give career guidance to students. Additionally, institution should introduce programmes that align theory and practical so as to cater for industries requirements.

6.3 Conclusion

The problem highlighted in this study is that there is a lack of consistency in the implementation of e-Skills development initiatives and its policies, with adverse consequences for the poor in rural areas. The purpose of the study was to investigate the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape. The question that was posed is “What is the magnitude of ICT skills shortages among career aspirants in under-developed areas of the Eastern Cape?” with the participants (grade 12 graduates, local employers and ICT training institutions. The ANT theoretical framework was used to analyse and to understand the problems that are related to e-skills shortages in South Africa. The framework presents the e-Skills development agenda and process as a network with actors, actants, activities and processes of problematisation, enrolment and mobilisation. The thinking in the problematisation concept is that the problem is commonly shared by actors, with programmes of action communicated to all during the enrolment and mobilisation processes. The situation in the eastern according to the findings suggests that though the problematisation process is evident in the case of policy and conference settings that unfold to set the redress agenda, but only to fail on enrolment and mobilisation aspects.

Reasons for the shortfalls are said to be a lack of access to basic ICT facilities, lack of awareness to ICT careers, a lack of access to ICT resources, limited access to training opportunities and irrelevance of ICT curricula in training institutions the rural areas. Recommendations in this thesis point to specific problem areas, highlighting areas of special attention across all concerned stakeholders.

Drawing on the theoretical framework however, it is also recommended for the key actors to attend to the enrolment and mobilisation processes of the e-Skills development network to ignite sound implementation of the e-Skills development agenda, not only for the Eastern Cape, but all affected areas in South Africa. The enrolment process would imply a meeting of stakeholders to identify and re-classify finer details of the problem, leading to a detailed programme of action in the mobilization process, where resources, tools and time frames towards a redress process are enforced. There should be a solid way to adjust the operational framework, scope and ultimately, a realisation of the objectives of e-Skills development agenda in the affected areas of the Eastern Cape and beyond.

6.4 Limitation of the Study

This research was conducted in the Eastern Cape Province (Centane and Butterworth location) as a result; findings are limited to that area. The population of this research consists of employed and unemployed grade 12 graduates of 18 to 35 years of age, high-level management in the training and development organisations and the local employers of ICT

graduates. Engaging the national and provincial departments of education regarding the bottlenecks on existing skills development initiatives would share more light on the problem and planned solutions in future studies.

6.5 Future Research

The focus of the study was to understand the level of ICT skills in under-privileged areas of the Eastern Cape. Because of a focus in a specific district, the Eastern Cape, one remains less certain (and therefore curious) on the extent of generalizability of the findings to similar conditions elsewhere in South Africa. Given significance and urgency of phenomenon of e-Skills shortages, one would recommend a continuation of similar studies in similar regions of South Africa. An aggregate comparison of findings from different regions nationally would improve insight on the reality of the challenges, and causes thereof.



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Interviewees

AM, MM, SM, TM, AE, BR, BN, IP, MB, MM, NN, NJM, NM, NM, NH, N, PN, SB, T, YB. LM, HRM-UB, HRM-J

APPENDICES

1: Interview Questionnaire for Un/employed Grade 12 Graduates

2: Interview Questionnaire for High Level Managers in ICT Department

- 3: Interview Questionnaire for Local Employers of ICT Graduates
- 4: Sample of Interview Data Transcript for Un/employed Grade 12 Graduates
- 5: Sample of Interview Data Transcript for High Level Managers in ICT Department
- 6: Sample of Interview Data Transcript for Local Employers of ICT Graduates
- 7: Sample - Participant Consent Form

8 APPENDIXES

8.1 Appendix 1: Interview Questionnaire - Un/employed Grade 12 Graduates



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ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

UNIVERSITY of the
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Questions for Un/employed Grade 12 Graduates

Interviewer: Olwethu Ntolwana

Interviewee:

1. Career Status

- 1.5 How old are you? (18 - 35)
- 1.6 When did you complete school?
- 1.7 What are you doing currently? (Working, studying etc.); or what is your occupation?
- 1.8 If working, is it the kind of job that you would like to do?
- 1.9 What kind of job would you prefer to do?
- 1.10 Why do you prefer this kind of work?
- 1.11 If not in your preferred career (or if unemployed), what are the reasons?
- 1.12 If studying, what kind of training? (what does it comprises of interns of development)
- 1.13 What do you hope to become when you finish this course?
- 1.14 If not working and not seeking for a job, elaborate why?
- 1.15 Have you heard that there are a lot of jobs (available) in IT?
- 1.16 If no, how come you don't know (they are frequently advertised over the Internet)?

2. ICT career Awareness

- 2.1 Do you know anything about ICT careers? (please elaborate)
- 2.2 Which of the computer-related jobs do you prefer (please elaborate why)?
- 2.3 How did you learn/ hear/ get to know about ICT related careers?
- 2.4 Why is computer-related work important/ unimportant?
- 2.5 Did you receive information concerning ICT training? If yes, where?
- 2.6 State if you made use of the information of ICT services offered.

3. Level of skill

- 3.1 Under question 3, respondents will be asked (and tested) to indicate their level of competencies to:
 - 3.1.1 Do you know how to switch on/off of a computer;
 - 3.1.2 Use of word processor (scale of 0-5);
 - 3.1.3 User of spreadsheet (scale of 0-5);
 - 3.1.4 Use of data-base such as Microsoft access (scale of 0-5);
 - 3.1.5 Use of a document scanner
 - 3.1.6 Use various aspect of the Internet (www);
 - 3.1.7 Do you have an email address? (send, retrieve, download attachments, etc)
 - 3.1.8 If yes, what do you normally use email for? (a. Business b. Communicate with friends c. Gaining new knowledge d. Emergencies)
 - 3.1.9 How do you communicate by email? (a. Use it for yourself b. Have never use email c. Ask some to email)
 - 3.1.10 How many times do you use email in a month?
 - 3.1.11 Respondents will also be asked about the purposes for which they normally use email for

4. Access to training opportunities

- 4.13 What are the reasons for lack of access? (a. Not interested b. Affordability c. Awareness d. Other-specify)
- 4.14 Did you have access to ICT in your school at past?
- 4.15 Where do you access/use the computer?
- 4.16 Where do you access/use the Internet?
- 4.17 How do you get to this point of access?
- 4.18 Why don't you use facilities close to home?
- 4.19 What does it cost to use computer/ Internet in these facilities?
- 4.20 How does the cost affect the frequency of use?
- 4.21 Do you think cost is too expensive for you? Explain?
- 4.22 How does the distance affect the frequency of use?

- 4.23 If no access, what are the reasons?
- 4.24 If you have used Internet, were you satisfied with the Internet connection speed?
- 4.25 Do you have access to reliable printing facilities?
- 4.26 Ever attended computer training classes (please elaborate)?
- 4.27 In what ways has the training helped you? Such as enable you to get a new job. Give detailed explanations

8.2 Appendix 2: Interview Questionnaire - Managers in ICT Departments



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Interviewer: Olwethu Ntolwana

Interviewee:

5. ICT career Awareness

- 5.1. What are the courses you currently offer?
- 5.2. What is the current intake compare to other courses?
- 5.3. How many students in IT department currently?
- 5.4. How are the students performing in this course?
- 5.5. On each year, how many students that finishes the course? (output)
- 5.6. Do you have computer facilities in the institution?
- 5.7. If yes, how is the functionality – (a. Available and fully function b. Available but not always fully working/functional c. Do not exist d. Not sure).
- 5.8. If not, what are you using to facilitate class? Or what ICT tool do you use when conducting a class?
- 5.9. What are the main barriers that affect the use of ICT?
- 5.10. In your opinion has this problem been solved since the government/organisations introduced skills programs/ or trainings? Elaborate?
- 5.11. How have you overcome these barriers?
- 5.12. What could be done to give grade 12 students access to ICT information?
- 5.13. How do you related with what industry want?
- 5.14. How/What is the feedback from the industry? What is the industry saying about the quality of your students?
- 5.15. In your opinion, what make the companies say that students/graduates from school (university/college) need to be trained?

- 5.16. What is the organisation doing to alert the people about the ICT?
- 5.17. Does the organisation offer any ICT training programme for townships?
- 5.18. What about ICT training programmes for rural areas?
- 5.19. What strategy do you use to ensure that graduates get access of information that is relevant to their lives?

8.3 Appendix 3: Interview Questionnaire - Employers of ICT Graduates



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Interviewer: Olwethu Ntolwana

Interviewee:

1. Quality and Relevance of Curricula

- 1.1. What is approximate number of graduate in IT department currently?
- 1.2. Do they need to know/to have any basic computer skills?
- 1.3. What role does IT play in the banking industry? On which category?
- 1.4. What kind of skills do normally need/require?
- 1.5. Where do you source the people with the skills?
- 1.6. How do you determine them?
- 1.7. How does it affect you (organisation) the issue of shortages of skill?
- 1.8. How do you deal with this problem?
- 1.9. What kind of training, skills and knowledge does a graduate need?
- 1.10. How long does it take to train the new staff?
- 1.11. Why do you need to train them (people from varsity or collage)?
- 1.12. In your opinion, what make skills to be scarce?
- 1.13. Which ICT jobs do you offer?
- 1.14. Which services are you using? (projector, printing, scanning, training, Internet, telephone services, television, radio)
- 1.15. What is the total number of computer available?
- 1.16. What is the total number of printers available?
- 1.17. What other hardware are available?
- 1.18. Are the available facilities enough to satisfy the needs of the students in this institution? If not, why is that so?
- 1.19. How relevant is the skills output from tertiary into the ICT field?

- 1.20. Do you think the ICT graduates are ready when they come out of varsity? (please elaborate)
- 1.21. What are the reasons for ICT graduates to be under-prepared for the industry?
- 1.22. How does your organisation deal with this problem (inadequate skills)?
- 1.23. Whose responsibility is it to address the problem of poor ICT skills?
- 1.24. How can this problem be resolved?
- 1.25. In your opinion, is there any improvement in the quality of graduates produced? Elaborate your answer?

Extra questions

1. In your opinion, can ICT contribute to socio economic development of people in this community?
Please elaborate.
2. Is there any direct relationship by this university/collage and socio economic development of people living in this community?



8.4 Appendix 4: Data Transcript Sample - Un/employed Grade 12 Graduates



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ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

Interviewer: Olwethu Ntolwana

Interviewee: [REDACTED] (YS) from Centance

My name is Olwethu Ntolwana; I am doing masters at the University of the Western Cape. My research topic is about ICT skills shortages in under-developed areas of South Africa. I'll be focusing more in Centane and in Butterworth.

Career Status

Q: What are you doing currently? (Working, studying etc.); or what is your occupation?

YS-R1: Currently, I'm working, so far, where I am working in company, campus barker, there I'm working as the operator in the rapping machine. We are rapping the products there, so they call me as an operator because I'm operating the machine.

Q: Is it the kind of job that you would like to do?

YS-R2: No, it's not the kind of the job because there I'm working hard but if I was well educated, or I have a skill that I want but it's because of means, I didn't make ... yah

Q: To the tertiary level? What kind of job would you prefer to do? What exactly or is the job that you wanted to do?

YS-R3: The job that I wanted to do like, I wanted to do information technology. To have more access, like to know how to work in a computer, or how to help people like they don't know something, they want information about a job or something.

Q: Oh! So tell me, when did you finish your grade 12?

YS-R4: It was on 2007

Q: How old are you? (18 - 35)

YS-R5: 26 years

Q: So what are you planning to do like to achieve your goal of IT since you said you want to IT?

YS-R6: Like now, where I am working, I don't have enough money like. Yah, I am saving money but I have problems here and there. So I'm trying to save money so that when I have chance I can go to school.

ICT career Awareness

Q: Did you hear that there are a lot of jobs (available) in IT, some internship that the government offer and the bursaries that are been given for people to study? Haven't heard about those things?

YS-R7: yah I heard about that, but you know what's going on now, now when you want a bursary, you have to have information, how is the easy way to get it first so its not easy to get it, because firstly we are blacks so when... in rural area, so now we are here its not easy there's lack of opportunities to go there to those people are handling bursaries.

Q: So, while you were doing your grade 12 at Centane, didn't they organise anything about scholarship, did they tell you about loans, bursaries or something...?

YS-R8: Yah, they tell us but what I know or what I observe, I know that, sometime when you have a bursary when you finish at school you must pay it back. so you see now we have our parents, firstly the don't have enough money, and also, so if we have some bursaries like NSFAS, you see, something like that so its not easy to get something for a school fees and money to eat, you see, so I hear about those things

Q: So you heard about them?

YS-R9: mmh!

Q: After you heard, why didn't you apply for them or have you tried to apply for those things?

YS-R10: Yah, I did try but they said no because of my symbols

Q: So you didn't have

YS-R11: Mmh!

Q: Do you know anything about ICT careers? (Like that there's into ye umntu okwi IT industry uzobayi system analyst, IT helpdesk, call center or anything about)

YS-R12: No no, I don't lie, I don't know about those things

Q: So, i'm...You already said that you preferred to do i... you want to be an IT person

YS-R13: Yah,

Q: So which jobs – (computer related jobs) you want to do in the IT industry?

YS-R14: yah, yah, something like an access in Internet you see, to have a skill, like for instance, how to make a--- what can I say? How to make a music there, like to compile a music, how to make a CV's, to help people how to make a CV or how to fix a computer when it having a problem.

Q: So you want to do those things?

YS-R15: mmh!

Q: How did you learn/ hear/ get to know about ICT related careers?

YS-R16: yah, I hear there at school in my teachers, they told me about those things. So I see its a good opportunity for me.

Q: What did they do? Did they call a formal meeting where did career exhibitions to tell about the careers?

YS-R17: No, they just tell us, if you want a job, there are careers that you can follow to get a job, that's what they say

Q: So that's what they did, they just tell you these are the subjects that you can take to do a particular

job or what so ever.

YS-R18: yah

Q: So, Why is computer-related work important/ unimportant? Or do you think is un/important?

YS-R19: Yah! It is important, I think it is important. Why I think is important because it's easy when you want information. You can search it there in the computer. So the computer system it makes our life easy because we can connect to each other through the computer and to see what is going on in your world

Q: Did you receive information concerning ICT training?

YS-R20: No, not yet

Q: Did you do any computer course?

YS-R21: No I didn't do any computer course yet

Level of Skills

Q: But do you know how to use a computer?

YS-R22: Yah, here a there, I can use it

Q: Do you know how to switch on/off of a computer;

YS-R23: Yes

Q: Can you show me how to switch it on?

YS-R23: what I know you press power button [4]

Q: Use of word processor (scale of 0-5); or do you know how to type

YS-R24: Yah! I can, I learn it there at school [1]

Q: Do you know how to open word processor?

YS-R25: No [0]

Q: So how did you use it or who was opening it for you?

YS-R26: Teachers, they show us okay you open it like this but; we don't have time to open it so you came there its already open, they show you how to type... and we normally find them open [1]

Q: So you know how to type, do you know how to save a document?

YS-R27: No, I'm not sure [0]

Q: User of spreadsheet (like that document yemm... is mostly used by accounting people);

YS-R28: No [0]

Q: Use of data-base such as Microsoft access (scale of 0-5);

YS-R29: So yah, yah, I know about it [1]

Q: Have you done any presentation?

YS-R30: No [0]

Q: Use of a document scanner (like scanning a document)

YS-R31: No [0]

Q: Use various aspect of the Internet (www);

YS-R32: No [0]

Q: So where do you get information?

YS-R33: like a... what I use now I use my phone, I don't use a computer. When I want something like when I want Facebook or twitter all of those things.

Q: So you don't search anything in your phone other than using Facebook and twitter

YS-R34: yes

Q: Do you have an email address?

YS-R35: No [0]

Q: So how you access your Facebook messages if you don't have an email or where are your messages because send to?

YS-R36: my messages there was someone who made a Facebook for me, I did not do on my own

Q: So how many times you use a Facebook or twitter - daily?

YS-R37: Yah I use it, I can say two times a day

Q: Is it for an hour or 30 minutes?

YS-R38: it's an hour

Access to training opportunities

Q: Now I want to know, in your opinion, what are the reasons for lack of access? (Is it because they don't have an interested, or IT career, they don't affordability, or not aware about ICT careers or zange nje beva ngazo ezozinto?)

YS-R39: yah, like some are not aware about it, some they don't have means to get it. I think that's the main, they don't have means to get the computer because you must have the money to buy it and you must have the money to get an Internet card so that you get in an Internet.

Q: So if we can say people have money to buy, what would be other reasons for lack of access?

YS-R40: no like a--- it's a lack of education on it first. Because they are not educated about it so they don't know like, something okay what I want to do now and what I have to do --- you see

Q: Did you have access to ICT in your school at past?

YS-R41: yah, yah we did have it

Q: While you have computers, were you able to use them?

YS-R42: no like, they were just ok showing us if you want to do this, I must press here and there but they were not teaching us properly on how to use it or where to go or how to search like information

Q: So were you access/use the computer at school and home?

YS-R43: No, we just access it at school

Q: You don't have a computer at home?

YS-R44: No

Q: Did you have access/use the Internet at your previous school?

YS-R45: No, we didn't have Internet at my school

Q: Do you have any ICT facilities like Internet cafe close to home?

YS-R46: No

Q: What does it cost to use computer/ Internet in these facilities?

YS-R47: I don't know because we don't have it around here

Q: Did you have access to the printers at your school or at work currently?

YS-R48: yah! At work, yah

Q: What do you use printers for?

YS-R49: I use printers for like--- to print a bar code and price

Q: So, how do you do those bar codes?

YS-R50: Like, we are using a computer there but that computer is easy to use it because it just go straight to what you want

Q: So did they offer any training to use that computer at your work?

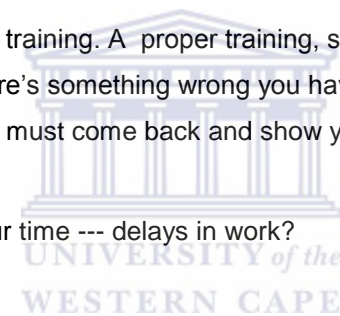
YS-R51: No, there's no proper training--- you just learn looking at others how do they make and you try until you it right

Q;' so you just learn by observing others. Do you think that is helping you guys to observe or you prefer training?

YS-R52: what I prefer is to have training. A proper training, so that we can know when there's something wrong, because if there's something wrong you have to wait and call that person shows you how to do it and then he/she must come back and show you how to solve a problem that you have at that time

Q: Has that take too much of your time --- delays in work?

YS-R53: yah! Yah, it takes time



Thank you very much for your time!



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ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

Interviewer: Olwethu Ntolwana

Interviewee: Noluvuyo Magoloza (NM) from Butterworth

My name is Olwethu Ntolwana; I am doing masters at the University of the Western Cape. My research topic is about ICT skills shortages in under-developed areas of South Africa. I'll be focusing more in Centane and in Butterworth.

Q: How old are you? (18 - 35)

NM-R1: 30 years

Q: When did you complete school?

NM-R2: in 2000

Q: What are you doing currently? (Working, studying etc.); or what is your occupation?

NM-R3: I'm currently working at for Tiger Brands SS company as a Merchandiser

Q: How long you have working for this company?

NM-R4: almost 4 years now

Q: If working, is it the kind of job that you would like to do?

NM-R5: No, I didn't even dream about that job

Q: What kind of job would you prefer to do?

NM-R6: I want to be an IT specialist

Q: Why do you prefer this kind of work?

NM-R7: because I want to know more about technology, in my mind, is not that I want to work on my own and have money but I want to have my own business (I'm the business minded person). I see myself open business like a computer school especial in rural areas because there's no technology there in order to help others to know more about technology (so that is my intentions).

Q: When are you planning to start working towards your dream of being an IT specialist?

NM-R8: I'm sure that I'm gonna start next year - 2012

Q: What are things that were hindering you to study and became you wanted to be?

NM-R9: firstly, it was financial problem...

In fact, I was doing a Bachelor of Arts at university of Forth Hare but I didn't complete my degree.

Then I looked for a job and now I am working. As I am continuing with life, I realise/ thought that I want to do IT. I become to have an ambition in IT,

Q: Did you hear about bursary, all kinds of things that can help you to further your studies while you at

university?

NM-R10: at that time, there were no such bursaries, we had what we call Tefsa (Tertiary student fund ...), but it was paying 50% because they said I must pay 50% on my own because they saw that my father was working and they thought that he can afford. So i couldn't finish my studies

Q: Did you attend any IT trainings at your workplace?

NM-R11: No, because Im in a retail (working at the shop), there's nothing to do with computers and staff. I just write everything down. But in 2006, i did go to college (High-Tech college in cape town) doing computer skills (course) though i was not for long, only 3 months.

Q: What exactly were doing in that course?

NM-R12: I did business administration and secretary

Level of Skills

Q: Do you know how to switch on/off of a computer;

NM-R13: yes, I know

Q: Use of word processor (scale of 0-5);

NM-R14: Yes, 3

Q: User of spreadsheet (scale of 0-5);

NM-R15: not 100% sure but I did used it at college - 1

Q: Use of a document scanner

NM-R16: yes, i used to do at where I was working previously

Q: Presentation

NM-R17: Yes, 1

Q: Do you have an email address?

NM-R18: No

Q: How many times do you use Internet a month? Do you have Internet access?

NM-R19: No, I don't

Q: Do you know anything about ICT careers? (please elaborate)

NM-R20: yes, I know. A friend of mine did a computer course in college of Cape Town. He is now working for ABSA, when there's problem they call him to come and fix the computers. Fixing computers, connect networks, systems analyst

Q: Which of the computer-related jobs do you prefer (please elaborate why)? If not, IT specialist, what else would you like to do?

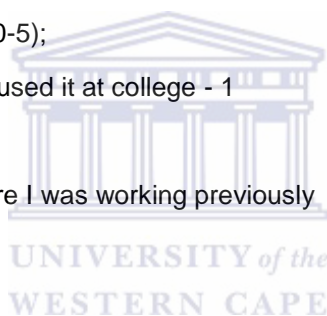
NM-R21: office management technology... anything that has technology is fine for me

Q: Why is computer-related work important/ unimportant?

NM-R22: yes, it is important. Because it make things easy for you, we are living in a time of technology so if you don't have a computer, there's no way you can go.

Q: How did you learn/ hear/ get to know about ICT related careers?

NM-R23: Not yet



Q: Do you think is one of the reasons why not working/ doing any IT related?

NM-R24: No, it's not the reason

Q: What is the reason?

NM-R25: I think, I am not putting more effort in terms of looking/searching about the service or help to fulfilling my dreams. Because I need find information for myself

Q: What are the reasons for lack of access? (a. Not interested b. Affordability c. Awareness d. Other-specify)

NM-R26: it's a lack of knowledge, most of people especial in rural areas, if you go there, there's no a lot of people that can tell you that you can do this (IT courses) so that you can get a better job. They just pass their grade 12 and sit at home or look for the jobs.

Q: Did you have access to ICT in your school at past?

NM-R27: yes, while I was doing my grade 12 (even though I did not have much time)

Q: So what are things that you were taught in the computer class?

NM-R28: word, spreadsheet for accounting, it was not a lot

Q: Where do you access/use the computer?

NM-R29: in the Internet cafe

Q: Where do you access/use the Internet?

NM-R30: Internet cafe

Q: How do you get to this point of access?

NM-R31: I use a taxi

Q: Why don't you use facilities close to home?

NM-R32: because the service is poor. For example, while I was there, I saw that even the assistance don't what they are doing. I didn't get what I want

Q: What does it cost to use computer/ Internet in these facilities?

NM-R33: it's R10 per hour

Q: How does the cost affect the frequency of use?

NM-R34: I don't go there everyday. I only use it when there's an urgent thing, but if that came late a day, then I wait for the next day. Use it twice money

Q: Do you think cost is too expensive for you? Explain?

NM-R35: it's not too expensive. Because in that hour I get everything that I want

Q: How does the distance affect the frequency of use?

NM-R36: it affect when i want to do something now because I'll need wait for a taxi and the taxi does not come at time you want it, so I have to wait for it and it doesn't go if its not full. If its something urgent e.g. email

Q: If you have used Internet, were you satisfied with the Internet connection speed?

NM-R37: yes, I'm always satisfy

Q: Do you have access to reliable printing facilities?



NM-R38: I do printing to the same Internet cafe.

Q: Do you have personal computer?

NM-R39: No,

Q: So do you only use computer at Internet cafe?

NM-R40: yes, I use it Internet cafe, i don't even have it at work

Q: Ever attended computer training classes (please elaborate)?

NM-R41: Yes

Q: In what ways has the training helped you? Such as enable you to get a new job. Give detailed explanations

NM-R42: a little bit, i just helped on how to use a computer because ever since I finish that course I didn't get a related job to what I was doing there. It was only about word and presentation.

Thank you very much for your time!



8.5 Appendix 5: Data Transcript Sample - Managers in ICT Departments



UNIVERSITY of the
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ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

Interviewer: Olwethu Ntolwana

Interviewee: [REDACTED] (LM) from Centance

My name is Olwethu; I currently studying at the University of the Western Cape in Cape Town. I'm doing masters and my research topic is ICT skills shortages in under-developed areas of South Africa. I'm focusing more in Centane and in Butterworth.

Q: Before we start our interview I would like to introduce yourself, just tell me who you are, what are you currently doing and which department are you working in, everything about you?

LM-R1: Eee-e! Igama lam ndingu [REDACTED], I'm working at King Hinsta FET College in Butterworth. I'm working under the section of education and training services, under the sub-section of academic services.

Q: Okay, and what are the courses you currently offering at King Hintsas?

LM-R2: E-King Hintsas we have a --- different programmes. We have business studies, engineering studies, and we also have utility studies. To be specific, we offer civil engineering at one campus, primary agriculture, engineering and related design and electrical infrastructure. And then kwenye icampus yethu eseCentane (in Centane campus) we offer hospitality and tourism. At Dutywa, we offer marketing, we offer IT and we offer management and lastly, our HD...group at Willovale we offer finance, economics and accounting, and also i-i-I nantsi ka i-accessable ...function

Q: So, in terms of IT nhe, what is the current intake compare to other courses?

LM-R3: eeh! U-IT, it has the lowest numbers because besibatlisha to get infrastructure (we are battling to get infrastructure) and also to get ... that will facilitate the programme of IT but i-IT is the limited program that ... to all the programmes esele ndizibalilie (that I already mentioned). So in numbers zayo (its numbers) are relatively low like ezinto ezi as you can compare

Q: Which one that is in the top in numbers?

LM-R4: Its civil engineering ... because civil engineering at Teko campus is having three (3) programmes under it. It is having carpentry, bridge laying and plumbing.

Q: Oh! Oh! That's why it is has a...

LM-R5: That's why it is has a big numbers and also the fact that yona njengoba (it's in) ise-Teko campus, iTeko is having a fully ... hostel and icampus le iofferisha iT ayinayo ihotel because ibiyicampus entsha esandukwaxhiwa (the campus that offers IT doesn't have hostel because it's a new campus).

Q: Oh! Okay. When was it started the IT site department?

LM-R6: I-IT siyiqale ngo 2009... zonke ezinye ziqale ngo 2009 (IT was started on 2009 and all other courses we started on 2007).

Q: So, how are the students performing in this IT course and engineering?

LM-R7: To be honest, they are not doing well at all because the facilitators that we have or lectures if I would say ngabantu abaphuma straight from varsity abaka – abaka capaciyethwa that much, uyabo! (I would say, its people that come straight from varsity, they don't have much experience) So we are still having that challenge of trying to go our and train our lectures, uyabo. Enye into esi-dealishana nayo u-government they way a-operator ngakhona nhe (other thing that we are dealing with is the government. The way they operate...), the poorest colleges which is the former transkai collges are given the least money and the other colleges, like ee college talk loveday, talk i-Buffalo city. In terms of Eastern Cape, they are given more money and also uGovernment ujonga lento ithi (look at), he's going to fund i-inantsika College according to the numbers of students so we couldn't take abantwana abaninzi (a lot of students) because we don't have much infrastructure, uyabona (you see)? Yenye yezinto keleyo esenze singakwaziba sibeneclass ezininzi (that's one of things that make us not too many classes) like to focus more on senior research development.

Q: And then who is actually doing the employment of these people like in the IT or people that are lecturing or facilitating the class?

LM-R8: Eee! Abantu aba-employer-yo nhe (people that employer)?

Q: It is you guys or you get the people from the government?

LM-R9: No, I'm--- thina botishara buthe (our teachers/lectures) that are employed by the college, in fact nabaku ... (khekhayo) ba under the supervision and under the employment of the college; according to the college, according to the FET act of the 2007.

Q: Okay, so on each year, how many students that finish the course? Like, let's focus more in the IT and then engineering. Like, how much is the output on each year? Like, since you started IT on 2009, how much of the students that finished the course from 2009, 2010 and now

LM-R10: Ingxaki, yabona ezi course sizi offerishayo apha (the problem is that the courses that we offereing here) are NCU programmes and we start from level 2 up to level 4 as a college. So level 4 is equivalent to grade 12 uyabo (you see), so each level ngunyaka lowo, ithatha unyaka ilevel nganye, uyano (you do one level in a year). So which is 3 years, level 2 to 4. So kuba thina siqale ngo (we started on) 2009 and our students were not doing very well asikabinaye (we don't have level 4) ulevel4... iphela ku level 3 (it end in level 3). Asikabinabo abantwana abafuna uzoregisterisha (we don't have student that want to register) ever since started in IT. As for engineering, which is only now that we are having level 4 at engineering. Kang'ba, the only students that has passed and gone out to the industry are the students from hospitality and tourism which is programmes that are build at Centane campus.

Q: So, those 2 courses are doing very well in terms of producing ... the students?

LM-R11: Ya, there are doing very well.

Q: Oh, Okay. So, do you ...

LM-R12: Engineering is doing very well but besisa strugglisha ke kuba besisa (we were struggling because we were) kick-start programmes. because otishara bethu, uRhulument uthe nhe, if college zethu were offering i-mac programmes, ezanto sithi zi N's, oma N2, N3 so uyabo (our teachers, the government said that if our college is offering MAC programmes, these things called N's, like N2, N3). Kwafumaniseka eza programmes azikho aligned with what is actually in the industry and abantwana bathi xabegqibe eza N's namgaqasheki because they got a lot on theory akho practicals kangako (We find out that these programmes are not aligned with what the industry want and students said that when they completed N's, they are not employable because they had a theory not practical). So wa (the government) introduced this programme through reauthorisation, if you remember kukho (there's) reauthorisation yeTaxi kukho (of Taxi's and) i reauthorisation ye (of) colleges only in a country, whereby onootaxi ne-ne-ne ...had to bring back iTaxi ezindala banikwe imali (their old taxi's and get money). And then icolleges zona zazinikwe a some of money to build the infrastructure, to-to buy textbooks and all that (And the college were give money to build their infrastructure, to buy textbooks and etc.). So into ebe (everything was) - according to strategies of ... so zinikwe lomali ke (were given that money), in preparation for NCV the programme e-introduwe ngu government lekengoku siyi offerishayo (that was introduced by the government). Otishara bethu besinabo kengoku bebe-battlisha to change from ... to start a new thing abangayaziyo nabo (our teachers were battling to change and start a something new that they don't know).

Q: So, you still need to train your staff before you offer the classes to the students?

LM-R13: Ewe, yayikhona i-allocation in that budget ye re-cauterisation yo-trainwa kotishara but kengoku (Yes, it was allocated in that budget of re-cauterisation to train teachers but) it was not much – it was not much, they still need training ... proper training.

Q: Mmm, okay. Then how long did that training take, like to prepare this mmn, (what is it?) facilitators?

LM-R14: Eeem! ire- cauterisation started from 2006 up to 2009 that is 6 and 7 financial year and 7, 8 and 9 ... so yaphela ke (so it ended) re- cauterisation. Otherwise otishara (the teachers) were ... trained from there from the beginning of the financial year ngo (on) 2006 from re- cauterisation.

Q: Do you think that training has helped the staff that you have currently?

LM-R15: Kakhulu sisi, kakhulu, kakhulu! It has made a very big different because, imagine xa uzothi wawu-applyele then for utitsha uclosing because kuCentane kwakukho iclosing campus, uyabona. So seku offerishwa i-hospitality ne tourism so uzothi umazelaphi uzpmazelaphi uba uthini u hospitality no tourism but now that our teachers like, especially kwi tourism babuya no 100% like in the country there are number 1. out of the 50 colleges that are on the country we are rating number 1 kwi tourism. So it has helped kakhuli but still we need more funds for i-i- HRD and infrastructure of our college

Q: Do you have computer facilities in the institution, let's say in Centane?

LM-R16: Yes, we do. Sinazo icomputers kuzozonke icampuses but ezocomputers azoneli izistudents because sometimes we are faced with a challenge xa bebhala iexams, icomputers ezininzi are up to scretch uyabo. So kufuneke kengoku mhlawumbi xa kubhala abantwana baseDutya bathathwe basiwe eTeko for exam purposes yabo. But icollege – campuses ziya negotiator ... (to arrange the time)... because each and every year icollege kufuneka increase innumbers uyabo, so that ibonakale uba iyakhula.

Q: So that movement of taking students from let's say from Dutywa to Teko, how does it affect the students? Does it have any impact to them in terms of the exams or something or they know it in advance that they have to move from one side to the other side?

LM-R17: No, it doesn't have much impact because i-computers zikhona eDutywa nhe, in fact in all the campuses but zimbalela and nezi zikhoyo nhe, azikwazi --- ziya serviswa ngo IT people bethu but emveni koba zi-servisiwe ufumanise uba azikwazi ugqiba throughout the exam process, uyabo. So kunyanzeleke kengoku from that time abantwana bathathwe kufunwe itransport besiwke kwizinye icampuses but ixesha ebeli allocathelwe lona liyabanjwa and then baqhutyekiswe so akhonto iba-afecthayo

Q: So your computers nhe, they don't fully function at some point?

LM-R18: Ya! Ya! ... But as onyaka behamba simane sifumana ifunds from kwi suppliers zethu, simane sicela ne donations and all that. Imeko imane iba betelanyana as ixesha lihamba.

Q: So what... ya, ya, ya, okay, and then, what are the main barriers that affect the use of ICT or use of computers in your department?

LM-R19: eeh! I think mostly what is affecting them is the fact that, abantwana basuka kwi background e-mostly rural. They are not expose to these kind of things, like computers and all that. Basuka ezilalini, utishara has to start from stretch. Uyabona mosinani uzoyazi xa unecell phone is not very much difficult to operate icompuuter uyabo. So, umabona uza ne... akayazi noba u-enter yinto yothini, so kufuneka, kufumaniseke ukuba utishara kufuneka eqale ekuqaleni. I think basically, yeyonto ya evele i-affect in numbers zezo... izistudents ezi... because abanalwazi lwecomputer, ya.

Q: Then, in your opinion has this problem been solved since the government introduced skills programs/ or trainings?

LM-R20: Ewe sisi, uyabona i-skills programme zizoyi addresser kakhulu lengxaki because eyonanto ee-siyijongileyo kakhulu, yileyo abantwana bafumane i-skill, abantwana baqhesheke, that is the many thing that we are focusing on. So ithetha ukuthi lonto xa kukho ezi-skill programmes, say for instance if we are doing to have a 3months or trimester programme abantwana bazofika bafume iskill bagqithe, kuphinde kuze nabanye njalo njalo... yes.

Q: Then nina kengoku at King Hintsa, how have you overcome this problem of accepting students that don't know anything about the computers or yonke nje into?

LM-R21: Ee! Uyabona kesi ingxaki isekubeni, uyabona ndizobangathi ndiphindaphinda into eyi-one because ee- we try by all means to always fit for us to continually trained otishara bethu so that they are well ... when it comes to the ... uyabo. But imali ke akululanga uvele ifumaneke, akululanga, akululanga but we try by all means so that they are trained and they know how to deal with this kind of things.

Q: And then just in your opinion as well, what could be done to give grade 12 students access to the computer or IT information?

LM-R22: Khawuphinde! Can you repeat that!

Q: What could be done to give grade 12 students access to IT information? Or as the college, what are you doing to give the students, like let's say the high school students or the secondary high school students to give them access to IT information since you just started IT?

LM-R23: Eee! I'll ,I'll, I am not sure if because I'm not operating at a campus level ke ndise-head office uyabo, but what I do know is that ocampus head in our campuses, they engage very much with communities uyabo. Kangangokuba ee! We have a hall in Idutywa, elaholo lisetyenziswa yicomunity, li owner yi community although lilelethu as the college, but most of the things (izinto ezibalulekileyo ezifuna uba mazenziwe yicomunity liyasetyenziswa elaholo yicomunity yaseDutywa. So, I'm very much sure but I don't want to lie I've never heard like that but I'm very sure that abantwana that can come looking for an information can be accepted.

Q: So, because I think nhe the majority of students, they don't know about IT. Like they never get information about IT and you as the institution that is in the rural areas, you need to reach out and just to tell them about the importance of these different careers in IT and other courses that you offer.

LM-R24: Oh, in terms of marketing nhe?

Q: Yes, yes

LM-R25: Ya, that's what they do. In fact uDutywa nhe since eofferisha imarketing ne management each and every year abantwana bethu ee- bakwa marketing under the supervision of marketing section yethu, bayathathwa bahambe ezindawo giving out the information about all the programmes the college not only IT, uyabo. Bayathathwa yi marketing section yethu, iba traine in such a way and then also bahambe in terms of their iccept because it also adds imarks to their program. So, bamarkete iinstitution, kufuneka bachaze about all the different programmes

Q: So, where do they go? Do they go to the community or they just go to town and may put a stand and do that?

LM-R26: Ya, bayangena nasezilalini bayangena akhondawo bangaziyo kuyo. Bayangena elokishini everywhere.

Q: Oh! And then how do you relate (you as the institution nhe) with what industry want?

LM-R27: Eee! Uyabona ke sisi eyi, this – a it needs a tiraly (tharali) research but I think ee- when these programmes were developed, we looked at the need of the industry and we--- in fact the management decided that makuthathwe eziprogrammes because iicolleges were given ichance for uba zikhethe iprogrammes efuna ukuzirunisha but now ez'ba ixesha lihamba, things are changing so its a pitch uba andiyiphethanga lancwandi apha kum, but zikhona iprogrammes ebezi to be introduced nextyear. A responding to people that had come and the --- saying maybe akhonto indibanisa nento yepolitic apha, and then we take note of that so due that information, yiyo ke eyenza abantu bakwa-research babone ukuba no eyona demand ininzi apha ziprogram ezithile things that we are going to add on nextyear.

Q: Oh, okay. So, I'm--- what is the feedback from the industry? like, since you have you have students that are already finish nhe in different departments or in different courses that you had, so what it is the feedback from the research with regards to what is... the question that I asked you before?

LM-R28: I don't get your question.

Q: I'm asking nhe, What is the industry saying about the quality of your students? Like, haven't you get any feedback from the industry, from the – different courses that you already have the output of the students?

LM-R29: No, no that I know of. As far as I know we never received any complain but I can't recall a – receiving any feedback from the industry, maybe the people that are responsible for placing students might know but I'm sure I would've known because I'm in education and training sector.

Q: Ya, ya, ya.

LM-R30, So, I would've known if there was any complaint

Q; Then in your opinion nhe, what make the companies say that students from the colleges need to be trained?

LM-R31: Students for?

Q: From the colleges or university needs to be trained.

LM-R32: They need to be trained?

Q: Ya, what makes the companies to say that?

LM-R33: I-i perception yabantu in general even the companies they- the- bayibona icollege as also a tertiary institution but icollege is not a tertiary institution. These levels ebendikuchazela zona level 2 to level 4. Ulevel 4 is most equivalent to standard 10 so untana that we train thina as a college simtrainela for 2 things. Either uyaphuma akwazi ukuqhesheka from kwi-industry or aqhubekeke to higher institution to further his/her studies, uyabona. So abantwana xa bephuma apha bona baba-persive as graduates that are ready to – to I mean abantwana that do not need any assistance, uyabo. Okanye if I may put it like this nhe, they expect to much from them.

Q: Okay, alright buti. So, you offer...

LM-R34: Kanti uGovernment yena saying yena ngoba ababantu bangaqhesheki ngenxa yobabengana theory, they had to introduce programmes that will align theory and practical as the same time so that xa bephuma baphume, because ixesha elinizi abantwana xakufuneka befumane umsebenzi kufunwa iexperience kubuzwe have you ever had any experience? So now we are going to say if you are taking office management that we offer at 2level, uyayazi umntana 70% of my time bendichithela eofisini, I know how to fax, I know how to email, I know how to photocopy because those thing are build your practical kwi office management, uyabo. Then elinye ixesha bendilichitha eclasini so I know how to do these things, it was not phase 2 but I know how to do it.

Q: Oh! Alright, that's good. And then, I think one would be close to my last question. What is the institution or the college doing to alert the people about the IT?

LM-R35: To alert people about?

Q: IT

LM-R36: Oh! Alright, iT sisi kubake abantu kubanyhani si-operator kwi –kwi- area eRural. Abantu, they do not know specifically iT, uyafana nomntu ongathethiyo, uyabona. So ee, bafuna izinto ze-business pha izinto abazaziyo, nezinto xa uthetha nge-engineering uyayazi uba umntanam xa ephuma pha uzakusebenza kwizinto ze-plumbing nakwinto zamanzi yonke lonto leyo. So, ee- kwanyanzeleka into bana otishara aba ba-offerisha iT ba-bancendise xa ku-marketwa because abantu bakwa marketing, they don't know much about IT, uyabo. So kengoku when they are advertising these things, when they are going for road show, otishara be IT are part of those road shows so that umntana xa enemibuzo ethile ke okanye ne complex question bakwazi ukuziphendula.

Q: Oh! Alright, that is very much better. Okay, and then I, does the organisation or the college offer any IT training programme for townships?

LM-R37: No, we don't offer IT programmes for township. It's only NCV le ndithetha ngayo. The only thing we do, ee- we offer i-skill programme zecomputer, only basic computer literacy and advance computer literacy but not that IT level.

Q: Oh! Okay. So you don't offer it to the township or for the rural areas, into the rural areas?

LM-R38: Aah, ingathi- andiyazi noba ndiphendula lento uyibuzayo na.

Q: Kaloku ndifuna ukwazi as institution nhe, nizazo itraining that specific computer training or IT training?

LM-R39: Icomputer training maybe yile izothatha just a few month or week...

Q: Ewe, kuright ezi ugqibozichaza nhe, uba niyazenza na for township okanye irural areas.

LM-R40: No, not yet. We haven't done

Q: Oh! Okay. Then my last question is that, what is the strategy do you use to ensure that the students that you produce get access of information that is relevant to their lives?

LM-R41:

Q: What is the strategy do you use to ensure that the students (like your current students) that you produce get access of information that is relevant to their lives?

LM-R42: In their? Ndixakwe leligama lokugqibela.

Q: In their lives. Ebomini babo.

LM-R43: Oh! Ebomini babo...ee- no ioffices zethu, they know that they can come at our office at anytime in fact, abanye babantwana nhe, xa seya lantika--- iprogrammes ezinje ngoma-lantika office administration, marketing ezinye yezinto esizenzayo, though simazi umntana xa ezomarketer, mosi imarketing yi field work uyabo, but abantwana has to know the basics. Zonke ezazinto bendikubalela zona zasezi-fofisini so akafani aphele unyaka abantwana singakhange sifake pha ezi ofisini zethu, uyabo. Ee- yonke into, I'm mostly take care of that, its one of things I do. I take through everything, they know what is happening at our college. Bayayazi kuzoqhubeka ntoni, i mean generally ke not izinto ezi-confidentially, ya and they know ikhona ioffice ka student services, izistudents are told, you can speak ... or they can to the office akomntu uzokuphoxa, they will get everything. And ezicampusini o-liaising officers that are – ngo tishara ken he, but ba-appointwa go liaising officers, ngabona bantu bahoyana nezistudents ukwenzela xa izistudents xa kunzima ukuba maziziyele ehead office si-dealishane nalotishara directly for any information that esisstudent siyifunayo.

Q: Oh, okay. So, does that help them in terms of getting the relevant jobs on what they studied for?

LM-R44: Ya, ya, for any information that they are looking for, they know that they liaise with student management officer at campus level.

Q: Ok, alright. That was my last question ke buti.

8.6 Appendix 6: Data Transcript Sample - Employers of ICT Graduates



UNIVERSITY of the
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ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

Interviewer: Olwethu Ntolwana

Interviewee: [REDACTED] HRM (UB) – ABSA Branch manager in Butterworth

My name is Olwethu Ntolwana; I am doing masters at the University of the Western Cape. My research topic is about ICT skills shortages in under-developed areas of South Africa. I'm focusing more in Centane and in Butterworth.

Q: Before we start, please introduce yourself, who are you & what are you currently doing?

HRM-UB-R1: I'm the branch manager in Butterworth branch and my name is [REDACTED] and I am providing an inbound network

Q: What is approximate number of graduate in IT department currently?

HRM-UB-R2: We don't have IT graduates in the branch

Q: Mmh! So the staff that you are working with, which qualifications do they have?

HRM-UB-R3: Mostly have grade 12 with obviously accounting and mathematics as one of the criteria ... subjects that needs to be in a grade 12 certificates.

Q: Do they need to know/to have any basic computer skills?

HRM-UB-R4: Yes, they need to have basic, basic computer skills like the windows and that

Q: What role does IT play in the banking industry? On which category?

HRM-UB-R5: We use computers on a daily basis, it plays a big role because everything we do we do on a computer and as well telephone as you mentioned that is also a big medium of communication in our industry and computers because to cut on telephone cost, we use mostly computers to communicate via email.

Q: What kind of skills do normally need/require from a person?

HRM-UB-R6: As I said the most important is mathematics and accounting because we are in a financial field and mathematics and accounting is very important and then customer service skills, people skills we look at that because also we are in retail space working with clients' everyday.

Q: Where do you source the people with the skills?

HRM-UB-R7: At the moment, we are advert source internal and if we need people external we do source outside, we do put adverts in the papers, on the intranet, Internet, so we do source outside as well

Q: How do you determine them?

HRM-UB-R8: What we do, we've got a system process where we get all the people that applied and

CV's together we put them and compare against the criteria that we have set out in the advert at the first place and then we shift them until we get to the top say 10, then we go through that as well, look at history, look at experience, also do background check, and then we shift up until we get the best of the best and then we do the interview and so forth ...

Q: Since there's this issue of shortages of skills, that people are talking (news, radio & TV), how does it affect you (organisation)?

HRM-UB-R9: What specific skill, because what we looking at mostly is there were financial side of it, where people need to acquire a qualification need to have for the financial side. And the most important skill need also is being able to work with people - giving that kind of service, you know what being able to have that skill, if we say, it's in a management position that we are advertising, we'll need to look at the management skills that we want. If it's in the front line, we to have, most important is the people skills.

Q: The part of skills that I am talking about is the management skills, (people with management skills are scarce and people with a financial background) more especial people that are computer literate.

HRM-UB-R10: What we do at ABSA, we tried to grow people from inside, let them perform and let them learn. if I would identify someone with potential, someone with a drive to sit in the manner that I can see that would in the future be able to sit in a management position. We make sure that we mentor, coach those people in that specific direction so now we are trying to grow our people from inside.

Q: Do you have some training?

HRM-UB-R11: Yes, we have some training interventions, we've got workshops, and we've got a lot of programmes: management programs if it's a management skill

Q: How do you deal with this problem?

HRM-UB-R12: It depends on which department. A teller it takes two to three months, to be a generic consultant it takes up 3 years to be a specialist in their role. Management also it takes up to 2-3 years. Teller enquiries and customer services clerk it up to 6 months. So it depends on which type of job you are looking at.

Q: Why do you need to train them (people from varsity or collage)?

HRM-UB-R13: because coming from the university into a banking industry its 2 different environment and if come from university and you've studied something different that what finance is, you need to get to know the basics, you wont be able to do what is needed in a banking environment.

Q: If the case where a person has studied finance, do you also train them? (Elaborate)

HRM-UB-R14: it depends on which department they gonna work in. If they gona work in finance department or in ... I don't think they'll need it, but it's only the basics that will be applicable. But if you want to work in a different like, our HR or let's say in retail space obviously they will need that retail training.

Q: In your opinion, tell me, what make skills to be scarce? (Skills that you already mentioned)

HRM-UB-R15: I think education, I mean, not all people have got the opportunity to go to the university to go and learn some skills. And for me, my personal opinion of skills are acquired if you do the job, because you can have all the book training, you don't apply it to something, its not going to help you

Q: Which ICT jobs do you offer at your branch?

HRM-UB-R16: At our branch, in the branch environment, there are no IT jobs. As I said, we've got vendors, and then we've got people that come and do the IT, the specific IT need that we have. In a branch environment it's only a customer service that is promenade space that is available.

Q: Lets say if there a problem in your computers (in the teller side), what do you do?

HRM-UB-R17: We contact our ... we call it the helpdesk, they log a call to IT and then they send out a technician to come and attend to our problem

Q: So, where is the IT department situated?

HRM-UB-R18: We've got different department, in different... I mean in Johannesburg there've got, I don't know how many because its vas a area there's a lot of IT and technician and departments in there, lets in every province we have different, different we try to sub contract from IT companies like ASJ Kanjima's and those people to be as close as possible to rural areas.

Q: So when you had that problem, does not take long to wait for Johannesburg to send a person to fix the problem?

HRM-UB-R19: As I said, for Butterworth there are people in East London and we've got people in Umtata that's an hour drive from us. Firstly they try and help us over telephone, if it's something which we cannot (do) be fixed over the phone they send the technician to come and fix.

Q: Does that process not delaying you in terms of your services?

HRM-UB-R20: Sometimes it does, it depend on what the problem is.

Q: So, would you prefer t maybe to have an IT specialist that is situated within the branch or you are satisfied the way things are?

HRM-UB-R21: That would be the idea oh! Yes but, for some logistic and reason business reasons it's not always possible. Because it's not that there be some breaking and fixing everyday so to have someone sitting there at the branch its not 2-3 weeks of the month the computers are up and running so it's going to be very feasibly to have somebody sitting and not doing anything.

Q: Which services are you using? (Projector, printing, scanning, training, Internet, telephone services, television, radio)

HRM-UB-R22: we've got printers, we've got scanners, we've got Internet, we've got computers, we've got self service kiosk, we've got (what else...is counted under IT) telephone, TV, not radios

Q: What is the total number of computer available?

HRM-UB-R23: we've got staff amount of 33 in the branch so each person has a computer

Q: What is the total number of printers available?

HRM-UB-R24: each person need to have own printer so there are 33

Q: In terms of the Internet, does the speed of the connection fast enough to get what you want?

HRM-UB-R25: Internet access is only granted to your role specific. So if you were a teller you won't need Internet, yes our internal intranet which is available for everyone but Internet is only role specific. Like to consultant maybe to look up something for a clients or to business managers to but not for everybody in the branch.

Q: Are the available facilities enough to satisfy the needs of the students in this institution? If not, why

is that so?

HRM-UB-R26: Yes

Q: How relevant is the skills output from tertiary into the ICT field?

HRM-UB-R27: my personal opinion because I heard from in experience of this, if it was up to me, I would rather employ a person straight from high school. reason being, they are still hungry to work, they want to learn, whereas a person coming from university, they will feel like I already got my degree on that and that, why should I need to come and learn the basics for example teller and what happens is you don't get that loyalty from a person from the university compared to a person that comes from high school. because my personal experience is we had somebody from university wanting to start you know, a career in finance, but starting to think along those lines and leaving company in almost 2-3 months whereas, if you have a person from school that person is still very fresh. You can still mode that person and they really want to work.

Q: So, as the organisation, how do you deal with that issue?

HRM-UB-R28: We have not had much of that, I think that's if why ABSA went and did the growing of inside rather start recruiting from the people inside and growing people our people that are in the lower level not the lower level but is in the basic level. Rather start growing them into is the next managers where skills and expertise is a little scarce at the moment. That's why ABSA went that way to start inside.

Q: Do you think the ICT graduates are ready when they come out of varsity? (Please elaborate)

HRM-UB-R29: I don't think so, when you go to the university you go and learn into a certain direction. And sometimes when you finish your degree at university you come in the field where you studied and you are unsuccessful so now you come in financial field which is two different world so that person need to be skilled and upskilled from stretch from day 1 now, which in my opinion its very unfair for that graduate because that graduate spend 5 years learning in the specific field and now being unsuccessful made him to come and study again.

Q: Whose responsibility is it to address the problem of poor ICT skills?

HRM-UB-R30: Every line manager. So every department is got a manager and that manager is suppose to monitor what skills gaps, what training gaps, and whatever gaps there for his staff have. And then at the begging of the year a contract is signed to say these are the skills I identified, this is the training we need to apply to close those gaps. And then through the year is been monitored.

We also have a tele-forum where as managers sit and we say I see you have a potential to be a COE, so what are we gonna do to get you to CEO. But before we do that we sit down with staff member and we say, you've been identified for this... are you will to? So it's a case where a manger identifies you and you must go. If the staff is willing to then we continue sending him/her into training. If a staff is not willing to, they we ask which direction does a person want to go to (where are interested in?) and work from there, trying to work into that direction as well.

8.7 Appendix 7: Sample - Participant Consent Form



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ICT Skills Shortages in Under-developed Areas of South Africa: A Case of the Eastern Cape

CONSENT TO PARTICIPATE IN RESEARCH

Title: ICT Skill Shortages in Under-developed Areas of South Africa: A case of the Eastern Cape

You are asked to participate in a research study conducted by Ms Olwethu A. Ntolwana from the Department of Information System, Faculty of Economic and Management Sciences (EMS), UWC.

This research study is partially conducted towards the completion of the researcher's master's thesis at the University of the Western Cape.

You were selected as a possible participant in this study because you are grade 12 graduates, or an ICT employer or an ICT trainer in the rural areas of the Eastern Cape.

1. PURPOSE OF THE STUDY

The aim of this study was to understand the magnitude of skills shortages among career aspirants in under-developed areas of the Eastern Cape.

2. PROCEDURES

If you volunteer to participate in this study, we would ask you to respond in all questions honestly as your name will not be disclosed and feel free to ask questions when you do not understand.

3. POTENTIAL RISKS AND DISCOMFORTS

No potential risks are envisaged at this stage. However, if something might come up, it will be dealt with in a sensible and sensitive manner.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

This research contributes by expanding the conceptual, theoretical and practical understanding of factors related to ICT skills shortages in South Africa (and the Eastern Cape in particular), for the benefit of stakeholders across academic, policy and development circles. For example, it could help by advising those who wish to improve government policies in this area. The research could also inform practice in the area of introducing and developing ICT facilities in order to build an inclusive Information Society in rural areas.

5. PAYMENT FOR PARTICIPATION

No payments to the participants will be made.

6. CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law.

Confidentiality will be maintained by proving abbreviates of the participants (Post-Matric, ICT employers and trainers) and by means of themes and categories that will be identified and used in the analysis and discussions of the findings and the outcomes, in the research report, the thesis, and in conference papers and articles that would be submitted for possible publication in academic journals.

The researcher further pledge that any information given by participants will be handled in the strictest confidence, and that the information participants give will not be used to reflect negatively on them in any way.

7. PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so such as you not attending the monthly meetings over the course of the research period.

8. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact me at (021) 407-3195 (w); 078-536-8170 (cell); and e-mail 2505156@uwc.ac.za.

9. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study.

SIGNATURE OF RESEARCH SUBJECT OR LEGAL REPRESENTATIVE

The information above was described to *me, the participant* by Ms O. A. Ntolwana in *English* and *I am the participant* in command of this language. I was given the opportunity to ask questions and these questions were answered to *my* satisfaction.

I hereby consent voluntarily to participate in this study. I have been given a copy of this form.

Name of Participant

Name of Legal Representative (if applicable)

Signature of Participant or Legal Guardian

Date

SIGNATURE OF INVESTIGATOR

I declare that I explained the information given in this document to _____ [*name of the participant*]. He/she was encouraged and given ample time to ask me any questions. This conversation was conducted in *English* and *no translator was used*.

Signature of the Investigator

Date

