THE ROLE OF DIGITAL LITERACY IN THE ACADEMIC PERFORMANCE OF FIRST YEAR STUDENTS IN THE NATIONAL DIPLOMA: INFORMATION TECHNOLOGY AT THE UNIVERSITY OF JOHANNESBURG

by

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DECLARATION

I, Glenda Barlow-Jones, declare that the work contained in this dissertation is original (except where citations and acknowledgements indicate otherwise). No part of this work has been, or will be, submitted in any form as part of another degree at this, or any other University.

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2008

DEDICATION

To my husband Wayne and twin daughters Jemma and Paige.

“It always seems impossible until it’s done.” – Nelson Mandela

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ABSTRACT

The aim of this study is to determine the role of pre-existing levels of digital literacy on the academic performance of students who are enrolled for the National Diploma Information Technology at the University of Johannesburg.

The majority of students entering the University of Johannesburg are black and come from schools and communities which do not enjoy the same technologically rich environments as that of their counterparts, yet on entering their first year of studies, they are expected by lecturers to perform at the same level as those from advantaged backgrounds. Students enrolled in 2008 were targeted, using a mixed methods study that incorporated both quantitative and qualitative data to illuminate the factors related to digital literacy that may have influenced the students' likelihood to succeed in the Information Technology modules. The data that were collected were brought in relation to the students final marks for the subject Information Systems 1 Module A (Computer Concepts).

It emerged that the computer literate students performed significantly better during the first semester compared to the computer illiterate students. The computer illiterate students indicated that the lack of computer experience influenced their ability to pass computer related subjects; however, it was not the only limiting factor as socio-economic factors also played a role. Other results showed that students battled to keep up with the fast pace with which subjects were lectured. The students' level of the English language is a predictor of their success in the Diploma and more than 70% of students were unable to use the Internet.

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CHAPTER 1: INTRODUCTION

1.1 Background to the study

The spread of Information and Communications Technology (ICT) around the world has increased significantly since the late nineteen-eighties, with computers playing an increasing role in the everyday lives of most people in the developed world. Computers are found in homes, schools and in the workplace, as "today, most people are realizing that knowing how to use a computer, especially a personal computer, is a basic skill required to function effectively in society" (Shelly, Cashman, Waggoner & Waggoner, 2000:12). As computers proliferate, the term 'digital literacy' is receiving prominence: Gilster defines it as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (1997:1). With the spread of ICT worldwide and with South Africa wishing to compete in the global marketplace, the country has had to keep abreast with technological developments.

It is clear however, that not all South Africans have equal access to ICT. The Draft White Paper on E-Education (Department of Education, 2003:19) states that "every South African learner in the general further education and training bands will be ICT capable by 2013", yet statistics show that "although the number of schools with computers for teaching and learning was increased from 12.3% in 1999 to 26.5% in 2002, there are still more than 19 000 schools without computers for teaching and learning in South Africa" (Department of Education, 2003:12). Unequal access to ICT persists in South Africa, and has resulted in what is often referred to as the 'digital divide', a term used to differentiate between people who have access to computers and have the ability to use them and those who do not. A more descriptive definition states that:

> The digital divide is the growing gap that exists between those who have access to the Information Society and those who are deprived of such access due to cultural bias in the applications and contents, gaps in their education (for example, illiteracy), personal handicap, poor digital infrastructure, or lack of appropriate computer equipment. (Blake & Tucker, 2004:2).

In order to understand the digital divide, McFarlane explains that there are multiple divides which are: (1) different types of technologies that are available; (2) the age, capacity and functionality of devices being used; (3) the availability of support and resources to which people have access; (4) those who personally own the latest personal computers and have access to the Internet; (5) those who only have access to personal computers and the Internet either at work or by some other means; (6) those who have little access to ICTs and very little reason to use them; and (7) those who do not have any experience with ICTs (2006). To illustrate this point, someone in the United States of America (USA) who does not have his or her own personal computer, and who relies on a public computer in a library for access, could be seen as a 'have not', whereas someone in South Africa in the same situation would be seen as a 'have'. The key issue is not unequal access to computers but rather the unequal ways that they are used (Warschauer, 2003).

The causes of the digital divide could include the high cost of technology, lack of relevance, interest and aspirations, lack of literacy and the lack of electricity and education in the developing world:

> Disparities in access to technology between the affluent and impoverished, is a global phenomenon that is most serious in the poorest parts of the world. The millions who struggle daily for enough food, clothing, housing and transportation are unable to afford the hardware, software and service charges associated with ICT. (Tiene, 2004:89).

Statistics show that only 5.3 million South Africans' have a personal computer, making up 11% of the total population (Media Club South Africa, 2008).

It is generally accepted that in the previous political dispensation (prior to 1994), unequal education was provided to learners. Although attempts are being made to address this issue, the legacies remain. Broekman, Enslin and Pendlebury (2002) refer to education in South Africa as not being equal, which results in students not all having the same capacities on entering higher education and "if technological resources are unequally distributed or used in schools, ICT can serve to stratify already existing inequalities" (Warschauer, 2003:129). The 'digital divide' leads to people being either digitally literate or illiterate, with digital illiteracy meaning that in certain learning contexts, learning cannot be optimal. This is explained by theories of situated cognition, which states that people learn and gain knowledge from their experiences, including the community in which the situation occurs and its physical aspects (Brown, Collins & Duguid, 1989). Warschauer (2003:124) agrees that "the concepts of situated cognition are invaluable for understanding the relationship of ICT to education, particularly when considering programs that seek to promote social inclusion for marginalized groups".

Since researchers have concluded that the integration of technology involves educators and learners both using technology to solve problems in a way that advances higher order thinking skills (Kemker, 2005:1), technology has become a popular tool to situate learning. Teo (2000) describes a process (Figure 1.1) that stresses the need for instructional design to deliberately provide opportunities for students to interact with the content, and engage in authentic activities and real life applications of the content.

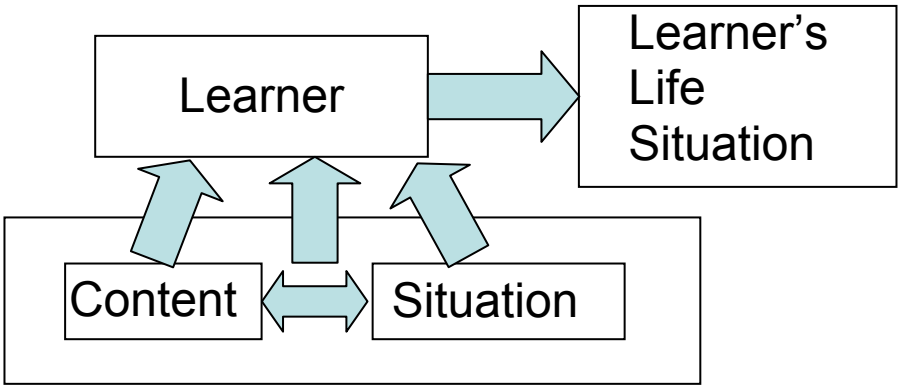


Figure 1.1: Situated learning model (Teo, 2000)

To use an example on how to apply this process, in the researchers own experience, when my IT students learn about the Internet and the world wide web in their studies, they can find the text-based component somewhat confusing, especially those who do not have a computer background: I find that when I use terms such as, 'search engine', 'hits' and 'links', the students look on blankly, but when I take them to a computer laboratory, log into the Internet and show them how to conduct a search, identify how many hits there were in relation to the search, and then show them how to identify and select a link, they understand the concept much better. The students can then for example go to the cyber centre on campus and look for information on the Internet for an assignment that they have to hand in, thus transferring their new-found knowledge to a real life situation.

Not only do the tools attract and hold the students attention and focus, but they also encourage them to work collaboratively with the computer in constructing their own knowledge. Thus, the learner takes an active approach rather than a passive one in his or her acquisition of knowledge. Mulkeen agrees that "we learn more when we do something to process material, than we do when we sit and passively listen to it" (2006:79). ICTs thus enable teachers and learners to move away from the traditional approaches to teaching and learning. According to Ling and Choo (2005:2) situated learning helps students to:

- Become more actively engaged in learning
- Construct new knowledge that is meaningful to them
- Relate or apply the knowledge acquired to deal with real life problems or issues and thus
- Increase their cognitive level.

However, it seems that a lot of students enter tertiary education either digitally illiterate or with very limited digital literacy skills. These limitations deter students from making full use of available technology and their benefits (Barraket & Scott, 2001:4).

1.2 Research problem

In view of the fact that many schools in South Africa do not have ICT access, first-year students studying the National Diploma in Information Technology at the University of Johannesburg, who come from diverse educational backgrounds, face many challenges. Almost one-third of these students do not have any form of computer experience when they embark on their studies, which could be one of the reasons that they are not successful in passing their major subject, Information Systems 1, of which the course content is basic computer concepts. These students are on the 'wrong side' of the digital divide when embarking on their computer studies. Barraket and Scott argue that "poor information literacy limits students' motivations and capacity to access available resources" (2001:4). Therefore, it would seem that the students on the 'wrong side' of the digital divide would always be catching up and their peers on the 'right side' of the digital divide would always be at an advantage. In addition, as "ICT is particularly important for the social inclusion of those who are marginalized" (Warschauer, 2003:28), students may feel that they are being socially excluded.

In this study I will argue that such students:

1. may lack cognitive skills required for success in the field of ICT (du Plessis, Janse van Rensburg & van Staden, 2005:863)

2. have less opportunity to take part in the education, training, shopping, entertainment and communications opportunities that are available online (Talwar, 2000:1)

3. would still have to acquire basic skills (e.g. keyboard, mouse, operating system) which their peers on the 'right side' of the digital divide would already have mastered and

4. could lack self confidence and motivation due to inexperience.

As a lecturer at the University of Johannesburg, lecturing first-year students in their major subject of Information Systems 1 (basic computer concepts), I am concerned about the low success rate, as Information Systems 1 is a prerequisite to continuing the Diploma. Historically, on average, 25% of students studying the diploma will fail during their first year of study. Some students have even indicated that they have not used a computer before embarking on their studies. This manifests itself in the first week of computer classes when students in the computer laboratories pick up the mouse and point it at the computer screen, and then appear puzzled when nothing happens when they click the mouse button. This mimicking of a television remote control indicates how much ground needs to be covered to ensure that all students have the knowledge and skills to perform effectively within a technology-driven course.

Students who fail Information Systems 1 are not permitted to continue into their second year of study. In the National Diploma Information Technology, students can select

one of two streams, namely, Information Systems and Technology or Software Development. The majority of students choose the stream Software Development as they enjoy the programming aspect, however, it is a requirement that students obtain a final mark of 60% in their first year subject Development Software 1 and also that they pass their major subject of Information Systems 1 in order to continue with the stream. Many students who do not meet the requirements are then forced to either complete their first year the following year (if they failed Information Systems 1) or to choose Information Systems and Technology, which would not be their preferred choice (if they did not obtain a final mark of 60% for Development Software 1). This means that many students who envisaged becoming IT programmers when they embarked on their studies will follow a different career path from the one they envisaged.

Thus, the reason for conducting this study is to determine whether the digital divide, which can also be seen as an educational divide, is the cause for the high failure rate amongst first-year students studying the subject Information Systems 1, or whether other contributory factors play a role.

1.3 Research question

Based on the above, the research question is:

What role does digital literacy play in the success rate of first-year students enrolled for the National Diploma Information Technology at the University of Johannesburg?

1.4 Current research

Research on the digital divide and digital literacy is widely reported on in research papers, books and journals. A search conducted on the Africa Wide: NiPAD database, which includes South African and African Studies on thesis/dissertations and

periodicals published in and about South Africa and multidisciplinary information on Africa on 3 September 2007, resulted in the following:

Key words used in the search		*South African Research (Nexus) Number of records*
1.	**Digital literacy and first-year students**	0
2.	**Digital divide and first-year students**	1*
3.	**Computer literacy and first-year students**	0

A search done on the OCLC (Online Catalog of the Library of Congress) database (which includes World Category Dissertations) on 3 September 2007, resulted in the following:

Key words used in the search		*International Research (OCLC) Number of records*
1.	**Digital literacy and first-year students**	0
2.	**Digital divide and first-year students**	1*
3.	**Computer literacy and first-year students**	3

* same article

The studies mentioned above include the following dissertations:

1. Addressing the reality of technology skills and competencies freshman students use in their first-year of higher education, by N K Kleinglass.

2. A study of computer literacy skills in first-year Sinclair Community College students, by J D Day.

3. Computers, critical literacy and first-year composition, by B B Duffelmeyer.

4. The impact of digital divide as reflected in the attitudes and performance of first-year students at the Technikon Pretoria, Nelspruit Campus, by W P Visser.

The only study which is marginally associated with the role of digital literacy in the academic performance of first-year students in the National Diploma: Information Technology at the University of Johannesburg, is the dissertation by W P Visser. No other studies were found.

1.5 Aims and objectives of the research

The aim of this study is to determine what the effect of digital literacy on the academic performance of students who are enrolled for the National Diploma Information Technology at the University of Johannesburg for the first-year of study is. In order to achieve this, the following objectives are set:

- To explore and report on literature relating to the digital divide, in order to isolate those factors that may impact on student performance

- To create instrumentation that would adequately identify the digital literacy of students who enroll for the qualification

- To explore the effect of previous digital literacy on the academic performance of students

- To match and compare the digital literacy of students with their academic performance in their first year.

1.6 Research design

During this study, I started by looking in depth at literature that is relevant to the topic. As Creswell (2003:31) states: "the literature is used to frame the problem in the introduction to the study". Literature explored in this study included the results of existing, available research on the nature of the digital divide, how it emerged, its extent and how it has affected the role of ICT in education and ICT-based education, with reference to digital literacy. According to Henning (2004:27) "a good literature review lays the foundation of your research and sets the stage for your research". The research design is discussed in more detail in Chapter 3.

1.6.1 Research method

In this study I used both quantitative and qualitative data to illuminate the factors related to digital literacy that may have an influence on the students' likelihood to succeed in the Information Technology modules. This type of research is often referred to as 'mixed methods' research:

> "A mixed method approach employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both numeric information as well as text information so that the final database represents both quantitative and qualitative information" (Creswell, 2003 :18).

1.6.2 Population and sampling

Data for this empirical research was drawn from a population of approximately 240 first-year students enrolled for the National Diploma Information Technology at the University of Johannesburg for the year 2008.

1.6.3 Data collection techniques

A structured questionnaire (non-anonymous) was compiled to gather the necessary data to determine whether previous exposure to ICTs influences students' academic performance. These questionnaires were handed out and collected in one class session. I also incorporated the services of *Statkon* (Statistical Consultation Services) at the University of Johannesburg to assist me with the formulation of questions, analyses, interpretation and formulation of the results.

Once a trend was determined through the results of the questionnaire, I selected individuals who completed the questionnaire and conducted a focus group interview in order to gain insight into the students' experiences.

1.6.4 Data analysis

Quantitative data is information gathered in a numeric form (e.g. questionnaires). All quantitative data was analysed with SPSS (Statistical Package for Social Sciences). SPSS produces tables, charts and numerical statistical measures which were then interpreted.

Qualitative data is information gathered in a non-numeric form (e.g. focus group interviews). Coding was used to analyse data collected from the focus group interviews. Similar words and statements were highlighted in a specific colour and then labeled collectively. Once comparisons were made they were then grouped and categorised.

Data collected from both the questionnaires and focus group interview were analysed to:

- identify the digital literacy of students who enroll for the qualification

- match and compare the digital literacy of students with their academic performance in their first-year

- explore the role of previous digital literacy on the academic performance of students.

1.6.5 Validity and reliability

In this study, I endeavored to provide information that is valid and reliable. According to Henning (2004:148-149), to validate means:

> to check (for bias, for neglect, for lack of precision and so forth), to question (all procedures and decisions – critically), to theorize (looking for and addressing theoretical questions that arise throughout the process – not just towards the end) and to discuss and share research actions with peers as critical in-process reviewers.

The research that was conducted therefore, measured that which it was intended to measure. Golafshani, states that "if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable" (2003:598). The results of the research are therefore consistent with the data collected. I also showed the readers that the procedures used ensure reliability of the method and validity of the conclusions.

1.6.6 Ethical issues

The participants in this study participated willingly in the study. They were required to complete consent forms in which their rights were spelled out, as well as what would be expected from them during the research process, e.g. completing questionnaires or

being interviewed. It could therefore be said that participants gave informed consent. Participants were told that they had the right to withdraw from participating in the research at any time without penalty in any form.

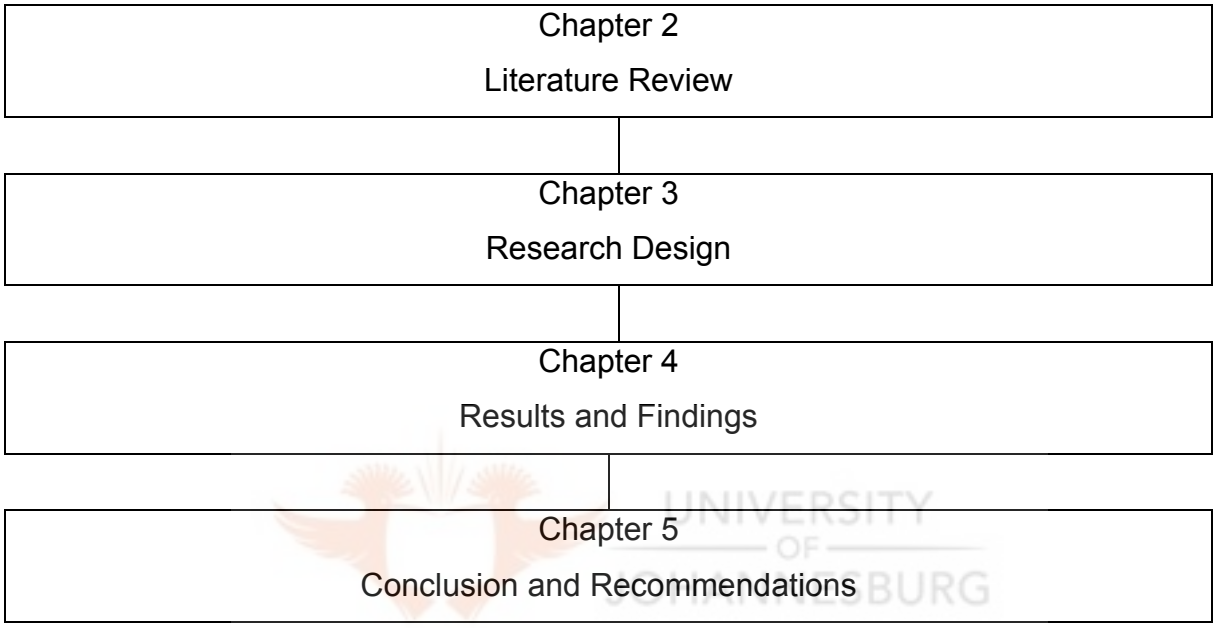
At no stage were participants exposed to harm during the research process. Permission to conduct the research was sought from the relevant Head of Department. Permission letters are included in the final research report as appendices.

All results emanating from the research were made available for scrutiny by participants and the institution before publication of the results. All data and artefacts that result from the research will be archived either electronically or in the form in which it was generated, and will be available for a period of time in line with the University of Johannesburg's requirements.

In all cases, utmost care was taken to ensure that data was collected in a responsible way, and that data was recorded as accurately as possible. During interviews, tape recorders and video recorders were used. During the data analysis part of the research, I attempted to use measures that would ensure the integrity of the analysis by being informed of the appropriate data analysis techniques, and by employing measures of trustworthiness.

1.7 Structure of the research

The rest of the study is organized as follows:



1.8 Summary

The aim of this chapter was to give an overview of the research. A background to the study was given and a problem statement made. Current research being conducted in this field both nationally and internationally was shown and the aims and objectives of the research were discussed. The research design that was used to investigate the problem was also made known, as well as the structure of the rest of the dissertation. In the next chapter an in-depth discussion takes place of the situatedness of the learners who enter the course with focus on the digital divide and digital literacy.

CHAPTER 2: THEORETICAL PERSPECTIVES - THE SITUATEDNESS OF LEARNERS

2.1 Introduction

In this chapter, those aspects related to the situatedness of the learners who enter the National Diploma: Information Technology are explored. It will be shown how theories of situated learning can be used to explain those differences that exist between learners that may impact on their performance in the modules. In addition, a particular aspect of the entry situation of these learners, their level of digital literacy, is examined, as the assumption is that this may significantly affect their ability to be successful in the modules.

As computers proliferate in all spheres of society, the term 'digital literacy' is receiving prominence:

> Digital literacy represents a person's ability to perform tasks effectively in a digital environment, with "digital" meaning information represented at machine language level, in numeric form and primarily for use by a computer and "literacy" including the ability to read and interpret media, to reproduce data and images through digital manipulation, and to evaluate and apply new knowledge gained from digital environments (Jones-Kavalier & Flannigan, 2006:9).

It is evident that being digitally literate in the 21st Century is desirable. However, in South Africa, it appears that a large section of the population is digitally illiterate (World Internet Usage Statistics News and Population Stats, 2007). This may be caused by what is often referred to as the 'digital divide'. The 'digital divide' means that some people have access to ICTs and are computer literate and other people do not have access to ICTs and are computer illiterate (Shelly, Cashman & Vermaat, 2003:1.30).

Being computer literate in the modern world will also impact on learning and, therefore, not being digitally literate means that in certain learning contexts, learning cannot be optimal. Students studying the National Diploma: Information Technology at the University of Johannesburg therefore begin their first year of studies with uneven IT skills. Some are experienced game players, use the web for banking or e-mail purposes, develop their own web sites and are proficient in several software packages, whilst others have never before had access to a computer.

However, it can also be argued that much of a student's educational experience depends on that student's socioeconomic background and has nothing to do with the student's intelligence, learning ability or industriousness (Stoll, Fink & Earl, 2003). Theories of situated cognition can be used to explain that people learn and gain knowledge from their experiences, including the community in which the situation occurs and the physical aspects of the situation (Brown, Collins & Duguid, 1989).

2.2 Digital literacy

Conceptualisation

The term 'digital' refers to:

> electronic technology that generates, stores, and processes data in terms of two states: positive and non-positive. Positive is expressed or represented by the number 1 and non-positive by the number 0. Thus, data transmitted or stored with digital technology is expressed as a string of 0's and 1's. Each of these state digits is referred to as a bit (Whatis.com, 2008).

In laymen's terms, 'digital' therefore refers to the representation of any form of data (pictures, sound, motion, text) by digital devices (e.g. televisions, computers, digital

decoders). For example, sound (sound waves are analogue signals) may be digitized (the analogue signal is converted to 1's and 0's) and stored on a Compact Disc (CD). The digitized signals on the CD are then interpreted by a CD player, which converts the 0's and 1's back to sound.

Literacy is broadly defined as:

> the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning enabling an individual to achieve his or her goals, develop his or her knowledge and potentials, and to participate fully in the community and wider society (UNESCO Literacy Assessment and Monitoring Programme (LAMP), 2004:2).

Digital literacy is thus the ability to be digitally competent and to be able to succeed in life, whether in a job, studies or free time. Gilster defines digital literacy as "the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers" (1997:1), and "the skills of the digitally literate are becoming as necessary as a driver's license". The Department of Education in South Africa also views digital literacy as a 'life skill' in the same way as literacy and numeracy (Department of Education, 2003:17). Van Joolingen elaborates on this definition by defining ICT literacy as:

> the interest, attitude and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in society (2004:6).

In the 21st century, social activity has been mediated through digital facilities such as e-mail, newsgroups, message boards, internet telephony, chat rooms, instant messaging,

and digital video conferencing, making digitally enabled communities a way of life. Not only have social communities grown, the Internet also offers limitless information. In this context, Martin writes that "out of all of the challenges offered by a digitally infused society, the question of how individuals can understand, and cope with, the digital world becomes a significant one" (2006:7).

It can be deduced that being digitally literate is not only being proficient in the use of computers but also having the skills needed for reading and writing with them (Kope, 2006). Digital literacy can therefore be seen as more than mastering a specific skill, it is achieved when certain digital competences are thoughtfully deployed in authentic life situations in solving a problem or completing a task (Martin, 2006). In the context of life, work and education it is important for an individual to be aware of their own digital development and to realize that digital literacy is an ongoing process that depends on the needs of the situation. Those who are not digitally literate will be at a distinct disadvantage as the world is being significantly impacted on by digital technologies.

In this regard, Prensky identifies two different groups of people, namely, those who have grown up with technology and "have spent their entire lives surrounded by and using computers, videogames, digital music player, video cams, cell phones, and all the other toys and tools of the digital age", known as *Digital Natives,* and "those who were not born into the digital world but have, at some later point in our lives, become fascinated by and adopted many or most aspects of the new technology" known as *Digital Immigrants* (2001:1,2). He argues that these two generations of people "think and process information differently", which has a direct impact on education today as educators (digital immigrants) and their students (digital natives) are speaking a different language.

Digital natives and digital immigrants are also referred to as 'Generation Y' and 'Generation X'. Generation Y, offspring of the 'baby boomers' (children of the first post-war generation), were roughly born between 1980 and 2000 and Generation X 1979

and before. Fields, Burmeister, Cohen, Wilder and Casnocha note that Generation Y has grown up with more technological advances than any prior group and as a result they "have a distinctive way of managing their interests, their business and their lives". They believe that for this reason much can be learned from Generation Y (2007:1). A study conducted by Saatchi and Saatchi, found that "digital media has collectively made Generation Y members more positive and optimistic than Generation X, instilling in the former greater confidence in mastering their destiny" (The New York Times, 1999). The study also found that digital media enhances Generation Y's intellectual and social sophistication by increasing its access to information.

It is thus clear that being digitally literate is a desirable state in modern society. However, it is also clear that not all members of all societies are equally digitally literate. In South Africa, this state of affairs is particularly evident. It appears that a large section of the population may in fact not be digitally literate. This may be caused by what is commonly known as the 'digital divide'.

2.3 The digital divide

Defining the digital divide is complex as there are many facets involved. *Bridges.org* is an international non-profit organization with headquarters in Washington DC and bases in Uganda and South Africa. Their mission is to promote the effective use of Information and Communication Technologies (ICTs) in developing countries to improve people's lives. They simply define the 'digital divide' as "the division between those who have access to ICTs and are using it effectively, and those who do not" (Bridges.org, n.d.). The Organization for Economic Co-Operation and Development (OECD) elaborates by defining the term 'digital divide' as:

> the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access

> information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities (OECD, 2001:5).

The two common elements of these definitions are 'ICTs' and 'access'. It can therefore be surmised that the 'digital divide' is the difference between people who have access and are able to use computers and the Internet, thereby empowering them to take educational and job opportunities which are more related to computers, versus people who do not have access and are unable to use computers and the Internet, thereby affording them less opportunity to take part in the information-based economy.

People who are on the 'wrong side' of the digital divide are normally found in disadvantaged groups within developing countries. The 'digital divide' is therefore, closely related to social inequality. In this regard, Czerniewicz and Hodgkinson-Williams argue that "the uptake of ICTs (in South Africa) is uneven and constrained by existing divides and stratifications along lines of race, class, gender, disability and nationality" (2005:8). The causes of the digital divide could include the high cost of technology, lack of relevance, interest and aspirations, lack of literacy and the lack of electricity and education in the developing world.

The term 'digital divide' has only been in use since the introduction of ICTs. Although computers have existed since as far back as the 1940s, personal computers were only introduced in the late 1970s. Between the 1970s and 1980s computers were for the most part used for business purposes and very few people owned home computers as they were deemed expensive and unnecessary (Bulger, 2007).

In the 1980s, software applications started to incorporate graphical user interfaces, whereby the user interacted with the software using text, graphics and visual images such as icons. As software applications became easier to operate, computers became increasingly popular. However, it was not until the growth of the Internet in the 1990s that personal computers went from being the exception to the norm. Gordon Moore,

the Co-founder of *Intel* in the 1960s, accurately predicted that every year computers would increase in power and decrease in costs (Shelly, Cashman & Vermaat, 2007:193), making them more accessible to the average user. In the Fall of 1990 there were approximately 313 000 computers online throughout the United States, and by 1996 that number exploded to 10 million (Bulger, 2007:1). The Internet, which affords people the opportunity to take part in education, shopping, entertainment, communications and other opportunities, such as gaining income from products or services offered online, was the motivating factor behind the transition from IT (Information Technology) to ICT.

2.3.1 The extent of the digital divide

To determine which side of the 'digital divide' somebody is on, their use of computers and internet access are main indicators to determine whether they are a 'have' or a 'have not' (Selhofer & Hüsing, 2002:2). Table 2.1 and Figure 2.1 show the world Internet usage statistics for Africa, Asia, Europe, Middle East, North America, Latin American/Caribbean and Australia/Oceania:

Table 2.1: World Internet usage and population statistics (World Internet Usage Statistics News and Population Stats, 2007)

WORLD INTERNET USAGE AND POPULATION STATISTICS 2007				
World Regions	Population (2007 est)	Population % of World	Internet Usage (As at 12/9/2007)	Usage % of World
Africa	933 448 292	14.2	33 545 600	2.9
Asia	3 712 527 624	56.5	436 758 162	37.2
Europe	809 624 686	12.3	321 853 477	27.4
Middle East	193 452 727	2.9	19 539 300	1.7
North America	334 538 018	5.1	232 655 287	19.8
Latin American/Caribbean	556 606 627	8.5	109 961 609	9.4
Australia/Oceania	34 468 443	0.5	18 796 490	1.6
WORLD TOTAL	**6 574 666 417**	**100**	**1 173 109 925**	**100**

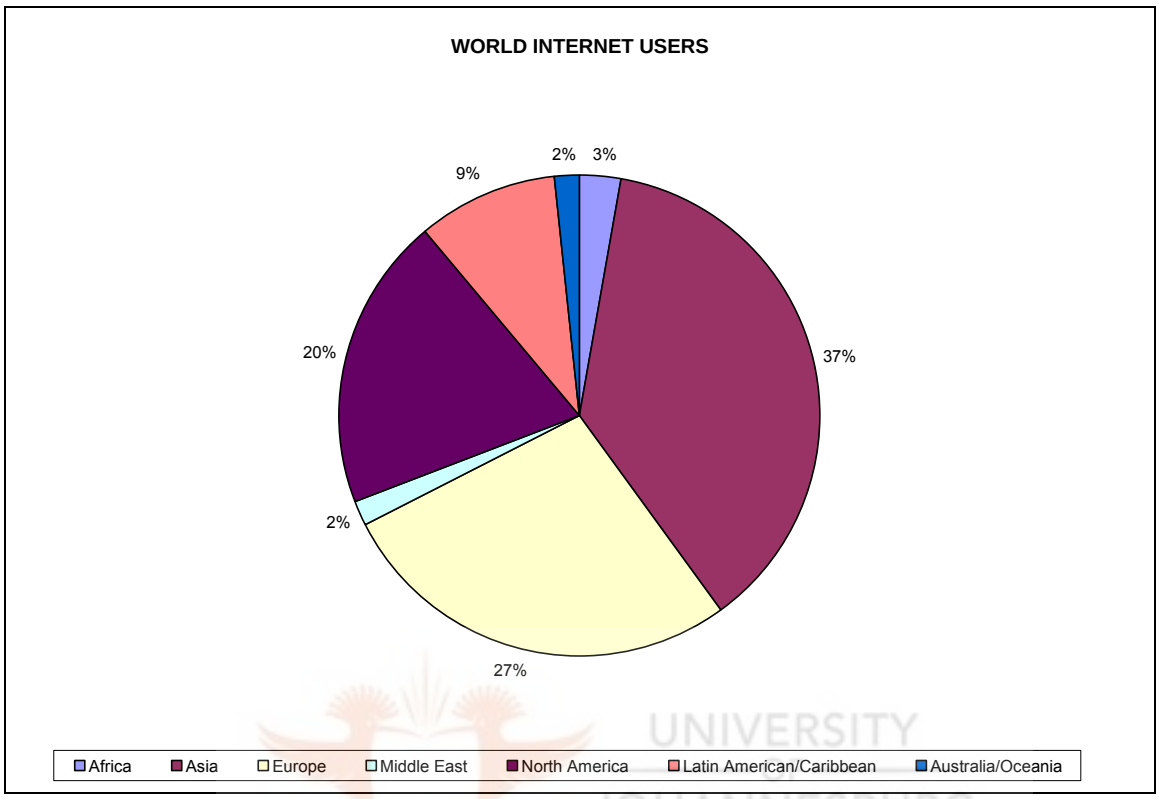


Figure 2.1: World Internet usage and population statistics (World Internet Usage Statistics News and Population Stats, 2007)

From the statistics shown in Table 2.1 and Figure 2.1, in relation to its population, Africa by far remains behind the developed world in terms of Internet usage, although South Africa still has the highest percentage of users in Africa, totaling 15.2%. The results of the 'Internet Access in South Africa 2007' study, announced in July 2007 by World Wide Worx, predicted that a total of 3.85 million South Africans would have Internet access by the end of that year, a mere 8% of the total population (2007).

In 2007, of Africa's 26 million fixed lines, over 75% were found in just 6 of the 55 African nations, thus Africa has an average of 3 fixed lines per 100 people, whereas the USA has an average of 34 fixed lines per 100 people. This has resulted in Africa

having the highest ratio of mobile subscribers of any world region, despite being 'the least wired region in the world': the total number of mobile subscribers continent-wide at the end of 2004 was 76 million (World Internet Usage Statistics News and Population Stats, 2007). The last census conducted in South Africa, in 2001, revealed the following results: only 24.4% of South African households had a *Telkom* telephone; 8.6% of South African households had a computer; and 32.3% of South African households had a cell phone (Statistics South Africa, 2001). These statistics give an indication of the extent of the digital divide in South Africa and as ICTs have a major role to play in education it is apparent that the digital divide also has a direct impact on the formal education sector.

The South African Government is aware that there is a digital divide and is committed to ICT in education, as the Draft White Paper on E-Education states that "every South African learner in the general further education and training bands will be ICT capable by 2013" (Department of Education, 2003:12). However, as Table 2.2 reflects, provinces are at different levels of ICT integration in education:

Table 2.2: Provinces and computers in schools (Department of Education, 2004:11,12)

Provinces	***Schools with Computers***	***Schools with computers for teaching and learning***
	%	%
Eastern Cape	8.8	4.5
Free State	25.6	12.6
Gauteng	88.5	45.4
KwaZulu Natal	16.6	10.4
Mpumalanga	22.9	12.4
Northern Cape	76.3	43.3
Limpopo	13.3	4.9
North West	30.5	22.9
Western Cape	82.4	56.8
National	**39.2**	**26.5**

These statistics give an idea of the extent of the digital divide in schools in South Africa, which is a cause for concern, as the majority of students then enter the higher education sector not being digitally literate.

2.3.2 Bridging the digital divide in South Africa

Many initiatives are in place to provide access to technology in townships and rural areas in South Africa. A joint programme between the Department of Communication and the South African Post Office resulted in self-service Public Internet Terminals (PITS) being implemented in post offices, multi-purpose community centres and libraries around the country. The PITS provide access to services and information such as government information, e-mail facilities, local and national business directories, selective Internet sites, education information and other facilities (Matsepe-Casaburri, 2002).

The telecentre is one of the most widely implemented initiatives to bridge the digital divide. Bridges.org defines telecentres as "shared facilities usually providing public access to basic telephony and other information services to a disadvantaged community" (n.d.). The goal of telecentres is to provide disadvantaged communities within developing countries access to technologies that they could not otherwise afford. These telecentres provide services such as telephony, copying, faxing, printing, e-mail, scanning, computer training, word processing and Internet access.

The digital doorway is a project implemented by the CSIR business unit *icomtek*. It is aimed at providing people in rural and disadvantaged areas with computer terminals that allow them to learn with minimal external input. The idea is for children to acquire computer skills without any facilitation. The digital doorway is similar to the 'Hole in the Wall' project, where one man, Sugata Mitra, left one computer connected to the Internet in an Indian community and observed how the children, without any adult supervision, taught themselves how to use it even with their limited understanding of

the English language (Mitra, n.d.). The digital doorway consists of a free-standing multimedia computer terminal with a keyboard and includes *Microsoft Word* and *Excel* software, mathematics, science, music and language applications as well as Internet and e-mail access. The Minister of Science and Technology Mosibudi Mangena said that "this project will give communities in rural and peri-urban areas the opportunity to become computer literate and access information" (South African Information Reporter, 2007).

According to the Department of Education, a few initiatives are in place to bridge the digital divide in schools, for example, the *Telkom Foundation* has developed Supercentres in approximately 1 300, schools which includes computers, software applications, Internet connections, monthly subscriptions and a rent-free telephone line. Together with Thintana, the *Telkom Foundation* has committed over R200 000 000 to support education and training in the learning areas of ICT, maths and science (Department of Education, 2003:12).

Other initiatives in place are also (1) the One Laptop Per Child (OLPC) Foundation, whose mission is to make sure all schoolchildren in developing countries receive a lap top, with global connectivity, so that they and their families and communities can not only learn but also 'learn about learning' (n.d.). The OLPC Foundation focuses on distributing laptops to under-privileged children in developing countries; and (2) the New Partnership for Africa's Development (Nepad) e-Schools Project, which is currently in a pilot stage, is aimed at equipping schools in developing countries with a computer lab consisting of approximately 20 computers, a server and network infrastructure as well as printers, scanners and whiteboards. Six schools in South Africa have been identified to benefit from this project (South African Information Reporter, 2007).

The initiatives mentioned above are, to name but a few of the many programmes in place providing some form of ICT access to disadvantaged communities. These

programmes are initiated by organizations ranging from the smallest National Government Organisation to the largest multinational corporation. Their goal, however, is the same: to bridge the gap between the 'haves' and the 'have-nots'.

In the South African context, the digital divide reflected the social, economical, cultural, educational and political conditions divisions that existed in the pre-democracy era (Greyling, 2003). The types of divisions and inequalities that existed in all spheres of the South African society, particularly extended to education. In pre- and post-1994 schools, it was apparent that schools that were previously disadvantaged by resourcing policies, still perpetuated the digital divide.

2.4 The digital divide and South African education

Blake and Tucker explain that "the South African digital divide grows out of a particular history which is one of great prior division and historical backlogs for large parts of the people" (2004:2). Under the apartheid (pre-1994) educational system, The Bantu Education Act of 1953 ensured that blacks received a minimal education that would provide them with skills to become labourers and servants. Not only did this Act directly make it difficult for black people to obtain an education, but it also ensured that more government funding was given to the white schools than to the black schools (Ocampo, 2004). Disparities in unequal funding meant that there was a lack of facilities in schools as well as a lack of teachers, with many teachers being under-qualified for the positions that they held: "The 'liberation now, education later' stance taken during the years of the anti-apartheid struggle severely damaged the culture of learning and teaching in schools and universities" (du Plessis, Janse van Rensburg & van Staden, 2005:878).

Since the apartheid era (post-1994), many educational policies have changed to equalize educational inequalities. Although the South African Government is trying to rectify the imbalances in education, the apartheid legacy still remains in the poorer rural

provinces such as Kwazulu-Natal and the Eastern Cape. The schools in wealthier provinces, such as the Western Cape and Gauteng, generally have better educational resources (South Africa Information Reporter, 2006). In order to rectify this situation, the government is identifying low income areas and giving the schools in those areas more funding than higher income areas (Ocampo, 2004). Rural schools face many challenges that are foreign to their urban counterparts, and these hurdles need to be overcome before any form of ICTs can be introduced to improve their access to quality education.

2.4.1 Causes of digital illiteracy in schools in South Africa

Generally speaking, children in the developing world are inadequately educated or receive no education at all. As the organization OLPC states "children are consigned to poverty and isolation – just like their parents – never knowing what the light of learning could mean in their lives" (n.d.). Former President Thabo Mbeki said at the South African launch of the Nepad e-schools demonstration project in Mpumalanga on 18 April 2007 that technology was vital to pulling Africa out of poverty.

According to UNESCO (2002), the main aim of having computers in schools is to produce a new generation of skilled, creative and innovative individuals who are able to use ICT effectively in accessing and managing information from technology. Such skills include the following (UNESCO, 2002):

- Providing for all-round development, with provision for individual abilities
- Emphasising intellectual, emotional, spiritual and physical growth
- Producing a technologically literate workforce that can think critically

- Democratising education, offering equal access to learning opportunities and accommodating differing learning abilities, styles and pace.

In order to keep up with the rest of the world, the South African educational system has had to incorporate ICTs into its curriculum (Department of Education, 2003:14). As South African institutions are preparing themselves for the integration of ICT into their teaching, several challenges have arisen that need to be dealt with.

In 2002 Mentz and Mentz conducted a random telephone survey covering 49 schools from the North West Province district of Potchefstroom. Questions in the survey ranged from how many computers were available for teaching, learning and administration purposes, and to what level of training the computer educator had achieved. The findings were that 54% of schools did not have computers for administrative purposes and 81% of schools did not have computers for teaching and learning purposes, even though 88% of the 52 principals who took part in the survey viewed access to computers by learners as very important. When the principals were asked what the obstacles were that prevented the effective use of computers in South African schools, the following responses were given (in order of importance):

1. Insufficient financial support by the Department of Education

2. Untrained teachers

3. Lack of electricity

4. Socio-economic status of the community

5. Insufficient security and the resulting vandalism and theft

6. Curriculum constraints

7. Unfavorable teacher/learner ratio

8. Lack of classrooms suitable to serve as computers laboratories.

As this survey was conducted five years ago, it will be useful to define each of the problems posed with supporting current literature, to show that the obstacles mentioned are still very relevant:

2.4.1.1 Insufficient financial support by the Department of Education

During the whites-only apartheid rule, the funding allocated to schools varied greatly between the different ethnic groups. Schools catering for black children inevitably received far less than those for whites, further entrenching the policy of inequality. After the fall of the apartheid regime in 1994, South Africa's first black president Nelson Mandela made education the number one priority of his new administration and the education ministry's budget now accounts for around 20% of the overall national total (IOL, 2008 a). However, Graeme Bloch, a specialist in education from the Development Bank of South Africa, argued that it is not enough. Insufficient funding is often overcome in the wealthier schools by funds being raised by the parents and the community, however, the schools in poorer rural areas find it difficult to raise the money to buy computers and even if they are successful they have the added threat of vandalism and theft to worry about.

2.4.1.2 Untrained teachers

Many teachers obtained their college degrees or diplomas before the 21st century, in which computers have revolutionized the world. Many teachers

are techno-phobic and do not feel comfortable using technology in their classrooms. For this to be changed, training must take place in such a way that the teachers feel confident in their abilities: "To achieve sustained technology use, teachers need hands-on learning, time to experiment, easy access to equipment, and ready access to support personnel who can help them understand how to use technology well in their teaching practices" (Swain & Pearson, 2003:330). In the same vein, Mentz and Mentz identify "the lack of trained teachers as one of the main obstacles in the way of effectively introducing technology into schools in South Africa" and goes on to say that "the following critical aspects need to be addressed before technology can effectively be introduced into schools in South Africa" (2002:5):

- Improving the computer skills of teachers
- Enhancing teacher's ability to use the computer as a tool in problem solving, and
- Making technology available in schools.

In 2003, the private and educational sector launched a campaign called INTRADEM (Institute of Training, Development and Empowerment), aimed at bridging the technology gap between the approximately 30 000 unqualified and under-qualified teachers in South Africa. This upgrading programme was aimed at the transfer of basic technological literacy skills to teachers as a technology literate education force was seen as vital in reducing the impact of the digital divide (Greyling, 2003:2). Other initiatives the Department of Education have identified to support teachers are (1) SCOPE, SchoolNet SA and the SAIDE (South African Institute for Distance Education institutions) which have developed 11 Teacher Development Modules for introducing ICT

into schools; (2) SchoolNet SA, which have developed a mentor-based in-service training module made available to teachers online to introduce ICT into the curriculum, and; (3) *INTEL's* Teacher Development Programme, which provides teacher training in ICT integration into teaching and learning (Department of Education, 2003:11).

Once computers have been implemented into schools and teachers have acquired basic computer skills, the teachers can then impart their knowledge to the learner, ensuring that he or she becomes computer literate. Once learners have become computer literate, the school can then investigate how computers can successfully be incorporated into their curriculums. Swain and Pearson, argue that "teachers must become proficient in the use of the technology and then learn and reflect on instructional strategies appropriate for their students and curriculum" (2003:330), as this will have the potential for enhancing student achievement and decreasing the digital divide.

2.4.1.3 Lack of electricity

According to Visser (2004:26), many rural areas in South Africa do not form part of the national electricity grid and are therefore without electricity. According to Bloch (IOL, 2008 a), nearly 17% of schools still have no electricity. An initiative to solve this problem is the implementation of solar power and wind turbine power technologies. These two sources of power can assist rural areas to obtain electricity at an affordable cost. Another alternative is the use of wireless technology which could prove beneficial where a physical connection is not practical or even possible. In comparison with fixed lines for Internet access, wireless systems have recently become a more cost effective and easy-to-use solution for providing Internet access (Visser, 2004:26).

2.4.1.4 Socio-economic status of the community

Forty two percent of the students studying the National Diploma: Information Technology at the University of Johannesburg have indicated that they come from rural areas (see Chapter 4). Geldenhuys and Pieterse identify the following external barriers to the academic progress of learners from lower socio-economic communities: "violence, abuse, under nourishment, HIV/AIDS, ineffectual developmental transitions and commercial exploitation" (2005:3). Many students live under less than adequate conditions that are not conducive to studying. In many cases they do not have the facilities such as electricity or even a room in which to study, due to six or even more family members living in the same house. The general atmosphere of study is therefore hindered due to noise, overcrowding and general poverty.

2.4.1.5 Insufficient security and the resulting vandalism and theft

High levels of crime currently in South Africa are also affecting schools. A *Cape Times* reporter quoted Western Cape provincial Education MEC Cameron Dugmore (IOL, 2007 b) as saying that his department was "deeply concerned with the high levels of burglary and vandalism in schools", cases of which are said to have tripled since 2005. The *Independent Online* (IOL, 2008 c) reports that school holidays have become notorious for burglaries and vandalism, costing the Education Department millions of rands in repairs. In December 2007, in the Western Cape alone, more than 50 schools were burgled and vandalized, with thieves setting fire to classrooms, damaging ceilings and windows, destroying bathrooms and stealing school equipment and furniture. Many of the schools were linked to armed response security companies, however, when school alarms were activated, many of the patrolman feared for their own safety in the townships and other

high risk areas and failed to respond to these calls. The Department of Education has said that high-risk schools will now have closed-circuit television (CCTV) cameras installed in 2008 (IOL, 2008 d).

2.4.1.6 Curriculum constraints

The *South African Information Reporter* (2008) announced that the new school curriculum '2008' was in full effect at the beginning of the school year. The new curriculum ensures that all learners from Grade 0 to Grade 12 are learning under the outcomes-based national curriculum statements, which according to the Department of Education "raises the bar from previous ones". However, the National Teacher's Union spokesperson Musa Gumede has highlighted the following problems with the new curriculum (IOL, 2008 e):

- Teachers have not received sufficient training on the new curriculum
- Teachers are not adequately prepared to teach the New Curriculum Statements
- Few subject advisors were appointed in 2007 to guide teachers on the new curriculum
- There will be problems with pupils being able to understand the new curriculum.

Another concern highlighted by Chairperson of the Kwazulu Natal School Governing Body Association, Reginald Chiliza, is that much time will be lost while teachers familiarize themselves with the new curriculum (IOL, 2008 e). This poses the question of where teachers fit computer education into all of this.

2.4.1.7 Unfavorable teacher/learner ratio

The Western Cape Education Department has listed the ideal teacher-pupil ratio as 1:39, however, several schools in the Western Cape are struggling with overcrowding, with one school having to accommodate more than 60 pupils per class (IOL, 2008 f). Jonavon Rustin, provincial secretary of the South African Democratic Teachers Union (Sadtu), said: "We reject class sizes larger than 30 as this is not educationally sound and further contributes to the lack of learner discipline in our schools. Large class sizes lead to a low teacher morale and results in teachers leaving the profession" (IOL, 2007 g).

Gert Witbooi, the spokesperson for the Education MEC Cameron Dugmore, has said that schools with bigger classes will be allocated more teachers on a temporary basis until permanent posts can be filled. The Department of Education also has plans to build more schools in each of the provinces in South Africa, which should in turn have a positive impact on the teacher/learner ratio.

2.4.1.8 Lack of classrooms suitable to serve as computer labs

Many poorer schools do not even have suitable classrooms for their pupils, let alone classrooms suitable to serve as computer labs. The Headmaster of the Ibhongo High School in Soweto, Kenneth Mabuza, said at the beginning of 2008 that students found themselves being taught in run-down buildings, scrawled with graffiti and littered with broken windows (IOL, 2008 a). At the Silukhanyo Primary School in the Strand, some pupils have to stand during their lessons because there are not enough tables and chairs for all the pupils. The MEC Cameron Dugmore (IOL, 2008 h) admitted that a lack of

infrastructure at the school was 'a problem'. The Department of Education is making arrangements to construct proper school buildings where this problem exists.

This survey highlights many obstacles that prevent the effective use of computers in South African schools. At the moment, it recommends that emphasis of ICT in teaching and learning should be placed on higher education and high schools and, eventually, there can be more of a priority placed on providing ICTs for students in primary and even pre-primary schools, so that computer literacy can be gained sooner and young people can learn with the assistance of ICTs earlier in their education. The obstacles mentioned above unfortunately have a direct effect on digital literacy in higher education.

2.4.2 Digital literacy in higher education in South Africa

The Minister of Education, Naledi Pandor called a Colloquium for ICT Skills Development on a Tertiary Level at the Birchwood Conference Centre in Boksburg, Gauteng, South Africa on 19 March 2007. The parties who attended the Colloquium consisted of members of the National Department of Education, the formal and informal ICT education sector, the ICT industry and other employers of ICT graduates. The reason for the gathering was to recognize the existence of a significant ICT skills gap between the workplace demand and the current rate of production of the tertiary sector. One of the primary concerns observed by the Colloquium was the quality and preparedness of school leavers who register for a diploma or degree in ICT.

The Vaal University of Technology (VUT) has collaborated with the National Institute of Information Technology (NIIT) in India, in working towards widening access and at the same time contributing to the ICT skills base. Du Plessis et al., identify that "one of the concerns that have been observed by the research team is the gap in the base skill level and maturity of the learners who desire to enter the ICT mainstream directly from

school" (2005:864). They recognize the following shortcomings in scholars who want to pursue a qualification in ICTs:

- A lack of required foundational skills needed to be successful in pursuing the ICT programme
- A low exposure to and a weakness in communication and numerical skills
- An overall lack of prior knowledge of ICT
- Low pass and throughput rates in computer programming modules.

Blignaut, Venter and Cranfield (2000), from the University of the Western Cape, in an effort to fast-track students from disadvantaged backgrounds into main stream Computer Science introduced the teaching of both Computer Literacy (EUC) and Computer Science simultaneously to the first-year of study. The aim of their study was to determine if the parallel teaching of Computer Science and Computer Literacy, achieved the set objective of fast-tracking students with no computer background into successfully completing main stream Computer Science. This intervention was deemed successful in achieving a higher success rate in Computer Literacy however, the retention rate of Computer Science students (46%) remained a concern (2000). Blignaut et al. deduced from their study that students who had been exposed to computers at schools were more than likely to have a computer at home and African language students from disadvantaged backgrounds were more than likely to have been exposed to computers for the first time at university (2000). This therefore raises questions about other possible factors that may be determinants in the success rate of students in the modules of the National Diploma: Information Technology. It is for this reason then that theories of Situated Learning are further explored.

2.5 Perspectives on situated cognition

From the perspective of a learning theory, situated learning means that learning is placed in a milieu implying that information is meaningful only in relation to its context (Ling & Choo, 2005). Lave and Wenger (1990), who are often credited with starting the situated cognition movement, define situated learning as "a general theory of knowledge acquisition based on the notion that learning occurs in the context of activities that typically involve a problem, others, and a culture" They go on to argue that situated learning "involves a process of engagement in a 'community of practice'" (Smith, 2003:2). In accordance with this view, Tiene and Ingram describe situated learning as "learning that is located or situated in a real-world context and that is meaningful to the lives of the learners" (2001:67). The students who are the objects of this course thus participate in daily life and gain different experiences before entering university as a first year student.

Dewey agrees that individuals live in a series of situations, that is, interaction is going on between individuals and objects and other persons constantly (1902), meanwhile Clancey, states that one's action is situated in one's role as a member of a community of practice (1995). The communities of practice referred to are everywhere and all people are involved in them one way or the other, whether at work, school, home or through a specific interest such as a hobby or sports. However, it can be deduced from these various definitions that students have to be in a situation in order to acquire new knowledge. What is learned and how it is learned and used cannot be separated. In the education field, learning does not just occur during periods of formal education, but throughout one's lifetime. Learning is social and comes largely from experience of participating in daily life; however, society is structured such that not all participants experience similar forms of participation.

All students entering a university will come from different backgrounds and experiences when embarking on their studies. Some will have come from private schools and others from government schools, some from urban areas and others from rural areas. The one thing that they will have in common is that they have already attained a certain level of cognitive development. However, many students do not do well academically during their first year since they are confronted with language issues, time pressures and under-preparedness (Woods & Marsh, 2007). Woods et al. (2007) firstly explain that the language issues arise out of poor primary and secondary schooling; secondly, time pressures relate to university timeframes that do not allow students to work at their own pace; and thirdly, under-preparedness is a result of disadvantaged institutions which are under-resourced and lack the infrastructure to adequately cater for students' needs, for example, inadequate computer access.

2.5.1 Situating the student: higher order and critical thinking skills

According to Frith, Jaftha and Prince (2004), many under-prepared students entering their first year at a university have the potential to do well but do not possess the relevant thinking skills required for certain courses. It is important to realise that although university students are participating in a tertiary education they are more than likely unable to think critically. In a study conducted by the Rural Education Access Programme (REAP, 2008:45) whose mission is to provide Higher Education opportunities for marginalised rural youth, "students spoke of being 'spoon fed' by their teachers at school, which had militated against them acquiring certain skills", thus making their transition to higher education more difficult. The National Diploma: Information Technology requires students to operate at different levels of cognition, from lower to higher order thinking. In many cases these students may have been accepted only because of their ability to memorise specific study content or formulae. This may have assisted them in school tests and exams but in a university setting it is imperative that the students achieve understanding on a higher level. Memorisation can be seen as a lower order activity which can be identified as "any operational task

requiring more than a mechanistic activity, needing almost no cognitive engagement, problem solving or decision making" (Stoney & Oliver, 1999:3). An important aspect of developing higher order thinking skills is "the ability to reflect on the learning experience and incorporate new knowledge with pre-existing knowledge" (Stoney & Oliver, 1999:4). Critical thinking can be described as a process in which a problem is given to students which they then have to solve through a series of steps that allows them to develop the appropriate skills (Nuhfer & Pavelich, 2002:1).

Computer Programming is the main attraction for students choosing the National Diploma Information Technology. As discussed in Chapter 1, there are two streams that students can select when doing their diploma, the most popular stream being Software Development. However, it is a requirement that students obtain a final mark of 60% in their first year subject Development Software 1 (*Java* Programming Language) and also that they pass their major subject of Information Systems 1 in order to continue with the stream. Generally the trend is that students who fail the major subject of Information Systems 1 also fail the programming subject Development Software 1. This could be because the mastery of computer programming skills is not easily acquired.

Programming a computer involves writing instructions that enable a computer to perform a single task or a group of tasks. To write these instructions, a computer programming language must be used (Farrell, 2001:2). Computer programming is a process of problem-solving, coding of the programming language and implementation of the programme solution. It requires that the learners understand the problem statement, and are able to apply and adapt the knowledge learnt to solving that problem using a computer language. Learning a computer programming language requires that the programmer learn both the syntax and the vocabulary of the language, as well as having the ability to think critically and creatively in order to be able to solve the problem (Quevauvilliers, 2003).

There are many reports of high failure rates in programming courses at several academic institutions in South Africa, with the University of KwaZulu Natal having a failure rate as high as 50% (Naidoo & Ranjeeth, 2007:1). In the study conducted by REAP (2008:45), lecturers blamed a poor schooling system for what they perceived as the poor quality of students entering higher education. The lecturers contended that "students lacked foundational competencies in literacy and numeracy, let alone higher order cognitive competencies, and that this was an endemic problem".

2.5.2 Situating the student: socio-economic status

A student's social background is one of the major reasons for educational inequality. Socio-economic status refers to a person's overall social situation with regards to family life, income, occupation, and educational background. Universities have an increasing number of diverse students entering the system, with many experiencing a range of complex 'disadvantaging' factors. In the study conducted by REAP (2008:20,21) the five key elements of disadvantage were identified as:

- Geography (specifically, students from rural areas)
- Financial resources (which often goes hand-in-hand with geographic disadvantage)
- Schooling (where students have often attended under-resourced, low performance schools)
- Language (where the language of tuition in the higher education institution may be a second or even a third language for the student)
- Other socio-cultural factors which may prevent students from being adequately prepared for, and able to participate effectively in tertiary studies.

In several studies conducted across the world, it is clear that children from low socio-economic status families exhibit educational patterns of 1) having lower levels of literacy, numeracy and comprehension; 2) having lower retention rates; 3) having lower higher education participation rates; 3) exhibiting higher levels of problematic school behaviour; 4) being less likely to study specialized maths and science subjects; 5) being more likely to have difficulties with their studies and display negative attitudes to school; and 6) having less successful school-to-labour market transitions (Considine & Zappalá, 2002:92).

Thus, private schools are more likely to have a greater number of students from high socio-economic status families who possess stronger academic abilities and have greater financial resources, as opposed to poorer government schools which would have a greater number of students from low socio-economic status families with weaker academic abilities and meagre financial resources. Even though South Africa is classified as a middle-income country, a large proportion of the population live in poverty, with only 40% of children living in households with income levels higher than a minimum acceptable level (Potterton, 2008). The level of poverty in South Africa is closely related to the high unemployment rate.

Several studies conducted in South Africa have shown that there is a positive relationship between a student's socio-economic status and his or her academic performance (Fleisch, 2007). 42% of the students studying the National Diploma: Information Technology at the University of Johannesburg have indicated that they come from rural areas and more than 30% have identified their economic status as below middle class (see Chapter 4). According to Evans (2004) in Okafor (2007:11) "lower income children have less stable families, greater exposure to environmental toxins and violence, and more limited extra-familial social support networks". A REAP student advisor explained a disadvantaged home life as one where (1) students come from a home where there is no electricity and they have to study by candlelight; (2)

students have to work after school by fetching water for the family and doing other chores like washing dishes, which impacts on the students study time; (3) students worry about their parent's health and lack of finances (REAP, 2008). Disadvantaged students are thus more likely to experience a profound number of problems and challenges in their first year of study, which will have a direct impact on their academic achievement.

2.5.3 Situating the student: limited English proficiency

South Africa is a multilingual society with 11 official languages. English and Afrikaans remain the languages of learning in English medium and Afrikaans medium schools, respectively, much the same as they were pre-1994. African languages are used through to fourth grade in black schools, after which English takes over as the language of instruction (Kamwangamalu, 2000:1). The diversity of languages is reflected in the student population at the University of Johannesburg, specifically for the first year students studying the National Diploma: Information Technology, of which only 6.3% of the students home language is English, 2.3% Afrikaans, 12% foreign languages and the other 79.4% speaking an African language (see Chapter 4). As the language of instruction at the University of Johannesburg is English, the majority of the students studying ICTs are learning in their second or even third language.

In a study by Leibowitz, it emerged that for African and Afrikaans speaking students, mastering of the English language was of the utmost importance, as the consequences of not doing so, were frequently attributed to the inadequacy of English instruction in schools. Many of the students studying at the tertiary institution where the study was conducted said that they struggled to understand lectures in their first year of study, with some even blaming their academic problems in their third year of study on their limited English proficiency (Leibowitz, 2004:46).

Research has shown that whilst the language-medium factor cannot be isolated as the main reason for students failing, in the mind of most educators; it is one of the most important factors (Council on Higher Education, 2001). Thus, language and academic success are closely related and academic language proficiency is far more difficult to acquire in a second language. It is therefore doubtful that students whose first and sometimes even second language is not English, can take full advantage of the educational opportunities available at a tertiary level.

2.6 Summary

One of the most difficult challenges associated with the digital divide is that of finding funding for projects. The South African Government, as well as private organizations, realize the importance of bridging the digital divide in South Africa and, as discussed, have many initiatives in place to provide access to technology in townships and rural areas. However, while the problem of obtaining physical access to hardware and software is being addressed, it is not an end in itself. Without the skills and understanding to make use of the technology it is of little or no benefit to anyone.

According to Tiene (2004:89), “addressing the digital divide in schools throughout the developing parts of the world is a huge challenge”. These challenges include, amongst others, insufficient financial support, poor infrastructure and lack of experienced teachers. Although there is much being done to address these challenges, as Wilson-Strydom, Thomson and Hodgkinson-Williams stress, “integration of ICT into teaching and learning has risen on the South African education agenda, particularly with the release of the White Paper on e-Education in 2003” (2005:72), there is still a long way to go before all South African scholars will be computer literate after completing Grade 12.

The current reality is that students studying ICTs at university come from very different backgrounds. Some of them have had no exposure to computers and are not

computer literate while others have had previous exposure and are computer literate when starting their first year of study. The digital literacy level on which all students enter university is thus different, as a result of their learning competence, socio economic status and their previous exposure to ICTs, which for the previously disadvantaged students is of particular concern (Barraket, Payne, Scott and Cameron, 2000:37).

In the next chapter the methodology used in this research project is discussed.

CHAPTER 3: RESEARCH DESIGN

3.1 Introduction

As the aim of this study is to determine the role of existing levels of digital literacy in the academic performance of students who are enrolled for the National Diploma Information Technology at the University of Johannesburg. Questionnaires were used to gather the students' background information, level of computer literacy and their understanding of basic computer concepts. A focus group interview was also conducted. The data collected were in relation to the students final marks for the subject Information Systems 1 Module A (Computer Concepts), to determine whether students who were technologically advantaged before embarking on their studies performed better than those who were technologically disadvantaged.

In this chapter, the mixed method research approach that was used in this study is justified, followed by an elucidation of the research design. Then, the data collection techniques and data analysis techniques are described. Finally, the issues related to reliability and validity, as well as ethical issues, are discussed.

3.2 Research design: mixed method data paradigm

In this study, I used both quantitative and qualitative data to illuminate the factors related to digital literacy that may have influenced the students' likelihood to succeed in the Information Technology modules. This type of research is often referred to as 'mixed methods research:

> A mixed method approach employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both numeric information as well as

text information so that the final database represents both quantitative and qualitative information (Creswell, 2003:18).

In the past there were many debates over whether quantitative research was a more reliable method to use over qualitative research (Thomas, 2003). However, Strauss and Corbin argue that "both qualitative and quantitative methods can be used effectively in the same research project" (1990:18). The issue seems to be not whether one method is better than the other, but rather which method answers the research question. Thomas is convinced that "each research method is suited to answering certain types of questions but not appropriate to answering other types" (2003:7), therefore, it seems that the best answer frequently results from using a combination of qualitative and quantitative methods.

In my study I found that the statistical information from the quantitative data was useful in revealing general group trends but failed to convey the respondents' thoughts and feelings on particular topics. For this reason I also held a focus group interview. Therefore, the data collected for this study involved gathering both numeric data from surveys as well as text data from focus group interviews, so that the final dataset represented both quantitative and qualitative information.

Figure 3.1 illustrates the research method of this study

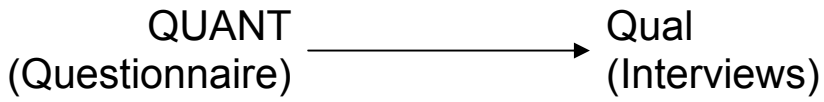


Figure 3.1: Research method for the integration of qualitative and quantitative research (*Source:* Adapted from Johnson & Onwuegbuzie, 2004:22).

According to Johnson and Onwuegbuzie (2004:20), in order to construct a mixed method, the researcher must make two primary decisions: a) whether one wants to operate largely within one dominant paradigm and b) whether one wants to conduct the phases concurrently or sequentially. Figure 3.1 shows that, in this study, the quantitative method is the more dominant method (denoted by using capital letters) than the qualitative method (denoted by using lower case letters). Figure 3.1 also shows that the survey was conducted first, followed by the qualitative focus group interview.

According to Henning, "if surveys are the dominant method of data gathering in this study and if statistical analysis is the main way of working with the data, the design type or genre would most likely just be a survey study" (2004:34). As the main data collection technique in this study was one of questionnaires, the overall design is one of a survey. According to Fink (2006:1), surveys can be defined as "information collection methods used to describe, compare, or explain individual and societal knowledge, feelings, values, preferences, and behavior." Surveys can be divided into two broad categories: the questionnaire and the interview (Trochim, 2006).

3.3 Data collection techniques

There are many different techniques that can be used to collect data; the method used will ultimately be determined by the research design. It can be surmised that all data starts out as words. In qualitative research the original words would be coded to identify themes, ideas and categories and in quantitative research the words communicated would be transformed into numbers (Blaikie, 2003). The two methods of data collection in this study were questionnaires and interviews.

3.3.1 Questionnaire

Questionnaires are used as data collection tools for many types of research, including fact-finding questionnaires which "are used to determine peoples opinions, perceptions

and attitudes, to identify interests and experiences, to conduct needs assessment and so on" (Thomas, 2004:1). The function of a questionnaire is measurement. The researcher therefore, needs to determine what the broad aim of the questionnaire is. For the purpose of this study a structured non-anonymous questionnaire (Annexure B) was compiled to gather the necessary data, to determine whether previous exposure to ICTs (digital literacy) influences students' academic performance.

The questionnaire consisted of three sections:

1) Biographical information

2) Exploring the students' accessibility or non accessibility to computer technology before commencing their studies at the University of Johannesburg

3) Measuring of the students' current understanding of computer and other electronic media concepts. (Note: Questions were geared towards establishing digital literacy as it is today).

Table 3.1 shows the types of questions used in the survey.

Table 3.1: Types of questions used in the survey

Type of Question	*Description*	*Example*
Dichotomous Questions	Students were given a choice between two variables only, for example 'yes' or 'no' (Bryman, 2004).	Before registering for this course had you used a computer before?
Selected Responses	This type of questioning is appropriate for factual questions (Gillham, 2000). Simple selected responses were given when asking students to give basic information about themselves.	Was the school that you matriculated from: 1) Private, 2) Model C, 3) Government or 4) Other
Multiple-Choice Questions	In order to determine the students' basic understanding of computer concepts before starting their IT studies, a series of multiple choice questions were asked with only one answer being the correct one.	Which one of the following types of storage media is becoming obsolete? 1) USB Flash Drive, 2) Floppy Disk, 3) CD, 4) DVD
Open Questions	Open questions have no definitive response (Gray, 2004:194). Two main open questions were asked to get more information regarding a specific aspect.	Why did you choose to study a diploma in Information Technology?
Rating Scales	Several questions were written for each objective in a way that these responses could be summed (Thomas, 2004). In order to determine how often a student used technology, a scale of 'once a day or more' to 'never' was asked. In order to determine how skilled the student was in a particular form of technology, a scale of 'never used' to 'very skilled' was asked.	How often do you use the web to keep your own blog or vlog? 1) Once a day or more, 2) Once/twice a week, 3) Once/twice a month, 4) Once/twice a year, 5) Never

Due to the size of the sample group the majority of questions incorporated were either dichotomous, selected responses, or rating scale questions, helping the students to respond with ease as well as making it easier to analyse the data collected.

The questionnaires were handed out to the first-year students on their first day of class and were collected in three class sessions (one per group). I also incorporated the services of *Statkon* (Statistical Consultation Services) at the University of Johannesburg to assist me. *Statkon* helped in the formulation of the questions for the questionnaire design, and also captured the data for analysis as well as providing assistance with regard to the interpretation of the statistical results in the form of graphs and tables which can be seen in Chapter 4.

3.3.2 Focus group interviews

The use of interviews is one of the most common ways of collecting data in qualitative research. Interviews can be defined as "the process of gathering information by asking people questions, either face-to-face or through a medium such as a telephone or e-mail link" (Buckingham & Saunders, 2004).

After data had been collected and analysed from the questionnaires, I held one focus group interview with 7 of the students who had participated in the survey. Focus groups are structured small group interviews. The group was focused in two ways. Firstly, the students that I interviewed had failed the subject Information Systems 1 A module and had indicated in the survey that they had no previous exposure to computers before embarking on their studies. Secondly, the aim of the interview was to gather information about the students' experience of the module, and possibly to identify to what extent their levels of digital literacy, in their view, may have affected their chances of success in the module.

The purpose of the interview was explained to the students beforehand and they were asked to keep an open-mind and be honest in their answering of the questions. A general question was asked at the beginning of the interview and as participants began to feel more comfortable and started sharing their experiences, several other questions were asked. The researcher ensured that all participants had a chance to voice their opinions and remained objective throughout the whole process. The emphasis in the interview was on insights, perceptions, views and opinions.

After the interview, notes were reviewed and written down. The interview was audio and video taped, a transcript of which is attached as Annex C. The interpretation of the interview is discussed in detail in Chapter 4.

3.4 Population

In accordance with Thomas (2003), who notes that the overwhelming majority of research studies are conducted on convenience or available samples, data for this research was drawn from a population of 175 first-year students enrolled for the National Diploma Information Technology at the University of Johannesburg for the year 2008.

3.5 Data analysis

Ultimately, all data needs to be broken up into manageable themes, patterns, trends and relationships:

> The aim of analysis is to understand the various constitutive elements of one's data through an inspection of the relationships between concepts, constructs or variables and to see whether there are any patterns or trends that can be identified or isolated, or to establish themes in the data (Mouton, 2001:108).

3.5.1 Quantitative analysis

Quantitative data can be analyzed using various methods. In this study t-tests, histograms, cross tabs, Pearson correlations and Mann-Whitney U tests were used. Table 3.2 shows the different methods used to analyse the data from the surveys.

Table 3.2: Methods used to analyse quantitative data

Method	*Description*	*Example*
t-test	This test is probably the most commonly used statistical data analysis procedure for hypothesis testing. The t-test can be defined as a test for comparing one set of data with another, by comparing two means to see if they are significantly different (Vockel, 1983).	A t-test was used to compare whether the majority of students who are male performed better than those who are female.
Histograms	These are commonly used in statistics to demonstrate how many of a certain type of variable occur within a specific range (Antonius, 2003). Histograms show the data in a bar graph format where the frequency of the data is represented by the height of the bars.	A histogram was used to show students' final marks.
Cross Tabulation (often abbreviated as 'cross tab')	"Cross tabs illustrate the number and percentage of occurrences in the sample of each value of one variable simultaneously with each value of the other variable" (Nardi, 2006:54). Cross tabs show the data in a table format and tend to be easy to understand.	A cross tabulation was used to show that students who had Computer Science as a Grade 12 subject performed better than those who did not.
Pearson Correlation	The Pearson product-moment correlation coefficient is a measure of the strength of the linear relationship between two variables (Antonius, 2003).	The Pearson Correlation Coefficient was used to measure whether those students who had a better understanding of basic computer concepts before studying the diploma course performed better in their Information Systems 1 A module.

Mann-Whitney U Test	The Mann-Whitney U Test compares two independent groups when the t test cannot be used, e.g. if the sample is too small. This statistical method tests the equality of the medians (Fink, 2006:72).	The Mann-Whitney Test was used to determine whether students who went to private or model C schools performed better than students who went to government schools.

All quantitative data was analysed with SPSS (Statistical Package for Social Sciences). SPSS produces tables, charts and numerical statistical measures, which must then be interpreted. The majority of data reported on in Chapter 4 included either independent (one variable) or dependent (two variables). According to Antonius (2003:10) "a variable is a characteristic or quality that is observed, measured, and recorded in a data file". Data was grouped into categories, together with the corresponding frequencies and presented as a table. The researcher then extracted the data from the frequency tables and created column charts to graphically represent the data. Each column represented a percentage and corresponded with one category of a variable, for example, gender. Where more than one variable needed to be analysed, t-tests or Mann-Whitney U tests were used to represent the data.

3.5.2 Qualitative analysis

Coding was used to analyse data collected from the focus group interview. According to Flick "coding is the procedure for analyzing data, which have been collected in order to develop a grounded theory. Coding here is understood as representing the operations by which data are broken down, conceptualized and put back together in new ways" (2006:296). The data collected from the focus group interview was transcribed verbatim and typed up into a *Word* document. Open coding was then carried out, which according to Henning (2004:131) "refers to naming and categorizing phenomena through close examination of the data." Keeping the research question in mind, the data was manually analysed sentence-by-sentence in order to determine whether there were similarities or patterns to help interpret the data. The transcription was typed in double line spacing with wide margins which were used to make notes. Similar words and

statements were highlighted in a specific colour and those words and statements were then labeled collectively. Once comparisons were made they were grouped and categorised.

Data collected from both the questionnaires and focus group interview were grouped and themes were created to:

- assess the digital literacy of students who enrolled for the qualification
- match and compare the digital literacy of students with their academic performance in their first year
- explore the role of previous digital literacy on the academic performance of students.

3.6 Triangulation, reliability and validity of the research

Triangulation involves the use of different methods to research the same issue with the same unit of analysis (in this case, the first-year students) and then a cross checking of one result against the other. Patton advocates the use of triangulation as it strengthens the study through its combination of various methods, which may include quantitative and qualitative approaches (2001:247).

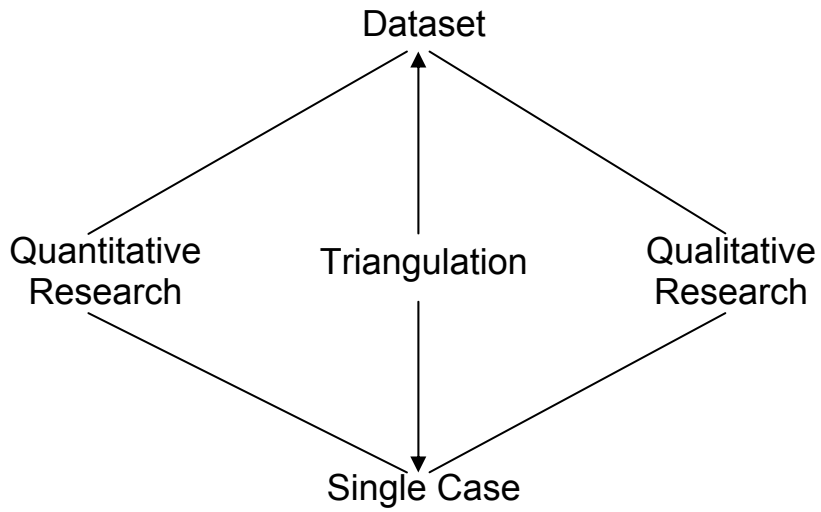


Figure 3.2: Levels of triangulation of quantitative and qualitative research (*Source*: Flick, 2006:37)

Figure 3.2 shows the levels of triangulation of the mixed methods approach used in this study, whereby both the quantitative and qualitative research methods operated side-by-side with the focus on the single case, meaning that the same people were involved in both parts of the study. 175 Students participated in the initial survey, from whom 7 were selected for the focus group interview. This decision was based on which students 1) had indicated that they had no previous exposure to computers before embarking on their studies and 2) had failed the subject Information Systems 1 Module A. The data set consisted of the data collected from the questionnaires, as well as the data collected from the focus group interview, then both were analysed and compared.

The data collected from the focus group interview was not used as a measurement of reliability or validity but rather was used to illuminate the data already collected from the questionnaires as a means to strengthen the study. Therefore the reliability and validity issues discussed in the next section refer to the survey only.

3.6.1 Reliability

Reliability is concerned with the accuracy of the actual measuring instrument or procedure; it is "the extent to which an experiment, test, or any measuring procedure yields the same result on repeated trials" (Colorado State University, n.d). Vockel (1983:29-31) identifies several ways in which to increase reliability:

- Use technically correct, unambiguous items: the survey was checked by both myself and a professor at *Statkon* to eliminate errors before being handed out to the students

- Standardise the administration procedures: the survey was conducted during three class settings (one for each group of students). Each class was given the same set of instructions and the same amount of time to complete the survey

- Standardise the scoring procedures: open-ended questions were kept to a minimum and all other questions were standardized

- Being alert for respondent irregularities: the students completed the questionnaire on their very first day of lectures; they were all excited to be starting classes and were enthusiastic about their studies. Very few students knew one another and so did not talk to each other during the process

- Make the test long enough to include a good sample of items: the survey consisted of three sections with various questions under each section

- Be certain that each item on the test measures the same outcome or set of outcomes: The researcher is confident that she included enough questions for every outcome that she was trying to measure

- Construct items of an appropriate level of difficulty: the first two sections of the survey consisted of questions that did not have a right or wrong answer but rather consisted of questions asked to obtain biographical information and use of technology. The questions set out for the third section of the survey consisted of multiple choice questions of which there was only one correct answer. These questions were adapted from the students' first year text book for Information Systems 1 and so were directed at an appropriate level.

Students were informed that their participation was voluntary and that the results would be used for research purposes only; they were urged to answer all questions as honestly as possible. The researcher endeavored to ensure that the measuring instrument was as reliable as possible.

3.6.2 Validity

Validity refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher set out to measure. According to Fink (2006:40), in order to help strengthen validity, one should make sure that all relevant topics have been included in the survey. This is referred to as 'content validity', which according to Vockel (1983:56) can be defined as "the extent to which a test measures a representative sample of the subject matter or the behavioral changes under consideration." The researcher, when designing the questionnaire, kept the research question in mind at all times, ensuring that all questions asked were relevant and would measure what they were designed to measure.

3.7 Ethical issues

Those who participated in the study did so willingly. They were required to complete consent forms in which their rights were spelled out, as well as what was expected from them during the research process, e.g. completing questionnaires or being interviewed (Annexure A). It could therefore be said that participants gave informed consent. They were told that they had the right to withdraw from participating in the research at any time, without penalty in any form.

All results emanating from the research were made available for scrutiny by participants and the institution before their publication. All data and artefacts that resulted from the research were to be archived either electronically or in the form in which they were generated, and would be available for a period of time in line with University requirements.

In all cases, utmost care was taken to ensure that data was collected in a responsible way, and that data was recorded as accurately as possible. During the focus group interview, a video camera and tape recorder was used. During the data analysis part of the research, the researcher attempted to use measures that ensured the integrity of the analysis by being informed of the appropriate data analysis techniques, and by employing measures of trustworthiness.

3.8 Summary

This study aims to assess whether there is a relationship between digital literacy and the performance of first-year students studying IT. The study incorporated both a group of students with previous exposure to ICTs, as well as a group without exposure. Both quantitative and qualitative research methodologies are incorporated in the study. The questionnaires and focus group interview are aimed at establishing whether students who had exposure to ICTs at school level performed better in their studies than students

who did not. The study also tried to determine what the impact of non-exposure to ICTs was on students or whether it had any influence at all. Students enrolled for the National Diploma: Information Technology at the University of Johannesburg in 2008 were targeted.

The findings of the research are discussed in Chapter 4.

CHAPTER 4: RESULTS AND FINDINGS

4.1 Introduction

In this Chapter, the data that were collected are reported and analysed. The data were collected from a sample of 175 first year students studying the National Diploma: Information Technology by means of questionnaires and a focus group interview. Using the analysis techniques discussed in Chapter 3, data is explored and grouped and presented in categories of students' levels of digital literacy and levels of academic performance.

4.2 Background information

Students studying the National Diploma: Information Technology at the University of Johannesburg do the major subjects of: (1) Information Systems 1: Module A (Introductory Computer Concepts plus *Microsoft Word* and *Excel*) and Module B (Systems Analysis and Design plus *Microsoft Access* and *Powerpoint*); (2) Development Software 1 (using the programming language *Java*), and (3) Systems Software 1. The minor subjects are Accountancy, IT Skills Module A (Communication), IT Skills Module B (Entrepreneurship) and IT Skills Module C (Law).

In the Department of Business Information Technology at the University of Johannesburg, lecturers are adopting technology tools to present authentic work-related problem situations to learners as a means to situate their learning, thereby linking their theory to practice. Table 4.1 below illuminates the practical applications used in specific subject content in the National Diploma: Information Technology.

Table 4.1: Practical applications used in specific subject content in the National Diploma: Information Technology. (Note: All of the subjects mentioned also have a theoretical component.)

Subject	Technology Tool	**Computer Lab Time**
Information Systems 1 Module A (Computer Concepts)	World Wide Web Graphic and Multimedia Software *Microsoft Office*: (*Word, Excel*, *Access* and *PowerPoint*)	2 Hours (Chapter 2 - Internet Only) 2 Hours (Chapter 3 - Application Software Only) 2 Hours per week (first year of study)
Systems Software 1	Hardware and Software: Students learn how to ▪ install hardware ▪ install software applications ▪ install operating systems ▪ set up and control a peer to peer network.	1 Hour per week (first year of study)
Development Software 1	*Java* and C++	2 Hours per week (first year of study)
Information Systems 2 (Databases)	*Sequel* (Database)	1 Hour per week (second year of study)
Development Software 2 Development Software 3	*Visual Basic.Net* and *ASP.Net*	2 Hours per week (second and third year of study)
Technical Programming 1 Technical Programming 2	*Java* (Programming Language)	2 Hours per week (second and third year of study)
Web Design	World Wide Web: Students learn how to ▪ design a web page on the Internet	1 Hour per week (second and third year of study)

Communication Networks 2	Hardware and Software: Students learn how to ▪ design and implement small and medium networks	2 Hours per week (second year of study)
Communication Networks 3	Hardware and Software: Students learn how to ▪ install and configure processes and procedures for the Linux operating system ▪ setup and configure the network on a Linux system ▪ design and configure a hybrid network between Windows and Linux, using SAMBA ▪ demonstrate troubleshooting procedures on Linux networks	2 Hours per week (third year of study)
Graphical User Interface	Software Packages: ▪ Microsoft Expression Web ▪ Adobe Dreamweaver ▪ Adobe Fireworks ▪ gimp (open source software)	2 Hours per week (second year of study)

In my encounters as a lecturer at the University of Johannesburg, I have observed over the years that many of the students studying the National Diploma: Information Technology had not used a computer before embarking on their studies. Most of these students are introduced to computers for the first time at university. In the three years that I have been lecturing Information Systems 1 Module A (Computer Concepts), which is a pre-requisite to continue with Module B (Systems Analysis and Design), the failure rate of first year students averages 25%, as shown in Table 4.2 below.

Table 4.2: Failure rate of first year students studying the subject Information Systems 1 Module A

Year	No. of Students Registered	No. of Students who Passed	No. of Students who Failed	Percentage of Students who Failed
2005	266	203	63	24%
2006	277	197	80	29%
2007	202	159	43	21%

This low success rate is of concern, as Information Systems 1 is the 'gatekeeper' to continuing studies in the Diploma. Students who fail Information Systems 1 are not permitted to continue into their second year of study. This partially gives impetus to the necessity of this study: finding the causes for the failure of students may give direction to finding ways to address the problems that they may encounter.

4.3 Analysis of questionnaires

A structured non-anonymous questionnaire (see Appendix B) was compiled to gather the necessary data to determine whether previous exposure to ICTs influence students' academic performance (see Appendix D).

The questionnaire consisted of three sections:

1. Biographical information

2. Computer Literacy Level

3. Understanding of Computer Concepts

Annex D shows the first year students results for the subject Information Systems 1 Module A (computer concepts). These results consist of a year mark (counting 50%)

combined with an exam mark (counting 50%), totaling a final mark out of 100. It is important to note that students who did not get a year mark of 40% were not admitted to write the exam and as a result they were awarded 0 for their exam mark, resulting in some final marks appearing to be extremely low. The results for the sample group of 175 students were then extracted and are shown in Figure 4.1 and Table 4.3.

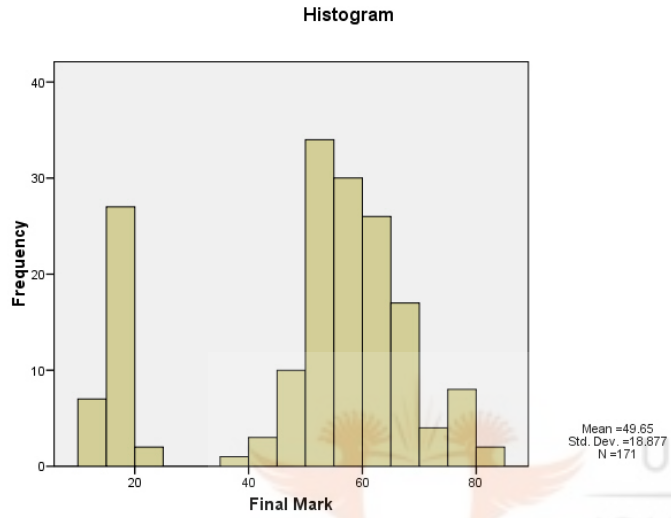


Figure 4.1: Distribution of final marks in the Information Systems 1 Module A Exam written in 2008

Table 4.3: Final symbol

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	2	1.1	1.2	1.2
	B	12	6.9	7.0	8.2
	C	43	24.6	25.1	33.3
	D	64	36.6	37.4	70.8
	E	13	7.4	7.6	78.4
	F	37	21.1	21.6	100.0
	Total	171	97.7	100.0	
Missing	System	4	2.3		
Total		175	100.0		

Four students did not have any results, giving a total 171 students.

4.3.1 Analysis of biographical information

In order to compare groups of students, background information relating to them was collected.

4.3.1.1 Gender

The sample reflected a male dominance, with 58% of students being male and 42% female. The difference in performance in Information Systems 1 A between the males (N = 99, M = 53.67%, SD = 16.69) and the females (N = 72, M = 44.14%, SD = 20.37) was statistically significant [t (df) 134 = 3.25, p = .001]. This result shows that the male students performed better in Information Systems 1 A than their female counterparts.

Table 4.4: T-Test of final marks between male and female students

Group Statistics					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Final Mark	Male	99	53.67	16.694	1.678
	Female	72	44.14	20.378	2.402

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Final Mark	Equal variances assumed	13.998	.000	3.356	169	.001	9.528	2.839	3.923	15.133
	Equal variances not assumed			3.252	134.083	.001	9.528	2.930	3.734	15.322

4.3.1.2 Ethnicity

The ethnicity of the sample as illustrated in Figure 4.2 represents more or less the population demographics of the University of Johannesburg Bunting Road Campus, with the majority of the students' being black (N = 164) and the minority being white (N = 3). Due to insufficient numbers, no statistical analyses were made of these variables.

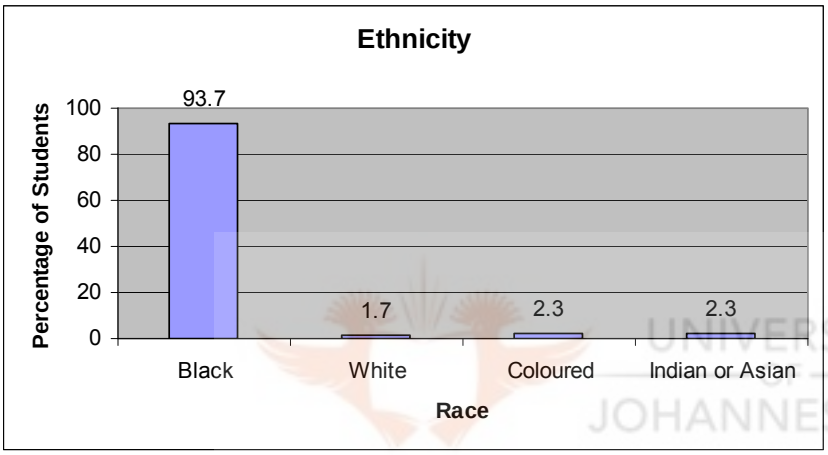


Figure 4.2: Ethnicity

4.3.1.3 Rural vs Urban

The majority of students indicated that they grew up in an urban area. The difference in performance in Information Systems 1 A between students from an urban area (N = 98, M = 54.07%, SD = 17.11) and students from a rural area (N = 73, M = 43.73%, SD = 19.60) was large and statistically significant [t (df) 143 = 3.600, $p < 0.001$]. This result shows that students who come from urban areas performed significantly better in Information Systems 1 A than those who come from rural areas.

Table 4.5: T-Test of final marks between urban and rural area students

Group Statistics

	How would you describe the area in which you grew up?	N	Mean	Std. Deviation	Std. Error Mean
Final Mark	Urban	98	54.07	17.118	1.729
	Rural	73	43.73	19.607	2.295

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	Std. Error Differ-ence	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Final Mark	Equal variances assumed	9.976	.002	3.673	169	.000	10.345	2.817	4.785	15.906
	Equal variances not assumed			3.600	142.800	.000	10.345	2.873	4.666	16.025

4.3.1.4 Home language of students

Figure 4.3 indicates that the majority of the first year students' home language was either Zulu, Sotho or Tswana, with only 6.3% of students being English, which is the language of instruction at the University of Johannesburg.

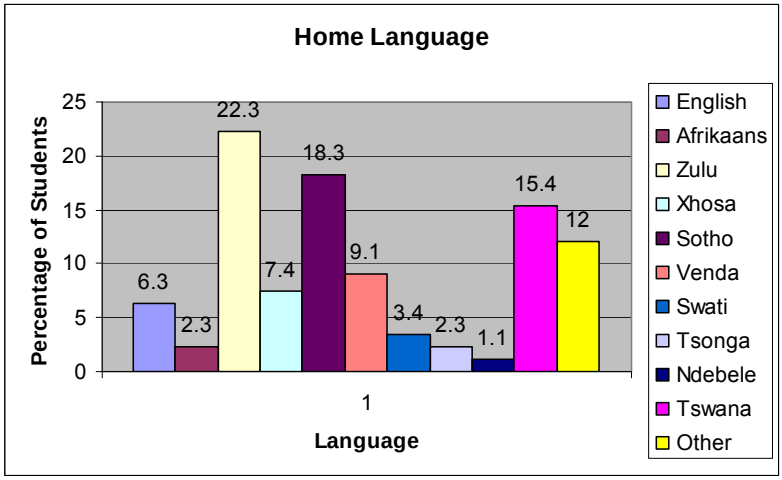


Figure 4.3: Home language

4.3.1.5 Province in which students matriculated

Figure 4.4 shows that the majority of the students came from the Gauteng region.

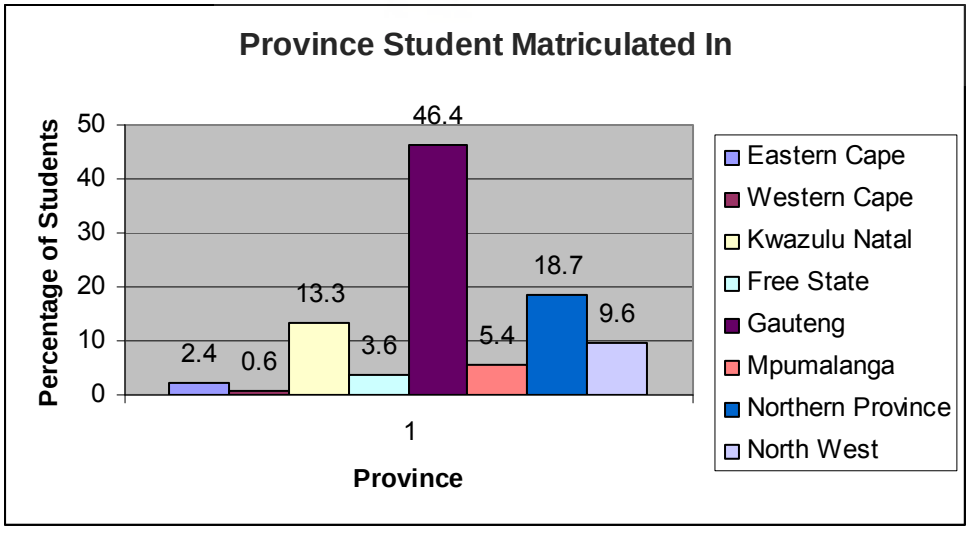


Figure 4.4: Province in which student matriculated

4.3.1.6 Type of high school attended

Table 4.6 indicates that the majority of students attended Government schools (N = 129) with only a small number attending either Private or Model C schools (N = 38). For the purposes of analysis, Private and Model C schools were grouped together. The difference in performance in Information Systems 1 A for students from Private and Model C schools (M = 50.21%, SD = 17.73) and students from Government schools (M = 49.48%, SD = 19.17) was small and statistically non-significant [Mann-Whitney U = 2437.50, z = -0.5, p = .959].

Table 4.6: Mann-Whitney U test of final marks between private or model C schools and government schools

Group Statistics

	Was the school that you matriculated from...?	N	Mean	Std. Deviation	Std. Error Mean
Final Mark	Private or Model C	38	50.21	17.734	2.877
	Government	129	49.48	19.173	1.688

Ranks

	Was the school that you matriculated from...?	N	Mean Rank	Sum of Ranks
Final Mark	Private or Model C	38	83.64	3178.50
	Government	129	84.10	10849.50
	Total	167		

Test Statistics(a)

	Final Mark
Mann-Whitney U	2437.500
Wilcoxon W	3178.500
Z	-.052
Asymp. Sig. (2-tailed)	.959

a Grouping Variable: Was the school that you matriculated from...?

4.3.1.7 Computer Science (Grade 12) and final mark

Table 4.7 illustrates that those students who took Computer Science as a Grade 12 subject (N = 30) performed better in the final assessment than those who did not have Computer Science as a Grade 12 subject (N = 141).

Table 4.7: Cross tabulation of final marks between students with Computer Science as a Grade 12 subject and those who did not have Computer Science as a Grade 12 subject

			Pass or Fail		Total
			Pass	Fail	Pass
Did you take Computer Science as a Grade 12 subject?	Yes	Count	26	4	30
		% within Did you take Computer Science as a Grade 12 subject?	86.7%	13.3%	100.0%
	No	Count	95	46	141
		% within Did you take Computer Science as a Grade 12 subject?	67.4%	32.6%	100.0%
Total		Count	121	50	171
		% within Did you take Computer Science as a Grade 12 subject?	70.8%	29.2%	100.0%

4.3.1.8 Maths (Grade 12) and final mark

The researcher examined the relation of Grade 12 mathematics with the students' final mark for Information Systems 1 A. Results show a weak and non-significant relation [r (174) = 0.001, p = 0.99].

Table 4.8: Maths and final mark

Correlations

		M_Score_Maths	Final Mark
M_Score_Maths	Pearson Correlation	1	.001
	Sig. (2-tailed)		.990
	N	174	170
Final Mark	Pearson Correlation	.001	1
	Sig. (2-tailed)	.990	
	N	170	171

4.3.1.9 English (Grade 12) and final mark

The researcher examined the relation of Grade 12 English with the students' final mark for Information Systems 1 A. The results show a moderate, positive and statistically significant relation [r (175) = 0.359, p < 0.001], meaning that students who performed better in Grade 12 English also performed better in Information Systems 1 A.

Table 4.9: English and final mark

Correlations

		M_Score_English	Final Mark
M_Score_English	Pearson Correlation	1	.359(**)
	Sig. (2-tailed)		.000
	N	175	171
Final Mark	Pearson Correlation	.359(**)	1
	Sig. (2-tailed)	.000	
	N	171	171

** Correlation is significant at the 0.01 level (2-tailed).

4.3.2 Analysis of computer literacy level

This section of the questionnaire explored the students' accessibility or non-accessibility of computer technology before commencing their studies at the University of Johannesburg. The objective was to establish the students' level of computer literacy on the date of enrolment in January 2008.

4.3.2.1 Number of students with cell phones

Figure 4.5 confirms that the majority of students owned cell phones (N = 167). This figure correlates with the statistics discussed in Chapter 2, which reported that Africa has the highest ratio of mobile subscribers of any world continent.

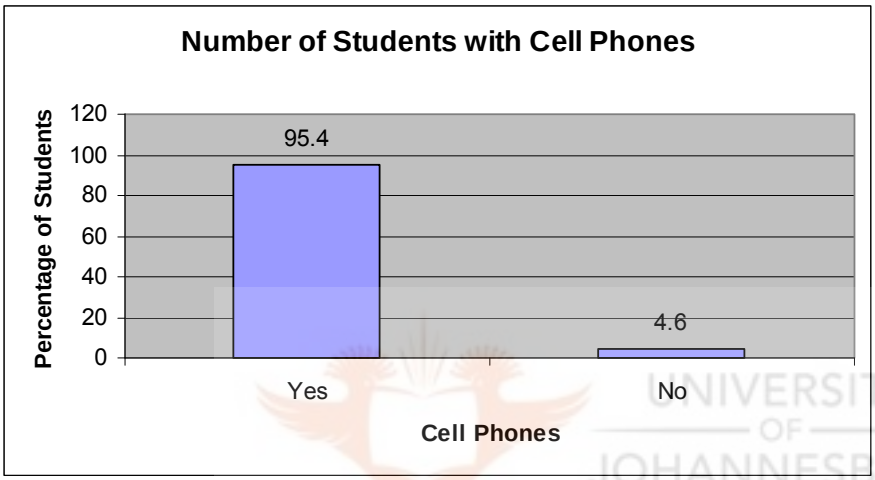


Figure 4.5: Number of students with cell phones

4.3.2.2 Cell phone usage

When students were asked whether they made use of certain features available on their cell phones, other than the most common features of phoning and texting, they answered as shown in Figure 4.6. This diagram illustrates that although a large number of students own cell phones, their use of it is limited to the PDA functions, video camera, MP3 player and Bluetooth.

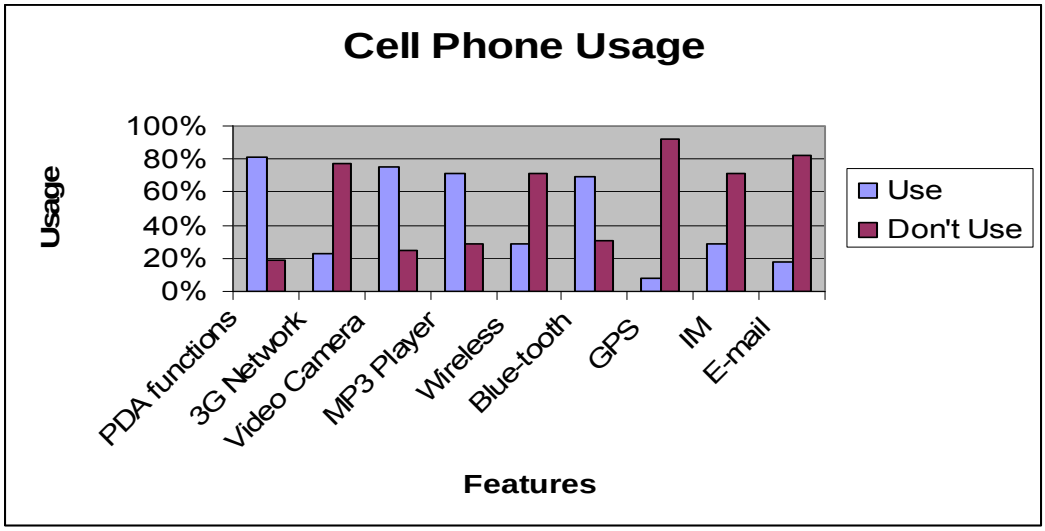


Figure 4.6: Mobile phone usage

4.3.2.3 Computer access before studying at the University

To determine whether previous exposure to computers or the lack thereof had an influence on the performance of the students, the Mann-Whitney U Test was used. 78.3% of students indicated that they had used a computer before embarking on their studies (N = 135) with 21.7% of students not having used a computer (N = 36). The difference in performance in Information Systems 1 A between students who had used computers before enrolling in the course (M = 52.87%, SD = 17.58) and students who had not used computers before enrolling in the course (M = 37.58%, SD = 18.90) was large and statistically significant (Mann-Whitney U = 1234.50, z = -4.53, p < 0.001]. This result shows that students, who had access to computers before enrolling, performed significantly better in Information Systems 1 A than students who had no previous access.

Table 4.10: Mann-Whitney U test of final marks between students with previous computer experience and those with no computer experience

Group Statistics

	Before registering for this course had you used a computer before?	N	Mean	Std. Deviation	Std. Error Mean
Final Mark	Yes	135	52.87	17.584	1.513
	No	36	37.58	18.900	3.150

Ranks

	Before registering for this course had you used a computer before?	N	Mean Rank	Sum of Ranks
Final Mark	Yes	135	94.86	12805.50
	No	36	52.79	1900.50
	Total	171		

Test Statistics(a)

	Final Mark
Mann-Whitney U	1234.500
Wilcoxon W	1900.500
Z	-4.533
Asymp. Sig. (2-tailed)	.000

a Grouping Variable: Before registering for this course had you used a computer before?

4.3.2.4 Computer access at home

Forty three percent of students indicated that they had a computer in the home in which they grew up. The difference in performance in Information Systems 1 A between students who had computer access at home (N = 74, M = 54.49%, SD = 15.76) and those who did not have computer access at home (N = 97, M = 45.97%, SD = 20.25) was statistically significant [t (169) = 3.092, p = .002]. This result shows that students who had computer access at home before enrolling for the course performed better in Information Systems 1 A than those who did not have computer access at home.

Table 4.11: T-Test of final marks between students who had a computer in the home while growing up and those who did not.

Group Statistics

	Did you have a computer at the home you grew up in?	N	Mean	Std. Deviation	Std. Error Mean
Final Mark	Yes	74	54.49	15.767	1.833
	No	97	45.97	20.255	2.057

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differ-ence	Std. Error Differ-ence	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Final Mark	Equal variances assumed	13.889	.000	2.991	169	.003	8.517	2.848	2.896	14.139
	Equal variances not assumed			3.092	168.921	.002	8.517	2.755	3.079	13.956

4.3.2.5 Students ownership of computers

When students were asked whether they currently (at the time) owned a computer, 42% responded in the affirmative. The difference in performance in Information Systems 1 A between the students who at the time owned a computer (N = 73, M = 54.90%, SD = 17.45) and those who did not own a computer (N = 97, M = 45.54%, SD = 19.01) was statistically significant [t (161) = 3.33, p = .001]. This result shows that students who at the time owned a computer performed better in Information Systems 1 A than those who did not own a computer.

Table 4.12: T-Test of final marks between students who currently (at the time) owned a computer and those who did not.

Group Statistics

	Do you presently own a computer?	N	Mean	Std. Deviation	Std. Error Mean
Final Mark	Yes	73	54.90	17.452	2.043
	No	97	45.54	19.019	1.931

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Final Mark	Equal variances assumed	4.049	.046	3.292	168	.001	9.368	2.845	3.751	14.985
	Equal variances not assumed			3.333	161.473	.001	9.368	2.811	3.817	14.919

4.3.2.6 How often and how skilled are students using technology and final mark

The students were asked to indicate how often they used technology and how skilled they were using the technology, through a series of questions, broken into categories of (1) computer usage (2) Internet usage (3) game playing and (4) mobile phone usage. The data reveals that the majority of students used computers to play games, and although the students did use some of the functions available on their cell phones, very few made use of the Internet. In fact, 72.76% of the students indicated that they had never used the Internet before. The researcher obtained a total score for frequency of technology use and skill in technology use by summing up responses to questions 33.1 to 33.43. Both total scores were reliable (Frequency, α = 0.93, Skill, α = 0.94).

Table 4.13: Reliability statistics – how often

Cronbach's Alpha	N of Items
.927	43

Table 4.14: Reliability statistics – how skilled

Cronbach's Alpha	N of Items
.941	43

The correlation between Frequency and Information Systems 1 A was moderately positive and statistically significant [r (171) = 0.327, p = 0.001]. Similarly, the correlation between Skill and Information Systems 1 A was moderately positive and statistically significant [r (171) = 0.363, p < 0.001].

Table 4.15: Correlation between frequency, skill and Information Systems 1 A

Correlations

		Often	Skilled	Final Mark
Often	Pearson Correlation	1	.919(**)	.327(**)
	Sig. (2-tailed)		.000	.000
	N	175	175	171
Skilled	Pearson Correlation	.919(**)	1	.363(**)
	Sig. (2-tailed)	.000		.000
	N	175	175	171
Final Mark	Pearson Correlation	.327(**)	.363(**)	1
	Sig. (2-tailed)	.000	.000	
	N	171	171	171

** Correlation is significant at the 0.01 level (2-tailed).

4.3.3 Analysis of students understanding of basic computer concepts

This section of the questionnaire measured the students understanding of basic computer concepts. Multiple Choice questions were divided into the following categories: The Internet, Application Software, Input, Output, Storage, Communication and Networks and Computer Security. The type of questions asked were for example, which of the following is not an input device? a) mouse; b) joystick; c) keyboard; d) speaker. The researcher examined the relationship between students' multiple choice results and their final marks for Information Systems 1 A [r (175) = 0.387, p = <0.001]. This result shows a moderate positive and statistically significant relation. Therefore, students who have a better understanding of basic computer concepts before embarking on their studies perform better in Information Systems 1 A than those who do not have a good understanding of basic computer concepts.

Table 4.16: Results of multiple choice questions measuring students' basic understanding of computer concepts and final mark

Correlations

		Test Score out of 14	Final Mark
Test Score out of 14	Pearson Correlation	1	.387(**)
	Sig. (2-tailed)		.000
	N	175	171
Final Mark	Pearson Correlation	.387(**)	1
	Sig. (2-tailed)	.000	
	N	171	171

** Correlation is significant at the 0.01 level (2-tailed).

4.4 Analysis of focus group interview

A focus group interview took place on 26 August 2008 at 1 pm to explore the experiences of the students studying the National Diploma: Information Technology. The 7 students participating in the focus group interview had (1) failed the subject

Information Systems 1 Module A (Basic Computer Concepts) and (2) indicated in the survey that they had no previous exposure to computers before embarking on their studies. The duration of the interview was 30 minutes. A pattern of repeated words as shown in Table 4.17 started to emerge.

Table 4.17: Words frequently repeated in the focus group interview

Course Challenging	No Computer	Too Fast
Not Easy	No Textbook	No Money
No Time	Course Difficult	Stressed
Time Spent Traveling	Too Tired	Home Late
Chores to do	No Electricity	Computers Stolen
Single Parent	Death in Family	I Thought

The words were then categorized into the themes shown in Table 4.18.

Table 4.18: Initial themes identified from the focus group interview

Challenged by not having a computer at home (1)	Too tired to study (12)
Feelings that the course was too fast-paced (2)	Difficulty with subjects that are not IT-related (13)
Thought that the course would be easy (3)	Lack of interest in non-computer subjects (14)
Lack of funding to buy the necessary text books (4)	Expected to do chores at home (15)
Uninformed about course content (5)	Can only practice on the computers when at the University (16)

Stressed about failing Information Systems 1 Module A (6)	Found the ND: IT to be challenging and difficult (17)
Spending a lot of time traveling to get to and from University (7)	Perception that computers were only for the wealthy (18)
Feel like a financial burden on family (8)	Did the course to impress families (19)
No time to study (9)	Little opportunity to study computers at school (20)
Ridiculed by peers (10)	Emotional stress experienced after a death in the family (21)
Raised by a single parent (11)	

The themes in Table 4.18 were then further grouped into the categories, shown in Table 4.19.

Table 4.19: Final categories of themes for the focus group

Socio-economic	4, 8, 10, 11, 19
Digital Divide	1, 13, 14, 17, 18, 20
Misconceptions	3, 5,
Time Pressures	2, 7, 9, 16, 12, 15
Stress	6, 21

When students were asked how they experienced the National Diploma: Information Technology, it was clear that they found the course to be challenging and felt that the reason they were battling was (1) because they did not have their own computers and (2) because they could not afford the text books, as highlighted below:

Line 7: “In the beginning, I thought it was challenging, because I didn’t have any computer. Especially for Java (programming language) and for Information Systems 1 …”

Line 24: “At the beginning, I thought IT was easy, but I find it challenging, because I didn’t have books and a computer …”

Line 35: “I think the reason I failed Information Systems 1 is because, I have to have my own computer …”

Line 78: “I don’t even have a computer in my house; I have to do my chores so I only see the computer when I am here.”

Line 15: “Then I was struggling to get the text book because I didn’t have money to buy the text book …”

Line 25: “… it was difficult, and I don’t have money to buy books.”

Line 30: “I didn’t have the text book ...”

Line 43: “… the problem is, I didn’t have a text book.”

When students were asked if the National Diploma: Information Technology was what they expected it to be, it was clear that a lot of students had a misconception of the course in terms of the subject content as shown below:

Line 20: “… it was the first time for me to do accounting, so I am struggling with it.”

Line 39: “… entrepreneurship and accounting, I'm doing them for the first time, so I found them very difficult for me.”

Line 54: “First of all I thought we were going to do maths. I found out that the other students, the second years, they did maths but we did not, and we did accounting. I would never choose accounting because I never wanted to do any commerce.”

Line 59: “I thought we were going to work with computers only, focusing on the computers not the other stuff.”

Line 100: “I thought it was going to be theory about the computers and then the practical for computers. Only this!”

Line 103: “I expected anything about computers and stuff and technology and then this accounting and this entrepreneurship, was hard and law, especially law. I didn’t expect those subjects to be there.”

Line 108: “I was expecting to learn more about computers and these subjects, law, accounting, entrepreneurship, I wasn’t expecting them.”

Line 112: “I was expecting to do all the subjects except accounting, and I was scared of accounting but now I'm ok with it.”

When students were asked whether any other factors, either negative or positive, impacted on their learning, the main trend that emerged was socio-economic factors, as shown below:

Line 251: Student 1 - “Because, my dad doesn’t have money and NSFAS [National Student Financial Aid Scheme], they say that he does have a lot of money to afford to pay for school fees. So, when my father gets worried, it affects me a lot because I look up to him because he is the only role model that I have. When he is down, I feel like I am disappointing him to go to school.”

Line 265: Student 2 - “The fact that I am staying with her [the aunt], she isn’t my mother. She doesn’t even pay the fees for me; she makes me work very hard. I don’t even have time to study. I have to leave the school early so I can get to where I stay because it’s far and I have to clean up the flat when I come there and I have to do everything, so I will be tired and then I will have to sleep, wake up and come to school. I would say that I didn’t have the chance to study. Not the fact that I didn’t have the text book. I just didn’t have the time.”

Line 274: Student 3 - “I say financial problems. I am raised by a single parent. My mother is a single parent; she doesn’t have much money to give me. NSFAS also didn’t give me money, so I didn’t have money to buy books.”

Line 278: Student 4 - “I can say that the impact I have is the people I am living with, all of them are doing engineering and they keep on telling me that, "You

won't have a computer in your life." and "you know that you will never have a computer but you still continuing with IT."

Line 296: Student 5 - "I would have said financial problems. Also my mother died last year December [student started to cry and took a moment to compose herself], so I think I was cramming too much, but now I'm fine."

Line 301: Student 6 - "I think time, because my last class is at 5 o' clock and then I have to travel home."

Line 310: Student 7 - "I think I was having financial problems, because my parents don't have much money to pay for my studies. I applied for a bursary but I didn't get one."

Another topic of interest that was raised during the focus group interview was that students found the course to be too fast paced:

Line 8: "Especially for Java (programming language) and for Information Systems 1, it was too very quickly."

Line 75: "They are moving too fast …"

Line 197: "Computers are just practice, practice, practice. They are so fast here at school."

Line 216: "But at the beginning I didn't have a computer, and here at school they were too fast and I couldn't practice it, so that's why I was performing so badly, because they were too fast and I couldn't go home and do it again ..."

4.5 Summary

In this chapter the most important findings from the questionnaire and focus group interview were discussed. The targeted group was the entry level students studying the National Diploma: Information Technology at the University of Johannesburg. The final sample consisted of 171 students who completed the survey and 7 students who formed part of the focus group interview.

From the survey results it is evident that students who were previously exposed to computers performed better than those who had no previous exposure. From the focus group interview it emerged that the lack of computer experience influenced the students' ability to pass computer-related subjects, however, it is also evident that soci-economic factors, for example, lack of finances, also played a role. To these students, the lack of exposure to computers was a limiting factor in their academic performance, but not the only limiting factor.

In Chapter 5 conclusions are drawn and recommendations about the study made.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

This research began when the problem emerged that approximately 25% of students studying the National Diploma: Information Technology failed during their first year of study. Some students even indicated that they had not used a computer before embarking on their studies. Thus, the reason for conducting this study was to determine whether the digital divide, which can also be seen as an educational divide, was the cause for the high failure rate amongst first-year year students studying the subject Information Systems 1, or whether other contributing factors played a role. In order to achieve this, the following objectives were set:

- To explore and report on literature about the digital divide in order to isolate those factors that may impact on student performance
- To create instrumentation that would adequately identify the digital literacy of students who enrol for the qualification
- To explore the role of previous digital literacy on the academic performance of students
- To match and compare the digital literacy of students with their academic performance in their first year

This chapter verifies that the above objectives have been addressed, a conclusion reached by summarizing and highlighting the findings of Chapters 2, 3, and 4, in which the objectives were discussed.

Chapter 2 provided a literature study which focused on those aspects related to the situatedness of the learners who enter the National Diploma: Information Technology. It also showed how theories of situated learning could be used to explain the differences that existed between learners, which could have had an impact on their performance in the modules. In addition the students' level of digital literacy was examined, as the assumption was that it might significantly affect their ability to be successful in the modules.

Chapter 3 presented the mixed method research approach that was used in this study, followed by an elucidation of the research design. Then, the data collection techniques and data analysis techniques were described. Finally, the issues relating to reliability and validity, as well as ethical issues were discussed.

Chapter 4 provided the research findings and results from the data collected.

5.2 Conclusions

In summary, the analysis of the role of digital literacy on the performance of students studying an IT course lead to the following conclusions:

5.2.1 The majority of the students studying the National Diploma: Information Technology were black (93,7%), and as a result spoke an African language. These students' did not receive tuition in their first language but rather in their second or even third language, as the language of instruction at the University of Johannesburg is English. The findings in Chapter 4 clearly indicate that a student's level of the English language is a predictor of their success in the Diploma.

5.2.2 It appears that the level of digital literacy of students entering the National Diploma: Information Technology is a significant factor in their performance as

students who were digitally literate before embarking on their studies performed better than those who were digitally illiterate.

5.2.3 It is evident that socio-economic factors also play a role in students' performance as, for the digitally illiterate students', the lack of exposure to computers was a limiting factor in their academic performance, but not the only limiting factor.

5.2.4 Students' clearly did not expect the minor subjects of IT Skills - Communication (Module A), IT Skills - Entrepreneurship (Module B) and IT Skills Law - (Module C) and Accountancy to be part of the syllabus. The majority of students' in the focus group interview indicated that (1) they did not understand the relevance of these modules and (2) they were struggling with these modules.

5.2.5 It also emerged that students were not used to the fast pace with which subjects were lectured. For example in the subject Information Systems 1 students completed one chapter per week. It appears that some students may be struggling to keep up.

5.2.6 The majority of students (72.76%) were unable to use the Internet.

5.3 Recommendations for the National Diploma: Information Technology

Based on the study, it is proposed that:

1. Students who apply for the National Diploma: IT who are digitally illiterate, should be afforded the opportunity of being accepted into the extended learning programme which is simply an extension of the first-year mainstream course over a two year period. The extended learning programme consists of mainstream coursework coupled with relevant development components such as language and academic literacy and study skills. (Recommended for 5.2.2)

2. Time be set aside per week for academic development skills and literacy skills for all IT diploma students which focus on time management, basic reading skills, study skills, note-taking, stress-management and exam techniques. (Recommended for 5.2.5)

3. The minor modules of Communication, Entrepreneurship, Law and Accountancy need to be re-looked at in terms of their content and whether they are geared towards IT. (Recommended for 5.2.4)

4. Students who are at a high risk of failing the programme should be identified at an early stage and their progress closely monitored. These students should be put in touch with the tutors who are available to support the students in the relevant modules. (Recommended for 5.2.3)

5. The language requirements for entry level to the National Diploma: IT should be re-looked at. Currently, the admission requirement for the language of teaching and learning is a 3 (40% - 49%) and for another recognised language, a 3 as well on the new matric system. It is recommended that these requirements be changed to at least a 4 (50% - 59%) with English being on this level. (Recommended for 5.2.1)

6. Currently, the computer laboratories in the Business Information Technology Department where the National Diploma Information Technology is offered, are not connected to the Internet. If students are expected to use the Internet for research purposes, it is recommended that these laboratories be connected to the Internet. (Recommended for 5.2.6)

5.4 Recommendations for further research

In terms of further research, it is recommended that:

- This study is repeated on an annual basis to see whether the students who are selected for the programme are performing worse, better or the same.

- This study is repeated in other programmes to determine whether digital literacy is a predictor of success in other diplomas or is only limited to the National Diploma IT.

- This study is conducted at other Universities to establish whether the same results would be experienced.

5.5 Limitations to the study

I found the following limitations in my study:

- The research was conducted on a single group, which means that the findings might not be the same in groups that came before or those that come after.

- The study was only carried out in one institution.

- The basic academic literacy of the students' is not known as all data besides the final mark for Information Systems 1 Module A was self-reported.

- As the researcher was also the lecturer for the subject Information Systems 1 Module A, she may have been subjective in her findings.

5.6. Summary

The world is becoming increasingly digital, and this is affecting the way in which we learn and live. Those learners who do not have access to technology and are unable to make use of technology tools are at a distinct disadvantage.

There is much to be benefited from studying ICTs at tertiary level, however, the gap in the skills from a school-leaving student entering into an ICT course at a university is lacking. It seems as if computer exposure prior to university has improved since 1994 but is still inadequate, resulting in a number of students studying an IT-related course being at a disadvantage over their peers.

This study has shown that, amongst other factors, such as language barriers, socio-economic circumstances and imbalanced education policies, the role of digital literacy plays a significant part in the academic performance of first-year year students in the National Diploma: Information Technology at the University of Johannesburg.

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ANNEX A

11 February 2008

Dear Student

QUESTIONNAIRE

The attached questionnaire forms part of a research exercise to determine whether previous exposure to digital literacy has an impact on the academic performance of first year students studying the National Diploma Information Technology at the University of Johannesburg.

The aim of this research is to:

- Explore the role of previous digital literacy on the academic performance of students;
- Match and compare the digital literacy of students with their academic performance in their first year.

In order to assist in this regard, I kindly request that you complete the attached questionnaire as honestly as possible (it should not take more than 45 Minutes), the information provided will be used for the above mentioned research only and will not be made available for any other purposes. Should you request to do so, I will make the research report available to you. I may also request at a later stage that you participate in an individual or focus group interview. Participation is voluntary.

Thank you in anticipation for your time and participation.

I, _____ _____
Name and Surname Student Number

have volunteered to participate in the study being conducted by Mrs G Barlow-Jones.

ANNEX B

Section A – Background Information

Mark X in the applicable box to answer the question or fill in the answer in the space provided.

This section of the questionnaire refers to background or biographical information. I am aware of the sensitivity of the questions in this section, this information will however; allow me to compare groups of respondents.

---

1. Initials and Surname _____

2. Student Number _____

3. Gender

Male	1
Female	2

4. Age

18	1
19	2
20	3
21	4
22	5
23	6
24	7
25 or more	8

5. Ethnicity

Black	1
White	2
Coloured	3
Indian or Asian	4
Other	5

6. How would you describe your economic status?

Poor	1
Lower Class	2
Middle Class	3
Upper Class	4
Affluent	5

7. How would you describe the area in which you grew up?

Urban	1
Rural	2

8. How many people, including yourself lived in the house where you grew up?

One	1
Two	2
Three	3
Four	4
Five	5
More than Six	6

9. Home Language

English	1
Afrikaans	2
Zulu	3
Xhosa	4
Sotho	5
Venda	6
Swati	7
Tsonga	8
Ndebele	9
Tswana	10
Other: Specify	11

10 If you are not a South African Citizen, indicate which country are you from?

11. Name of school attended:

School:
Province:

12. Was the school that you matriculated from:

Private	1
Model C	2
Government	3
Other: Specify	4

13. Did you take Higher Grade or Standard Grade Maths in Grade 12?

HG	1
SG	2

14. What was your symbol for your Grade 12 Maths?

A	1
B	2
C	3
D	4
E	5
F	6

15. Did you take Higher Grade or Standard Grade English in Grade 12?

HG	1
SG	2

16. What was your symbol for your Grade 12 English?

A	1
B	2
C	3
D	4
E	5
F	6

17. Did you take Computer Science as a Grade 12 subject?

Yes	1
No	2

18. If you answered yes to question 17, did you take Higher Grade or Standard Grade Computer Science in Grade 12?

HG	1
SG	2

19. If you answered yes to question 17, what was your symbol for your Grade 12 Computer Science?

A	1
B	2
C	3
D	4
E	5
F	6

20. Indicate whether you have received formal training on any of the following applications **(please mark with an X all of the relevant applications completed)**

20.1	Microsoft Office	1
20.2	Microsoft Word	2
20.3	Microsoft Access	3
20.4	Microsoft Powerpoint	4

21. Was it necessary to complete the extended programme before commencing with the National Diploma IT?

Yes	1
No	2

Section B – Computer Literacy Level

Mark X in the applicable box to answer the question or fill in the answer in the space provided.

This section of the questionnaire explores your accessibility or non accessibility of computer technology before commencing your studies at the University of Johannesburg.

---

22. Did you have electricity at the home you grew up in?

Yes	1
No	2

23. Did you have a Telkom phone at the home you grew up in?

Yes	1
No	2

24. Do you have a cell phone?

Yes	1
No	2

25. If you answered yes to question 24, does your phone have any of the following features:

		Yes	**No**	**Not Sure**
25.1	PDA functions (e.g. calendar, diary)	1	2	3
25.2	3G Network	1	2	3
25.3	Video Camera	1	2	3
25.4	MP3/Audio Player	1	2	3
25.5	Wireless	1	2	3
25.6	Blue-tooth	1	2	3
25.7	Global Positioning System	1	2	3
25.8	Instant Messenger	1	2	3
25.9	E-mail	1	2	3

26. Do you make use of any of the specified features on your cell phone:

		I Use	**I Don't Use**
26.1	PDA functions (e.g. calendar, diary)	1	2
26.2	3G Network	1	2
26.3	Video Camera	1	2
26.4	MP3/Audio Player	1	2
26.5	Wireless	1	2
26.6	Blue-tooth	1	2
26.7	Global Positioning System	1	2
26.8	Instant Messenger	1	2
26.9	E-mail	1	2

27. Have you used a computer before?

Yes	1
No	2

28. Did you have a computer at the home you grew up in?

Yes	1
No	2

29. Do you presently own a computer?

Yes	1
No	2

30. If you answered yes to question 27, where did you use a computer for the <u>first time</u>?

At a friend or family members house	1
Home	2
School	3
Work	4
Internet Café	5
Previous Studies: Specify	6
Other: Specify	7

31. If you used a computer at school, what did you use it for? **(Please mark with an X all of the relevant uses)**

		Yes	**No**
31.1	Computer Typing	1	2
31.2	Computer Science	1	2
31.3	Internet Access	1	2
31.4	Other: Specify Below:	1	2

32. Using the table below, indicate with an X whether you have access to these types of technologies **(NOT including your access on campus)**. **Please answer all questions.**

	Types of Technology	**Yes**	**No**
32.1	Desktop computer	1	2
32.2	Portable computer	1	2
32.3	Electronic organizer (e.g. PDA)	1	2
32.4	MP3 Player (e.g. iPod)	1	2
32.5	MP3/4 Player with video capabilities	1	2
32.6	Digital camera	1	2
32.7	Memory stick (e.g. flash drive, USB stick)	1	2
32.8	Dedicated video games console (e.g. Playstation)	1	2
32.9	Web cam	1	2
32.10	Dial-up internet access	1	2
32.11	Broadband internet access	1	2
32.12	Wireless internet access	1	2

33. Below is a list of different ways in which information and communication technologies can be used. **Please indicate with an X:**

a) how often you have used that technology over the past year and
b) how skilled you are at using that type of technology.

If you have never used the technology indicated, then please answer:

how often – never
how skilled – never used

PLEASE ANSWER ALL QUESTIONS.

		How Often					**How Skilled**			
	Use of Technology	Once a day or more	Once/twice a week	Once/twice a month	Once/twice a year	Never	Never used	Not very skilled	Average	Very Skilled
33.1	Use a computer to manage or manipulate digital photos (e.g. using Photoshop)	1	2	3	4	5	6	7	8	9
33.2	Use a computer for creating presentations (e.g. PowerPoint)	1	2	3	4	5	6	7	8	9
33.3	Use a computer for creating or editing audio and video (e.g. iMovie, Movie Maker)	1	2	3	4	5	6	7	8	9
33.4	Use a computer to play games	1	2	3	4	5	6	7	8	9
33.5	Use a games console to play games	1	2	3	4	5	6	7	8	9
33.6	Use the internet/web or a LAN to play networked games	1	2	3	4	5	6	7	8	9
33.7	Use a PDA or handheld computer as a personal organiser (e.g. diary, address book)	1	2	3	4	5	6	7	8	9
33.8	Use a smart phone which includes a PDA, wireless and internet functions	1	2	3	4	5	6	7	8	9
33.9	Use a handheld games console (e.g. PSP) to play games	1	2	3	4	5	6	7	8	9
33.10	Use the web to access a learning portal or university intranet	1	2	3	4	5	6	7	8	9
33.11	Use the web to look up reference information for study purposes (e.g. search engines, online dictionaries, e-Journal)	1	2	3	4	5	6	7	8	9
33.12	Use the web to browse for general information (e.g. news, holidaying, event timetables)	1	2	3	4	5	6	7	8	9

33.13	Use the web to listen to sound recordings (e.g. via streaming audio or iTunes)	1	2	3	4	5	6	7	8	9
33.14	Use the web for other pastimes (i.e. for leisure activities)	1	2	3	4	5	6	7	8	9
33.15	Use the web to buy or sell things (e.g. eBay, Amazon, air tickets.)	1	2	3	4	5	6	7	8	9
33.16	Use the web for other services (e.g. banking, paying bills)	1	2	3	4	5	6	7	8	9
33.17	Use the web/internet to send or receive email (e.g. Hotmail, Yahoo, Outlook)	1	2	3	4	5	6	7	8	9
33.18	Use the web/internet for instant messaging / chat (e.g. MSN, QQ, ICQ)	1	2	3	4	5	6	7	8	9
33.19	Use the web to build and maintain a website	1	2	3	4	5	6	7	8	9
33.20	Use social networking software on the web (e.g. Myspace, Trendster, Yahoo! Groups, Facebook)	1	2	3	4	5	6	7	8	9
33.21	Use the web to download podcasts (e.g. using Juice, iTunes)	1	2	3	4	5	6	7	8	9
33.22	Use the web to publish podcasts (e.g. using Podifier, Podcaster, PodProducer)	1	2	3	4	5	6	7	8	9
33.23	Use the web to download and/or share music/video files (e.g. MP3, WMV)	1	2	3	4	5	6	7	8	9
33.24	Use the web to share photographs, videos, or other digital material (e.g. using blinklist, Flickr, YouTube)	1	2	3	4	5	6	7	8	9
33.25	Use the web to make phone calls (e.g. VoIP using Skype)	1	2	3	4	5	6	7	8	9
33.26	Use the web for webconferencing (e.g. using a webcam with Skype or MSN Messenger)	1	2	3	4	5	6	7	8	9
33.27	Use the web to read RSS feeds (e.g. news feeds)	1	2	3	4	5	6	7	8	9
33.28	Use the web to keep your own blog or vlog	1	2	3	4	5	6	7	8	9
33.29	Use the web to read other people's blogs or vlogs	1	2	3	4	5	6	7	8	9
33.30	Use the web to comment on blogs or vlogs	1	2	3	4	5	6	7	8	9
33.31	Use the web to contribute to the development of a wiki	1	2	3	4	5	6	7	8	9
33.32	Use a mobile phone to call people	1	2	3	4	5	6	7	8	9
33.33	Use a mobile phone to text / SMS people	1	2	3	4	5	6	7	8	9
33.34	Use a mobile phone to take digital photos or movies	1	2	3	4	5	6	7	8	9
33.35	Use a mobile phone to send pictures or movies to other people	1	2	3	4	5	6	7	8	9
33.36	Use a mobile phone to make video calls	1	2	3	4	5	6	7	8	9
33.37	Use a mobile phone as an MP3 player	1	2	3	4	5	6	7	8	9
33.38	Use a mobile phone as a personal organiser (e.g. diary, address book)	1	2	3	4	5	6	7	8	9

33.39	Use a mobile phone to access information / services on the web	1	2	3	4	5	6	7	8	9
33.40	Use a mobile phone to send or receive email	1	2	3	4	5	6	7	8	9
33.41	Use a mobile phone or GPS to navigate	1	2	3	4	5	6	7	8	9
33.42	Use a mobile phone to access to instant messaging services (e.g. MSN, QQ)	1	2	3	4	5	6	7	8	9
33.43	Use a mobile phone to post entries in blog	1	2	3	4	5	6	7	8	9

34. Why did you choose to study a diploma in Information Technology?

35. What stream are you enrolled for?

Information Systems and Technology	1
Software Development	2

36. What career path do you intend following once you graduate e.g. I want to become a web designer.

Section C – Understanding of Basic Computer Concepts

Mark X in the applicable box to answer the question.

This section of the questionnaire will measure your current understanding of computer concepts.

Internet

37. A Website is

A collection of related Web pages	1
The location from which a Web page originates	2
The source of a Web page	3
An author of a Web page	4

38. Some people use the phrase, _____, to refer to the activity of using links to explore the Web

Surfing the Web	1
Weaving the Web	2
Navigating the Web	3
Exploring the Web	4

39. When viewing a Web page, pointing to, or positioning the pointer on a link on the screen, typically changes the shape of the pointer to a small _____.

Right-pointing arrow	1
Hand with a pointing index finger	2
I Beam	3
Lightning bolt	4

Application Software

40. Two categories of software are

Operating system and system software	1
System software and utility programs	2
Utility programs and operating systems	3
System software and application software	4

41. What is loaded, or copied, into memory from the computer's hard disk each time you start your computer?

Operating System	1
Software Application	2
Software Package	3
Utility Program	4

42. What happens when you format a document?

Text, numbers, or graphical images are inserted using an input device.	1
Changes are made to the document's existing content.	2
The appearance of the document is changed.	3
The document is copied from memory to a storage medium.	4

Input

43. Which of the following is not an input device?

Mouse	1
Joystick	2
Keyboard	3
Speaker	4

Output

44. Which of the following is not an output device?

PC Monitor	1
Printer	2
Digital Video Camera	3
Earphones	4

Storage

45. Which one of the following types of storage media is becoming obsolete?

USB Flash Drive	1
CD	2
Floppy Disk	3
DVD	4

Communications and Networks

46. A _____ is a high speed network that connects networks in an area such as a city or town and handles the bulk of communications activity across that region.

Local area network.	1
Metropolitan area network.	2
Wide area network.	3
Variable area network.	4

47. A type of communications device that connects a communications channel to a sending or receiving device is a _____.

Modem	1
Server	2
Satellite	3
Microwave station	4

Computer Security

48. A _____ is a program that copies itself repeatedly in memory or on a network, using up resources and possibly shutting down the computer or network.

Computer virus	1
Worm	2
Trojan horse	3
All of the above	4

49. _____ is a scam in which a perpetrator sends an official looking e-mail that attempts to obtain a user's personal and financial information.

Spam	1
Adware	2
Spyware	3
Phishing	4

50. A _____ is a small text file that a Web server stores on a user's computer.

Worm	1
Spike	2
Cookie	3
Payload	4

ANNEX C

Focus Group Interview

Mrs Barlow-Jones: "Students, thank you all for coming. I appreciate it. Some of you didn't even have a test today but you came in to help me. Thank you very much. Now, I'm going to ask you the first question and I want you to think to yourselves, how do I feel about this? Student number one, how have you experienced this course, the National Diploma: IT. How have you experienced it, for yourself?"

Student 1: "In the beginning, I **thought** it was **challenging**, because I didn't have any **computer**. Especially for Java (programming language) and for Information Systems 1, it was too very **quick**ly. But all in all now it's fine. It's a very good course."

Mrs Barlow-Jones: "Are you enjoying the course?"

Student 1: "Ja."

Mrs Barlow-Jones: "And you, student number 2, how have you experienced this IT course?"

Student 2: "At first I **thought** it was **easy**, because I knew I was a hard **work**er and I could face anything, any challenge I was up for it. Then I was struggling to get the **text book** because I didn't have **money** to buy the **text book**, and now I could say its still **difficult** for me, but I have the **text book** now, but still, I'm still struggling."

Mrs Barlow-Jones: "What are you struggling with specifically?"

Student 2: "I would say **entrepreneurship** and **accounting**. Since I did maths and science in High School, but it was the first **time** for me to do **accounting**, so I am struggling with it."

Mrs Barlow-Jones: "And you student number 3. How have you experienced the National Diploma: IT?"

Student 3: "At the beginning, I **thought** IT was **easy**, but I find it **challenging**, because I didn't have books and a **computer**, so it was **difficult**, and I don't have **money** to buy books. I was waiting for **NSFAS** to bring me **money** to buy books, but they didn't bring the **money** and it was **challenging**."

Mrs Barlow-Jones: "And student number 4. How have you experienced the course?"

Student 4: "It was very interesting, but you need to take care of your school **work**. Maybe all of us have got the same reason. I didn't have the **text book** but I tried to do some stuff and I only failed one subject, Information Systems 1, but now I think I'm going to pass all of them. I only feel **stress**ed when I think about the subject I failed because it's my major course. So I can do nothing now."

Mrs Barlow-Jones: "And you student number 5?"

Student 5: "The course is fine. I think the reason I failed Information Systems 1 is because, I have to have my own **computer** but the course is good."

Mrs Barlow-Jones: "And you student number 6?"

Student 6: "The course is good, but there are some things that are **difficult**. Like she (referring to another student) has said like **entrepreneurship** and **accounting**, I'm doing them for the first **time**, so I found them very **difficult** for me."

Mrs Barlow-Jones: "And you student number 7?"

Student 7: "I also think the course is very good and I was going to **work** hard to achieve everything, but the problem is, I didn't have a **text book**."

Mrs Barlow-Jones: "Was there a reason?"

Student 7: “Ja.”

Mrs Barlow-Jones: “What was the reason?”

Student 7: “I wasn’t having a **text book** and I was also **traveling** and when I get **home** I get **tired**. So I try my best to do everything for school.”

Mrs Barlow-Jones: “So you've all said the course was good, although you found some challenges to it. What were your expectations of the National Diploma IT, before you came? When you were still at school and you wanted to apply for the course. What were your expectations of the actual course? What did you think it would be like? Is it what you **thought** it would be?

Student 1: “First of all I **thought** we were going to do maths. I found out that the other students, the second years, they did maths but we did not, and we did **accounting**. I would never choose **accounting** because I never wanted to do any commerce. When you come here they say that you are going to do **accounting**, and I was like, ok fine, and they said its IT. I can’t really understand why they using commerce and they say its IT. I **thought** we were going to **work** with **computer**s only, focusing on the **computer**s not the other stuff.”

Mrs Barlow-Jones: “What do you mean by other stuff?”

Student 1: “Like **law** and **accounting**. **Entrepreneurship** I can understand, but **law** and **accounting** I can't understand why they included that. But I get it now, because it’s IT in business and its reasonable now because each and everyday I learn different things in IT. So that’s why it’s an interesting course but I didn’t really expect that.”

Mrs Barlow-Jones: “And you student number 2. What were your expectations of the course?”

Student 2: “I was expecting to know about **computer**s. I am from the Eastern Cape, so we are not exposed to these technology things. I was expecting more, I wanted to know about technology, I wanted to know about **computer**s. That’s all I wanted to know.”

Mrs Barlow-Jones: “And now you have learned about **computer**s, has it met your expectations?”

Student 2: “Not really.”

Mrs Barlow-Jones: “Why?”

Student 2: “They are moving too **fast**, and I stay far so I have to take transport to go **home** early. I'm not staying at my flat; I'm staying with my aunt and I have to do my **chores**. I have to cook and do everything. So they're moving too **fast** for me. Even if I have to go outside now, I have to rush **home**. I don’t even have a **computer** in my house; I have to do my **chores** so I only see the **computer** when I am here.”

Mrs Barlow-Jones: “And you student number 3? What were your expectations of the course?”

Student 3: “I was expecting to know the **computer**. I was expecting to know what was in the **computer**, all the things about the **computer**. It was **challenging** and it was **difficult**. I failed Information Systems because I didn’t know the **computer**.”

Mrs Barlow-Jones: “Do you feel that you failed Information Systems because you didn’t know the **computer** before you started studying?”

Student 3: “Yes, I never did **computer**s before, so it was **challenging** for me. I didn’t know anything about the **computer**.”

Mrs Barlow-Jones: “But when you came here that’s what you expected to learn about - the **computer**?”

Student 3: “Yes, I **thought** IT was about the **computer** and **accounting**, I never did **accounting**. I find it **difficult**.”

Mrs Barlow-Jones: “And you student number four? What were your expectations?”

Student 4: “My first expectation was, what she was saying (referring to another student), "What is a **computer**?" and I found the answer in Systems Software Skills 1 and Information Systems 1 and so my expectation number one was covered. My Second expectation was programming. They going to bring me a **computer** in front of me then they say, "ok let’s just create a program that’s going to move a pointer from point A to point B". No, I didn’t found this thing. The other thing was, there would be no **accounting**, no **entrepreneurship**, and no **law**. I **thought** it was going to be theory about the **computer**s and then the practical for **computer**s. Only this!”

Mrs Barlow-Jones: “And you student number 5?”

Student 5: “As he said (referring to another student) I expected anything about **computer**s and stuff and technology and then this **accounting** and this **entrepreneurship**, was hard and **law**, especially **law**. I didn’t expect those subjects to be there.”

Mrs Barlow-Jones: “And you student number 6? What were you expecting?”

Student 6: “I was expecting to learn more about **computer**s and these subjects, **law**, **accounting**, **entrepreneurship**, I wasn’t expecting them. Information Systems 1 and Systems Software 1, Ja I was expecting to learn that.”

Mrs Barlow-Jones: “Ok and you student number 7?”

Student 7: “I was expecting to do all the subjects except **accounting**, and I was scared of **accounting** but now I'm ok with it.”

Mrs Barlow-Jones: "So what I'm getting from all of you is that you were all expecting the **computer** subjects, the programming, Information Systems, Systems Software. You didn't realize that there were going to be other subjects that might not be what you wanted to do but you have to do them, is that right?"

Student 1, 2, 3, 4, 5, 6 and 7 "Yes."

Mrs Barlow-Jones: "And you're finding it's a lot of **work**?"

Student 1, 2, 3, 4, 5, 6 and 7 "Yes."

Mrs Barlow-Jones: "Student number 1, I want you to talk about the fact that you didn't have a **computer** before you started the course, because all of you said in your questionnaire that you didn't have a **computer**. Did it influence your learning in any way? The fact that you didn't have a **computer** before you started studying?

Student 1: "Yes, it did, because I always wanted to have a **computer** as a child, when I was little. I **thought computer**s were only for rich people, people at **work**, but when I grew up I learned that you can have a **computer** and afford it. It made me feel that maybe I know how to build it and maybe I can build it for the learners at **home** so they can have **computer**s as well, so that they don't have to struggle when they come to university."

Mrs Barlow-Jones: "Ok and the fact that you didn't have a **computer** before you started this course, do you think it influenced your learning of Information Systems1, for example, in any way."

Student 1: "Yes, a lot. It made me want to know more about **computer**s. Like not the general knowledge, but to learn more about the secrets in IT. I wanted to be the first person at **home** to know it at **home**, so I can impress my parents and my other **family** that I know anything about a **computer** and if you bring me a **computer** I won't even struggle with it."

Mrs Barlow-Jones: "And you student number 2? The fact that you didn't have a **computer** before you started this course; did it influence your learning? Do you have a **computer** now?"

Student 2: "No".

Mrs Barlow-Jones: "Ok, so how has that influenced your learning in this year?"

Student 2: "I would say, it has played a big role. I think that if I had a **computer** in my place, before I chose this course, maybe I would have changed my mind or something. But I was interested in this IT course, because I wanted to know more about the **computer**s. Since we grew up without **computer**s, I **thought** it was going to be a new thing and I would go with all that I have, because I want to know more. But now I would say that I think I have chosen the wrong course."

Mrs Barlow-Jones: "Why do you think you have chosen the wrong course?"

Student 2: "I don't have that passion I used to have. I would say that I know a lot, but since I know just a little bit about **computer**s I don't have that interest and that thing that is forcing me to do this course."

Mrs Barlow-Jones: "So when you didn't know about the **computer** you wanted to know more and now that you know more you don't want to know anymore?"

Student 2: "Yes."

Mrs Barlow-Jones: "And you student number 3? The fact that you didn't have a **computer**, do you think it's made a difference in your marks, for example?"

Student 3: "No."

Mrs Barlow-Jones: "No? Ok, so how has it influenced you? The fact that you didn't have a **computer**?"

Student 3: "It influenced me badly because; I came here and **thought** I will know **computer**s very well. Better than my **family**. I came here to find out, but the **computer** is **challenging**, it is not something you can take for granted. From high school I **thought computer**s would be **easy** because I **thought** I would learn about **computer**s in the university, so I find it **challenging**. The fact that I don't have a **computer**, it affects me badly."

Mrs Barlow-Jones: "How?"

Student 3: "When I came here from school I **thought computer**s would be **easy**, but I am a student and I **travel** and I don't have a **computer** at **home**. When I am at **home**, I don't have a **computer** at **home** to practice like I do at school, so it's **challenging**."

Mrs Barlow-Jones: "And you student number 4?"

Student 4: "Can you please repeat the question?"

Mrs Barlow-Jones: "The fact that you didn't have a **computer** before you started studying here, has it influenced your learning this year in any way?"

Student 4: "Yes, it did."

Mrs Barlow-Jones: "How?"

Student 4: "Because I was used to getting distinctions the **time** I was at school, but now I don't even have one distinction. The reason was, the school I came from, I mean the high school, we didn't have **computer**s. They bought **computer**s the year I was doing matric, in September. I am from a rural area, and we don't have **electricity**. So no one has **computer**s there. It influenced me badly."

Mrs Barlow-Jones: "In what way specifically? How would a **computer** help you, if you did have a **computer**?"

Student 4: "I knew there was something called a **computer** and I wanted to know it. I believed that there was nothing that can be impossible for me, so I **thought** I can do IT, since there was no one who knew about **computer**s in my place. I found it very **difficult** because I didn't have a **computer** and I didn't know how to use a **computer**. If you were talking about a keyboard, I **thought** ok a keyboard is that thing. I had to think first, and then, ok I know that a keyboard is that thing with the keys, right? So it's influenced me badly. I think if I had a background for **computer**s, maybe it's going to help me.

Mrs Barlow-Jones: "And you student number 5?"

Student 5: "It did."

Mrs Barlow-Jones: "How?"

Student 5: "**Computer**s are just practice, practice, practice. They are so **fast** here at school.

Mrs Barlow-Jones: "Do you feel that the pace is too **fast**?"

Student 5: "Yes, you need to go **home** and type slowly."

Mrs Barlow-Jones: "And you still don't have a **computer**?"

Student 5: "Yes, and I don't know anything about EUC. I passed, but I don't know anything."

Mrs Barlow-Jones: "then how did you pass, because if you knew nothing, you wouldn't have passed?'

Student 5: "Maybe I crammed or something."

Mrs Barlow-Jones: "And you student number 6? The fact that you didn't have a **computer** before you started this course, just talk about that. Do you have a **computer** now?"

Student 6: "Yes."

Mrs Barlow-Jones: "You do? Ok, so can you tell us how it has benefited you, having a **computer** compared to when you didn't have a **computer**?"

Student 6: "Now, because I have a **computer**, I can learn more things at **home**. When we learn something at school I can go **home** and revise. But at the beginning I didn't have a **computer**, and here at school they were too **fast** and I couldn't practice it, so that's why I was performing so badly, because they were too **fast** and I couldn't go **home** and do it again, but now I can."

Mrs Barlow-Jones: "So you found it much better now that you have a **computer**?"

Student 6: "Yes."

Mrs Barlow-Jones: "And you student number 7?"

Student 7: "I've always wanted to have a **computer** but my parents didn't manage to buy me one and I didn't get a chance to do a **computer** course at school because they were **stolen**."

Mrs Barlow-Jones: "What school did you go to?"

Student 7: "A government school."

Mrs Barlow-Jones: "In which area?"

Student 7: "Limpopo."

Mrs Barlow-Jones: "So you had computers and you were just about to start using them and then they stole them?"

Student 7: "Yes".

Mrs Barlow-Jones: "Ok, so you didn't really have an opportunity at school to use the computers?"

Student 7: "Yes."

Mrs Barlow-Jones: "So now how do you feel about the fact that you don't have a computer, how has that influenced your learning?"

Student 7: "When I got here (to school), it was difficult for me to switch it on."

Mrs Barlow-Jones: "Are there any other things that have impacted your ability to learn. Anything besides what you've already said that you feel might have impacted your ability to learn? Whether it was negative or positive?"

Student 1: "I dont get the question ma'am."

Mrs Barlow-Jones: "Like someone said earlier that he has to travel really far to get home, and then you get home and you're tired. That can impact your learning. Just your circumstances can impact your learning. So what I want to know is, besides the fact that you didn't have a computer, is there something else that might have impacted your learning?"

Student 1: "Ja, financial problems."

Mrs Barlow-Jones: "How so?"

Student 1: "Because, my dad doesn't have money and NSFAS (National Student Financial Aid Scheme), they say that he does have a lot of money to afford to pay for

school fees. So, when my father gets worried, it affects me a lot because I look up to him because he is the only role model that I have. When he is down, I feel like I am disappointing him to go to school."

Mrs Barlow-Jones: "And he has to pay for you."

Student 1: "Exactly, so it's very painful for me to see my dad down so that's why it's hard for me."

Mrs Barlow-Jones: "And student number 2?"

Student 2: I will say that staying with my aunt is the problem that I failed Information Systems 1. I know I am a hard worker and I know that I can study. I know that I am not that clever. I can pass I know that."

Mrs Barlow-Jones: "If you got into this course, then you are clever. There were lots of applicants who didn't even make it, so you mustn't put yourself down."

Student 2: "The fact that I am staying with her (the aunt), she isn't my mother. She doesn't even pay the fees for me; she makes me work very hard. I don't even have time to study. I have to leave the school early so I can get to where I stay because it's far and I have to clean up the flat when I come there and I have to do everything, so I will be tired and then I will have to sleep, wake up and come to school. I would say that I didn't have the chance to study. Not the fact that I didn't have the text book. I just didn't have the time."

Mrs Barlow-Jones: "Because you were busy with other things. And you student number 3?"

Student 3: "I say financial problems. I am raised by a single parent. My mother is a single parent; she doesn't have much money to give me. "NSFAS Also didn't give me money, so I didn't have money to buy books."

Mrs Barlow-Jones: “And you student number 4?”

Student 4: “I can say that the impact I have is the people I am living with, all of them are doing engineering and they keep on telling me that, "You wont have a **computer** in your life." and “you know that you will never have a **computer** but you still continuing with IT.”

Mrs Barlow-Jones: “Are you in the Res.?”

Student 4: “Yes.”

Students 4: “So I cannot say it’s a **financial** problem, because I have a bursary and they told us about the new thing which is A full bursary.”

Mrs Barlow-Jones: “Are you saying that the people that you are surrounding yourself with are negative?”

Student 4: “Yes, they are negative towards my course. All of them are doing engineering and it’s only me doing a management course.”

Mrs Barlow-Jones: “But it doesn’t matter if you never have a **computer** yourself one day, you'll **work** for a company on a **computer**.”

Student 4: “So what I believe is that if I can pass this year maybe I can do some stuff of second year. If I can do this stuff for second year, I'm going to choose Software development because I love it.”

Mrs Barlow-Jones: “Student 5? Are there other things that have impacted on your year?”

Student 5: “I would have said **financial** problems. Also my mother **died** last year December (student started to cry and took a moment to compose herself), so I think I was cramming too much, but now I'm fine.

Mrs Barlow-Jones: "So you had emotional **stress** that you've had to deal with?"

Mrs Barlow-Jones: "And you student number 6?"

Student 6: "I think **time**, because my last class is at 5 o clock and then I have to **travel** **home**."

Mrs Barlow-Jones: "5 o clock! What class have you got at 5 o clock?"

Student 6: **Law**, and I still have to **travel**. I get **home** **late** and I'm **tired** and I don't have much **time** to study.

Mrs Barlow-Jones: "So that impacts on your studies? But you only have **law** twice a week. What about the other days?"

Student 6: "Some other days we are here until 4 o clock and it's also **late**."

Mrs Barlow-Jones: "So you guys are busy hey? And you student number 7?"

Student 7: "I think I was having **financial** problems, because my parents don't have much **money** to pay for my studies. I applied for a bursary but I didn't get one."

Mrs Barlow-Jones: "But how does that impact on your learning, the fact that you don't have **money**? I was also a student, and I also didn't have **money**, I paid for myself and I passed. Don't you find that you study harder because **financial**ly you've been given this opportunity? The fact that you don't have **money**, how does that influence your learning?"

Student 7: "It makes me study harder so that I can achieve anything."

Mrs Barlow-Jones: "But it's a worry?"

Student 7: "Not that much."

Mrs Barlow-Jones: “Who's paying for your studies?”

Student 7: “**NSFAS**.”

Mrs Barlow-Jones: “Thank you students for answering all of my questions, I’ll see you again next year for Information Systems 1 Module A. Enjoy your recess.”

ANNEX D

Official Mark Sheet: **INFORMATION SYSTEMS 1A**
Year: **2008**
Exam Month: **6**
Subject Code: **ILS11A4**

Afrikaans students: **0**
English students: **221**

Weight:			50	50	75	25	50	50		**EXAM**	**EXAM**	**CAMP**
Stud Number	**Surname**	**Initials**	**FPM**	**EM**	**SAM1**	**SAM2**	**FPM**	**EM**	**FM**	**ADM**	**TYPE**	**CODE**
200835170	NGWENYA	ZM	55	61	53	59	55	61	58	Y	NORM	5
200802165	ALONGA	CY	63	67	60	73	63	67	65	Y	NORM	5
200811934	AVONTUUR	ED	62	72	57	76	62	72	67	Y	NORM	5
200710625	BAHLEKAZI	S	49	59	49	48	49	59	54	Y	NORM	5
200829360	BALOYI	HP	51	66	47	61	51	66	59	Y	NORM	5
200821920	BALOYI	OT	66	66	66	65	66	66	66	Y	NORM	5
200835626	BEYA	NM	31		30	33	31		16	N	NORM	5
200835233	BOLOANG	O	53	56	47	72	53	56	55	Y	NORM	5
200803611	BRICKER	A	80	73	81	75	80	73	77	Y	NORM	5
200701450	BUDIMUKANA	BM	67	72	62	80	67	72	70	Y	NORM	5
200715415	BUTHELEZI	GGL	46	46	47	44	46	46	46	Y	NORM	5
200803968	CHABALALA	TM	63	63	63	64	63	63	63	Y	NORM	5
200814664	CHABIKULI	J	29		26	38	29		15	N	NORM	5
200829882	CHOKOE	MA	45	60	46	40	45	60	53	Y	NORM	5
200826601	CHOKOLO	N	60	63	58	67	60	63	62	Y	NORM	5
200806847	DIBETSO	ML	51	64	48	60	51	64	58	Y	NORM	5
200829628	DITSHEGO	TC	59	60	52	80	59	60	60	Y	NORM	5

200814759	DLAMINI	ML	45	55	43	50	45	55	50	Y	NORM	5
820400494	DLAMINI	ZZ	57	71	57	57	57	71	64	Y	NORM	5
200829734	DLOMO	ZA	38		33	54	38		19	N	NORM	5
200830854	DUBE	PB	41	48	40	42	41	48	45	Y	NORM	5
200809108	FAKUDE	GB	53	65	56	43	53	65	59	Y	NORM	5
200817229	GEORGE	NS	36		36	36	36		18	N	NORM	5
200802074	HARIPARSAD	Y	36		36	36	36		18	N	NORM	5
200822003	HASSAN	YA	65	75	57	88	65	75	70	Y	NORM	5
200829190	JANTJIES	KM	62	62	66	51	62	62	62	Y	NORM	5
200806903	JELE	MN	67	67	68	65	67	67	67	Y	NORM	5
200802085	KAHUMBA	EVK	76	76	75	80	76	76	76	Y	NORM	5
200806807	KAMBU	NR	61	74	58	71	61	74	68	Y	NORM	5
200835339	KEETSE	MP	50	57	52	43	50	57	54	Y	NORM	5
200825525	KEKANA	MB	71	67	75	59	71	67	69	Y	NORM	5
200835569	KGATOKE	GS	55	51	54	59	55	51	53	Y	NORM	5
200621262	KGOPA	SS	52	54	52	52	52	54	53	Y	NORM	5
200814066	KHOZA	M	51	58	50	54	51	58	55	Y	NORM	5
200829673	KHULU	PK	49	50	48	53	49	50	50	Y	NORM	5
200822170	KHUMALO	BR	54	50	49	68	54	50	52	Y	NORM	5
200817059	KHUMALO	SN	37		31	53	37		19	N	NORM	5
200827941	KUMALO	T	48	53	45	58	48	53	51	Y	NORM	5
200821778	LAMINE	S	50	60	47	57	50	60	55	Y	NORM	5
200832015	LANGA	JM	37		35	43	37		19	N	NORM	5
200817304	LEBESE	K	48	61	41	67	48	61	55	Y	NORM	5
200829712	LINFORD	WR	86	80	89	75	86	80	83	Y	NORM	5
200729098	LUBOYA	NL	31		33	24	31		16	N	NORM	5
200817188	MABENA	TG	59	60	59	58	59	60	60	Y	NORM	5
200835281	MABIZELA	GX	36		34	42	36		18	N	NORM	5
200825795	MABOA	TK	55	69	49	71	55	69	62	Y	NORM	5
200825333	MADI	R	34		31	42	34		17	N	NORM	5

200814162	MADOBA	H	22		20	29	22		11	N	NORM	5
200829363	MADUNA	T	35		33	42	35		18	N	NORM	5
200825934	MAEMA	OW	41	39	41	41	41	39	40	Y	NORM	5
200835168	MAEPA	MP	49	50	51	41	49	50	50	Y	NORM	5
200835513	MAFAMADI	MG	26		23	34	26		13	N	NORM	5
200800958	MAGWEVANA	M	73	83	74	70	73	83	78	Y	NORM	5
200835707	MAHLANGU	T	54	49	55	50	54	49	52	Y	NORM	5
200825796	MAHLASE	TP	62	59	60	66	62	59	61	Y	NORM	5
200835488	MAILA	ML	11		15	0	11		6	N	NORM	5
200835309	MAIMANE	L	60	52	61	55	60	52	56	Y	NORM	5
200806513	MAITISA	C	44	59	43	45	44	59	52	Y	NORM	5
200814723	MAKASHIYA	RA	32		35	22	32		16	N	NORM	5
200806096	MAKAULA	A	39		33	58	39		20	N	NORM	5
200806745	MAKIESE	CM	60	71	58	65	60	71	66	Y	NORM	5
200821793	MAKITLA	LT	51	63	46	67	51	63	57	Y	NORM	5
200805602	MAKWARELA	KB	53	58	53	54	53	58	56	Y	NORM	5
200620804	MALAZA	SB	53	60	58	39	53	60	57	Y	NORM	5
200807717	MALOTLE	PMW	70	71	66	83	70	71	71	Y	NORM	5
200818250	MAMOSEBO	PP	59	58	62	51	59	58	59	Y	NORM	5
200514171	MAMPHAGA	MT	52	47	52	52	52	47	50	Y	NORM	5
200827868	MANAMELA	M	62	72	63	57	62	72	67	Y	NORM	5
200801444	MANAMELA	TP	52	64	52	51	52	64	58	Y	NORM	5
200825844	MANUEL	B	66	71	69	58	66	71	69	Y	NORM	5
200829207	MANYAMA	MD	43	58	45	38	43	58	51	Y	NORM	5
200804727	MAOLOGELA	LV	50	64	48	57	50	64	57	Y	NORM	5
200835289	MAPONDO	GS	54	53	49	69	54	53	54	Y	NORM	5
200835420	MARELETSA	TM	68	64	69	65	68	64	66	Y	NORM	5
200817422	MARTINS	MJ	74	71	76	67	74	71	73	Y	NORM	5
200829265	MASELA	RM	56	61	55	58	56	61	59	Y	NORM	5
200704922	MASENYA	BI	74	76	72	80	74	76	75	Y	NORM	5

820401323	MASHAU	PR	61	56	62	57	61	56	59	Y	NORM	5
200819222	MASHININI	JS	49	45	46	57	49	45	47	Y	NORM	5
200825778	MASHININI	MM	64	74	62	68	64	74	69	Y	NORM	5
200606764	MASOEK	TSG	62	61	63	59	62	61	62	Y	NORM	5
200829590	MATANGA	H	48	52	43	62	48	52	50	Y	NORM	5
200819117	MATHABATHE	F	52	61	52	51	52	61	57	Y	NORM	5
200808744	MATHEBA	NG	50	62	50	51	50	62	56	Y	NORM	5
200835173	MATHOBELA	MPH	31		26	45	31		16	N	NORM	5
200814656	MATIWANE	OL	63	51	68	47	63	51	57	Y	NORM	5
200829653	MATLI	MN	50	50	50	50	50	50	50	Y	NORM	5
200835231	MAVHUNGU	MP	32		25	51	32		16	N	NORM	5
200726201	MAZIBUKO	MG	43	57	41	50	43	57	50	Y	NORM	5
200835519	MAZIBUKO	NE	62	56	68	42	62	56	59	Y	NORM	5
200835698	MBALATI	LB	51	64	49	55	51	64	58	Y	NORM	5
200829557	MBAMBO	JFSS	46	38	46	46	46	38	42	Y	NORM	5
200814370	MBATHA	NMW	52	58	50	57	52	58	55	Y	NORM	5
200676015	MBENZA	KU	47	53	46	51	47	53	50	Y	NORM	5
200835528	MBETE	L	26		23	36	26		13	N	NORM	5
920401038	MEDUPE	AP	52	52	44	75	52	52	52	Y	NORM	5
200810507	MGOLODELA	M	60	61	63	50	60	61	61	Y	NORM	5
200729133	MGUDLWA	PS	53	67	52	54	53	67	60	Y	NORM	5
200807989	MHLANGA	DE	58	70	54	69	58	70	64	Y	NORM	5
200835401	MHLONGO	C	38		30	61	38		19	N	NORM	5
200833409	MHLONGO	G	44	56	40	54	44	56	50	Y	NORM	5
200835402	MHLONGO	T	45	49	40	61	45	49	47	Y	NORM	5
200807218	MKHALIPHI	M	47	57	40	66	47	57	52	Y	NORM	5
200812521	MKHIZE	TS	50	60	47	59	50	60	55	Y	NORM	5
200829763	MKHUTYUKELWA	S	51	63	54	40	51	63	57	Y	NORM	5
200835593	MKONO	KC	34		33	37	34		17	N	NORM	5
200816268	MOCHONGOANE	MD	74	75	75	69	74	75	75	Y	NORM	5

200835414	MODISADIFE	T	42	41	46	31	42	41	42	Y	NORM	5
200621220	MODISE	OD	46	53	46	46	46	53	50	Y	NORM	5
200814604	MOEKETSI	JM	35		35	35	35		18	N	NORM	5
820405729	MOGASHOA	ME	66	59	69	55	66	59	63	Y	NORM	5
200823186	MOKALE	DD	41	59	40	45	41	59	50	Y	NORM	5
200816838	MOKGOATJANA	ML	61	68	64	51	61	68	65	Y	NORM	5
200815975	MOKOENA	TF	48	63	50	43	48	63	56	Y	NORM	5
200835464	MOKONE	KA	34		31	41	34		17	N	NORM	5
200825839	MOKONYANE	TB	48	57	40	71	48	57	53	Y	NORM	5
200805018	MOLOI	KF	47	58	47	45	47	58	53	Y	NORM	5
200829596	MOLOI	KS	52	65	52	50	52	65	59	Y	NORM	5
200829620	MOLOI	TA	43	47	40	50	43	47	45	Y	NORM	5
200712247	MOLOKOE	GI	53	59	49	63	53	59	56	Y	NORM	5
200707584	MOLOTSANE	EM	47	53	44	54	47	53	50	Y	NORM	5
200835618	MONARE	ST	51	62	50	55	51	62	57	Y	NORM	5
200835462	MONNATLALA	M	47	60	41	64	47	60	54	Y	NORM	5
200835598	MONOSI	I	36		36	36	36		18	N	NORM	5
200812672	MONTWEDI	BA	40	65	40	41	40	65	53	Y	NORM	5
200620115	MOSIA	MMP	48	70	48	48	48	70	59	Y	NORM	5
200804594	MOSITO	ML	62	60	64	55	62	60	61	Y	NORM	5
200801927	MOTALANI	S	89	80	91	81	89	80	85	Y	NORM	5
200829760	MOTEPA	MN	0				0		0	N	NORM	5
200835293	MOTHAPO	FM	23		25	16	23		12	N	NORM	5
200825852	MOTHEMANE	S	48	57	48	49	48	57	53	Y	NORM	5
200728309	MOTLHAMME	PT	66	67	65	69	66	67	67	Y	NORM	5
200813302	MOTLOUNG	SM	74	75	79	57	74	75	75	Y	NORM	5
200829487	MOTLOUNG	TP	45	64	45	46	45	64	55	Y	NORM	5
200829232	MOTSAPOLE	MK	37		37	37	37		19	N	NORM	5
200817228	MOTSHEPE	RL	52	52	55	41	52	52	52	Y	NORM	5
200731613	MOYO	KMA	33		27	49	33		17	N	NORM	5

200835268	MPHULO	LF	74	77	76	66	74	77	76	Y	NORM	5
200825360	MSIBI	ZP	50	49	46	60	50	49	50	Y	NORM	5
200612382	MTHIMKHULU	L	36		32	49	36		18	N	NORM	5
200801684	MTSWENI	BW	33		32	36	33		17	N	NORM	5
200822082	MTSWENI	SE	58	54	52	76	58	54	56	Y	NORM	5
200807191	MUDZWIRI	FA	52	51	54	46	52	51	52	Y	NORM	5
200835478	MUFAMADI	MP	41	58	40	45	41	58	50	Y	NORM	5
200814684	MUGIMBO	IBDS	61	66	61	60	61	66	64	Y	NORM	5
200806710	MUKENDI NGALULA	E	35		33	40	35		18	N	NORM	5
200806573	MUKENYI TSHIBANGU	L	27		24	36	27		14	N	NORM	5
200729386	MUTHAMBI	UP	63	57	63	63	63	57	60	Y	NORM	5
200812336	MUTHEIWANA	DS	36		30	52	36		18	N	NORM	5
200835524	MUTOMBO	J	53	35	56	44	53	35	44	Y	NORM	5
200812242	MXALISA	M	64	58	63	68	64	58	61	Y	NORM	5
200829546	NAANE	KT	68	72	62	86	68	72	70	Y	NORM	5
200710923	NAIDOO	T	50	54	50	50	50	54	52	Y	NORM	5
200814330	NDESI	M	43	48	42	46	43	48	46	Y	NORM	5
200818936	NENGOVHELA	N	53	50	53	51	53	50	52	Y	NORM	5
200829523	NETSHITENZHE	MB	58	64	59	56	58	64	61	Y	NORM	5
200574324	NGEMA	ZN	67	71	61	85	67	71	69	Y	NORM	5
200814885	NGOMANE	TV	41	52	40	43	41	52	47	Y	NORM	5
200835196	NGUBENI	SS	78	77	80	71	78	77	78	Y	NORM	5
200825821	NGWAKO	TM	42	57	42	40	42	57	50	Y	NORM	5
200829397	NGWENYA	JB	64	67	66	56	64	67	66	Y	NORM	5
200582155	NGWENYA	LN	62	62	59	69	62	62	62	Y	NORM	5
200829531	NJIJI	MR	32		33	28	32		16	N	NORM	5
200807676	NKAMBULE	NE	60	66	58	67	60	66	63	Y	NORM	5
200674261	NKONE	TN	70	55	70	70	70	55	63	Y	NORM	5
200801646	NKOSI	NP	50	58	50	51	50	58	54	Y	NORM	5
200835286	NKWANYAMA	NW	37	34	40	29	37	34	36	N	NORM	5

200829206	NONYANE	MP	56	66	55	58	56	66	61	Y	NORM	5
200824109	NQUBUKA	B	60	63	55	74	60	63	62	Y	NORM	5
200829687	NTOMBELA	NC	48	51	50	43	48	51	50	Y	NORM	5
200825870	NTOMBELA	PS	57	58	57	56	57	58	58	Y	NORM	5
200802267	NXUMALO	KL	76	74	79	68	76	74	75	Y	NORM	5
200835512	PADAYACHEE	K	51	62	44	72	51	62	57	Y	NORM	5
200729724	PHAKISI	ST	59	52	59	59	59	52	56	Y	NORM	5
200806648	PHETO	T	39	51	43	26	39	51	45	N	NORM	5
802049358	PHILLIPUS	JA	52	47	58	35	52	47	50	Y	NORM	5
200829465	PHIRI	NG	55	58	56	53	55	58	57	Y	NORM	5
200835349	PHOKOMPE	LC	43	51	40	50	43	51	47	Y	NORM	5
200835494	PLAATJIE	A	44	48	41	51	44	48	46	Y	NORM	5
200823988	POOE	PR	36		32	49	36		18	N	NORM	5
200821959	RAITO	KT	73	62	72	75	73	62	68	Y	NORM	5
200822177	RAMATAPA	CS	60	61	59	61	60	61	61	Y	NORM	5
200829217	RAMOTANDA	NJ	20		20	20	20		10	N	NORM	5
200821690	RATAU	SPM	34		29	47	34		17	N	NORM	5
200821516	SEFOKA	ME	62	67	62	63	62	67	65	Y	NORM	5
200825858	SEKELE	SS	39		37	44	39		20	N	NORM	5
200801778	SEKWADI	IO	47	45	43	59	47	45	46	Y	NORM	5
200801362	SHABALALA	NS	57	50	56	61	57	50	54	Y	NORM	5
200831082	SHABANE	TQ	54	58	49	68	54	58	56	Y	NORM	5
200809979	SHELLARD	RJ	71	78	64	92	71	78	75	Y	NORM	5
200826440	SIBANDA	MT	80	72	81	77	80	72	76	Y	NORM	5
200835542	SIBANYONI	PBP	51	56	49	58	51	56	54	Y	NORM	5
200825851	SIBIYA	SP	49	51	45	59	49	51	50	Y	NORM	5
200825740	SIBIYA	Y	43	51	40	53	43	51	47	Y	NORM	5
200820662	SIBOTO	Z	61	51	58	71	61	51	56	Y	NORM	5
200835587	SITHOLE	JF	53	62	51	60	53	62	58	Y	NORM	5
200813262	SITHOLE	NQ	51	54	49	57	51	54	53	Y	NORM	5

200829343	SITHUGA	T	34		33	38	34		17	N	NORM	5
200823761	SIWUNDLA	LN	67	63	66	70	67	63	65	Y	NORM	5
200816663	SOKHELA	WZ	56	71	58	51	56	71	64	Y	NORM	5
200807071	STANDER	AH	69	62	68	71	69	62	66	Y	NORM	5
200671463	TAPALA	ID	38		31	58	38		19	N	NORM	5
200809524	THUO	K	64	52	71	41	64	52	58	Y	NORM	5
200807067	TJABANE	TR	67	72	67	68	67	72	70	Y	NORM	5
920107682	TLAKA	RI	61	65	62	57	61	65	63	Y	NORM	5
200729451	TLHABYE	T	32		32	32	32		16	N	NORM	5
200814824	TLHAPANE	OV	61	62	67	44	61	62	62	Y	NORM	5
200829334	TLHAPI	K	73	64	68	88	73	64	69	Y	NORM	5
200671587	TLHOAELE	N	46	43	46	46	46	43	45	Y	NORM	5
200508911	TLOUBATLA	TA	44	45	44	44	44	45	45	Y	NORM	5
200806983	TSHIBANGU MASENGU	J	67	76	64	76	67	76	72	Y	NORM	5
200600801	UOANE	KJ	64	64	62	68	64	64	64	Y	NORM	5
200805877	VAN NIEKERK	LZE	60	70	51	86	60	70	65	Y	NORM	5
200817187	VIKISI	PT	52	51	53	50	52	51	52	Y	NORM	5
200706115	VILAKAZI	BJ	61	59	61	61	61	59	60	Y	NORM	5
200835399	VOOI	A	32		35	23	32		16	N	NORM	5
200807340	XULU	TC	57	62	59	51	57	62	60	Y	NORM	5
200829533	YENDE	BC	48	57	46	52	48	57	53	Y	NORM	5
200817804	YENDE	KA	70	63	66	81	70	63	67	Y	NORM	5
200607286	ZITHA	SM	58	61	59	55	58	61	60	Y	NORM	5
200835458	ZONDI	SB	38		35	48	38		19	N	NORM	5

Signatures: _____ _____ _____

	EXAMINER	MODERATOR	HOD
Name:	G Barlow-Jones	S Buckley	L Labuschagne
Date:	15-Jun-08		

Annexes