Use of information and communication technologies (ICTs) by postgraduate students and academic staff for teaching and learning at the University of KwaZulu-Natal

By

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(BIS and DIPLADS)

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Dedication

TO GOD BE THE GLORY, GREAT THINGS HE HAS DONE.

"Great is His faithfulness, morning by morning new mercies I see. All I have needed, His hand has provided. Great is the faithfulness of the Lord unto me."

and

To all Grey's Hospital Urology Department doctors, who have been by my side throughout the period while I was struggling for my life; without knowing, they have always inspired me and given me the strength to move on.

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Abstract

The application of information and communication technologies (ICTs) is changing the organization and delivery methods of higher education. The pedagogical and socio-economic forces which have driven higher learning institutions to adopt and incorporate ICTs in teaching and learning include greater information access and better communication and learning. ICTs are being used to support pedagogic practices that provide learning environments that are more learner, knowledge and assessment-centered. Universities are thus responding to the many changes and adjusting to new demands and advancements through the incorporation of ICTs into the various aspects of their operations.

In light of the above, a study to investigate the use of ICTs for teaching and learning by academic staff and postgraduate students in the Social Science Schools of the Faculty of Humanities, Development and Social Sciences (HDSS) of the University of KwaZulu-Natal (UKZN), Pietermaritzburg, was carried out. The study's conceptual framework was drawn from Vygotsky's constructivist theory of learning which suggests that learning is achieved by the active construction of knowledge supported by various perspectives within meaningful contexts. Such meaningful contexts include the use of ICTs as tools that facilitate constructivist teaching and learning.

The study used both qualitative and quantitative methods of data collection. The former was served by the use of a survey. Two questionnaires (one for academic staff and the other for students), administered by the researcher, were used as the main data collection tools. The questionnaires contained both closed and open-ended questions. In addition to the questionnaires, a focus group interview for postgraduate students was used to collect qualitative data. To increase the reliability and validity of the data collection tools, the researcher pre-tested the questionnaires before final distribution to the study population. Sampling followed a simple random stratified method for the survey and purposive sampling for the focus group interview. The target population for the study was academic staff and postgraduate students selected from the Faculty of HDSS. A total of 173 postgraduate students responded which yielded a response rate of 92% and all 53 academic staff responded which yielded a response rate of 100% for the academic staff. Data from

the survey questionnaires was analyzed using SPSS® version 15.0 for Windows. Thematic content analysis was used to analyze the open ended questions obtained from the focus group interview.

The findings indicated that a majority of academic staff and postgraduate students used ICTs for teaching and learning. Furthermore, the study identified various ICT hardware and software which were available at UKZN for teaching and learning and whether staff and students used these ICTs to support their teaching and learning. The study's findings showed that a number of problems were experienced when using the ICTs for teaching and learning. The top three problems experienced were insufficient numbers of computers; slow network connections and poor support from the technical staff. Apart from the problems encountered when using ICTs for teaching and learning there were benefits to using the ICTs such as: ICTs facilitated communication and simplified interaction between academics and students: accessibility to learning materials was improved for students while academics considered that ICTs improved student's skills. Lectures that could be delivered online were a positive benefit for academics. Furthermore, ICTs had enabled students to use computers more effectively to support their learning.

Recommendations and suggestions to improve the use of ICTs for teaching and learning in general were made by the academic staff and the postgraduate students with regard to the findings and the literature reviewed.

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List of acronyms and abbreviations

ACTS	Association of Catholic Tertiary Students
AU	African University
BIT	Business Information Technology
BIS	Bachelor in Information Science
CD	Compact Disc
CFL	Computer Facilitated Learning
CORBIT	Control Objectives for Information and Related Technology
DIPLADS	Diploma in Library Archive and Documentation Studies
DoE	Department of Education
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DVD	Digital Versatile Disc
ECA	Economic Commission for Africa
E-journals	Electronic Journals
E-mail	Electronic mail
GDP	Gross Domestic Product
HDSS	Humanities, Development and Social Sciences
HE	Higher Education
HEIs	Higher Education Institutions
ICTs	Information and Communication Technologies
IMF	International Monetary Fund
ISPs	Internet Service Providers
IT	Information Technology
IP	Internet Provider
Kbps	Kilobits Per Second
LANs	Local Area Networks
LMSs	Learning Management System
Mbps	Megabits Per Second
MIS	Master of Information Science

NRI	Networked Readiness Index
OHP	Overhead Projector
OPAC	Online Public Access Catalogue
OLS	Open Learning System
OAU	Obafemi Awolowo University
PCs	Personal Computers
PDA	Personal Digital Assistant
PMB	Pietermaritzburg
PhD	Doctor of Philosophy
SA	South Africa
SNAL	Sokoine National Agricultural Library
SORAT	School of Religion and Theology
SSA	Sub-Saharan Africa
SPSS	Statistical Package for the Social Sciences
SUA	Sokoine University of Agriculture
TELI	Technology-Enhanced Learning Investigation
TENET	Tertiary Education Network
TDIS	Test Documentation Information System
UCT	University of Cape Town
UJ	University of Johannesburg
UK	United Kingdom
UKZN	University of KwaZulu-Natal
UKZNP	University of KwaZulu-Natal, Pietermaritzburg
UN	United Nations
UNDP	United Nations Development Programme
US	United States
WEF	World Economic Forum
WWW	World Wide Web

CHAPTER ONE: SETTING THE SCENE

1 Introduction

Today we live in the digital age known as the information society. There are tools of communication which serve as sources of information for people, organizations and academics. These tools or devices are called Information and Communication Technologies (ICTs). ICT is an umbrella term that includes any communication device or application and encompasses: radio, television, telephones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning (TechTargent 2007). ICTs can be categorized according to age. Firstly, "new" ICTs which include personal computers (PCs), satellites, wireless one-on-one communications (including cellular phones), electronic mail (e-mail) and the internet. Secondly, "old" ICTs which include radio, television, landline telephones and telegraph (SIDA 2005). ICTs have been identified as one of the most important aspects in future "social and organizational change" (Minishi-Majanja 2004a). The significance of ICTs to the functioning of universities has been well documented (Amutabi 2004). For the purposes of this study, the researcher will deal with only some of the new ICTs such as computers, e-mail and the internet.

Living in a knowledge-based society driven by the wide-spread diffusion of ICTs gives rise to the need to acquire new competencies and master new skills related to the use of ICTs. According to Newhouse (2002) ICTs are used to support pedagogic practices that provide learning environments that are more learner-centered, knowledge-centered, assessment-centered, and community-centered. Gregorian (1996) observes that the growth of knowledge has resulted in its fragmentation requiring higher and better skills of mastering and/or imparting the knowledge. The same technologies provide tools for the effective integration and management of this vast and fragmented body of knowledge. Burbules (2000) notes the mounting pressure from graduates and employers, pleading for a skills-oriented education. Real-life orientation of interdisciplinary approaches has prompted higher education institutions to adopt a greater use of the new technologies. Universities and colleges are thus responding to the many changes and adjusting to the new demands and advancements through the incorporation of ICTs into the

various aspects of their operations. According to Minishi-Majanja (2004a), ICTs affect major aspects of higher education namely, management, administration, teaching and learning.

1.1 Brief history of the University of KwaZulu-Natal and ICTs

The University of KwaZulu-Natal (UKZN) is one of South Africa's leading academic research institutions and among the top 500 universities internationally. It is spread across five campuses with approximately 40,000 students and more than 6,000 staff (UKZN 2009). In terms of networks the University has selected a comprehensive range of Novell[1] solutions with the aim of providing flexible, reliable and secure access to academic resources, administrative systems, e-mail and other services, within a very tight budget. The University's ICT division is responsible for providing technology and services to staff and students across all five campuses. The division manages an extensive and complex infrastructure, including: 150 servers in three primary data centers, 1,000 network switches (consisting of more than 20,000 network points), 11,000 networked PCs (of which 4000 are for the exclusive use of students), and nearly 200 wireless hotspots. Providing the right people with access to the right resources is a constant challenge for the division (UKZN 2009). It is with this challenge in mind that the present study investigated the use of ICTs by academic staff and postgraduate students for teaching and learning.

1.2 Statement of the problem

ICTs play an important role in institutions of higher learning because they contribute to their growth as well as towards the success of their students (Wanyembi 2002). Wanyembi (2002) pointed out that the use of ICTs in universities is increasing rapidly. However, the various ICT resources acquired by UKZN over a period, from the early 1980s to date, differ in models, ages, and other characteristics and this increases the complexity of using them for teaching and learning. The possible lack of users' (that is postgraduate students and academic staff) knowledge, skills and confidence in using ICTs, and the management of ICT resources often adds to the challenge. At UKZN many of the financial resources go towards the provision of

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[1] Software development company specializing in networking and workgroup applications. Novell started life as Novell data systems, a computer hardware business. The company was reorganized as Novell, Inc., and began to focus almost entirely on networking in 1983 (Learnthat 2004).

ICTs (as outlined above and see rationale below) and this begs the question: are these resources being used effectively and efficiently by both staff and students? (UKZN 2009).

In this regard, universities such as UKZN continue to face problems like: (i) outdated computer systems; (ii) incessant network (or internet) interruptions; and (iii) problems associated with lack of competence in terms of computer use by the users (students and staff) (Howell and Lundall 2000). It is important to ensure that ICT facilities are functionally accessible and effectively used in teaching and learning at the university. It is this issue which the proposed study attempts to respond to. To do so, the study investigated the use of ICTs by academic staff and postgraduate students and for teaching and learning at the University of KwaZulu-Natal.

1.3 Research questions

The following research questions were identified for this study:

- What ICT facilities are available for teaching and learning at UKZN?
- What potential role can ICTs play in both teaching and learning?
- How are students and academic staff at UKZN utilizing ICTs in their teaching and learning?
- What challenges are faced by staff and students when using ICTs at UKZN?

1.4 Broader issues investigated

Any discussion of ICTs in a developmental context, such as South Africa, necessitates an examination of the 'digital divide'. It is this 'broader issue' of the digital divide which will be briefly examined here - in both a general, and then more specifically, in a higher education context. There are various definitions of the digital divide and each has a different emphasis. Some emphasize access or lack of access to the internet, while others put an emphasis on the entire spectrum of ICTs. In the study the emphasis will be on both definitions of the digital divide and technological literacy. Fuchs and Horak (2008) define the digital divide as:

… unequal patterns of material access to usage capabilities of, benefits from computer-based information-and communication technologies that are caused by certain stratification processes that produce classes of winners and losers of the information society, and participation in institutions governing ICTs and society.

To understand the digital divide in Africa, we have to look at the term 'global digital divide.' James (2004:45) defines the global digital divide as "the noticeably differential extent to which rich and poor countries enjoy the benefits of information technology" and as "the unequal distribution of computers, Internet connections, fax machines and so on between countries". Norris (2001) suggests that the global digital divide is mainly an aspect of the economic divide because it is concerned with the difference in access to and usage of ICTs between rich and poor countries. Poor countries are those endowed with little economic capital, and people there are much less likely to be able to access ICTs, to know how to use them, and to benefit from their usage (Fuchs and Horak 2008:102).

Norris (2001) describes the digital divide as a multidimensional phenomenon and distinguishes between the global digital divide, the social divide, and the democratic divide. Norris (2001) adds that, the social divide includes the income gap, which makes a difference between those who can afford a computer and internet access and those who cannot. For Wilson (2006) there are eight aspects of the digital divide: physical access, financial access, cognitive access, design access, content access, production access, institutional access, and political access. Wilson (2006) relates these eight aspects to six demographic dimensions of the digital divide: gender, geography, income, education, occupation, and traditions, all of which involve challenges which face the African continent.

From the above descriptions, it is clear that the digital divide describes the gap, caused by various factors, between those who have access and those who do not have access to the following: appropriate information content; computer facilities; computer literacy skills; information literacy and use skills; internet facilities and telecommunication facilities (phone, fax, and so forth) (UNCTAD 2006). The above are becoming essential, in terms of being technologically literate, a competency required by, and expected of, both academic staff and postgraduate students. In Africa most higher learning institutions are faced with technological illiteracy (Fuchs and Horak 2008). In this regard Peters (2003) states that in these institutions the digital divide is not a single thing, but a complicated patchwork of varying levels of ICT access, basic ICT usage and ICT applications. Chisenga (2001) points out that "For the majority of people on the continent, access to ICTs will be meaningless unless they are able to use the

technologies and access content that is appropriate and relevant to their needs". His observation applies equally to academics and postgraduate students in higher learning institutions. Chisenga's point does not stop at observation alone but issues a challenge to academic staff who seek to integrate technology into their teaching but are faced with a lack of technological expertise and pedagogical preparation. As Budin (1999 cited by Juniu n.d) indicates,

> … academics often feel overwhelmed by the double challenge of keeping abreast of a rapidly changing technological environment on the one hand, and, of finding academic strategies that allow for technology to be effectively integrated with their course content, on the other.

Moreover, in relative isolation from the academic staff who face this challenge in their teaching, university administrators and information technology (IT) departments struggle to provide the most appropriate resources to support lecture hall integration (Juniu n.d).

Although the digital era has bridged some of the gaps between those who have access and skills to use technology and those who are just spectators of a digital world, Milliron and Miles (2000) cited by Juniu (n.d), argued that it has also emphasized these differences and created unequal distribution and access to technological knowledge. The authors argue that a key problem that higher education faces today is that the use of sophisticated technologies brings the need to rely on the IT department's technological expertise, creating an uneven relationship. However, Juniu (n.d) notes that higher education institutions show their commitment to the transforming uses of technology by providing technical and design support as well as the technological infrastructure to support teaching, learning and administrative activities. Furthermore, academic staff do not only depend on IT staff for technological support but also face pressures from the higher education sector to demonstrate the role of technology in supporting positive, reliable, and cooperative learning (Juniu n.d).

1.5 Rationale for the topic

According to Bingimlas (2009) the use of ICTs in education is very important for providing opportunities for both students and lecturers to operate in an information age. ICTs, particularly the internet and its applications (the most well known being the World Wide Web (WWW) and

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e-mail), in providing wide access to information and new instructional possibilities are changing the teaching and learning process. With the development of sophisticated information technologies, the future of universities depends on their capability to participate fully in the information society and meet the needs of an ever more demanding professional market (Hoskins 2002:30). The University of KwaZulu-Natal, like many other academic institutions worldwide, has made significant investments in ICT resources such as computer software and hardware, internet infrastructure, ICT staff and accompanying computer-based technology to ensure access to the resources.

It was the intention of this study to establish if these ICT resources were being put to maximum use by both students and staff to justify the expense. In terms of use, Minishi-Majanja (2004b) states that the competence of academic staff and students in using ICTs can be a constraint and extra training often needs to be organized, to provide both ICT literacy and more advanced skills. Minishi-Majanja (2004) added that the ICT infrastructure both at an institutional and national level is also inadequate in most African countries, thus affecting internet connectivity, information traffic and general access to the full range and power of ICTs. Knowing the problems associated with the use of ICTs in higher institutions of learning may assist to overcome these challenges and thus ensure that the institutions become successful technology adapters and users in the future (Bingimlas 2009).

In South Africa, much of the discourse on using ICTs in Higher Education (HE) teaching and learning seems to focus on access to technology; that is, on the availability of computers, the internet and bandwidth rather than on the way ICTs are being used in support of teaching and learning. Mostert and Quinn (2009) add that in many contexts this focus on access has resulted in pedagogically poor applications of technology where ICTs are only used in transmitting lecture or seminar notes for teaching and learning. While, various studies have been done in other contexts, both in South Africa and internationally, little is known about the use of ICTs for teaching and learning at the University of KwaZulu-Natal's Pietermaritzburg campus. Thus, the present study would be of significance in raising awareness of various aspects of ICT usage by academic staff and students on the Pietermaritzburg campus.

1.6 Conceptual framework

This study draws mainly from Vygotsky's constructivist theory of learning. Among the theories of learning that have the greatest influence today are those based on constructivist principles (Duffy and Cunningham (1996 cited by Tinio 2002). Constructivist principles state that learning is achieved by the active construction of knowledge supported by various perspectives within meaningful contexts. In constructivist theory, social interactions are seen to play a critical role in the processes of learning and cognition (Vygotsky 1978). The guiding principle of constructivist learning theories is the students' own active initiative and control in learning and personal knowledge construction, which is referred to as the self-regulation of learning. The student does not passively take in knowledge, but actively constructs it on the basis of his/her prior knowledge and experiences (Huitt 2009). From the pedagogical point of view, the students' learning activities should be directed at examining their own prior conceptions and regulating it to the new knowledge.

The learning environment should provide students with opportunities to test and try out their new conceptual understanding in various applied circumstances, like problem solving. Constructivism can therefore be contrasted with objectivism, the traditional view that knowledge is an external entity with an absolute value which can be transferred from lecturer to student (Duffy and Jonassen 1992). The strengths of constructivism lie in its emphasis on learning as a process of personal understanding and the development of meaning in ways which are active and interpretative. In this domain, learning is viewed as the construction of meaning rather than as the memorization of facts.

Learning approaches using contemporary ICTs provide many opportunities for constructivist learning through provision and support for resource-based, student-centred settings and by enabling learning to be related to context and to practice. However, ICT tools are not static and continue to be re-approached as their use within different communities evolves (Sutherland *et al.,* 2004). Without efficient and effective application of ICT tools the learning and teaching outcomes are most likely to be impaired. ICTs provide both academic staff and postgraduate students with a means to easily capture, manipulate and re-organize information as they construct, exchange and test ideas (Jonassen 2000). Hence, providing opportunities for academic

staff and postgraduate students to interact with others as they engage in teaching and learning with ICTs could contribute to improving the quality of the learning (Lincoln 2009). Furthermore with the benefits of using ICTs in teaching and learning both academic staff and postgraduate students need to examine the perceptions or beliefs they hold about teaching, learning and technology (Lincoln 2009).

In the past, the conventional process of teaching and learning has revolved around lecturers planning and leading students through a series of instructional sequences to achieve a desired learning outcome. Typically, these forms of teaching have revolved around the planned transmission of a body of knowledge followed by some forms of interaction with the content as a means to consolidate the knowledge acquisition. As mentioned, any use of ICTs in teaching and learning settings can act to support various aspects of knowledge construction. As more students employ ICTs in their learning processes and as more staff do so in their teaching processes, the more pronounced the impact of this will become (Jonassen 2000).

1.7 Delimitations of the study

Firstly, six Social Science Schools, which are part of the Faculty of Humanities, Development and Social Sciences on the Pietermaritzburg (PMB) campus were selected. Secondly, due to time constraints and the nature of the study this study only included postgraduate students (Diploma, Honours, Masters and PhD) and the academic staff of the selected Schools. The results of the study should be able to assist the Faculty in the use of ICTs for teaching and learning by staff and students.

1.8 Definition of the terms

For the purpose of this study the terms are defined as follows:

Academic staff: personnel whose primary assignment is instruction, research, or public service. This includes staff personnel who hold an academic rank with titles such as professor, associate professor, assistant professor, instructor, lecturer, or the equivalent of any of these academic ranks (OECD Glossary of Statistical Terms 2003). In this study all ranks mentioned above are targeted

E-learning: the business of providing courses on the internet for students so that they can study and learn at home (Cambridge Advanced Learner's Dictionary 2010). For the purpose of this study, e-learning will be applicable only for students to access lecture notes from their respective lecturers and/or Schools and use them for their learning.

Use: According to Abbott (1989:15) use is a complex term that has a wide range of meanings and is very difficult to define. The *Collins Concise English Dictionary* (McLeod and Hanks 1982) defined 'use' as the "state of making practice or habit of employing; exercise". It is further defined as a means of accomplishing a purpose or achieving a result. Pearsall (1998: 2038) cited by Shezi (2005) defined 'use' as to put into service or action; employ for a given purpose. The Oxford Advanced Learner's Dictionary (1986:4211) has described 'use' as, "to do something with a machine, an object, and a method etc. for a particular purpose". These dictionary definitions do not adequately explain the meaning in this particular context.

The term 'use' in the context of this research was the ability to operate the ICT tools efficiently to enable the academic staff and the postgraduate students to construct their own knowledge in order to gain new skills.

ICTs: Information Communication Technologies (ICTs) are used for accessing, gathering, manipulating, interpreting or communicating information. In this particular study this includes all types of computer-based software and tools used for teaching and learning and only assumes the existence of the hardware and network infrastructure required to utilize these tools. Thus ICTs are a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information". These technologies include computers, the internet, broadcasting technologies (radio and television), and telephony. This study will also include teaching and learning software such as Moodle, Open Learning System (OLS), Novell and Turnitin (WIKIBOOKS 2010).

Postgraduate: a student who has already got one degree and is studying at a university for a more advanced qualification (Cambridge Advanced Learner's Dictionary 2010). For the purpose

of this study they were students who had obtained their first degree and were doing either a Postgraduate Diploma, Honours, Masters or Doctorate (PhD).

Learning: is a process of active engagement with experience of acquiring new knowledge, behaviours, skills, values, preferences or understanding, and may involve synthesizing different types of information. In this study learning was considered to be for both postgraduate students and academic staff, simply because this knowledge is what one obtains from experience, practice and studying (Vygotsky 1978).

Teaching: To impart knowledge of or skill in or to give instruction in (Dictionary.com 2010).

Teaching and learning: The term teaching and learning refers to face-to-face, practical, clinical, field and work-based and technology-delivered activities, distance education and open and flexible learning and on-shore and off-shore provision (Macchiusi 2001). For the purpose of this study the terms teaching and learning are used by both academic staff and postgraduate students.

1.9 Overview of the study

Chapter One introduces the study, research problem, reasons for choosing the topic, research questions, delimitations, definition of key terms and theoretical framework. Chapter Two is comprised of the literature review related to the proposed study. Chapter Three raises the issue of the research methodology and the research methods used, which include the research approach, population, sampling, data collection and data analysis. Chapter Four presents the research results from the academic staff and postgraduate students' questionnaires and focus group session. Chapter Five discusses and analyzes the findings of the study. Chapter Six concludes the study and makes recommendations.

1.10 Summary of the chapter

This chapter provided an introduction to the study by presenting a brief background to the study, an outline of the research problem, reasons for choosing the research topic, the broader issues that were investigated, definition of the key terms relevant to the study, the conceptual

framework which guided this study, the research questions which were asked as well as the delimitations of the study.

CHAPTER TWO: LITERATURE REVIEW

2 Introduction

This chapter discusses the literature on the use of ICTs for teaching and learning at higher education institutions. Related studies conducted outside and in Africa were reviewed. The reasons were to establish the need for this kind of research and to acquaint the researcher with methodologies that have been used by related studies to find answers to research questions similar to the ones investigated in this study.

Neuman (2006:111) observes that the literature review is based on the assumption that knowledge accumulates and that people learn and build on what others have done. Trochim (2001:27) noted that a review of the literature is important because it enables the researcher to acquire an understanding of the topic, identify related research and place the work in the context of what has already been studied. The main purpose of the literature review is to determine what has already been done in relation to the research problems being studied. According to Mugenda and Mugenda (2003:29) a literature review helps the researcher avoid unnecessary and unintentional duplication and demonstrates the researcher's familiarity with the existing body of knowledge on the subject. Reading the literature helps the researcher focus on significant issues and variables that have a bearing on the research question. The literature review should highlight pertinent literature and contribute to the field by providing an original and focused reading of similar studies. "A literature review involves identifying relevant literature or sources of relevant information (bibliographic access), physically accessing the most relevant literature (document delivery), reading and analyzing these works" (Kaniki 2006:22).

Different studies have been done on the use of ICTs for teaching and learning at higher learning institutions internationally and locally. The United Nations Development Programme (UNDP) (cited by Minishi-Majanja 2004a:66) observes that the development of scientific research networks using the internet has helped to empower research programmes even in developing countries. Research processes in higher education have been enhanced by the ICT environment

that enables researchers to co-ordinate research information and collaborate in research activities. For instance:

> … virtual research groups - composed of interconnected specialists of different parts of the world - allow databases to be shared, conferences to be organized, papers to be circulated and discussed, and collaborative research and reporting to be undertaken (Mugenda 2006:4).

ICTs have an impact on all aspects of the teaching, learning and research provision within institutions. The importance of ICTs (and their potential impact) means that they cannot be marginalized or their use considered in isolation (Conole *et al*. n.d).

2.1 ICTs in higher education and their importance

Macchiusi (2001) observes that the future of technology in higher institutions of learning is a kind of mixed learning experience in which technology supplements, not supplants, both the content and the discourse that have been part of the traditional experience of going to university. ICTs have transformed higher education by providing greater access to new frontiers of learning and a richer content. Through the growing demand by graduates and employers, who want skills-oriented, interdisciplinary education, higher education has embraced the power of ICTs in order to improve accessibility, quality and efficiency of its services and products. Countries have to take advantage of the potential of ICTs, especially developing countries, that wish to accelerate their social and economic development (Mushi and Le Roux 2008). According to Mostert and Quinn (2009) many developing countries have regarded ICTs as the solution to a range of educational problems. In South Africa, much of the discourse on using ICTs in Higher Education (HE) teaching and learning, however, seems to focus on access to technology; that is, on the availability of computers, the internet and bandwidth, rather than on the way ICTs are being used in support of teaching and learning. Mostert and Quinn (2009) add that, in many contexts this focus on access has resulted in pedagogically poor applications of technology where ICTs are only used in transmission modes of teaching and learning. James, T. (2004) pointed out that ICTs can contribute to new pedagogical methodologies thereby enhancing learning and teaching particularly in the context of the education crisis in Africa. Moreover, ICTs have been known to improve students' learning as they facilitate improved motivation, learning by trial and error,

practical experience, self-paced learning, concretization of abstract concepts and better retention of lessons (Gunasekaran, McNeil and Shaul 2002:2). Gunasekaran, McNeil and Shaul (2002:2) added that, ICT-mediated learning can facilitate sophisticated and customized performance simulation suitable for vocational training programmes. Its advantages include: user satisfaction derived from higher ICT utilization, exploitation and maintenance, higher productivity levels derived from ICT utilization, exploitation and maintenance and higher levels of achievement of universities objectives. ICTs are used to support pedagogic practices that provide learning environments that are more learner-centred, knowledge-centred, assessment-centred, and community-centred (Wanyembi 2002).

According to Vilakazi (2006) the use of ICTs in lecture halls is important since lecturers should view it as a means of learning how ICT tools can enhance teaching and learning. Secondly, the knowledge of ICTs in education enables academic staff to decide how to deliver learning in an interesting way. Thirdly, academic staff should be able to engage in discussions on how ICTs can benefit education and even suggest how it 'could' and 'should' be used. This will enable lecturers to discover, explore and exploit the value that computers can offer in their day-to-day teaching, as well as in their professional and personal activities. This is achieved when lecturers engage in designing learning packages that learners can use to support their learning, and in so doing, transfer their knowledge and skills. In these designs, learning theories, philosophies of learning, learning styles and instructional design principles related to the use of ICTs are applied. According to Jonassen and Reeves (1996), the use of ICTs in an educational location acts as a catalyst for change because it provides opportunities to shift from academic staff-centred to student-centred learning. ICTs by their very nature are tools that encourage and support independent learning. Students using ICTs for learning purposes become immersed in the process of learning. As more and more students use computers as information sources and cognitive tools, the influence of technology on supporting how students learn, will continue to increase (Oliver 2002). Thus academic staff and postgraduate students no longer have to rely solely on printed books and other materials in physical media housed in libraries for their educational needs. With the internet and the WWW, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many higher

learning institutions in developing countries, and even some in developed countries, that have limited and outdated printed library resources. ICTs also facilitate access to resources, mentors, experts, academicians, researchers, professionals, business leaders, and peers all over the world (Tinio 2003).

Several studies argue that the use of new technologies in the lecture room are essential for providing opportunities for students to learn to operate in the information age. It is evident, as Yelland (2001 cited by Bingimlas 2009) notes that traditional educational environments do not seem to be suitable for preparing students to function or be productive in the workplaces of today's society. She claims that institutions that do not incorporate the use of new technologies cannot seriously claim to prepare their students for life in the twenty-first century. This claim is supported by Grimus (2000 cited by Bingimlas 2009:236) who pointed out that by teaching ICT skills in the higher learning institutions, students are prepared to face challenges in the future with regard to ICTs. In the same manner, Bransford *et al.* (2000) reported that what is now known about learning provides important guidelines for the uses of technology that can help students and lecturers develop the competencies needed for the twenty-first century. Kunaefi (2007:8) divulges that ICTs are undeniably instrumental in promoting teaching and learning activities in higher learning institutions. It could solve problems pertaining to quality, equity, and access to higher education. ICTs could also promote resource sharing and therefore improve efficiency and productivity while at the same time open access to worldwide resources of knowledge and information. Having introduced the chapter the next section will discuss the general use of ICTs in teaching and learning.

2.2 ICTs in teaching and learning

Information technologies have been seen as a resource to help fulfil the university education mission. Nowadays, different areas of learning, science and technology are making far more use of information technologies (Hoskins 2002:31). Morales and Roig (2002 cited by Mushi and Le Roux 2008) note that integration of new technology in teaching and learning is said to be a significant factor in the promotion of academic innovation and transformation, hence influencing the teaching and learning paradigm. The authors further explain that there is a learning paradigm which requires university students to have skills in instructional technology, in addition to their

subject matter expertise. Mostert and Quinn (2009) have cautioned against the use of ICTs without a conceptual framework or without a clear understanding of why and how ICTs will contribute to students' learning. These insights have led some Higher Education Institutions (HEIs) to realizing that pedagogically sound integration of ICTs in lecturers' teaching requires more than technical support; it also needs professional development for lecturers to use ICTs in their teaching and learning. Mushi and Le Roux (2008) note that academic staff need to be aware of, and use a variety of learning styles such as active learning, learning to learn, collaborative learning, problem-solving and role playing, which are easily facilitated by ICTs.

Academic staff ought to adjust their instructional methods and/or pedagogy to match the growing demand for the use of ICT-based tools in the technological age. This includes learning how to develop courseware to enhance an increased use of ICT integrated instructional devices that: (i) foster greater hands-on learning; (ii) promote tutorial software or courseware applications for the variety of different courses taught at the university; and (iii) create quality assurance in terms of excellence. Lecturers should also support students by providing relevant course materials, flexibly structured and arranged in modular form. Tinio (2002) noted that ICTs can motivate learning in the form of videos, television and multimedia computer software that combine text, sound, and colourful, moving images. This can be used to provide challenging and authentic content that will engage the student in the learning process. Interactive radio, likewise, makes use of sound effects, songs, dramatizations, comic skits, and other performance conventions to compel the students to listen and become involved in the lessons being delivered. More than any other type of ICT, networked computers with internet connectivity can increase learner motivation as they combine the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events. Wong *et al.* (2006 in Bingimlas 2009) add that technology can play a part in supporting face-to-face teaching and learning in the lecture room. Many researchers and theorists assert that the use of computers can help students to become knowledgeable, reduce the amount of direct instruction given to them, and give lecturers an opportunity to help those students with particular needs (Bingimlas 2009).

While ICTs can help lecturers enhance their pedagogical practice, they can also assist students in their learning process, as mentioned earlier. According to Crabe and Grabe (2006) ICTs can play

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an important role in improving students' learning skills, knowledge and motivation. Higgins (n. d: 5) noted that there is evidence from research that ICTs can help students to learn and lecturers to teach more effectively. However, there is no simple message in such substantiation that ICTs will make a difference by simply being used. Even though ICTs can improve learning there are a number of issues that need to be considered if such technology is going to make a difference.

Jonassen and Reeves (1996) support Higgins (n.d) by noting that the use of ICTs in an educational setting, by itself acts as a catalyst for change. ICTs, by their nature, are tools that encourage and support independent learning. Thus students using ICTs for learning purposes become immersed in the process of learning as more and more students use computers as information sources and cognitive tools. Oliver (2002) is of the view that the influence of the technology on supporting how students learn will continue to increase. The greatest integration of ICTs occurs when process and content are addressed simultaneously. Both academic staff and postgraduate students are more likely to enhance a particular pedagogical task that requires problem solving approaches with respect to both process and content. Such approaches encourage cross programme inquiry-based activities (Downes *et al.* 2001).

2.2.1 The impact of ICTs on teaching and learning

The following sections describe particular types of learning that are gaining importance in universities and higher institutions of learning worldwide. In the past years educational institutions have provided little choice for students in terms of the method and manner in which programmes have been delivered. This section also points out the benefits of ICTs in teaching and learning. Students have typically been forced to accept what has been delivered and institutions have the propensity to be quite traditional in terms of the delivery of their programmes. ICT applications provide many options and choices and many institutions are now creating competitive edges for themselves through the choices they are offering students. These choices extend from when students can choose to learn to where they learn. The concept of flexibility in the delivery place of educational programmes is not new (Moore and Kearsley 1996). Technology is influencing and supporting what is being learned in universities, so it is supporting changes to the way students are learning. Moreover, moves from content-centred curricula to competency-based curricula are associated with moves away from lecturer-centred

forms of delivery to student-centred forms. Through technology facilitated approaches, contemporary learning settings now encourage students to take responsibility for their own learning (Oliver 2002). Students have become very comfortable in learning through transmissive modes in the past. The growing use of ICTs as an instructional medium is changing and will probably continue to change many of the strategies employed by both lecturer and students in the learning process (Oliver 2002).

Crown (2007) stated that, despite the fact that much progress has been made in recent years in terms of the impact that ICTs have had on learning and teaching, quality exists only in isolated pockets. There has been a general improvement across all sectors but the overall impact of the adoption of ICTs in learning and teaching does not reflect its potential. Thus very few learning organisations have carried out a comprehensive or systematic evaluation of the extent of improvements in learner motivation and engagement through the use of ICTs. Therefore, teaching staff use an insufficiently wide range of ICT-based teaching approaches to maintain and increase students' motivation. Additionally, more than a few teaching staff in higher learning institutions do not value or recognize the role of ICTs in enhancing a broader range of learning for life, society, culture and personal development than is typical in the formal taught curriculum (Crown 2007). ICTs provide new opportunities for education since they enhance learning and teaching, and facilitate collaboration, innovation and creativity in academics. The benefits of deploying ICTs for learning depend on the learning approach used, emphasizing the role and the skills of the lecturers and the need for supportive settings for both postgraduate students and academic staff (Ala-Mutka, Punie and Redecker, 2008). Vilakazi (2006:338) states that the use of ICT in teaching and learning is an innovation, but if ICTs are not supported "it is bound to fail".

According to Baldwin (1998) cited by Macchiusi (2001:64) technology is gradually transforming higher education and the work of the academic profession. Electronic communication (e-mail) is perhaps the most widely used of the ICTs in the higher education sector. Academic teaching staff are replacing office contact hours by making themselves available through the use of email and bulletin boards. E-mail facilities enable the instructor to communicate with their students, and students are able to communicate with each other. List serves can be created by instructors using

e-mail. This allows discussions to occur between the participants who are part of the list. E-mail also enables academic staff and postgraduate students to send files electronically, hence students are able to submit various drafts and final assignments electronically (Macchiusi 2001). Additionally, Bates (2000 cited by Macchiusi 2001), notes that the use of electronic communication for most academic staff increases their contact with students, which although of real benefit to students, can cause work overload for academic staff. The benefit of ICTs for students, at least according to the enthusiasts, is that it will help transform learners from being passive and uncritical receptacles of past knowledge into being active and creative learners, ready to take responsibility for the future (Macchiusi 2001). The benefit of ICT for academic staff is that it will allow them to interact more freely and collaboratively with students to foster social change. ICT networks offer the possibility of greater professional development in the form of the immediate sharing of research and theoretical discourse anywhere in the world. Collegiality is fundamental to the profession of education, especially at the university level, and ICTs have already created vast networks of academic staff that span the world (Wang 2009:208). The impact of ICTs on teaching and learning cannot be considered without examining the concept of information literacy.

2.2.2 Computer literacy

According to Kuhlthau (1990:16) computer literacy is an understanding of what computer hardware and software can do as well as a certain competence in using computers. In order for academic staff and postgraduate students to be termed computer literate, they need to be capable of utilizing computers flexibly, productively and persistently. According to Newhouse (2002) the fundamental definition of computer literacy concerns people being able to use computer technology to facilitate the completion of necessary tasks and the solution of problems presently associated with their lives. This probably implies that a person also possesses positive attitudes about the future use of computers in order that he/she remains computer literate. Computer literacy then, is concerned with the way in which a person sees the computer fitting into their life now and in the future. It involves building up a series of useful concepts about computers so that a person who wants to use one knows how to use it in a useful and appropriate manner.

Isaac (2002:27) is of the view that, computer literacy encompasses being capable of identifying what task one needs to accomplish, as well as determining whether a computer will help in achieving that particular task. Johnson and Eisenberg (1996) argue that "true computer literacy is achieved when students incorporate their individual computer skills within an information problem-solving process". Moreover when people use computers to help them complete tasks which they regard as problems, they are then likely to have a more positive attitude towards the use of computers, and are likely to look for further tasks which can be completed using a computer. If however, people use a computer to complete what they regard to be an unnecessary task or in using the computer, the task is made more difficult or less satisfying, then they are less likely to use computers in the future (Newhouse 2002). Despite the benefit of computer literacy a discouraging challenge is the fact that many of the academic staff in the profession are not computer literate (Minishi-Majanja 2007). This not only hinders their own efforts to retrieve and utilize this important information resource for teaching purposes, but also prohibits them from assisting or teaching the students in using the technology effectively. Normally, when the lecturer is not computer literate, the students are also barred from using the available computers, thus rendering them useless educational tools (Mostert and Nthetha 2007:39).

Assisting academic staff to integrate technology into their teaching and learning is the single most important information technology issue confronting an organization (Macchiusi 2001). It can be argued that the computer enables a much richer exploration of experience, but demands a high level of competence on the part of the lecturers to enable students to fully benefit from this experience. Academic staff require skills to initiate, organize and evaluate, and often need to be prepared to change while still being critical of the use of technology such as computers. It is likely that without substantive long-term change, computers will become an expensive way of 'doing the same thing'. So academic staff need to develop the ability to judge whether or not a particular piece of software will provide the learning claimed by the publishers and whether this learning is relevant to their lecture halls and curriculum. Academics need to determine the situations in which the computer is best able to support their programme of instruction, considering short and long term goals (Newhouse 2002:36). The next section will provide a brief discussion of the factors influencing the use of ICTs for teaching and learning.

2.3 Factors negatively influencing the use of ICTs for teaching and learning

There are a number of factors which determine the level and quality of use of ICTs in teaching and learning at higher learning institutions. These factors are explained generally and will be elaborated on in more detail later in the literature review. The literature suggests some of the main pedagogical and economical forces that have driven the push for universities to adopt and incorporate ICTs in teaching and learning. Macchiusi (2001) claims that the WWW has made it possible to access primary sources of information on demand. Mastery of this tool has become essential in order to gain access to an ever growing body of recent and up-to-date knowledge available electronically. The rate of job change has also caused a rethinking of the skills required for lifelong learning, such as the skilful use of ICTs. The potential is there for these new ICTs to attract a more competitive market, thus making the institution a more financial and viable entity. According to Crown (2007), policy and planning are significant in identifying the aims of using ICTs in education and in influencing priority and resources. Education authorities and the centres for which they are responsible have key tasks related to enabling, implementing and monitoring the use of ICTs for learning and teaching.

Improvements in ICT infrastructure and resources to support learning and teaching, have increased the potential availability of ICTs for learning and teaching. Nevertheless, there remains much room for improvement in effective access to ICTs for learning and no consistent pattern of use is emerging. Effective use of ICTs by postgraduate students and academic staff demands that they can interact with ICT-based learning and teaching materials in such a way that the students' education benefits. Issues around this area include user accounts, personal file storage, communication tools such as e-mail and discussion debates, and the storage of and access to appropriate software and ICT-based learning and teaching materials (Crown 2007). As indicated earlier, the confidence and competence of academic staff in the use of ICTs is a key determinant in the effective use of ICTs for teaching. Many teaching or academic staff use ICTs regularly in their teaching. In more than a few cases, they use it in a way that enriches their teaching, for example, through the use of animations, simulations and online video, as well as appropriate use of internet sites. However, according to Crown (2007) the levels of confidence and competence of teaching staff are not sufficient enough to enable them to make effective use of ICTs in their teaching. The institution's level and quality of technical support is very important in maintaining

the confidence of students and academic staff in the reliability of access to equipment and software. Where this support is prompt and effective, students and academic staff do not hesitate in planning for the use of ICTs in their teaching and learning. Where the level of technical support is poor, user confidence regarding reliable access falls, and postgraduate students and teaching staff make far less plans to use ICTs (Crown 2007). The use of ICTs will become inevitable in institutions of higher learning and their successful installation will depend on strategic partnerships between such institutions (Wanyembi 2007:10). Policy is extremely important in any institution and organization, therefore the next section will provide a brief discussion of ICT policy in institutions of higher learning.

2.4 ICT policy in institutions of higher learning

This section explains the importance of ICT policy as a blue-print for direction in any organization, and in institutions of higher learning. According to Bassi (2009: 25)

> Policy is a set of principles or a broad course of action that guides the behaviour of organizations, institutions, governments, corporations and individuals. It bridges the gap between the vision of any organization and its desired goals as manifested in the plans that enable us to get there.

The provision of technology alone will not optimally harness the potential of ICTs to improve access, student achievement and the transformation of teaching and learning. To take full advantage of the different technologies and to direct their maximum use for the benefit of all students, there needs to be a clear framework which sets the scene and provides the enabling environment for technologies to be integrated, deployed and used to their fullest potential. The ICTs in education policy can provide such a framework (Bassi 2009). Mushi and Le Roux (2008) point out that the resultant ICT policy of an organization will have a direct effect on the infrastructure, communications and applications segments of the market as well as the nature of e-government services. The successful implementation of ICT policies and plans depends crucially on the clear identification of key players and their roles and responsibilities in taking forward the agenda set by policies.

2.5 ICT policy in South Africa

According to the Department of Education (DOE) (2004:17 cited by Jaffer, Ng'ambi and Czerniewicz 2007:132) the South African government has identified the use of ICTs for teaching and learning as an important priority. For example, the e-Education policy states that:

> Every South African manager, teacher and learner in the general and further education and training bands will be ICT capable (that is, use ICTs confidently and creatively to help develop the skills and knowledge they need as lifelong learners to achieve personal goals and to be full participants in the global community) by 2013.

Thus, the ultimate goal of the policy is the realization of ICT-capable managers, academic staff and students by 2013. The e-Education policy together with the National Higher Education Plan, have consequences for instructional designers, lecturers, students and researchers. The underlying argument of the South Africa e-Education policy is that the realization of the policy's goals largely depend on the extent to which current educational challenges are re-conceptualized in the context of the role that ICTs can play in teaching and learning (Czerniewicz *et al.* 2005a cited by Jaffer, Ng'ambi and Czerniewicz 2007:132).

South Africa possesses a relatively well developed technological infrastructure, since the introduction of technology into the education curriculum has been a central point since the early 1990s. According to James (2001 cited by Mostert and Nthetha 2007) South Africa has done more than any other sub-Saharan country to establish an educational ICT policy. Since 1995, it has been on the policy agenda of the DoE. In 1996, the Ministry of Education and the DoE initiated the Technology-Enhanced Learning Investigation (TELI) in order to establish a clear policy framework for the effective use of technologies in education, which led to a series of policy processes (Holcroft 2004). This resulted in a discussion document which was completed in 1996. The focus of this document was on the development of an enabling infrastructure for the effective use of technologies in education and training. As part of this document, a TELI decision making framework was also developed. The framework emphasized "the appropriateness of technological choice to the educational context and need, as a requirement to ensuring that limited resources are used as effectively as possible" (James 2001 cited by Mostert and Nthetha 2007). Based on this document Kader Asmal, the Minister of Education at the time,

appointed a team of experts to develop a structure and set of strategies for choosing technologies to introduce into the teaching and learning environments. This process was completed in 1998 (Mostert and Nthetha 2007). The national ICTs Forum was established to guide national ICT strategy. In 2004, the government published a draft White paper on e-Education, which was aimed at transforming the education environment through the use of ICTs. In this document, e-Education is described as more than the development of computer literacy and the skills necessary to operate the various types of ICTs, as it also includes the ability to:

- Apply ICT skills in order to access, analyze, evaluate, integrate, present, and communicate information; and
- Create knowledge and new information by adapting, applying, designing, inventing, and authoring information.

These facilities are required to function in a knowledge society by using appropriate technology and mastering communication and collaborative skills (Department of Education 2004:14 cited by Jaffer, Ng'ambi and Czerniewicz 2007). After discussing the growth of ICTs in education in South Africa the next section will give a background of ICTs at the UKZN and the University network and technical services offered in terms of the UKZN ICT strategic plan.

2.5.1 ICT policy at the University of KwaZulu-Natal.

The University's ICT division is responsible for providing technology and services to staff and students across all five campuses of UKZN. This includes issues like installation, operation, maintenance, network administration and security. This is an important part of the implementation and integration of ICT in the education system. In most cases, however, technical support is not available, which implies that trainers and students require some basic troubleshooting skills to overcome technical problems when using ICTs (Sife, Lwoga and Sanga 2007). Appropriate strategies should be in place to ensure that the integration of ICTs in the teaching and learning process goes together with the recruitment, training, retraining and retention of required staff. At UKZN technical staff provide support on all the 'backroom' facilities of the network. This includes servers, networking equipment and operating systems and the services supplied by these facilities. Technical staff and other members of the ICT division

act as consultants to users and are primarily involved in the roll out of new services and the maintenance of existing ICT services (UKZN 2009).

The UKZN's strategic plan for 2007-2016 is stipulated as part of an overall performance management system. In terms of this plan the UKZN has put in place service-level agreements, standards of performance, and codes of conduct for support divisions such as the ICT division in specified situations. The University maintains it will regularly review its policies, processes and systems and effect improvements on an on-going basis. Moreover increased efficiency will be achieved by enhanced automation and adopting 'best practice' methodologies. Efficient electronic transactions, supported by an integrated ICT structure will provide real-time access to information for students, staff and for management decision-making purposes alike. Performance will be regularly monitored and evaluated, with a view to improving the quality of services offered at UKZN (UKZN 2007).

The plan suggests that successful achievement of service excellence at UKZN is significantly dependent on the establishment of sound operational relationships within and between support divisions, the academic community and the student body served by these divisions. A clearly articulated web-based information site that provides full details of the relevant support structures, key personnel, the services provided, and that which facilitates the initiation, approval and processing of transactions routinely and efficiently, form part of the strategy to achieve the goal of service excellence. Furthermore, the University maintains it measures its success in providing excellent teaching and learning programmes against the achievement of the following targets by 2016:
- A pass-rate of 85% in all modules; and
- A cohort completion rate of 65% within a recognized time line.

It is in the opinion of the researcher that these targets can only be accomplished with the effective use of ICTs for teaching and learning (UKZN 2007).

2.6 ICT infrastructure and higher education

ICT infrastructure mainly refers to networks, cables, wireless links or satellite dishes, as well as other important elements such as optimal use of these physical assets (interconnection of

different networks or the management of the frequency spectrum) and their maintenance (Africa Partnership Forum 2008:7). ICT infrastructure in Africa has increased over the past years, in spite of the challenges of low population density, low incomes and large rural populations. Particularly noteworthy is the virtual explosion of mobile phones in many African countries which surpassed 200 million subscribers in early 2007 and continues to grow at a higher rate than any other region (Africa Partnership Forum 2008:7). A study conducted by Green (1996) identified infrastructure as a critical catalyst for the adoption of ICTs in teaching and learning. Establishing the technology infrastructure is usually the first strategy most institutions have to adopt. Bates (2000 cited by Macchiusi 2001) claims that the strategy must necessarily be closely linked to other strategies in place across the university. ICT infrastructure is made up of the physical elements such as desktop computers, laptops, software, data projectors, servers, networks, telecommunication links, as well as the human support for these resources. Bates (2000 cited by Macchiusi 2001) argued that the people who make the physical infrastructure work are more important than the actual physical infrastructure itself. Many African countries have a very low base from which to implement ICT interventions in education. It is estimated that less than one per cent of people in Africa use or have access to the internet Miniwatts Marketing Group (2010). James, J. (2004) has listed aspects that inhibit higher learning institutions from acquiring computers to include an absence of electricity, lack of funding, insufficient building space, lack of available and trained staff, and poor security.

2.6.1 Computer access and use in South Africa
The development of computer use in Africa is not easy. In some countries like South Africa, some sectors of higher learning are using computers in education on a par with the developed world, while others are only beginning to explore the possibilities of introducing higher learning networking (IDRC 2000:26). For example, SchoolNet Malawi, is in the start-up phase and most of the developments have been established since 1997. Time spent on computers in SchoolNet activities in Africa is generally limited and is related to access and use. Students doing computer studies will spend more time working with the technology than other students while lecturers and students in universities that have computers learn basic computer skills such as word processing. The integration of computers across learning areas happens in only a minority of universities. Pedagogical use is more universal in the areas of mathematics, science and technology than in

the humanities, especially since more funding is available in the sciences, as with the Microsoft in South Africa initiative (IDRC 2000:26).

According to Brown, Thomas, *et al.* (2007) in Africa, South Africa (SA) is regarded as a privileged country. In terms of its Gross Domestic Product (GDP), it was rated 29th in the International Monetary Fund (IMF) 2006 listings, International Monetary Fund 2007 which was two-and-a-half times larger than the next African country on the list (Nigeria at 48th). With this position on the African continent, one expects SA to be far ahead of its African counterparts in terms of ICT infrastructure. When one compares ICT access in SA to that of the rest of sub-Saharan Africa (SSA), it is obvious that admittance to ICTs in SA is far more widespread than in other SSA countries. SA has more fixed lines, mobile subscribers and internet users (including broadband subscribers) than other countries in SSA. Farrell and Isaacs (2007:4) argue that according to the World Economic Forum (WEF) Global Information Technology Report, South Africa has the most modern and best developed telephone system in Africa and a vibrant ICT sector with an annual investment of USD$9.6 billion (Farrell and Isaacs 2007:4). The Report uses the Networked Readiness Index (NRI), covering a total of 115 economies in 2005-2006, to measure the degree of preparation of a nation or community to participate in and benefit from ICT developments. The WEF ranks SA 37th out of 115 economies. Yet, most of South Africa's infrastructure is also poorly linked and spread unevenly throughout the country. As discussed earlier South Africa's national policy on e-Education, suggests that schools and education institutions are set to improve ICT access and usage (Farrell and Isaacs 2007:4-5).

2.7 Internet users in South Africa

The internet allows cost-effective information delivery services, collaborative and distance education, more than has ever been imagined (Brown, Thomas, *et al.* 2007). According to Roycroft and Anantho (2003) economics always plays an important role in encouraging the use of technology in developing countries. In Africa, there are no 'High-income' countries, and 33 countries are classified as 'Least Developed' The only countries classified as 'Upper-Middle income' are Gabon, Mauritius, Reunion, Seychelles, and South Africa (Economic Commission for Africa 1999 in Roycroft and Anantho 2003:65). Most telecommunications infrastructure in Africa is deployed in capital cities. Only 17 million telephone lines have been installed on the

continent and the overall teledensity is still only about one per 200 Brown, Thomas, *et al.* (2007). Additionally, Internet Service Providers (ISPs) are also primarily located in the capital cities, while more than 70% of Africa's population is in rural areas. Therefore, people in the rural areas who have access to telecommunications have to make a costly long distance call in order to connect to the internet (ECA 2002 cited by Roycroft and Anantho 2003). If you compared the cost of internet access between the Western and African countries, in Africa, the average total cost of using local dial-up internet for five hours a month is about $68 (US) per month (including usage fees and telephone time, but not telephone line rental). Put in context therefore, the average per capita income in sub-Saharan Africa is less than $1500 (US) per year. Internet access in Africa is a luxury that only a fraction of the population could consider (Brown *et al.* 2008).

Table 1: World internet usage and population statistics (2000-2010)

WORLD INTERNET USAGE AND POPULATION STATISTICS						
World Regions	Population (2010 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000-2010	Users % of Table
Africa	1,013,779,050	4,514,400	110,931,700	10.9 %	2,357.3 %	5.6 %
Asia	3,834,792,852	114,304,000	825,094,396	21.5 %	621.8 %	42.0 %
Europe	813,319,511	105,096,093	475,069,448	58.4 %	352.0 %	24.2 %
Middle East	212,336,924	3,284,800	63,240,946	29.8 %	1,825.3 %	3.2 %
North America	344,124,450	108,096,800	266,224,500	77.4 %	146.3 %	13.5 %
Latin America/Caribbean	592,556,972	18,068,919	204,689,836	34.5 %	1,032.8 %	10.4 %
Oceania / Australia	34,700,201	7,620,480	21,263,990	61.3 %	179.0 %	1.1 %
WORLD TOTAL	6,845,609,960	360,985,492	1,966,514,816	28.7 %	444.8 %	100.0 %

Miniwatts Marketing Group (2010)

Table 1 shows that Africa is far behind in terms of access to the internet when compared with other continents. According to Gillwald and Essler 2005 cited by Brown *et al.* (2008) the number of internet users in South Africa exceeds the number of personal computers if contrasted with other SSA countries. In fact, SA has fewer PCs per 1000 people than Namibia and Botswana. This raises the question of how South Africans access the internet, which is an essential resource for all higher learning institutions in the country. The fact that SA has fewer PCs per 1000 people, only became apparent since 2000, demonstrating that the internet has become more accessible outside the home (at school, work, and internet cafes and in communities) than in it. Data from household surveys in a number of African countries confirm this observation which

showed that whilst 4% of households had a computer at home, nearly 16% of households had at least one person with an e-mail address (Gillwald and Essler 2005 cited by Brown *et al*. 2008). Around 75% of these people rely on school or work to access the internet (Brown *et al*. 2008:70). This reveals just how important on-campus access is in tertiary institutions. Consulting the internet can be extremely slow if users do not have fast connections and powerful equipment. Information sources on the internet are too abundant and at times, not reliable (when outdated information is not removed). It is necessary to develop filtering methods and search systems which, although developing rapidly, are still insufficient. Providing user skills when using the internet are necessary for teaching, and users need to be trained on information searching and retrieval skills.

2.7.1 The internet in higher learning institutions

According to Jones, Johnson-Yale, Millermaier and Perez (2008) universities provide an environment for technological diffusion. Goldfarb (2006) argued that in the 1990s the United States (US) universities "taught a generation of students how to use the internet and fostered its diffusion". During that time, universities provided necessary programmes and equipment for students to go online and use the technology to which they may not have otherwise had access (Jones, Johnson-Yale, Millermaier and Perez, 2008). Goldfarb (2006) argued that many universities required that students use the internet for various administrative and course-related functions, which encourage students to use a technology they may not have had the inclination to try or incorporate into their academic lives. Goldfarb (2006) further argued that universities may also have aided in the diffusion of the internet by emphasizing its value and its potential use for "online commerce, online communication and online information searching". Most African universities began using the internet during the late 1990s compared to US colleges and universities which introduced the internet in the early 1990s.

The significance of ICT and the internet is recognized by higher learning institutions. Bon (2007) argued that the internet represents the world's largest knowledge database which is easily accessible through powerful search engines. Bon (2007) also argued that the internet can provide access to resources of scientific publications and scholarly information when students have daily access to computers and the internet with sufficient bandwidth for downloading and exchanging

documents over the network. The internet can also improve collaboration and interaction with research groups in other institutes, regions or countries contributing to improved quality of research and education (Hawkins 2005 cited by Rena 2008).

Jones *et al.* (2008) conducted a study on internet usage at a US college and found that compared to the general populace, 78% of students at higher learning institutions go online just for fun. Students mostly used the internet to browse the WWW, read e-mails, send instant messages, download files and use social networks. The study also revealed that 79% of the students agreed that internet usage has had a positive influence on their studies and academic progress. It showed that students were twice as likely to download music files as the general population; they were also three times as likely to have done this on any specific day. Jones *et al.* (2008) further claimed that college or university students have the greatest access to and use of the internet, more than any other demographic group.

In a study conducted by Nachmias and Segev (2003) at the Tel-Aviv University via the survey method, the results revealed that the use of the internet as an instructional tool in higher learning education was rapidly increasing. The purpose of the study was to evaluate how online content was utilized, identifying the individual differences of content usage among students and the amount of content presented in the Web-supported sites. The Web supported various types of students' engagements and interactivity providing access to a vast repository of resources. The study found that the internet was used mainly for information sharing between students and teachers. Nachmias and Segev (2003) realized that there was a decrease of scaffold[2] usage during tutorials over time, indicating an increase in knowledge and skills for students. This finding resulted from the basis that the presentation of educational content on the internet was highly valuable for students, especially those who enjoyed visual presentation of information, comments and supplements to materials taught in lectures.

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[2] Scaffolding is an instructional strategy that involves supporting students by limiting the complexities of the context and gradually removing those limits as students gain the knowledge, skills, and confidence to cope with the full complexity of the context (Young 1993).

Various studies have reported on computer access in Higher Education Institutions (HEIs) in South Africa. A report commissioned by the World Bank on connectivity in African tertiary institutions provided some comparative information on the average number of users per networked computer by region (Steiner, Tirivanyi, Jensen and Gakio 2004 cited by Brown, Thomas *et. al.* 2007). This was not particularly a student to computer ratio, as it included students and staff. However, it did give one an indication of the huge differences in levels of access. In South Africa, the HEI average is 11 users per computer, which is much better than the average for other African tertiary institutions (Steiner, Tirivanyi, Jensen and Gakio 2004 cited by Brown, Thomas *et. al.* 2007).

Hoosen (2010) argued that, the primary challenge facing the African university (AU) is the high cost of bandwidth. For example, the University of Zimbabwe uses satellite bandwidth, which is extremely expensive. Whilst the University of Zimbabwe has acquired access to a number of e-journals (which generally have the advantage of being more current), students can only download articles during the service provider evenings when more bandwidth is allocated to the library. Similarly, a major challenge facing African universities is security and virus threats, as virus protection software is currently not upgraded and downloaded automatically although subscriptions are paid regularly. The reason for such problems is the poor bandwidth, which makes it impossible to download effective updates of current files for the particular antivirus software in use (Hoosen 2010). Mugenda (2006) notes that African universities, whose campuses are connected to the internet, suffer from low speed and frequent breakdowns of internet servers. Some of these connections are so slow that such ICTs are considered a bother. There have been cases where it takes several attempts over a number of days to download a single document.

When one compares ICT access in South Africa to that of the rest of SSA, SA has the worst bandwidth of both the African and G8 countries. Russia has five times more bandwidth, Morocco 12 times more and the UK a massive 635 times more than South Africa (TENET 2009 cited by Brown, Thomas *et. al.* 2007:71). More importantly, the cheapest charge of internet access overall is in Egypt, which is less than the cost of access in the US. South Africa has the highest cost of internet access which is four times that in the US. Details of bandwidth availability and usage within HEIs can be obtained from the Tertiary Education Network TENET

(www.tenet.ac.za), which secures internet bandwidth on behalf of South African tertiary institutions. Usage ranges from 928 Kbps to 27,072 Kbps across the HEIs with the average availability being 9,127Kbps (Brown, Thomas *et. al.* 2007). In SA one of the biggest challenges facing Higher Education (HE) is access to online resources. Despite the fact that the cost of internet bandwidth in South Africa is amongst the highest in the world, the ICT division at UKZN embarked on a process of direct engagement with Telkom that saw the implementation of the highest internet bandwidth capacity by any higher educational institution in the country. A total of 60Mbps was procured on a Telkom TDIS Gold service (Brown, Thomas *et. al.* 2007).

2.8 Learning to use ICTs

Living in a knowledge-based society driven by the wide-spread diffusion of ICT gives rise to the need to acquire new competencies and master new skills related to the use of ICT (Punie *et al*. 2006). The European Commission has already done significant work during recent years on digital literacy and digital competence. This implies, for instance, understanding how ICT applications and services function. It does not necessarily mean technical know-how but rather understanding what it means to use digital technologies in everyday life. This is not only about 'computer literacy' for example, learning to operate the technology, but rather about higher order skills such as knowing where to search for certain information, how to process and evaluate information, how to assess the reliability and trustworthiness of websites and other online sources, and many others. Such skills fall within the information literacy domain. It is especially important, when dealing with educational content, to be able to assess the quality and reliability of knowledge and to contextualize it. In addition to these cognitive skills, networking skills related to building, maintaining and developing social interaction via ICTs are also necessary. This implies the importance of building social capital via ICT or 'relationship capital'. It also deals with sharing information, knowledge, and other resources. Learning to use ICTs is mainly concerned with the acquisition of 'ICT user skills' (Punie *et al*. 2006).

2.8.1 Information literacy

Information literacy facilitates the use of ICTs for teaching and learning. Steyn and Maritz (2003 cited by Nkosi 2009:21) argued that:

To be information literate, a person must be able to recognize when information is needed and have the capability to locate, evaluate, retrieve and use information they need. Postgraduate students and academic staff are expected to be information literate simply because almost all of their studies involve the use of ICTs (Ocholla 2003). There is a need for educational institutions to ensure that graduates are able to display appropriate levels of information literacy, the capacity to identify and locate and evaluate relevant information in order to engage with it or to solve a problem arising from it (McCausland, Wache and Berk 1999:2). The initiative to promote such developments stems from general moves among institutions to ensure their graduates demonstrate not only skills and knowledge in their subject domains but also general attributes and generic skills. Traditionally, generic skills have involved such capabilities as the ability to reason formally, to solve problems, to communicate effectively, to be able to negotiate outcomes, to manage time, to manage projects, to collaborate and use teamwork skills. The growing use of ICTs as tools of everyday life have seen the pool of generic skills expanded in recent years to include information literacy and it is highly possible that future developments and technology applications will see this set of skills growing even more (Oliver 2002).

2.8.2 ICT training and awareness in higher institutions

Amutabi (2004) did a study on the prospects and dilemmas of ICT in university education in Africa: the case of Kenya. He states that universities have serious problems when it comes to the use of ICTs. The lack of trained and experienced technical personnel to control and maintain the increasingly large numbers of ICT resources means that their utility values, effectiveness and efficiency, cannot be ascertained. The lack of theoretical knowledge and practical management, control and maintenance skills of ICT staff leads to these units being managed, controlled and maintained virtually on a trial and error basis. Some of the technicians are untrained or semi-trained in the real sense of ICT training. Amutabi (2004) further explains most of the ICT technical staff were trained initially not in computers but in other technical fields such as electronics, librarianship, or mechanics and only later on switched to managing computers, creating a continuity and credibility gap between professions.

Mugenda (2006) pointed out that, general competencies that are required for technical support for ICT in education to be effective, would be in the installation, operation, and maintenance of

technical equipment (including software), network administration, and network security. Without on-site technical support, much time and money may be lost due to technical breakdowns. According to Amutabi (2004) university lecturers need to be prepared in terms of ICT instrumentation and management to enhance their medium of instruction and training. Kaplan and William (2001 cited by Amutabi 2004) defined lecturer quality within two broad areas: lecturer preparation/qualifications and teaching practices. Teaching quality is also concerned with promoting student learning inside the classroom such as creating a positive learning climate, selecting appropriate instructional goals and assessments, using the curriculum effectively, and employing varied instructional behaviours that help all students learn at higher levels.

According to Aina (1993) ICT competency involves the ability of the staff to know how to identify appropriate contexts for using ICTs and also to be able to judge whether, when and how to use ICTs. The most effective staff development activities should give emphasis to these key issues as well as developing staff personal competencies in ICTs. Academic staff development is important since the ability to work with ICTs is recognized as one of the key competencies necessary for success in life and competition in the labour market which every citizen should possess (Levy and Murmane 2001; Salganik, 2001; Eurydice, 2002 in Šorgo, *et al*. 2010:37).

2.8.3 Academic staff development and ICTs in higher education

Digital technology, especially online technology, is changing the culture in higher education and causing new pressures on learning outside the control of academic staff. Macchiusi (2001:54-55) introduces the idea that future academic staff will be "learning managers", where their role is not to know everything but to be able to know where to access the most relevant and appropriate information through online technologies. Macchiusi (2001) further argued that employers are expecting graduates to be computer literate, including learning ICT skills. They should be Familiar with e-mail etiquette and associated communication tools in order to communicate with other professionals, being able to locate appropriate information on the internet and also being able to present information in a variety of formats (Macchiusi 2001:56).

 Integration of ICTs in teaching and learning does not only deal with the introduction of new hardware and software, but both academic staff and the students have to accept new roles, and

change their ICT behaviours and ways of teaching and learning (Sife, Lwoga and Sanga 2007). Sife, Lwoga and Sanga (2007) suggested that, preparation and short courses are needed not only to improve the skills of the academic staff, but also as a means of getting them involved in the process of implementing and amalgamating ICTs in teaching and learning. For example, academic staff require training not just in the choice and use of appropriate technologies, but more basically in how people learn and in instructional design (Bates 1997). According to Howell and Lundall (2000 cited by University of Montreal 2005:14), and as discussed earlier, the key factors blocking educational institutions from using microcomputers as teaching and learning tools are insufficient funds, insufficient number of computers, lack of academic staff with IT skills, academic staff's inability to integrate the computer into the different subject areas, and lack of appropriate microcomputer teaching programmes.

However, Pelgrum (2001) recommended that staff training had to be a continuous process to keep abreast of ICT developments. According to the University of Montreal (2005:12) inadequate initial training, insufficient motivation, absence of technical support, a higher learning institution administration that does not embrace ICT usage and lack of administrative support are the main challenges for integrating ICTs in higher learning education worldwide.

2.9 Challenges facing implementation of ICTs in higher learning institutions
The principal factor that prevents some of the higher learning institutions from using computers as tools for teaching and learning is insufficient funds. According to Sife, Lwoga and Sanga (2007:64) financial resources form a key factor to the successful performance and integration of ICTs in education. It is clear that higher education institutions with higher financial resource bases stand a better chance than those with limited resources to obtain benefits offered by ICTs. In addressing the problem of limited funds and sustaining donor funded projects, higher learning institutions can do the following: (i) accept freeware and open source software for teaching and learning activities; (ii) constantly press for more funds from their governments; and (iii) expand sources of funds to have a wide financial base. Other factors include insufficient numbers of computers, lack of computer literate academic staff; lack of lecturer's competence in integrating computers into different learning areas, and the absence of properly developed programmes for teaching computer skills (Howell and Lundall 2000). It is important that ICTs are seen as a

natural part of good learning and teaching. The challenge is to use them effectively to maximize learning and to enhance and enrich teaching and that means that the best practice needs to be widely embraced (Macchiusi 2001).

In Africa ICT facilities in many universities are insufficient with few students having access to computers with internet access at home. This reveals that the lack of ICT facilities in Africa is the major constraint in the adoption of this technology. There are many limitations when it comes to the implementation of ICTs in the higher learning institutions. Bates (2000 cited by Macchiusi 2001) addressed the inappropriateness of the current structure of higher learning institutions for the effective use of ICTs in teaching and learning and identified strategies for higher learning institutions that are moving to ICT-based teaching and learning. These strategies are a result of the experiences of many people who have faced and are facing similar issues in a variety of higher education institutions in the US, Canada and Australia. Bates (2000:3 cited by Macchiusi 2001) claims that the most difficult challenge for conventional university institutions is to "achieve an appropriate balance between face-to-face and technology based teaching and learning for the different kinds of students it will be serving". Integration of ICTs in the functions of any organization is a complex process that needs to be fully conceptualized and defined from the beginning. Sife, Lwoga and Sanga (2007) noted that despite achievements revealed by some of the Tanzanian universities in implementing ICTs for teaching and learning processes, these universities still face a lot of challenges in undertaking such a process. Since many higher learning institutions in developing countries have embraced the ICTs' integration process without clear plans to guide the way, the institution's ICT policy and strategic plan should be defined to provide a framework for the development and implementation of specific ICT projects (Sife, Lwoga and Sanga (2007). The diversity and competing interests of different stakeholders in the institution should be recognized when developing an ICT policy and a strategic plan. The following issues, amongst others, should be taken into consideration: (i) ICT infrastructure already in place; (ii) ICT skill levels in the institutions' (iii) number of staff and students in each department and projected growth; (iv) academic management process: curriculum development, assessment methods and administration; (v) cost-effectiveness analysis (including hidden costs) and the choice of proper technologies for the needs of the institution; and (vi) staff development in new technologies. Macchiusi (2001) added that higher education is

faced with considerably less financial support at a time of higher expectations. Governments and universities are no longer conceptualized as partners but in many cases as "two parties with different interests and priorities that sometimes converge and sometimes sharply conflict" (Macchiusi 2001).

2.9.1 Awareness and attitude towards ICTs

It is important for all stakeholders in the institution to know the existing ICT facilities and services and their importance in relation to their specific tasks (Macchiusi 2001:107). According to Tusubira and Mulira (2004) there tends to be some vague knowledge about ICTs by university staff. Some staff interpret ICTs simply as advanced technologies that require a lot of money and very advanced skills. They are not appreciated as a means of creating efficiency and cost effectiveness. Lack of awareness goes along with attitude. Positive attitude towards ICTs is widely recognized as a necessary condition for their effective implementation (Woodrow 1992). Full involvement of all stakeholders in the implementation process is a key to addressing awareness and attitude problems. Formally organized awareness programmes, visits to similar institutions where success has occurred, and short training courses can contribute to raising awareness and changing the attitude of stakeholders towards ICT facilities and services (Sife, Lwoga and Sanga 2007:63).

2.9.2 Administrative support

Administrative support is critical for the successful integration of ICTs into the teaching and learning processes. Administrators can provide the conditions that are needed, such as incentives, resources and ICT policy. The commitment and interest of the top management and other leaders at every level is the most critical factor for successful implementation of ICTs. According to Macchiusi (2001) interaction between academic staff, management and students can be structured and managed through electronic communications to provide greater access and flexibility. Sife, Lwoga and Sanga (2007) argued that for the integration of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, educational, administrative, financial, and social dimensions of ICTs in education. Similarly, Hoskins (2002:34-35) noted that many universities lack sufficient networking technical staff to support the expansion of ICTs. Not only

are academic staff needed, but technologically literate staff who are able to support the use and expansion of ICTs.

2.10 Studies conducted on the use of ICTs in teaching and learning

This section reviewed more than 25 related studies on the use of ICTs for teaching and learning in tertiary institutions. Such studies were conducted in Australia, China, India, Spain, Singapore, Slovenia, Bangladesh, Botswana, Cameron, Ghana, Tanzania, Togo, Kenya, Uganda, Namibia, Nigeria and South Africa. To bring more insight to the study the following section discusses studies conducted outside Africa.

2.10.1 Related studies conducted outside Africa

In relation to the studies conducted outside Africa, one of the studies reviewed was that conducted by Oliver (2002) in Western Australia. The study looked at the role of ICTs in higher education for the 21st century. The study revealed that ICTs have become commonplace entities in all aspects of life. Within education ICTs have begun to have a presence but the impact has not been as extensive as in other fields. Education is a socially oriented activity and quality education has traditionally been associated with competent academic staff having a high degree of personal contact with postgraduate students. The use of ICTs in education lends itself to more student-centred learning settings and often this creates tension for some academic staff and students. However, the role of ICTs in education is becoming more and more important and this importance will continue to grow and develop in the 21st century (Oliver 2002). Future studies should highlight the various impacts of ICTs on contemporary higher education and explore potential future developments. Oliver (2002) argues that, the role of ICTs in transforming teaching and learning should be explored as this will impact on the way programmes will be offered and delivered in universities and colleges of the future (Oliver 2002).

Macchiusi (2001) conducted a study on implementing innovative technology towards the transformation of a university. The focus of the study examined the use of ICTs in teaching and learning by academic staff within an Australian tertiary institution (Curtin University of Technology) and the mechanisms the University had established in order to realign itself with the information age. One of the key questions that guided the study was "How are Curtin University academic staff utilizing ICTs in their teaching and learning?" The combination of qualitative

(interview and case study techniques) and quantitative (survey and likert-type instrument) methods were used. Overall, the study was described as longitudinal in nature, relying upon such tools as observation, interviews and survey instruments to collect data at appropriate points in time from the various samples. The study revealed that the critical mass stage for integrating ICTs into teaching and learning had been reached by the teaching staff involved in the Curtin survey sample.

The most common teaching mode adopted by the survey sample was the traditional lecture and tutorial (workshop or laboratory). Data revealed that over the 16 month period of the study there was a large increase in the use of Web-based material for teaching and learning (Macchiusi 2001). The research revealed that a number of factors emerged which affected the adoption of ICTs. These factors included: leadership across the university; attitude towards the use of ICTs; the perceived benefits of adopting ICTs in teaching and learning; incentives, modelling mechanisms, the provision of adequate support structures; the time factor, training, availability of facilities and resources (Macchiusi 2001).

The study found that the existence of transformational leadership across all levels of the university was identified as a major factor in the promotion and adoption of ICTs and ultimately in the development of a truly professional learning community. The detailed case study data revealed that many of the academic staff possessed professional attributes which would be admired and valued in any university (Macchiusi 2001). The study pointed out that some of the universities were facing the challenge of identifying what role ICTs will play in the future of higher education and how to implement appropriate strategies which will meet these needs. Results revealed that the main key to meeting the challenges was to harness strategies that would lead to the development of a professional learning community (Macchiusi 2001).

Another study by Wang (2009) conducted in Taiwan on the transformational promise of ICTs for the professional education of architects attempted to answer three fundamental questions about the possibility of using ICTs to transform the delivery of education to professional architects. Firstly, what were the potential benefits of ICTs for teachers and students in higher education professional programmes such as architecture? Secondly, what were the issues that all too often

act as barriers to the full development of an ICT-rich learning environment in higher education? Finally, what were the particular issues involved in implementing ICTs to transform the teaching of architecture in a rapidly developing nation such as Taiwan (Wang 2009:206).

The response to the research questions required at the outset a selective literature review regarding the use of ICTs in professional education, specifically in architecture. The review focused firstly, on the relationship between the rhetoric and the practice of implementing ICTs in educational systems, and secondly, on important cultural issues involving ICT implementation. A recurring theme was the idea that ICTs have the potential for radically transforming educational practice; another was the idea that ICTs promote the constructivist paradigm of epistemology. The review concluded with an examination of the use of ICTs in architectural schools, concentrating on both the successes and the difficulties that were observed (Wang 2009:206). The review of the literature for the study revealed that there had been an abundance of positive claims published in recent years about the promise that ICTs hold for transforming higher education in the 21st century but there had also been a disturbing lack of empirical evidence to support these claims. Stensaker *et al.* (2007 cited by Wang 2009) describe their own findings about the difficulty of putting ICT theory into practice at universities:

> . . . it is not the visions, the visionaries (institutional top-management) and the economic foundations that seem to be lacking, but an effective link between, purpose, people, and pedagogy inside the institution (Wang 2009).

Ala-Mutka, Punie and Redecker (2008) conducted a study in Spain, on the use of ICTs for learning, innovation and creativity. The study revealed that ICTs have been taken up in Spanish educational institutions, thus 96% of Spanish learning institutions had internet access and 80% of the Spanish academic staff had an advantage in using computers in their institutions (Empirical 2006 cited by Ala-Mutka *et al*. 2008). In addition, the study revealed that ICT skills were divided between older and younger academic staff, for example, 80% of younger academic staff compared with 56% of older academic staff felt very competent in using word processors. Despite their use of ICTs, they had not had a transformative impact on teaching and learning in education and training institutions (Punie *et al.* 2006 cited by Ala-Mutka e*t al.* 2008).

Hoque and Alam (2010) conducted a study on the role of ICTs in delivering higher education in Bangladesh. The objectives of the study were:

- To look at ICT-based higher education in other countries;
- To investigate the current status of ICT-based higher education in Bangladesh, and
- To explore the opinion of academicians and students on ICT-based higher education in Bangladesh.

The study was empirical and explorative in nature and therefore the information presented was based on both primary and secondary data. Primary data was collected using a structured questionnaire. A stratified random sampling technique was used in terms of respondents. Overall 150 questionnaires were distributed to and collected from students, academics, and other professionals equally (50 each). The main aim of the study was to collect opinions from the respondents to examine the state of the role of ICTs in delivering higher education in the context of Bangladesh. Collected data were tabulated and analyzed using spreadsheet analysis. Secondary information was collected from various documents such as books, newsletters, reports, magazines, journals, daily newspapers, the WWW as well as from existing literature to understand the use of ICTs for offering various levels of higher education in western countries (Hoque and Alam 2010).

The study revealed that ICT-based higher education was popular for those who wanted flexibility in the learning process so that they could both study and work together. The study found that in terms of technical support received, almost equal numbers of respondents gave their opinion in favour and disfavour of adequacy of experts. Benefits included delivery of instruction and its reception by learners. Online course materials, for example, could be accessed 24 hours a day, seven days a week (Hoque and Alam 2010). Furthermore, the researchers pointed out that ICTs were a potentially powerful tool for extending educational opportunities, both formal and non-formal. Thus a majority of the respondents agreed that ICTs could help access to higher education. Slightly less than 30% of respondents thought that ICT-based course materials conform to the needs of the learners, and nearly 30% thought ICT-based course materials were adequate, while more than 30% thought they were not adequate. General comments from the

study showed that students preferred flexibility in the learning process facilitated through ICT-based education (Hoque and Alam 2010:101).

Choy, Wong and Gao (2009) conducted a study in Singapore on student teachers' intentions and actions on integrating technology into their classrooms during student teaching. A postgraduate teacher education cohort of 118 student teachers participated in the study. The results suggested that student teachers showed positive intentions of integrating technology to facilitate student-centered learning in their future teaching. However, they reported that they were more likely to use technology as a supporting and instructional tool during their student teaching rather than using technology to promote student-centered learning. Qualitative findings from 10 purposefully selected participants showed consistency with the quantitative results. The results of the study helped to better illustrate the student teachers' intentions and their actions in integrating technology into their classrooms (Gao *et. al.* 2009).

Jones, Johnson-Yale, Millermaier and Pérez (2008:3) conducted a study on academic work, the internet and US college students. The aim of the study was to explore, based on a nationally representative sample, US college students' use of the internet in their studies and their perceptions of academic life online, and changes in both perception and use since 2002. The main research questions were: (i) What role did the internet play in college students' academic routines? (ii) How did the internet affect students' research and writing habits during university? and (iii) What are the consequences for students' information literacy? The study used an online survey for collecting data from the college students at two-year and four-year public and private colleges and universities in the US. Participants were recruited through the use of mass e-mail to all students at 29 college campuses, and to a random sample of students stratified by class at 11 other campuses of a total population of 386,189 students. Recruitment yielded 7421 complete surveys, a response rate of 2%. The sample was intended to produce results that would correspond to the demographics for students as reported by each campus and overall, to produce results that would correspond to the demographics for US college students generally. Individual campuses represented a broad cross-section of types of higher education institutions in the US.

Findings showed that overall internet use for academic purposes has increased from 79% in 2002 to 84% in 2008. Students reported generally positive opinions about the internet's usefulness for academic work but satisfaction with it for academic interactions were not positive.

Furthermore Jones *et al.* (2008:4) argued that, with the internet and student-academic staff interaction, e-mail has become an important source of contact between students and academic staff. Willis and Coakes (2002 cited by Jones *et al.* 2008) found that speed, the ability to maintain a record of the correspondence, and the benefits of asynchronous communication were amongst the primary advantages to using e-mail. Other advantages include the international reach of email, document attachment capabilities, and its general appeal as a medium of correspondence for staying in touch. Jackson, Ervin, Gardner, and Schmitt (2001 cited by Jones *et al.* 2008) highlight the increased communication between students and academic staff online: "Internet use is encouraged in the university setting, and is almost a necessity as more and more course information and communication between academic staff and students take place online."

Kitao (1999) conducted a study on tertiary students in Japan via a survey research method whereby all students registered for the English language course were interviewed. The study established that the internet had many resources that were useful for students of English, especially for students (in Japan) who did not have many chances to communicate in English. Kitao (1999) further stated that there were sites where students could learn through grammar and vocabulary games and quizzes. On other sites students could practice their major language skills which are reading, writing and speaking. Lastly, Kitao (1999) noted that the study revealed that among the internet resources were journals that documented the reading of students, and students could also publish their own writing using the sites.

At the University of Bristol Selwyn, Marriott and Marriott (2000) carried out a study of student use of ICTs using a survey. The results revealed that within the wider drive in higher education to promote students use of ICTs, it was presumed that the internet would be a key application. Selwyn, Marriott and Marriott (2000) argued that popular conceptions of a new generation of students were at ease with online learning that persists through official literature and the media. Therefore, from that basis, the study took an empirical perspective of the use of the internet by

students, via focus group interviews with 77 students at two UK universities. The study explored the factors underlying their use (and non-use) of the internet in their university studies. Four crucial themes were identified: (i) the ways in which students were introduced to using the internet; (ii) operational problems encountered when using the internet as an information resource; (iii) treatment of information retrieved from the internet; and (iv) the social element of learning in online environments. These factors were examined in detail and discussed in relation to the future presentation and organization of students' internet use in university settings. The findings established that many of the students did not feel altogether at ease with using the internet as an educational tool. Searching for information on the internet was seen by many as something that they have little, or no, control over.

Hong, Ridzuan and Kuek (2002) conducted a study at the University of Malaysia reporting on the success of a technology and internet-enriched learning environment in moulding attitudes among students using the internet for learning. Hong, Ridzuan and Kuek (2002) declared that the lecturers actively encouraged the use of information technology, especially the internet, for the teaching and learning processes. Therefore, students were provided with computer facilities and were required to complete two compulsory generic courses in information technology. The results of the study indicated that the students had a positive attitude towards using the internet as a learning aid. The students also showed adequate basic knowledge of the internet and also viewed the environment as supportive in using the internet. The study revealed that students who preferred the internet for learning and viewed the environment as supportive to the use of the internet were those with better basic internet skills. Consequently, according to Hong, Ridzuan and Kuek (2002) the university achieved its objectives of promoting the use of the internet for teaching and learning. Hong, Ridzuan and Kuek (2002) equally found that students with better basic internet skills were more positively predisposed towards using the internet for learning.

Becta (2003) conducted a survey on barriers to the use of ICTs in teaching in UK . The data was collected through a questionnaire. The questionnaire was completed by 170 academics, many of them citing more than one barrier. Thus the total number of suggestions was 226. The numbers of survey responses for each item were as follows: lack of confidence 48; lack of access to quality resources 47; lack of time 37; lack of effective training 34; technical problems 30; and

lack of personal access 11. The barriers identified in the literature were broadly grouped into two levels seen in Table 2 below. All citations are cited by Becta (2003).

Table 2: Barriers identified when using ICTs for teaching and learning

Academic/lecturer level	Institutional level
Lack of knowledge necessary to enable academic staff to resolve technical problems when they occur (Van Fossen 1999)	Lack of ICT equipment and the cost of acquiring, using and maintaining ICT resources (Cox *et al.* 1999) and (Pelgrum 2001; Guha 2000)
Lack of personal change management skills (Cox *et al.* 1999)	Lack of access to ICT equipment due to organizational factors such as the deployment of computers in ICT suites rather than lecture rooms (Fabry and Higgs 1997; Cuban *et al.* 2001)
Perception that technology does not enhance learning (Yuen and Ma 2002; Preston *et al.* 2000)	Obsolescence of software and hardware (Preston *et al.* 2000)
Lack of motivation to change long-standing pedagogical practices (Snoeyink and Ertmer 2001)	Unreliability of equipment (Butler and Sellbom 2002; Cuban *et al.* 2001)
Lack of self-confidence in using ICT (Pelgrum 2001)	Lack of technical support (Preston *et al.* 2000; Cox *et al.* 1999)
Negative experiences with ICT in the past (Snoeyink and Ertmer 2001)	Lack of training differentiated according to academics existing ICT skill levels (Veen 1993)
Fear of embarrassment in front of pupils and colleagues, loss of status and an effective degrading of professional skills (Russell and Bradley 1997)	Lack of training focusing on integrating technology in the lecture rooms rather than simply teaching basic skills (Van Fossen 1999)

In line with these barriers, Bingimlas (2009) also did a study on barriers to the successful integration of ICTs in teaching and learning environments. The study provided a meta-analysis of the relevant literature that aimed to present the perceived barriers to technology integration in science education. The findings indicated that academic staff had a strong desire to integrate ICT

into education but they encountered many barriers. The major barriers were the lack of confidence, competence and access to resources. The next section discusses related studies conducted in Africa.

2.10.2 Related studies conducted in Africa

In Africa similar studies related to the present study were conducted by various academics. Muhirwa (2009) conducted his study on the teaching and learning of video-based learner-to-instructor interaction in international distance education. The study revealed that distance education and ICTs have been marketed as cost-effective ways to rescue struggling educational institutions in developing countries, particularly in SSA. The study used classroom video analysis and follow-up interviews with academic staff, students, and local tutors to analyze the interaction at a distance between learners in Mali and Burkina Faso and their French and Canadian instructors. Findings revealed the following obstacles to quality interaction: frequent internet disconnection; limited student access to computers; lack of instructor presence; ill-prepared local tutors; students who were unfamiliar with word processing and computer technology; and ineffective technical support. Bakari *et al.* (2005) stress that in most of the developing countries including Tanzania, there are very few technical experts to implement and maintain ICTs. The study concluded by re-visiting the educational potential of traditional technologies, such as radio and video, to foster development in poorer African countries (Muhirwa 2009).

Sife, Lwoga and Sanga (2007) conducted a study on new ICTs for teaching and learning. The researchers looked at the challenges facing higher learning institutions in developing countries. The study discussed new learning and training technologies considering their pedagogical cost and technical implications. As mentioned earlier, challenges for integrating these technologies in higher learning institutions, with examples from Tanzania, and giving best practice approaches for addressing each of the challenges were also discussed (2007:58).

The University of Montreal (2005) conducted a study on the Pan-African research agenda and the pedagogical integration of ICTs. The main objective of the study was to better understand how, for whom and under what circumstances the pedagogical integration of ICTs can

substantially improve the quality of teaching and learning at all levels and scales of African education systems (University of Montreal 2005:1-2). The study found that ICT's utilization appears to be more widespread in Africa in all levels of education, where academic staff or teachers and students use it to teach and learn in different subjects. ICTs are used more specifically for teaching and learning specialized disciplines such as motor skills, physical health and language acquisition. Thus, this study observed that certain disciplines had developed ICT-related practices. Accordingly, ICT integration into learning activities in colleges would seem to be all the more important, since it goes beyond interpersonal communication and integrates several dimensions such as interactive learning, collaborative learning, and research for information for analysis and problem-solving. In the higher African educational institutions, ICT integration also appears to be considered a necessity both for university students and academic staff. Indeed, the study highlighted that numerous disciplines are either not taught or poorly taught in Africa owing to a lack of academic professionals (University of Montreal 2005).

A study was conducted on ICTs and distance education programmes in SSA by Ololube, Ubogu and Egbezor (2007). The researchers examined the domain of open and distance education programmes in Nigeria. The study found that the introduction of ICT usage and its integration and diffusion has initiated a new age in educational methodologies and has radically changed traditional methods of teaching and learning patterns in the domain as well as offering contemporary learning experiences to both academic staff and students. The study was guided by two main research questions: (i) what challenges faced ICT usage, integration and diffusion in Nigerian distance education programmes? and (ii) what were the policy outcomes when evaluating distance education programmes in Nigeria? The study was carried out using a qualitative research methodology. The use of documentary materials and observation were an essential part of the instruments for data gathering (Ololube, Ubogu and Egbezor 2007:184). The discussions were made in terms of:

- The context of distance education in Nigeria;
- The challenges facing ICT usage, integration and diffusion; and
- The need to consider policies' outcomes when evaluating distance education programmes.

The study found that the high hopes and enthusiasm for open and distance education were interfered with as the nation is faced with inadequacies in essential services and infrastructure, such as electricity and postal and telecommunication services. However, there was an ongoing development in distance education resources (Ololube, Ubogu and Egbezor 2007).

Similarly, Odogwu and Nyala (2010) did a study on female students' competence in the use of ICT and their effect on their future careers in Nigeria. The descriptive survey method was adopted for the study. The main instruments used for data collection were the questionnaire and the interview. One hundred and fifty female students in Lagos State were targeted. However, 109 of those targeted were obtained through random sampling. Information collected showed that female students had experience in the use of computers, were capable of manipulating a computer and a majority of them planned to take up jobs that were related to ICTs. About 60% of the female students used ICTs three to five times a week. A majority of the students used a computer to type word documents, but only a few browsed the internet (Odogwu and Nyala 2010:554).

Ojedokun (2001) did a study at the University of Botswana which focussed on internet access and usage by students. For the purpose of the study unpublished documentary sources of the Department of Information Technology (DIT) were examined and two corporations were interviewed to obtain relevant information. The study investigated the adequacy of provision of access to, and the usage (in terms of use and misuse) of the internet by students, as well as the problems these students faced in internet use. The study revealed that many students did not have access to the internet due to the fact that at the time of the study there were inadequate computers with internet facilities. Ojedokun (2001) found that the majority of the respondents in his study did not use the Web for academic matters but they used it for entertainment purposes. Ojedokun (2001) also revealed that due to the lack of effective searching skills, those who had access to the internet used it essentially to search and retrieve information on entertainment, sports and news from around the world. The study found that the major use of the internet was for surfing the Web and e-mail. Additionally, Ojedokun (2001) stated that the report of the 1998 library survey of internet users at Seton Hall University revealed that 40.2% of respondents used the Web on a daily basis, 38% weekly, and 10.3% on a monthly basis. Thus Ojedokun (2001) reported that

students used file transfer less often and this possibly suggested that students did not have the necessary skills to make use of the service. Therefore, students were unlikely to know how to use the service to share data, write proposals and research papers, and engage on issues.

Another study on ICTs in teaching and learning was done by Ingutia-Oyieke (2008) which involved a comparative evaluation of two university libraries in Kenya. He demonstrated that ICTs play a crucial role in creating access to information sources through library networks. Therefore, when academic libraries integrate ICTs into their services, they play an important role in teaching and learning. The study sought to investigate the main features of ICT use by public and private university libraries in Kenya to support formal and informal teaching and learning. The three target groups that were included were third year undergraduate students, library committee members, and library managers. The collection of data was done through self-administered questionnaires, interviews, and site visits. The study looked at the four key issues namely; ICT infrastructure, access and use of ICTs, ICT usage patterns, and students learning outcomes. The results were as follows: (i) There was inadequate ICT infrastructure, specifically library networks and computers at Kenyatta University; (ii) Access to and use of ICTs was affected by the lack of access skills, and there was a need for training in this area and, (iii) student learning outcomes were varied. In the University of Eastern Africa, Baraton, students benefited from the use of library e-resources to meet their formal and informal learning needs while in Kenyatta University, students did not benefit at all (Ingutia-Oyieke 2008).

Mutula and van Brakel (2007) carried out another study on ICT skills readiness for the emerging global digital economy among small businesses in developing countries, using a case study of Botswana. The study was not on ICTs in higher education but is applicable in this study because of the area covered by the study plus the targeted population was academia. The purpose of the study was to characterize the ICT sector in terms of the skills needed in the sector to empower the emerging digital economy. Moreover, the study through the literature review covered the status of ICT skills for the digital economy both in developed and developing countries. The study used a qualitative design where focus group discussions were done to collect data from key stakeholders in the ICT sector. The stakeholders included ICT enterprises, citizen owned IT companies, a lobby group (CORBIT), Botswana Telecommunication Corporation, Botswana

Power Corporation, business community, academia, and legal experts. Data collected were analyzed using thematic content analysis. Results were presented using descriptive and narrative forms. The findings suggested that there was an acute global shortage of highly skilled and hands on personnel necessary for directing the emerging digital economy in both developed and developing countries, including Botswana. In addition, there was a serious ICT skills gap for certified specialists to help develop the sophisticated applications necessary to power the digital education, economy and more so the applications that depend on it.

Thus, the promotion of education and literacy in general, and digital literacy, in particular, remains a major challenge facing most countries especially those in the developing world. Hwang (2004 cited by Mutula and van Brakel 2007:233), in a study of the relationship between the diffusion of ICTs and changes in skills in the UK within business organizations, found that education and training were important in adjusting skill changes to the rapid expansion of ICTs. Enhancing education with the effective application of ICTs, both as a classroom tool and a subject in its own right, needs to be considered as one of the priorities of the governments of different countries. Moreover, it is important to deploy ICT-related skills through traditional education systems because most business enterprises provide little or no formal training, and tend to hire qualified staff. The importance of education in support of any national development and an ICT agenda cannot be over-emphasized (Mutula and van Brakel 2007:243).

Achimugu, Oluwagbemi and Oluwaranti (2010) conducted a study on an evaluation of the impact of ICT diffusion in Nigeria's higher educational institutions. In the education sector, tertiary institutions used computers in their academic programmes in order to produce good quality research output and learning. The study focused on how ICT diffusion had positively impacted on the higher education sector in Nigeria. The research also exposed the effect of ICT diffusion on undergraduate and postgraduate students of Nigeria's tertiary institutions. A combination of observation, interview and document materials for data gathering was employed as the methodology for carrying out the research. The result of the research suggested that ICTs are becoming a driving force for educational reforms and that ICTs have become an integral part of national education policies and plans in Nigerian tertiary institutions. Thus, ICT diffusion had led to the efficient institution of distance learning. Ibadan, Obafemi Awolowo University and the

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National Open University of Nigeria now operate distance learning centers, where a combination of print, live and recorded broadcasts as well as the internet are used to deliver courses or lectures to students. At the Obafemi Awolowo University, course materials are still predominantly print-based but online tutorials are becoming a convenient alternative to face-to-face tutorials especially for students unwilling or unable to go to the University's various physical learning centers. Challenges facing ICT utilization or diffusion in Nigerian tertiary institutions include inadequate infrastructure, inadequate skilled person power, resistance to change and inadequate funding (Achimugu, Oluwagbemi and Oluwaranti 2010). Tertiary institutions in Nigeria lack adequate ICT infrastructure to effectively tap into the opportunities offered by cyberspace. Personal computers were available in most Nigerian tertiary institutions, but they are not readily accessible to students because of the low PC: student ratio which was on average at about 1 to 40. In most cases, the basic software needed for practical work was not available or when available, was not accessible because of the limited ratio. There was also a lack of Computer Aided Interaction and other specialized software to support some areas of teaching, learning and research. Internet connectivity is available in most tertiary institutions in Nigeria, but in most cases the bandwidth subscribed to (which determines speed of access) was too small to support any meaningful academic activity during peak periods.

Inadequate ICT technical personnel was a major problem in Nigerian tertiary institutions. The reason for this can be ascribed to the lucrative job opportunities available to ICT professionals outside academia. The situation has made institutions rely on commercial private ventures to provide support for the few ICT facilities available. The support offered, in most cases, is commercial and lacks academic content. Various other researchers have conducted studies on the different aspects of use of ICTs in higher learning institutions in Africa. These include studies by Howell and Lundall (2000); Tusubira and Mulira (2004); Macchiusi (2007) and Beebe (2004). The last section of the related studies, discusses studies conducted in South Africa.

2.10.3 Studies conducted in South Africa

Czerniewicz, Ravjee and Mlitwa (2006) undertook a survey in South Africa on an exploratory mapping exercise, which describes and explores the landscape of ICTs and higher education since 2000. The focus was on teaching and learning within higher education. The study further

described the language of ICTs in HE both in terms of the shifting, emerging terminology and the varied understandings of ICTs in terms of national and institutional policies and reported practices. The study describes three prevalent meanings of technological change .These are change as improvement, change as innovation, and change as transformation. Finally, key issues and debates, which emerge from the data 'texts', were also identified and examined (Czerniewicz, Ravjee and Mlitwa 2006:3). The study revealed that there has been an increase in interest in technology in many HEIs in South Africa since 2000. The most common reason deduced from the data is that universities were refocusing their positions in the global economies and in the redefined local landscapes. There seems to be consensus that the move was towards a new kind of society, a knowledge society, for which ICTs were considered a basic requirement. Thus society requires a support infrastructure in the form of people with knowledge, skills, and the ability to deliver ICT services. It also involves a reformulation of the nature of learning and of what is required of a graduate (Czerniewicz, Ravjee and Mlitwa 2006:7).

Jaffer, Ng'ambi and Czerniewicz (2007) conducted a study on the role of ICTs in higher education. The study addressed a strategy for teaching and learning challenges in South Africa. The study revealed that one of the most common problems of using ICTs in education was to base choices on technological possibilities rather than educational needs. Jaffer, Ng'ambi and Czerniewicz (2007:131) maintained that a central role of educational technology is to provide additional strategies that can be used to address the serious environmental and educational challenges faced by academic staff and postgraduate students in higher education.

The educational needs manifested in South African universities include addressing a general lack of academic preparedness, multilingual needs in English medium settings, large class sizes and inadequate curriculum design. The researchers used case studies from one higher educational institution. Their study showed how specific and carefully considered interventions using ICTs can be used to address these teaching and learning concerns. These examples served to demonstrate ways in which teaching and learning may be enhanced when uses of educational technology are driven by educational needs. Jaffer, Ng'ambi and Czerniewicz's (2007) study concluded that the design of educational technology interventions should be driven by

educational needs within the context of a broader teaching and learning strategy which requires buy-in by both academic staff and postgraduate students.

Brown *et al.* (2008) conducted a study on the impact of South Africa's ICT infrastructure on higher education. The study described South Africa's ICT infrastructure and proceeded to highlight the issues in South Africa which HEIs face in terms of ICT access. They argued that a greater awareness of these issues can help plan for better e-learning interventions in higher education. A survey was conducted amongst 14 'e-Learning managers' from South African HEIs. The researcher evaluated the South African ICT infrastructure of HEIs in terms of issues such as internet users, bandwidth, demographic divides, cost and cell phone subscriptions. The following were identified as barriers: (i) negative perceptions of e-learning; (ii) lack of time; (iii) lack of management support; and (iv) unstable and unreliable Learning Management Systems (LMSs,) which were mentioned as a barrier by more than one institution. Brown *et al.* (2008) added lack of infrastructure in terms of computer availability as a barrier to the integration of ICTs in teaching and learning activities. Consequently these factors affect staff and students across institutions as they were highlighted (Brown *et al.* 2008: 69-74). The study also examined the constraints for teaching and learning and provided some suggestions to overcome these constraints. A good example was the need for collaboration, joint research projects and sharing of good practice so that opportunities could be maximized.

Brown *et al.* (2008) found that the way to establish how pervasive ICTs were in teaching and learning, and what staff and students had actually been doing, was to survey individuals. A number of studies have recently emerged which have used this approach (Czerniewicz and Brown 2006; Hodgkinson-Williams and Mostert 2006; Soudien, Louw and Muller 2007 cited by Brown *et al.* 2008). Yet whilst the studies indicate the generality of ICTs within the teaching and learning environment (97% of academics in the Western Cape and 88% of the academics in the social science study used ICTs to some degree for teaching) the study noted that the majority of academics did not use ICTs for teaching or learning on a daily basis and that other ICT uses such as research, communication and administration occurred more frequently (Czerniewicz and Brown 2006, Soudien *et al. 2007* cited by Brown *et al.* 2008). In addition, use of ICTs for teaching and learning was still quite narrow and confined to familiar technologies such as the

internet, e-mail and desktop packages. Nevertheless this did not mean that there was not a range of varied uses of ICTs. It is simply a matter of this type of use occurring less frequently and amongst a smaller group of people. For example, the Western Cape study showed that the hard disciplines of Science, Engineering and Health Sciences have a higher frequency of use of productive media (both as reported by staff and students) than the soft disciplines of Humanities and Business. This is not surprising, as electronic design and the use of specialized software is a strong feature of certain disciplines (Brown and Czerniewicz 2007 cited by Brown *et al.* 2008). There is also a higher frequency of use of simulations, role plays and case studies in the hard, applied disciplines of Engineering and Health Sciences which are consistent with these disciplines' strong practical focus in the application of course material.

The social sciences study showed that specialized use was also evident in particular institutions, for example, one institution used file sharing extensively whilst another two used electronic calendars extensively. The models of use also vary between institutions, with two using a fully online model fairly often whilst the others use the hybrid or Web supported model more often (Brown *et al.* 2008). The study concluded that despite the varied HEIs' contexts, each with their own infrastructural and organizational challenges, there were definite areas for collaboration, joint research projects and sharing of good practice. These opportunities were critical for e-learning practitioners, especially whilst operating in an environment of resource constraint (Brown *et al.* 2008).

Brink (2008) did a study on electronic assessment in an end-user computing course where he examined ways in which computer technology can be used to teach, so as to benefit all role-players in the learning process, including lecturers, students, the learning fraternity and industry, contributing to a more competent and capacitated workforce. The study looked at electronic assessment tools implemented by the University of Johannesburg (UJ), intended to enhance and upgrade learning in courses where computers were used. Data were collected in two different phases. The first was the qualitative phase that consisted of two identified focus groups made up of specific individuals from Business Information Technology (BIT). The focus groups comprised lecturers engaged in the daily use and activation of the electronic assessment systems and supported by information systems technical support personnel. The second phase,

quantitative in nature, used responses to structured questionnaires delivered to students who had used the assessment tool. Data was analyzed using content analysis. Data coding was used to develop categories of barriers faced by lecturers when engaging with an electronic assessment tool. The lecturers pointed out that the language used in questions and systems' challenges to teaching and learning while students highlighted a need for preparing them for the process, for example, calling for a tutorial with class presentation prior to assessment. The challenges were network/server capacity, hardware/PC capacity, accidental time exits by students, and security of the system. Thus, the study concluded that the electronic assessment systems used for the assessment of students needs to be stable in order to yield high performance.

De Villiers (2001) conducted a study at the University of Pretoria on asynchronous Web-based technologies to support learning. The study sought to investigate three Web-based technologies to determine their usefulness and the extent to which they support learning. The study comprised three case studies, each examining a separate Web-based technology, suitable for diverse groups of students in terms of age group and background. The main objective was to determine for whom and how these technologies could be used, with the intention of providing a systematic structure of Web-learning possibilities for students of different ages (undergraduates and postgraduates) and types of teaching (contact teaching and distance learning). The research was primarily a qualitative study but quantitative measures were taken to triangulate the data. Data were collected by means of a questionnaire which was distributed to the entire population of multimedia students. Among the 24 questionnaires that were given out, 20 were returned. In the case of the engineering students, a random sample of six students was drawn, who completed the questionnaires. Both academic staff were interviewed to obtain their insights and in-depth understanding of their use of WebCT[3] in their respective departments. Both students and academic staff experienced significant problems when using WebCT in some form or other, such as access problems, response problems, unreliable servers and uploading. A major problem especially for the postgraduate engineering students was the download time for accessing their course from home. This however, was due to large graphics and the limited bandwidth available in SA. Email, news groups and bulletin boards were standard communication tools available to

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[3] WebCT is a tool that supports the design, delivery and management of sophisticated web-based learning environments (De Villiers 2001).

support asynchronous communicative interaction for learning. However, despite the relative enthusiasm of standard internet tools the richness of communicative interactivity was actually very poor when compared to that of the average physical classroom (Hiltz and Wellman 1997 cited by de Villiers 2001:90). It was found that Web-based technologies could support learning. Their usefulness depends on how the instructional design addresses the different aspects of Web-based learning, and whether or not the course and Web-based materials match the characteristics or needs of the target group.

2.11 Summary of the chapter

This chapter provided information on the significance of ICTs for teaching and learning in higher learning institutions. The use and the impact of ICTs in teaching and learning, together with implementation challenges in higher learning institutions, were also reviewed in detail. Previous studies on ICT policy, information literacy, computer use and computer literacy as key to the successful use of ICTs in institutions of higher learning were also reviewed, as were similar studies conducted internationally and nationally. The next chapter will present the research methodology and methods used in this study.

CHAPTER THREE: RESEARCH METHODOLOGY

3. Introduction

The purpose of this study was to investigate the use of ICTs by academic staff and postgraduate students for teaching and learning at the University of KwaZulu-Natal. This chapter describes the research methodology that was used for this study. The research design is outlined together with the research methodology, study population, sampling procedure, data collection procedure and instruments, data analysis, validity, reliability and the evaluation of the research methods.

3.1 Research design

This section describes the research design which was used in this study. According to Leedy and Ormrod (2005:2) research is a systematic process of collecting, analyzing, and interpreting data in order to increase our understanding of the phenomenon about which we are interested in or concerned about. Research design is a plan of how a researcher intends to conduct a study (Babbie and Mouton 2001:74). It is the general blueprint for the collection, measurement and analysis of data, with the central goal of solving the research problem. It includes the outline of what the researcher did from writing the hypothesis and its operational implications, to the final analysis of data (Creswell and Plano-Clark 2007:58). Punch (2004:66) adds that the research design is the basic plan for a piece of research and includes four main ideas. The first is the strategy, the second is the conceptual framework, the third is the question of who or what was studied and the last idea concerns the tools and procedures to be used for collecting and analyzing empirical materials. According to Kothari (2004:14), a good research design must yield maximum information and provide an opportunity for considering many different aspects of the problem. Mikkelsen (1995: 22) pointed out that the nature and the context of the study determines a particular research design, since a good research design for one study might be inappropriate for another.

3.1.1 Research methods and methodology

According to Odongo (2002:13), the research method is the first step in the process and the means by which a research project is implemented. Leedy and Ormrod (2005) define research as

the process of collecting, analyzing, and interpreting data in order to understand a phenomenon. The research process is systematic in that defining the objective, managing the data, and communicating the findings occur within established frameworks and in accordance with existing guidelines. The frameworks and guidelines provide researchers with an indication of what to include in the research, how to perform the research, and what types of inferences are probable, based on the data collected (Williams 2007:65).

The three common approaches to conduct research according to Williams (2007) are quantitative, qualitative, and mixed methods. In terms of the quantitative approach use was made of the survey method. According to Birley and Moreland (1998:34) survey methods are particularly useful to get an overview of a particular situation. "Surveys gather data on a once-off basis, and are therefore economical and generate numerical data" (UKZN 2003:61). Babbie and Mouton (2001:232) are of the opinion that survey research is "probably the best method available to the social scientist interested in collecting original data for describing a population too large to observe directly". The qualitative component of the methodology was addressed by the focus group interview. Thus, research methodology does not only consider research methods, but also encompasses the logic behind the methods to be used in the research study, and the purpose of using a particular method so that the research findings are capable of being evaluated either by the researcher or by others (Kothari 2004:8). It focuses on the research process and the kind of tools and procedures to be used (Babbie and Mouton 2001:75).

The study used quantitative and qualitative approaches as a mixed methodology also known as triangulation. This means that data is gathered by the "comparison of the results of two or more methods" (Bailey 1987:263). Triangulation, according to Neuman (2006:149), is the idea that looks at something from multiple points of view to improve accuracy. Babbie and Mouton (2001:217) are of the view that methodological triangulation is the "best way to collect information about different events and relationships from different points of view". Broadly, quantitative methods involve collecting numerical data whereas qualitative methods explore attitudes, behaviour and experiences and also attempt to get an in-depth opinion from participants (UKZN 2003:59).

3.1.2 Qualitative versus quantitative approaches

In this section a distinction is made between the two methods used to collect data in this study. According to Denzin and Lincoln (1994 cited by Sarantakos 1998:35) qualitative research is a multi-perspective approach to social interaction, which aims at describing, making sense of, interpreting, or reconstructing this interaction in terms of the meanings that are subject to it. Creswell (2003) cited by Williams (2007:66) is of the view that quantitative research involves the collection of data so that information can be quantified and subjected to statistical treatment in order to support or refute 'alternate knowledge claims'. Punch (2004) noted that neither approach is superior to the other; each approach has its strengths and its weaknesses, and over confidence in any technique is not appropriate. Thus both approaches are needed in social research (Punch 2004:241). Quantitative and qualitative approaches specify a different form and sequence of decisions, and different answers as to when and how to focus the research (Neuman 2006:176). These differences can make techniques used by the other approach wrong or inappropriate. Qualitative research is often exploratory in nature, and it may use its observations to build theory from the ground up (Leedy and Ormrod 2005:95). Theory can either be causal or non-causal and is often inductive (Neuman 2006:157-158; Punch 2004:243). The quantitative approach seeks to establish, confirm, or validate relationships and to develop generalizations that contribute to theory (Leedy and Ormrod 2005:95).

The research procedures in qualitative studies are particular and replication is very rare, while the procedures in quantitative studies are standard and replication is frequent (Neuman 2006:157). In data analysis, the qualitative approach proceeds by extracting themes or generalizations from evidence and organizing data to present a coherent and consistent picture. Whereas, the analysis in a quantitative study proceeds by using statistics, tables or charts and discussing how they relate to hypotheses (Neuman 2006:157). To further differentiate qualitative and quantitative research, Leedy and Ormrod (2005:94-95) explain that while a quantitative study usually ends with the confirmation or disconfirmation of the hypotheses that were tested, a qualitative study is more likely to end with tentative answers or hypotheses about what was observed. These tentative hypotheses may form the basis of future studies designed to test the proposed hypotheses (Leedy and Ormrod 2005:94-95). According to Punch (2004) in the case of triangulation, the findings from one type of study can be checked against the findings derived

from the other type. Thus, quantitative and qualitative research is combined in order to provide a general picture. Thus quantitative research may be employed to 'plug the gaps' which arise in a qualitative study.

3.2 Study population and sampling

A population is the set of objects or people which form the focus of the investigation and about which the researcher wants to determine some characteristics (Bless and Higson-Smith 2000:84). The target population for this study comprised academic staff and postgraduate students in six Social Science Schools of the Faculty of HDSS on the PMB campus of UKZN. These schools were: Philosophy and Ethics; Sociology and Social Studies; Religion and Theology; Psychology; Politics and Anthropology, Gender and Historical Studies. The reason for choosing these Schools was that they had larger numbers of registered postgraduate students except for one School, that of Anthropology, Gender and Historical Studies, which had no postgraduates. However, academic staff in this School were included. The method of sampling was random stratified sampling.

3.2.1 Sampling process

According to Neuman (2006:219) a sample is a smaller set of cases a researcher selects from a larger pool and generalizes to the population. The sampling approach can be categorized into two groups; probability and non-probability. A sampling procedure is the process of selecting a sub-set of people or social phenomena to be studied from the larger universe to which they belong, in one of several ways, so as to be either non-representative or representative (Kothari 2004:55). In a qualitative study, the primary goal of sampling is to collect specific cases, events or actions that can clarify and deepen understanding. The main focus is to find cases that will enhance what researchers learn about the processes of social life in a specific context (Neuman 2006:219). The quantitative studies aim at accomplishing a representative sample, or a small collection of units from a larger collection or population, so that the researcher can study the smaller group and produce an accurate generalization about the larger group (Neuman 2006:219). Consequently the process of sampling is very important for both quantitative and qualitative research. Most quantitative studies primarily use probability (random) sampling, while qualitative studies tend to use the non-probability (non-random) technique (Onwuegbuzie and Leech 2005; Creswell and

Plano Clark 2007). The method of sampling in this study was random stratified sampling. According to Neuman (2006:23) stratified sampling was a random sampling technique in which the researcher first identifies a set of mutually exclusive and exhaustive categories and then divides the sampling frame by the cases from each category.

There were 394 postgraduate students in the six Schools. Using Krejcie and Morgan's (1970) guidelines the sample size for a population of 394 was 188. Table 3 below outlines how the number of students at the various levels in the six Schools was calculated in terms of the sample size of 188 and the (proportional) stratified sampling method used. Given the relatively small number of academic staff in the Schools (53) no sampling was done and all staff were approached to participate in the survey.

Table 3: Determination of student sample

Schools	Population	Sampling fraction
School of Religion and Theology	Honours=24(14%)*80 Masters=68(41%)*80 PhD= 75(45%)*80 **Total=167**	11 33 36 =80
School of Sociology and Social Studies	Diploma=39(34%)*55 Honours=24(21%)*55 Masters=34(30%)*55 PhD=18 (16%)*55 **Total=115**	19 11 16 9 =55
School of Psychology	Honours=31(44%)*34 Masters=24(34%)*34 PhD=15(21%)*34 **Total=70**	15 12 7 =34
School of Philosophy and Ethics	Honours=2(22%)*4 Masters=4(44%)*4 PhD=3(33%)*4 **Total=9**	0 2 1 =3
School of Politics	Honours= 15(45%)*15 Masters=10(30%)*15 PhD=8(24%)*15 **Total=33**	**7** 5 4 =16
School of Anthropology, Gender and Historical Studies	None	None
Total Population	**394**	**Sample size=188**

All postgraduate students were identified from the postgraduate register held at each School. Academic staff from the selected Schools were identified with the assistance of each School administrator or secretary. When all the participants were identified the researcher then delivered the questionnaire to them.

For focus group discussions the researcher used purposive sampling to select at least one postgraduate student from each School. Thus, one focus group interview was conducted with a group of eight postgraduate students.

3.3 Data collection methods and instruments

This section will introduce the methods used for data collection in this study. Data for this study was collected using questionnaires and a focus group discussion. The application of more than one instrument in data collection is vital to provide checks and balances with regard to shortfalls characterized by each of the data-gathering instruments. The section below provides information on the data collection instruments that were used in the study.

3.3.1 Questionnaire

According to Bless and Higson-Smith (2000:111), the questionnaire is the primary data collection tool used by social science researchers to cover both small and large populations within a short time with minimum costs. It is a very flexible method which allows both open and closed questions to be used, and it also enables the researcher to collect enough information from the respondents (Swisher and McClure 1984:80). The self-administered questionnaire was used as the survey data collection technique for postgraduate students and academic staff (see Appendix 2 and 3). The advantages of using questionnaires include the fact that they are cheap and participants can complete the questionnaires at their own convenience (Neuman 2006). In addition, according to Babbie and Mouton (2001:162), using a questionnaire can reduce interviewer bias and provide feelings of anonymity on the part of respondents. Both open and closed questions were used in this study.

3.3.1.1 Open questions

Neuman (2006:286) defines an open question as a type of survey research question to which respondents are free to offer any answer they wish. Bourque and Fielder (1995:59) are of the view that open questions have no list of possible answers. Neuman (2006: 287) adds that open questions permit an unlimited number of possible answers and they also allow respondents to answer in detail and qualify and clarify responses. Open questions were used in this study to allow the respondents to express their views freely and to provide some detailed information wherever they felt necessary.

3.3.1.2 Closed questions

According to Neuman (2006:287) a closed question is a type of survey research question in which respondents must choose from a fixed set of answers. The advantages of closed questions are that they are easier and quicker for respondents to answer, the answers of different respondents are easier to compare and also respondents are more likely to answer sensitive topics (Neuman 2006:287). Swisher and McClure (1984:88) add that closed questions allow respondents to complete the questionnaire within a short time by providing a choice of one or more appropriate categories. The disadvantages are that they force people to make choices they would not necessarily make in real life, thus respondents can be frustrated because their desired answer is not a choice (Neuman 2006:287). Most of the questions in the questionnaire were closed questions which included categories of open questions which allowed the respondents to provide other options which might have been omitted by the closed questions.

3.3.1.3 Advantages of questionnaires

A questionnaire has several advantages. Kumar (2005) stressed that it is less expensive and the researcher is not obliged to interview respondents, it saves time, and human and financial resources. The use of questionnaires, therefore, is comparatively convenient and inexpensive. Questionnaires offer greater anonymity, as there is no face-to-face interaction between respondents and the researcher. Thus in some situations when sensitive questions are asked it helps to increase the likelihood of obtaining accurate information. The responses can be completely anonymous, allowing potentially embarrassing questions to be asked with a fair chance of getting a true reply. Raju (2005:185) notes that questions are fixed, they do not change

according to how the replies develop, questions are the same for each respondent and the person posing the questions is remote. Questionnaires are generally geographically dispersed to the location of the respondent. Raju (2005:185) and Denscombe (2007:169) are of the view that the use of questionnaires can be a relatively economical method, in terms of cost and time of gathering data from a large number of respondents. According to Denscombe (2007:169) questionnaires supply standardized answers, respondents are posed with exactly the same questions with no scope for variation to slip in via face-to-face contact with the researcher. The data collected are thus unlikely to be contaminated through variations in the wording of the questions or the manner in which the question is asked. Thus there is limited scope for the data to be affected by interpersonal factors (Denscombe 2007:169). Questionnaires can be designed to determine what people know, what they think, or how they act or plan to act (Denscombe 2007). They can measure the respondents' factual knowledge about a topic or an idea, or people's opinions, attitudes or motives for behaviours or to predict future actions (Denscombe 2007:126).

3.3.1.4 Disadvantages of questionnaires

Although a questionnaire has several disadvantages, it is important to note that not all studies using this data collection method experience the same disadvantages. According to Kumar (2005:130-131) the presence of a disadvantage depends on a number of factors which one needs to be aware of, and understand their possible effect on the quality of the data. One main disadvantage of questionnaires is that their application is limited to a study population that can read and write, therefore it cannot be used on a population that is illiterate. Questionnaires are also notorious for their low response rates (Kumar 2005:130-131; Denscombe 2007:170-171) as not everyone who receives a questionnaire returns it, so there is a self-selecting bias. Thus, those who return their questionnaire may have attitudes, attributes or motivations that are different from those who do not, resulting in the findings not being representative of the total study population. The opportunity to clarify issues is lacking, so if respondents do not understand some questions, there is no opportunity for them to have the meaning clarified (Kumar 2005:130-131). The other negative implication of using a questionnaire as a data collecting tool, according to the UKZN (2003:84), is that respondents may not understand the questions asked or may provide answers that they think the researcher wants to hear.

3.3.1.5 Pre-testing and administering of the questionnaire

To increase the reliability and validity of the questionnaire, it was pre-tested before final distribution to the population of the study. The essence of a pre-test is to check that there are no ambiguous questions and instructions and to allow for the removal of items that would not yield usable data. The pre-test provides the researcher with the opportunity to revise the questionnaire and have it ready for the main distribution (Holland and Campbell 2005). According to the UKZN ethics and research policy, the questionnaire must be pre-tested before it is given to the respondents to complete. Powell (1997:105) stresses the point that questionnaires need to be pre-tested or evaluated to improve the standard of questioning, before they are used in a survey. Powell (1997) points out that pre-testing gives the researcher an opportunity to identify questionnaire items that tend to be misunderstood by the participants and therefore, do not obtain the information that is needed.

For this study the researcher pre-tested the questionnaire on 10 postgraduate students and two academic staff members from the School of Language, Literature and Linguistics at the UKZNP campus. Both student and academic staff names and contacts were obtained from the School administrator. These students and staff were chosen because they were considered similar to the targeted population of the Faculty of HDSS.

The questionnaire was distributed by the researcher to the identified population of both postgraduate students and academic staff. Nine out of 10 student questionnaires were returned and both academic staff returned the questionnaire with some comments. Minor changes, in the form of grammatical errors were corrected before the questionnaire was administered to the target population. The focus group interview questionnaire was not pre-tested.

The method of distributing the questionnaire is very important. In this study the questionnaire was distributed in various ways. The researcher liaised with the HDSS academic administrator from different disciplines and requested a list of registered postgraduate students and all academic staff from their Schools and their lecture timetables. The researcher distributed the questionnaires in the lecture rooms where both academic staff and postgraduate students filled in the questionnaires and handed them back to the researcher. The researcher also distributed the

questionnaires to individual offices of the academic staff and to all postgraduate rooms or offices. Some of the questionnaires were filled in and given back to the researcher at the same time but others were collected at a later stage. The researcher also liaised with the Matron of Robleigh, the main postgraduate students' residence on campus and permission was granted to distribute the questionnaires to the School of Sociology and Social Science students who lived in the residence. The researcher reminded both academic staff and postgraduate students to return the questionnaires sent to their offices. As noted earlier, most of the academic staff returned the questionnaire to the researcher directly. The response rate is described in Chapter 3.6 and also in Chapter 4.

3.3.2 Focus group interview

According to Neuman (2006:412) the focus group interview is a special qualitative research technique in which people are informally 'interviewed' in a group-discussion setting. Holloway and Wheeler (1996) cited by Maura (2008) notes that the focus group can be seen as comprising a number of people with certain common experiences or characteristics who are interviewed by the researcher. Kaniki (2006:11) stated that the techniques can be used in conjunction with self-administered questionnaires or interviews. Cohen, Manion and Morrison (2007:376) are of the view that the focus group brings together a specifically chosen sector of the population to discuss a particular given theme or topic, where the interaction within the group leads to data and outcomes. This study used focus group interviews to collect qualitative data. The focus group interview was guided by an interview schedule comprising a list of open questions that was used to collect qualitative data to support the questionnaire (see Appendix 4).The survey and the focus group interview had been used in studies similar to the present study, for example, Newhouse (2002); Czerniewicz and Brown (2005a); Czerniewicz and Brown (2005b) Brown, *et al*. (2007) and Mostert and Nthetha (2007).

3.3.2.1 Advantages of the focus group interview

According to Neuman (2006:412) one advantage of a focus group interview is that people tend to feel empowered and the natural setting allows people to express opinions and ideas freely. Thus, participants may query each other's points and explain their answers to one another (Neuman 2006:412). Another advantage of a focus group is that the accuracy of the information and the

rate at which it is generated is higher in groups than in individual interviews (Babbie 2004; Grenier 1998; Leedy and Ormrod 2005:115, 146; Smithson 2008). Less knowledgeable participants may also learn something new from the group (Grenier 1998). Focus groups are cheap, relatively easy and can be conducted in a short time (Krueger 1988:47; Langill 1999:26; Strydom *et al*. 1998:324; Marshall and Rossman 1999:115). Such focus groups are flexible and produce validated data and speedy results. They also capture real-life data in a social environment (Krueger 1988:47; Marshall and Rossman 1999: 115; Strydom *et al*. 1998:324). Focus group interviews are inexpensive, data-rich, flexible, stimulating, recall-aiding, cumulative and collaborative (Punch 2004:177).

3.3.2.2 Disadvantages of the focus group interview

The shortcoming of focus groups is that the researcher cannot reconcile the differences that arise between individual-only and focus group-context responses. Another point is that focus group participants also produce fewer ideas in groups than when conducted individually in the individual-only interviews (Neuman 2006:412).The desired information may be suspended because people in positions of authority, and males in general, tend to dominate discussions (Krueger 1988:44-45; Bryman 2004:360; Welman, Kruger and Mitchell 2005:204; Cohen, Manion and Morrison 2007:377). The researcher may also have difficulty in interpreting and analysing the observed data, and may have less control over proceedings than the individual interview. Groups are also difficult to assemble (Strydom *et al*. 1998:325-326; Marshall and Rossman 1999:115; Bryman 2004:360; Cohen, Manion and Morrison 2007:377). In a group interview there can also be problems associated with culture and dynamics, and in achieving balance in the group's interactions (Fontana and Frey 2005).

3.3.2.3 Procedures and selection of focus group interviews

It is recommended that the size of groups for focus group discussions should not be so large as to be uncomfortable and minimize adequate participation by most members, nor should it be so small that it fails to provide substantially greater coverage than that of an interview with one individual (Morgan 1988: 41; Morgan and Scannell 1998:71; Merton, Fiske and Kendall 1990:137; Bloor *et al*. 2001: 27). Maura (2008) indicated that deciding on the right number of participants for a focus group means striking a balance between having enough people to

generate a discussion and having too many people that some feel left out. Cohen, Manion and Morrison (2007: 377) argue that with a small group the intra-group dynamics will apply a disproportionate effect, while with too large a group it becomes harder to manage. Powell (1997:114) suggests that focus groups should be scheduled for one session of one or two hours.

A purposive sampling strategy was used to choose the focus group participants. Participants were selected using well-defined purposive selection criteria, as opposed to convenience samples, which emphasized the ease of recruiting the participants (Morgan and Scannell 1998:56). In purposive sampling, respondents or other units are chosen for a particular purpose (Robson 2002:265; Leedy and Ormrod 2005:206). Purposive sampling in this study insured that there was a rational representation from the participants. This means the respondents involved in the focus group discussions were postgraduate students from the Social Science Schools studied. Thus, one focus group interview was conducted with a group of eight postgraduate students.

The group discussion was facilitated by the researcher and the researcher's assistant. According to Kelly (1999 cited by Moyane 2007:37-38) the facilitator needs to "be aware of the personal and interpersonal dynamics at work within the group". This includes the comfort level of the group from the beginning to end. The researcher chose a venue that was comfortable and accessible for all participants to meet. The facilitator welcomed the participants with confidence and assured them that there were no right or wrong responses. The researcher requested permission to record the proceedings of the discussion and the participants were assured that their identity would remain confidential. The focus group interview lasted for an hour.

3.4 Validity and reliability

Validity and reliability are central issues in all measurements (Gray 2004:218; Neuman 2006:188). The person conducting the research needs to be sure that the data collecting instrument is both valid and reliable. Both validity and reliability help to establish the truthfulness and credibility of findings. According to Babbie and Mouton (2001:119) reliability is the degree to which a test consistently measures what it sets out to measure while at the same time yielding the same results. Whereas validity is the degree to which a measure does what it is intended to accomplish.

3.4.1 Validity

Neuman (2006:196) and Silverman (2010:47) are of the view that validity means truthfulness and correctness, thus it refers to show how well an idea "fits" with actual reality. According to Birley and Moreland (1998:41) "validity ensures that data sets collected or items used are applicable or relevant to the research". The concern should be to reduce the amount of interference by non-relevant or non-valid aspects, such as the language used. The language should not be complex or hinder understanding and answering (Birley and Moreland 1998:41). Generally, validity is the extent to which the research findings accurately represent what is really happening in the situation (Willig 2001; Welman, Kruger and Mitchell 2005:142; Leedy and Ormrod 2005:92).

Ensuring validity can be achieved in many different ways, one of which is to carry out an initial investigation (a pre-test) using the intended data collecting instrument to check the "authenticity and relevance of the data produced" (Birley and Moreland 1998:42). For the intention of this study pre-testing the questionnaire on 10 postgraduate students and two academic staff members of the School of Language, Literature and Linguistics at the UKZNP campus were used as tools for content validation.

3.4.2 Reliability

According to Punch (2004:98) reliability is a central concept in measurement, and basically means consistency. Birley and Moreland (1998:43) pointed out that reliability is the extent to which a test would give consistent results if applied more than once to the same people under standard conditions. One approach to check reliability is the test-re-test method, which involves using an instrument with a group on two separate occasions and analyzing how closely the two sets of results conform to each other (Birley and Moreland 1998). In this study in order to improve reliability, the researcher recorded every step that was taken during data collection in detail, in such a way that other researchers would be able to replicate the study.

3.5 Data analysis

Data collected was sorted and coded. "Coding is the process of structuring data into an analyzable form" (Birley and Moreland 1998:58). The data needs to be collated and presented in

a way that makes it understandable and interesting to the researcher and other readers. Coding of quantitative data uses either letters, numerals or alpha-numeric codes to describe the data, which becomes capable of being analyzed without reference to each of the responses of the sample (Birley and Moreland 1998:58).

Data from the questionnaire was analyzed using SPSS version 15.0. Analyzed data was presented in the form of graphs and frequency tables. According to Powell (1997:67) the SPSS system is a "comprehensive, relatively easy to use computer program for statistical analysis, report writing, tabulation and general purpose data management". The advantages of the SPSS system are that "it speeds up processing and analysis of data as well as saving and eliminating a good deal of tedious and repetitive work" (Ginindza 2008:62). Once the data was coded and entered, it was checked to make sure the data file was complete and in order. When errors were found, the original instrument was consulted and corrections were made (Fowler 2002:144). Analysis of data from the focus group involves the "transcription of views and opinions that emerged and has been verified through the group discussion" (Akpabio *et al.* 2007:40). In this study the qualitative data were analyzed using thematic content analysis. According to Babbie and Mouton (2001:383) content analysis is collecting and organizing information systematically in a standard format that allows analysts to draw conclusions about the characteristics and meaning of recorded material.

3.6 Evaluation of the methodology

According to Ngulube (2005:139) research methods should be evaluated in order to explain what information was needed, and how it was collected and analyzed. Willig (2001) adds that the evaluation of research methods ensures that the research methods are appropriate to the research questions and compatible with the kind of knowledge the study is aiming to produce. Moreover reliability and validity are also key ways of evaluating research and other criteria could be useful as well (Silverman 2010:59). Ngulube (2005:139) highlights some of these criteria which include unexpected changes to the research design, limitations of the research design, the acknowledgement of shortcomings of the execution of the study and ethical issues.

Although the data collection was done during examination preparation and the population consisted of 241, the researcher managed to distribute 188 questionnaires to postgraduate students and collected 173 questionnaires from them. All 53 questionnaires distributed to academic staff were collected. In total the researcher managed to collect 173 (92 %) questionnaires from postgraduate students and 53 (100%) from academic staff. This could be considered an excellence response rate from the total population. The researcher observed that every School in the Faculty of HDSS selected to represent the population had responded making the data representative.

Nonetheless, problems encountered during the distribution and collection of the questionnaires included:

- Questionnaires were distributed during the examination preparation, when some of the academic staff were busy with the release of final marks and writing School or lecture reports for their students. The researcher often had to visit their office more than three times to collect the questionnaire.
- Likewise some of postgraduate students were engaged in compiling their research reports and preparing for their final examination. This prevented them from focusing solely on the completion of the questionnaire.

In spite of the difficulties mentioned the researcher succeeded in collecting more than 90% of the questionnaires as a result of ceaseless pleading and follow-ups with respondents.

3.7 Summary of the chapter

This chapter has discussed the methods used for data collection in this study. The use of both quantitative and qualitative methods were adopted. Advantages and disadvantages of each method were explained. The selection of the population and the sampling procedure, the organization of the questionnaires, the focus group interview schedule and the response rate of the survey were clearly explained. Data collection methods and instruments were also discussed. The next chapter will present the findings of the study.

CHAPTER FOUR: DATA PRESENTATION

4 Introduction

The aim of this chapter is to present the raw data obtained from the study and to transform the data into meaningful facts. The data presented in this chapter was obtained from two self-administered questionnaires and a focus group interview of HDSS postgraduate students in the Social Science Schools of the Faculty. While the results of data for each question in the questionnaire were analyzed using SPSS, the data collected using the focus group interview were analysed using thematic content analysis.

The self-administered questionnaires were distributed to both academic staff and postgraduate students. Both yielded significantly high response rates. Fifty three questionnaires were distributed to the academic staff and were all successfully returned, yielding a response rate of 100%. In addition to that, a total of 188 questionnaires were distributed to postgraduate students and 173 were returned yielding a response rate of 92%. Response rates with questionnaires is a major concern in survey research. Researchers have not agreed on what constitutes an adequate response rate. According to Polit and Beck (2004:366) a response rate greater than 65% is probably sufficient for most purposes, but lower response rates are common. Babbie and Mouton (2001:261) asserted that the consensus in survey research was that a response rate of 50% was considered adequate for analysis, while 60% and 70% are good and very good respectively. Therefore, in this study a response rate of 100% for academic staff and 92% for postgraduate students was sufficient to allow the researcher to make generalizations about the total population. A focus group interview was conducted with eight postgraduate students who were representatives of all the Social Science Schools' participants.

4.1 Questionnaire results

Both questionnaires were arranged to cover the five main areas of the research topic. Section A of the questionnaire looked at the background information of the academic staff and students. Section B examined ICT hardware while section C looked at ICT software. Furthermore, section D examined ICT skills and training and section E looked at the impact of ICT for teaching and

learning. It must be noted from the academic staff questionnaire (Appendix 3) questions 6, 7, 8, 10, 11, 13 and 15 were multiple response questions that allowed academics to indicate more than one answer while questions 3, 16, 18, 25, 27 and 28 were open questions which allowed academics to provide any answer they liked. For the postgraduate students' questionnaire (Appendix 2) questions 7, 8, 9, 11, 13, 15, 16, 17 and 22 were multiple response questions and questions 4, 21, 25, 27 and 29 were open questions. The symbol N indicates the number of respondents that should have answered a particular question. Percentages were rounded-off to one decimal place. This chapter will present the data from the academic staff questionnaire first followed by the data from postgraduate students. Lastly, the data collected from the focus group interview will be presented.

4.2 The academic staff questionnaire

Results of the academic staff questionnaire are discussed below.

4.2.1 Section A: Background information of academics.

The background information provides more detail about which School the academics belonged to, their gender, age, race, designation and academic level.

4.2.1.1 Schools to which academics belonged

Question 1 sought to determine which Schools academics came from. Table 4 illustrates that 18 (34%) academic staff were from the School of Religion and Theology (SORAT). This was followed by the School of Sociology and Social Studies with 12 (22.6%) and 10 (18.9%) academics were from the School of Psychology. Six (11.3%) academics were from the School of Politics, and four (7.5%) were from the School of Philosophy and Ethics while one (1.9%) academic did not indicate a School.

Table 4: Schools for academics
N=53

School	Frequency	Percent
Religion and Theology	18	34%
Sociology and Social Studies	12	22.6%
Psychology	10	18.9%
Politics	6	11.3%
Philosophy and Ethics	4	7.5%
Anthropology, Gender and Historical Studies	2	3.8%
No response	1	1.9%
Total	53	100%

4.2.1.2 Gender

Question 2 sought to establish the gender of the academics. Of a total of 53 academics, 23 (44.2%) academics were female and 29 (55.8%) were male. Therefore, there were more female academics than male in the Social Science Schools of the Faculty.

Table 5: Gender of academics

N=53

Gender	Frequency	Percent
Male	30	56.6%
Female	23	43.4%
Total	53	100%

4.2.1.3 Age of academic staff

Question 3 was asked to establish the age groups of the academics. Figure 1 shows that the majority of respondents were from the age groups of 26 to 34 years while 12 academies did not indicate their age.

Figure 1: Age of academic staff
N=53
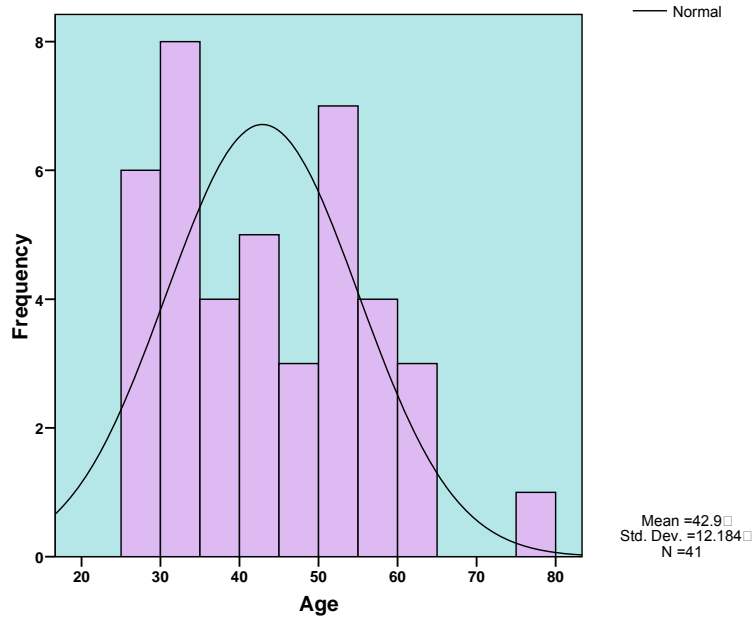
4.2.1.4 Race of academic staff

Question 4 sought to identify the race groups to which academics belonged. Figure 2 shows that almost half of the academic staff, 26 (49.1%), were White followed by 18 (34%) who were Black and four (7.5%) who were Indian. Two (3.8%) academics regarded themselves as African while two (3.8%) did not indicate their race and only one academic (1.9%) was Coloured.

Figure 2: Race of academic staff
N=53
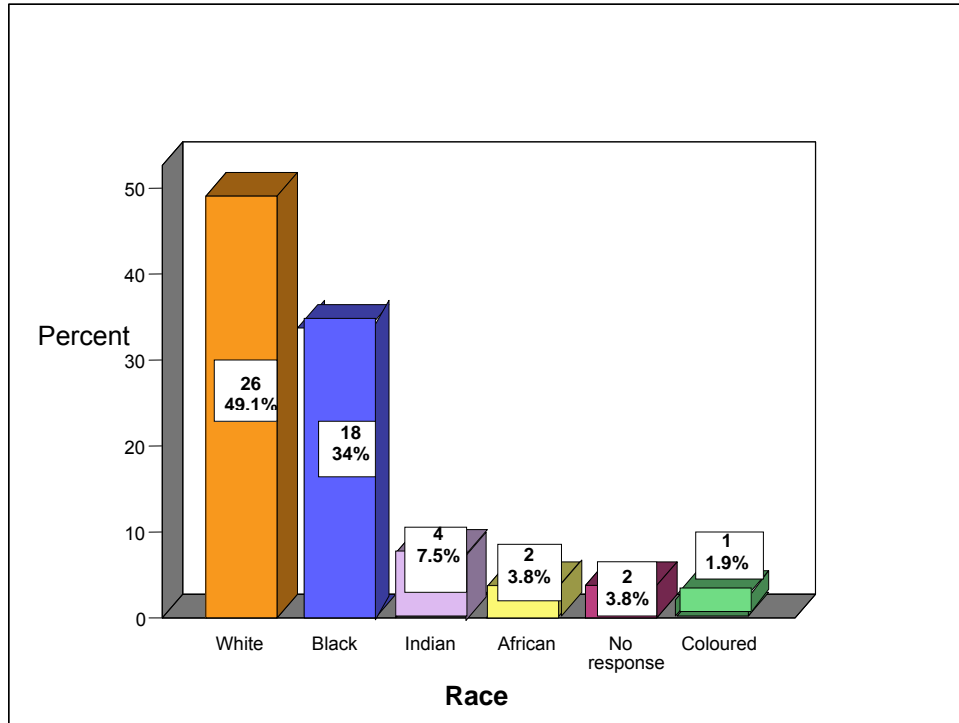
4.2.1.5 Designation of academic staff

Question 5 sought to identify the various designations of the academic staff. Figure 3 indicates that from a total of 53 respondents, more than half, 29 (54.7%), were lecturers, nine (17%) were professors, followed by seven (13.2%) who were senior lecturers and five (9.4%) were tutors. Three (5.7%) academics did not respond to the question.

Figure 3: Designation of academic staff
N=53
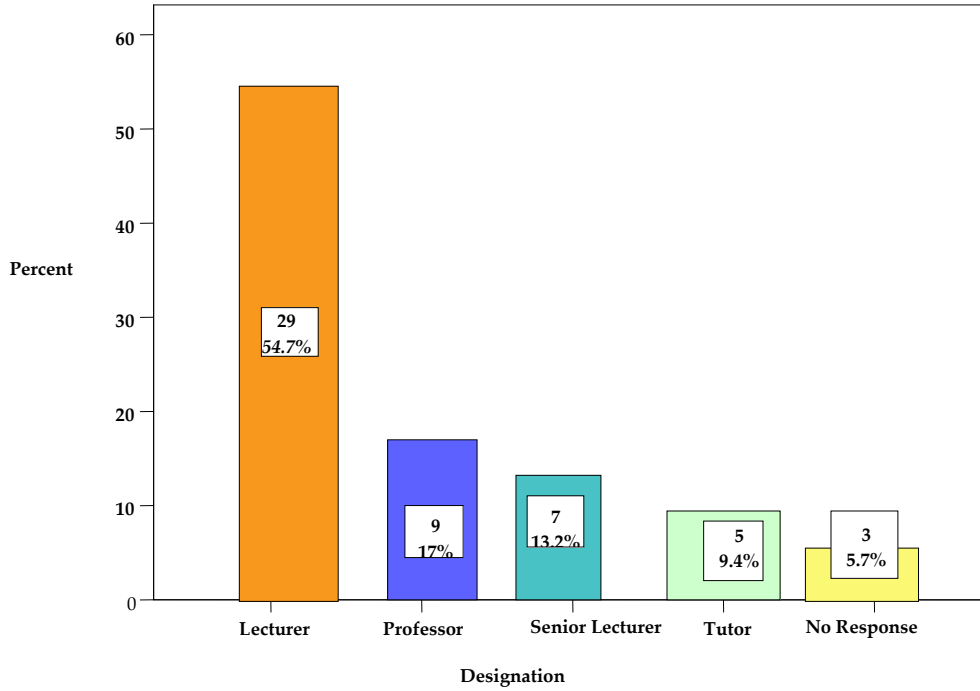
4.2.1.6 Academic level taught

Question 6, a multiple response question, sought to establish which academic levels of teaching staff were engaged with. Of the 53 academics, 46 (86.8%) indicated that they taught at the undergraduate level, while 42 (79.2%) indicated they taught at the postgraduate student level.

Table 6: Academic level taught

N=53*

Academic level taught	Responses	
	N	Percent
Undergraduate	46	86.8%
Postgraduate	42	79.2%
Total	88	166%

*Multiple responses

4.2.2 Section B: ICT Hardware

Question 7, a multiple response question, sought to find out the types of ICT hardware facilities used by academic staff for teaching purposes. Table 7 below shows that 45 (84.9%) academics used computers, 42 (79.2%) used data projectors, 30 (56.6%) used scanners and 40 (75.5%) used printers for teaching. On the other hand 17 (32.1%) had used a digital camera and 11 (20.8%) a mobile or cell phone. Apart from the listed hardware, respondents added their own hardware which they used to support teaching. In this regard, two (3.8%) used an overhead projector (OHP), one (1.9%) used a film projector, one (1.9%) used a music system and one (1.9%) used a video player.

Table 7: Hardware facilities used for teaching

N=53*

Hardware	Frequency	Percent
Computer	45	84.9%
Data projector	42	79.2%
Printer	40	75.5%
Scanner	30	56.6%
Digital camera	17	32.1%
Mobile/cell phone	11	20.8%
Overhead projector	2	3.8%
Film projector	1	1.9%
Music system	1	1.9%
Video player	1	1.9%

***Multiple responses**

4.2.2.1 Where ICTs are used for teaching

Question 8 focused on establishing where academic staff used ICT hardware. Of the 53 academics, 49 (92.5%) used ICTs in their office, 39 (73.6%) used ICTs in lecture rooms, 34 (64.2%) used ICTs at home, 26 (49.1%) used ICTs in the library, while 14 (26.4%) used ICTs in the LAN. Academics added extra locations, one (1.9%) academic used ICTs at an airport especially when they travelled, one (1.9%) used ICTs during workshops and one (1.9%) used ICTs when doing presentations at conferences.

Table 8: Location where hardware facilities used
N=53*

Location	Responses	Percent
In the office	49	92.5%
Lecture rooms	39	73.6%
Home	34	64.2%
Library	26	49.1%
Computer LAN	14	26.4%
When travelling (e.g. airport)	1	1.9%
Workshops	1	1.9%
Conferences	1	1.9%

*Multiple responses

4.2.2.2 Physical access to ICT facilities

Question 9 (i) sought to establish whether academic staff had physical access to ICT facilities. Table 9 shows that a majority of the academics, 48 (90.6%), had access to a desktop PC, a further majority of academics had access to a photocopier (47 or 88.7%), a scanner (43 or 81.1%), a laptop /notebook/netbook (42 or 79.2%), a black and white printer (40 or 75.5%), a CD/DVD writer (38 or 71.7%) and 36 (67.9%) had access to computer speakers. Of the 53 academics, 35 (60%) had access to a laser jet printer while 34 (64.2%) had access to a digital camera, 30 (56.6%) had access to a color printer, 24 (45.3%) to an inkjet printer and six (11.3%) had access to a handheld/PDA. The following ICT facilities were added by one (1.9%) academic each respectively, a digital video recorder, music system, and external hard drive.

Table 9: Physical access

N= 53*

Physical access	Responses	
	N	Percent
Desktop PC	48	90.6%
Photocopier	47	88.7%
Data projector	47	88.7%
Scanner	43	81.1%
Laptop /notebook/netbook	42	79.2%
Black and white printer	40	75.5%
CD/DVD writer	38	71.7%
Computer speakers	36	67.9%
Laser jet printer	35	66%
Digital camera	34	64.2%
Color printer	30	56.6%
Inkjet printer	24	45.3%
Handheld/PDA	6	11.3%
Digital video record	1	1.9%
Music system	1	1.9%
External hard drive	1	1.9%

*Multiple responses

4.2.2.3 Physical use of ICT facilities

Question 9 (ii) sought to establish the physical use of ICT facilities by the academic staff. Table 10 shows that a majority of academics had used a desktop (44 or 83%) followed by a data projector and photocopier used by 43 (81.1%). Black and white printers were used by 42 (79.2%), followed by 41 (77.4%) who used a scanner. A laptop PC/notebook/netbook was used by 35 (60%) and 34 (64.2%) used a laser jet printer. A color printer, CD/DVD writer and computer speakers were used by 30 (56.6%) academics each respectively. Only 34 (37.7%) academics used a digital camera while only five (9.4%) had used a handheld/PDA for teaching. Respondents added their own ICT facilities such as a digital video record, music system and external hard drive. Each of these additional ICT facilities was used by one (1.9%) academic respectively.

Table 10: Physical use

N=53*

ICT facilities	Responses	
	N	**Percent**
Desktop PC	44	83%
Data projector	43	81.1%
Photocopier	43	81.1%
Black and white printer	42	79.2%
Scanner	41	77.4%
Laptop /notebook/netbook	35	66%
Laser jet printer	34	64.2%
CD/DVD writer	30	56.6%
Computer speakers	30	56.6%
Color printer	30	56.6%
Inkjet printer	22	41.5%
Digital camera	20	37.7%
Handheld/PDA	5	9.4%
Digital video record	1	1.9%
Music system	1	1.9%
External drive	1	1.9%

*Multiple responses

4.2.3 Section C: ICT software and resources used for teaching

Question 10 was a multiple response question, sought to establish the types of ICT software and resources that were used for teaching by academics. The results show that all 53 respondents (100%) used word processing software followed by presentations software which was used by 47 (88.7%) academics. Furthermore, 45 (84.9%) used the internet while 44 (83%) used Novell GroupWise and only two (3.8%) academics used SPSS and NVivo respectively. The Moodle online learning program was also used in their teaching.

Table 11: ICT software and resources used by academics

N=53*

ICT software and resources used	Responses	Percent
Word processing	53	100%
Presentations	47	88.7%
Internet	45	84.9%
Novell GroupWise	44	83%
Spreadsheets	26	49.1%
Moodle	23	43.4%
Turnitin	23	43.4%
SPSS	2	3.8%
NVivo	2	3.8%
HotPotato	1	1.9%
Ancient languages database Biblical works software	1	1.9%
EndNote	1	1.9%
Mind manager	1	1.9%
Acrobat professional	1	1.9%
Publisher	1	1.9%
ES-WORD	1	1.9%
Online Bible	1	1.9%
Dikduk	1	1.9%
Bible works	1	1.9%
Adobe acrobat	1	1.9%
Interview windows	1	1.9%

*Multiple responses

4.2.3.1 Frequency of use of ICT software and resources for teaching

Question 11, a multiple response question, sought to establish how often academic staff used different ICT resources for teaching. Table 12 shows that from a total of 53 respondents, word processing was the most frequently used software. It was used daily by 42 (79.2%) academics and seven (13.2%) used it weekly. Only three (5.7%) had never used word processing. Use of the internet received the second highest ranking, with 38 (71.7%) academics using it daily, nine (17%) used it weekly. Only one (1.9%) academic admitted they never used the internet. GroupWise received the third highest usage, 36 (67.9%) used it daily, eight (15.1%) weekly whilst one (1.9%) used it monthly and one (4.3%) acknowledged that they had never used GroupWise. Turnitin was only used by one academic (1.9%) daily, five (9.4%) fortnightly, nine (17%) monthly and 13 (24.5%) academics admitted they never used the Turnitin program. Other software was added by the respondents and most of these received low frequency counts of use (see Table 12 below).

Table 12: Frequency of use of ICT software/and resources

N=53*

ICT software and resources	Daily	Weekly	Fortnightly	Monthly	Never used
Word processing	42 (79.2%)	7 (13.2%)	0 (0%)	0 (0%)	3 (5.7%)
Internet	38 (71.7%)	9 (17%)	0 (0%)	2 (3.8%)	1 (1.9%)
GroupWise	36 (67.9%)	8 (15.1%)	0 (0%)	1 (1.9%)	2 (3.8%)
Presentations	12 (22.6%)	24 (45.3%)	1 (1.9%)	3 5.7%	5 (9.4%)
Moodle	10 (18.9%)	5 (9.4%)	2 (3.8%)	3 (3.7%)	12 (22.6%)
Spreadsheets	6 (11.3%)	13 (24.5%)	8 (15.1%)	8 (15.1%)	6 (11.3%)
Turnitin	1 (1.9%)	2 (3.8%)	5 (9.4%)	9 (17%)	13 (24.4%)
SPSS	0 (0%)	0 (0%)	0 (0%)	1 (1.9%)	0 (0%)
NVivo	0 (0%)	0 (0%)	0 (0%)	2 (3.8%)	0 (0%)
Hot Potato	0 (0%)	0 (0%)	0 (0%)	1 (1.9%)	0 (0%)
EndNote	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mind manager	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Acrobat professional	2 3.8	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Biblical Language database	0 (0%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)
MS Publisher	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
ES WORD	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Online Bible	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dikduk	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Bible works	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Interview windows	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

*Multiple responses

4.2.3.2 Importance of ICT software and resources for teaching

Question 12, sought to establish the order of importance of ICT software for their teaching by academic staff. Table 13 shows that academics ranked word processing as essential by a majority of 47 (88.7%) academic staff while four (7.5%) ranked it as very important. The internet received the second highest ranking, with 39 (73.6%) ranking it essential and nine (17%) as very important. GroupWise received the third ranking with 34 (64.2%) considering it as essential and 10 (18.9%) as very important. Presentations were ranked fourth with 23 (43.4%) ranking it as essential and 19 (35.8%) ranking it as very important.

Table 13: Importance of ICT software and resources for teaching

N=53*

ICT software and resources	Essential	Very important	Important	Somewhat important	Not important
Word processing	47 (88.7%)	4 (7.5%)	1 (1.9%)	0 (0%)	0 (0%)
Internet	39 (73.6%)	9 (17%)	2 (3.8%)	1 (1.9%)	0 (0%)
GroupWise	34 (64.2%)	10 (18.9%)	3 (5.7%)	1 (1.9%)	1 (1.9%)
Presentations	23 (43.4%)	19 (35.8%)	1 (1.9%)	2 (3.8%)	3 (5.7%)
Moodle	9 17%	5 (9.4%)	9 (17%)	2 (3.8%)	9 (17%)
Spreadsheets	7 (17.5%)	7 (17.5%)	12 (30%)	5 (12.5%)	9 (22.5%)
Turnitin	7 (13.2%)	7 (13.2%)	8 (15.1%)	7 (13.2%)	9 (22.5%)
SPSS	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
NVivo	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Biblical language database	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
EndNote	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mind manager	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Acrobat	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Publisher	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
ES WORD	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dikduk	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Online Bible	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Interview windows	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

*Multiple responses

4.2.3.3 What ICT software and resources were used for in teaching

Question 13 sought to establish from the academic staff the purpose of their using ICT software and resources. All the respondents, (53 or 100%) used ICT for searching for further information, a majority of 51 (96.2%) used ICT resources for research, 49 (92.5%) used them for making presentations, 48 (90.6%) for preparing lectures, 47 (88.7%) for communicating with students, and 45 (84.9%) for communicating with other lecturers. In addition, 43 (81.1%) used ICT software for preparing research papers, 39 (73.6%) for collecting handouts and reference material and 38 (71.7%) for accessing online teaching tools. Respondents added other ICT software for analyzing data and for managing references, for accessing and using online assessment tools and conference presentations as shown in the Table 14 below.

Table 14: ICT software and resources use in teaching

N=53*

Use of ICT resources/software	Responses	Percent
For searching for information	53	100%
For research	51	96.2%
For making presentations	49	92.5%
For preparing lecture materials	48	90.6%
For communicating with students	47	88.7%
For communicating with other lecturers	45	84.9%
For preparing research papers	43	81.1%
For collecting handouts and reference materials	39	73.6%
For accessing online teaching tools	38	71.7%
For checking students plagiarism	37	69.8%
For analyzing data	35	66%
For managing references	33	62.3%
For accessing and using online assessment tools	25	47.2%
Conference presentations	1	1.9%

*Multiple responses

4.2.3.4 Social networking facilities for personal use by academics

Question 14 sought to establish whether academic staff used social networking tools for personal use. Table 15 shows that just over half, 27 (50.9%) of the respondents indicated that they used Facebook for personal use, 21 (39.6%) used YouTube and 19 (35.8%) used blogs. Only 14 (26.4%) used Wikis and 10 (18.9%) used Twitter.

Table 15: Social networking for personal use by academics

N=53*

Social networks	Response	
	Count	**%**
Facebook	27	50.9%
YouTube	21	39.6%
Blogs	19	35.8%
Wikis	14	26.4%
Twitter	10	18.9%

*Multiple responses

4.2.3.5 Social networking facilities used for teaching

Question 14.1 sought to establish whether academic staff used social networking tools for teaching. Table 16 below shows that, 14 (26.4%) indicated that they used YouTube for teaching, 13 (24.5%) used blogs for teaching and nine (17. %) used Wikis for teaching. Only eight (15.1%) used Facebook for teaching while five (9.4%) used Twitter and one other social network, Vimeo, was used by one (1.9%) academic for teaching.

Table 16: Social networking used for teaching
N=53*

Social networks	Response	
	Count	**%**
Facebook	14	26.4%
YouTube	13	24.5%
Blogs	9	17%
Wikis	8	15.1%
Twitter	5	9.4%
Vimeo	1	1.9%

*Multiple responses

4.2.3.6 Problems experienced when using ICTs for teaching

Question 15 sought to establish what problems were experienced by academic staff when using ICTs for teaching. Slow internet connection yielded the highest response reported by 30 (56.6%) academics, followed by the fact that technical support staff were not always available for help which was reported by 17 (32.1%) academics. Other problems experienced by academics included problems with password requirements reported by 15 (28.3%) academics and 14 (26.4%) academics encountered limited computers (personal) as a problem and only nine (17%) academics experienced difficulties with using ICTs. Academics also added other problems as shown in Table 17 below.

Table 17: Problems experienced by academics
N=53*

Problems	Response	
	N	**%**
Slow internet connection	30	56.6%
Technical support staff are not always available to help	17	32.1%
Password requirements	15	28.3%
Limited computers (personal)	14	26.4%
Difficulties in using ICTs	9	17%
Old outdated PCs are slow	2	3.8%
Lack of access to scanner and color printer	2	3.8%
Venues not very conducive to using ICTs meaningfully (connectivity, lack of data projectors and screen in lecture venues)	1	1.9%
Students don't have good LAN access	1	1.9%
SORAT has no guide for visiting lecturers' use of equipment	1	1.9%
Data projector at times not always working	1	1.9%

*Multiple responses

4.2.3.7 Modules taught using ICTs

Question 16 was asked to establish what modules academics taught using ICTs. Tables 18-26 below reflect each School's undergraduate and postgraduate modules where ICTs were used for teaching.

Table 18: School of Religion and Theology undergraduate modules taught using ICTs

N=19*

Module name and code	Count	Percent
Introduction to the Old Testament (BIST120)	3	15.8%
Introduction to Theological Method (SYTH120)	2	10.5%
Critical Tools for Biblical Study (BIST220)	2	10.5%
Introduction to Hellenistic Greek (BILA120)	2	10.5%
Introduction to Religion (THEO101)	2	10.5%
Biblical Studies (BIST341)	1	5.3%
Practical Theology (PRTH250)	1	5.3%
Introduction to the Old Testament (BIST341)	1	5.3%
Selected Christian Doctrines (SYTH210)	1	5.3%
Introduction to Christian Ethics (SYTH222)	1	5.3%
Research Article: Theology (THEO8RA)	1	5.3%
Introduction to Religion (THEO202)	1	5.3%
Biblical Theology (BST120)	1	5.3%
Biblical Theology (BST310)	1	5.3%
Biblical Studies (BIST110)	1	5.3%
Biblical Studies (BILA240)	1	5.3%
Biblical Studies (BIST331)	1	5.3%
Congregation Skills (PRTH330)	1	5.3%

*Multiple responses

Table 19: School of Religion and Theology postgraduate modules taught using ICTs
N=14*

Multiple responses*

Module name and code	Count	Percent
Selected Biblical Texts in Greek or Hebrew (THEO733/833)	3	25%
Theologies of Transformation (THEO737)	2	16.7%
Research Methodology in Religion and Theology (RELG701)	2	16.7%
Church and IDS (THEO830)	2	16.7%
Church and Development (THEO729)	2	16.7%
Studies in African Instituted Church (THEO807)	1	8.3%
Church and AIDS (THEO730)	1	8.3%
Church and AIDS (THEO830)	1	8.3%
People, Power, Faith (THEO843)	1	8.3%
Renaissance of African Socialism (THEO724)	1	8.3%
Aspects of Theological Method (THEO720)	1	8.3%
Method and Theory in Religion and Theology (RELG702)	1	8.3%
Primary and Secondary Sources in Islam (THEO707)	1	8.3%

Table 20: School of Sociology and Social Studies undergraduate modules taught using ICTs

N=11*

Module name and code	Count	Percent
Culture Communication and Development (SOCY310)	3	27.3%
Classical Sociology Theory (SOCY201)	3	27.3%
Introduction to Sociology (SOCY101)	2	18.2%
Introduction to South African Society (SOCY102)	2	18.2%
Information Literacy (LIIS110)	2	18.2%
Introduction to Global Politics (POLS102)	1	9.1%
Issues in International Affairs (POLS201)	1	9.1%
Politics and law in South Africa (POLS204)	1	9.1%
Comparative Government and Politics (POLS304)	1	9.1%
Internet Expertise (LIIS120)	1	9.1%
Social Change (SOCY202)	1	9.1%

*Multiple responses

Table 21: School of Sociology and Social Studies postgraduate modules taught using ICTs

N=21*

Module name and code	Count	Percent
Issues in Library and Information Science (LIIS830)	3	14.3%
Information Management (LIIS711)	2	9.5%
Rural Studies, Gender Studies (SOCY707)	2	9.5%
Research Proposal (LIIS831)	2	9.5%
Policy Monitoring and Evaluation (PODS805)	2	9.5%
Public Policy Analysis (PODS601)	2	9.5%
Governance in South Africa (SOCY803)	2	9.5%
Information Management (LIIS802)	1	4.8%
Automation of Information Centers (LIIS670)	1	4.8%
Public Policy Analysis (PODS701)	1	4.8%
Managing Public Policy (PODS801)	1	4.8%
Information Users and Use (LIIS640)	1	4.8%
Information Delivery Systems (LIIS641)	1	4.8%
Descriptive Cataloguing (LIIS610)	1	4.8%
Web-Based Information Systems (LIIS731)	1	4.8%
Subject Analysis (LIIS660)	1	4.8%
Public Policy Analysis (PODS811)	1	4.8%
Bibliography (LIIS739)	1	4.8%
Research Design and Statistics (SOCY703)	1	4.8%
Civil Society and Public Policy (PODS804)	1	4.8%
Contemporary Social Theory (SOCY702)	1	4.8%

*Multiple responses

Table 22: School of Psychology undergraduate modules taught using ICTs

N=6*

Module name and code	Count	Percent
Introduction to Psychology(SOCY702)	3	50%
Industrial Psychology (PSYC208)	1	16.7%
Change and Transformation (PSYC303)	1	16.7%
Educational Applications of Psychology (PSYC204)	1	16.7%
African and International Perspectives (PSYC209)	1	16.7%
Psychology in Education (PSYC318)	1	16.7%

*Multiple responses

Table 23: School of Psychology postgraduate modules taught using ICTs

N=3*

Module name and code	Count	Percent
Psychopathology (PSYC803)	2	66.7%
Psychological practice (PSYC802)	1	33.3%
Psychological Assessment (PSYC804)	1	33.3%

*Multiple responses

Table 24: School of Philosophy and Ethics undergraduate modules taught using ICTs

N=6*

Module name and code	Count	Percent
Introduction to Philosophy (PHIL101)	3	50%
Philosophy and Ethics from Ancient to Modern (PHIL102)	2	33.3%
Applied Global Ethics (ETHS101)	2	33.3%
Ways of Reasoning (PHIL203)	2	33.3%
Being and Knowing (PHIL205)	1	16.7%
African Ethics and the Postcolonial Condition (ETHS303)	1	16.7%

*Multiple responses

Only one module, Ethics studies (ETHS 803) was taught using ICTs at the postgraduate level in the School of Philosophy and Ethics.

Table 25: School of Politics undergraduate modules taught using ICTs

N=5*

Module name and code	Count	Percent
Comparative Government and Politics(POLS304)	2	40%
Policy Issues and Community Service (POLS310)	1	20%
Introduction to Global Politics (POLS102)	1	20%
Issues in International Affairs (POLS201)	1	20%
History of Political Thought (POLS207)	1	20%

*Multiple responses

No postgraduate modules in the School of Politics were taught using ICTs.

Table 26: School of Anthropology, Gender and Historical Studies undergraduate modules taught using ICTs

N=4*

Module name and code	Count	Percent
Topics in African History (HIST301)	2	50%
Globalization and the Modern World (HIST214)	2	50%
History of KwaZulu-Natal (HIST201)	1	25%
Empires of the Modern World (HIST105)	1	25%

*Multiple responses

No postgraduate modules in the School of Anthropology, Gender and Historical Studies were taught using ICTs.

4.2.4 Section D: ICT skills and training

Question 17 asked whether or not the academic staff had received any format ICT training. Figure 4 shows that from a total of 53 respondents more than half, 27 (51.9%), indicated they had received various types of ICT training while 22 (42.3%) had never received any formal ICT training. Four (7.6%) academics did not respond to the question.

Figure 4: ICT training of academics

N=53
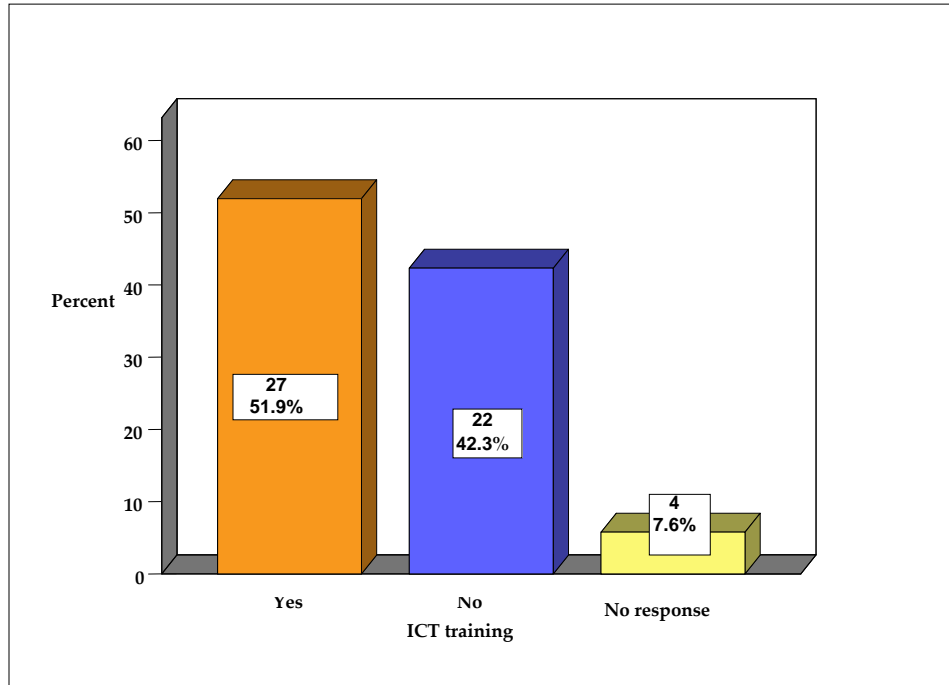
4.2.4.1 Types of ICT training received by academics

Question 18 focused on the types of ICT training that academic staff had received. Table 27 indicates that very few academic staff had attended more than one training course. More than half the academics, 27 (51.9%), who received ICT training, 12 (44.4%) attended an MS Word course followed by seven (25.9%) who attended a Presentations (PowerPoint) course and an Excel course each respectively. Other ICT training received by academics is indicated in Table 27 below.

Table 27: ICT skills and training received by academics

N=27*

Type of training	Responses	Percent
MS Word	12	44.4%
Presentations(PowerPoint)	7	25.9%
SPSS	6	22.2%
Excel	7	35.9%
EndNote	4	14.8%
HTML	4	14.8%
Moodle	3	11.1%
Introduction to computers	3	11.1%
NVIVO	3	11.1%
Web information	2	7.4%
MS Publisher	2	7.4%
Majored in business information system	1	3.7%
MCSE	1	3.7%
Windows	1	3.7%
Zotero	1	3.7%
Word-Press	1	3.7%
Literature search	1	3.7%
ICDL	1	3.7%
Basic ICT training	1	3.7%
End user computing	1	3.7%
Simulation	1	3.7%
Turnitin	1	3.7%
Internet course	1	3.7%
STATA	1	3.7%
Network construction	1	3.7%
PHP	1	3.7%
JavaScript	1	3.7%
SQL	1	3.7%
PTP	1	3.7%
Computer construction	1	3.7%

*Multiple responses

4.2.4.2 Sufficient ICT skills for academic staff

Question 19 asked whether or not academic staff had sufficient skills to access ICT facilities that were available to them for teaching. Figure 5 shows that more than half the academics (27 or 55.1%), considered that they had sufficient ICT skills while 22 (44.9%) did not and four (8.2%) did not respond to the question.

Figure 5: Sufficient ICT skills for academics

N=53
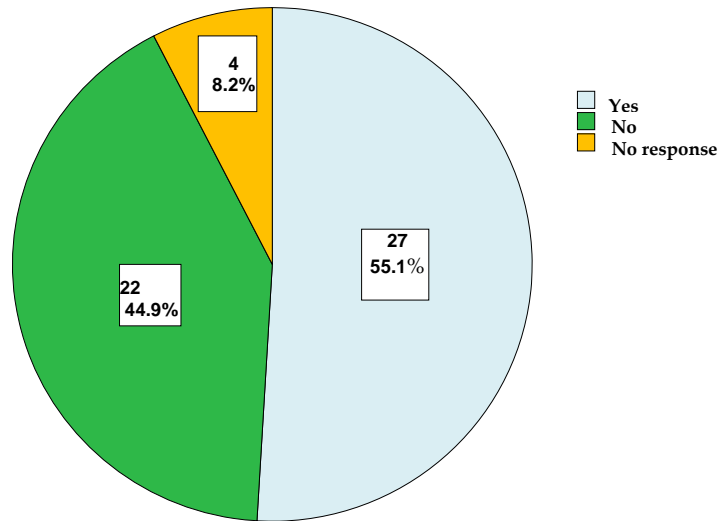
4.2.4.3 Reasons why academic staff did not have sufficient ICT skills

Question 20 asked those academic staff who regarded their ICT skills as insufficient to provide reasons why. Only four (18.2%) of the 22 (44.9%) provided reasons. Two (9.1%) academics indicated that the teaching process was difficult using ICTs while two (9.1%) stated that there was no training offered, especially in Moodle and EndNote.

4.2.4.4 Academics level of computer literacy

Question 21 asked the academic staff to rate their computer literacy level. Figure 6 shows that from a total of 53 respondents, just under half, 25 (47.2%) who responded to the question, claimed to be competent in ICTs, seven (13.2%) regarded themselves highly competent in computer literacy while 16 (30.2%) regarded themselves as average. Only two (3.8%) admitted that they were not computer literate and three (5.8%) did not respond to the question.

Figure 6: Academic's level of computer literacy
N=53
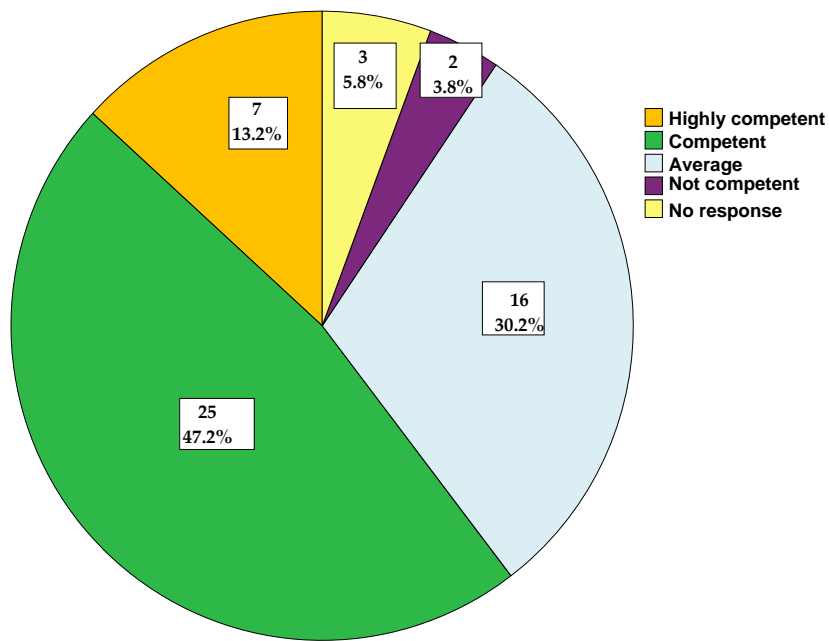
4.2.4.5 Level of ICT expertise

Question 22, a multiple response question, sought to establish the level of expertise in ICT facilities used for teaching. Table 28 shows that almost half the academics, 26 (49.1%), considered themselves excellent in word processing and 11 (20.8%) as very good. Only one (1.9%) was not capable in word processing. In terms of e-mail, 22 (41.5%) academics considered themselves excellent, followed by 17 (31.1%) who considered themselves very good with e-mail. On the other hand, 16 (30.2%) considered themselves excellent with internet browsing, 20 (37.7%) as very good, 11 (20.8%) as good, while two (3.8%) academics admitted that their level of expertise could be described as fair when browsing the internet.

Table 28: Academics' level of ICT expertise

N=53*

ICT facilities	Excellent	Very good	Good	Fair	Not capable
Word processing	26 (49.1%)	11 (20.8%)	8 (15.1)	4 (7.5%)	1 (1.9%)
E-mail	22 (41.5%)	17 (31.1%)	8 (5.1%)	4 (7.5%)	0 (0%)
Internet browsing	16 (30.2%)	20 (37.7%)	11 20.8%	2 (3.8%)	0 (0%)
Presentations	11 (20.8%)	11 (20.8%)	18 (34 %)	9 (17%)	2 (3.8%)
Spreadsheets	7 (13.2%)	11 (20.8 %)	11 (20.8%)	12 (22.6%)	5 (9.4%)
Statistical tools	6 (11.3%)	5 (9.4%)	11 (20.8%)	9 (17%)	16 (30.2%)
Graphics	5 (9.4%)	7 (13.2%)	7 (13.2%)	15 (28.3%)	13 (24.5%)
Web page designing	2 (3.8%)	2 (3.8%)	8 (15.1%)	8 (15.1%)	31 (58.5%)
Programming	0 (0%)	2 (3.8%)	3 (57%)	8 (15.1%)	37 (68.8%)
Database management	1 (1.9%)	6 (11.3%)	8 (15.1%)	7 (13.2%)	26 (49.1%)

*Multiple responses

4.2.5 Section E: Impact of ICTs

Question 23 was used to establish the extent to which ICTs affected the academics' teaching. Almost half the academics, 25 (47.2%), considered that ICTs affected their teaching to a very large extent. A further 17 (32.1%) considered that ICTs affected their teaching to a large extent and eight (15.1%) were neutral. Only one (1.9%) academic considered that ICTs affected their teaching to a little extent.

Figure 7: Effect of ICTs on teaching
N=53
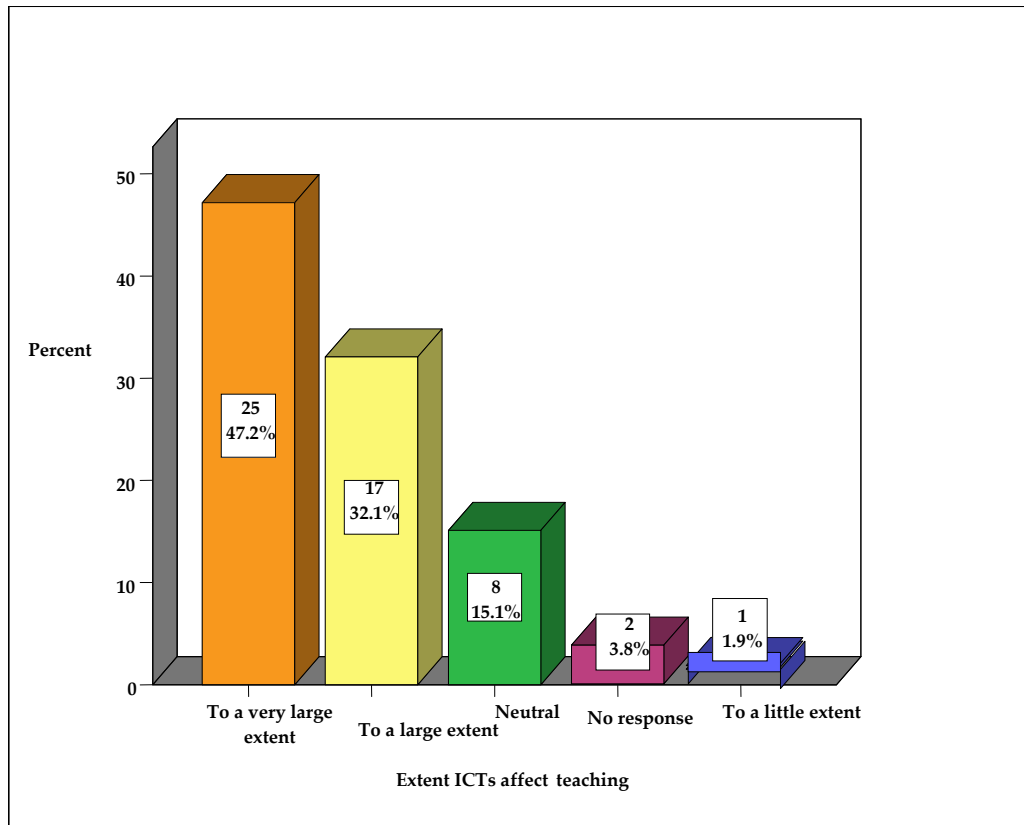
4.2.5.1 Positive or negative impact of ICTs on teaching

Question 24 asked whether or not ICTs had a negative or positive impact on the teaching process. Figure 8 illustrates that a majority of academics, 38 (71.7%), considered that ICTs had a positive impact on their teaching while 10 (18.9%) academics did not answer the question. Only one (1.9%) academic felt that ICTs had a negative impact on their teaching and four (7.5%) had mixed feelings about the impact of ICTs on their teaching.

Figure 8: Impact of ICTs on teaching
N=53
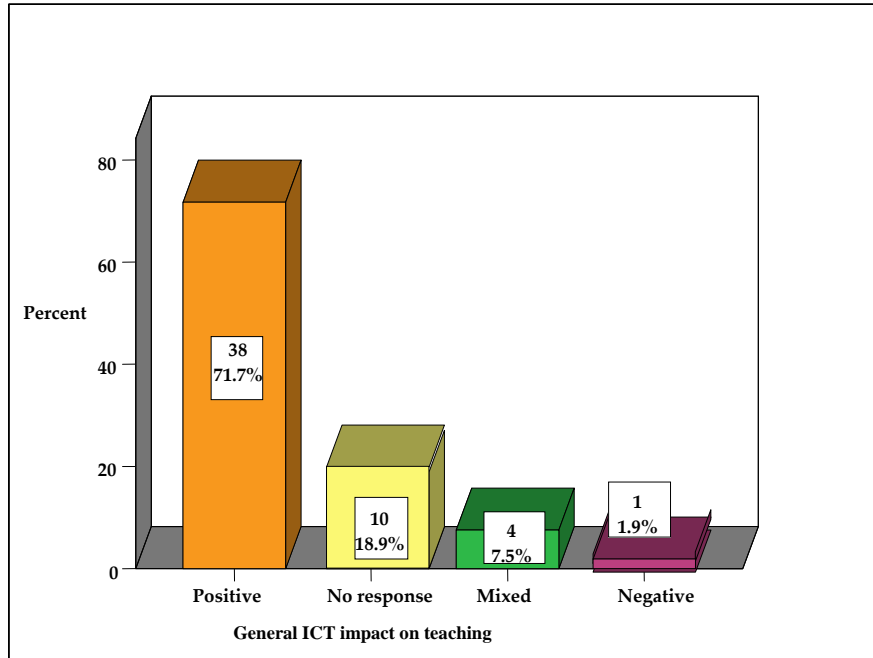
4.2.5.2 Type of positive impact of ICTs on teaching

Question 25 asked for examples from the 38 (71.7%) academic staff who considered ICTs had had a positive impact on their teaching. Table 29 demonstrates that 22 (57.9%) commented that ICT made teaching easier in terms of communication of current information. Of the 38 (71.7%), 17 (44.7%) academics considered improved accessibility for students to materials a positive impact while 16 (42.1%) considered improving students' skills to be positive. Lectures that could be delivered online and simplified interaction with students was positive for 11 (28.9%) academics. Ten (26.3%) academics considered it positive not to have to write on the board but to rather type and print notes. Ease of distribution of notes and the use of multimedia presentations were also seen as having a positive impact on teaching. In addition nine (23.7%) academics noted that there was improved accuracy of teaching materials and research when ICTs were used to support teaching.

Table 29: Examples of ICTs' impact on teaching
N=38*

ICT impact on teaching	Responses	
	N	Percent
Communication of current information possible	22	57.9%
Improved accessibility for students to materials	17	44.7%
Improved students' skills	16	42.1%
Lectures could be delivered online	11	28.9%
Simplified interaction with students	11	28.9%
There is no need to write on the board, rather type and print notes	10	26.3%
Multimedia presentations	10	26.3%
Distribution of course material facilitated	10	26.3%
Accuracy of teaching materials and research improved	9	23.7%
Use of PowerPoint great for library posters	7	18.4%
Word processing and much easier than written work	5	13.2%
Search databases online	4	10.5%
Use of data projector	4	10.5%
Storage and retrieval of data	3	7.9%
Use of DVD clips	1	2.7%
Content management systems enable access by students even at distance	1	2.7%
It helps to cope with large numbers of students	1	2.7%

*Multiple responses

4.2.5.3 Types of negative impact of ICTs on students' learning

Question 26 asked academics whether ICTs had a negative or positive impact on student learning. More than half, 28 (52.8%) of the academics acknowledged ICTs had a positive impact on their students' learning. Only one (1.9%) academic considered that ICTs had a negative impact on their students' learning.

4.2.5.4 Examples of ICTs' impact on students' learning

Question 27 asked those academics who considered that ICTs had a positive impact on their students' learning to provide examples. Out of 28 academic staff who experienced a positive impact on their students' learning, 16 (57.1%) thought that students could access lecture notes from Moodle and the School website easily, 15 (53.6%) academics considered their students ICT skills improved, while eight (28.6%) considered improved communication and being able to type and submit online (quicker) a positive impact on students' learning as seen in Table 30 below.

Table 30: Examples of ICTs' impact on students' learning

N=28*

Impact of ICTs	N	Percent
They can access lecture notes on Moodle and on School website easily	16	57.1%
Students' ICT skills improved	15	53.6%
Improved communication and being able to type and submit online (quick feedback)	8	28.6%
Digital resources are cheap and portable and allow for easier transfer and editing of work	2	7.1%
General speeding up of searching	2	7.1%
No Response	4	14.3%

*Multiple responses

4.2.5.5 Academic staff recommendations to improve the use of ICTs for teaching

Question 28, a multiple response question, allowed the academic staff to make recommendations on how to improve the use of ICTs for teaching at UKZN. Table 31 shows the recommendations made by academic staff. Of the 53 (100%) academics, 12 (22.6%) pointed out that academic staff should be given regular workshops, eight (15.1%) wanted improved internet access (bandwidth), while seven (9.2%) wanted more seats in the LANs urgently for students to use. Furthermore six (11.3%) pointed out that ICT facilities for staff and students needed to be improved (limited computers) and ICT support staff need to provide better technical maintenance support to staff and students. Other recommendations made by academics are reflected in Table 31 below.

Table 31: Academic staff recommendations

N=53*

Recommendations	N	%
Staff should be given regular workshops	12	22.6%
Improve internet access (bandwidth required)	8	15.1%
More seats in the LANs (essential and urgent)	7	13.2%
Improve ICT facilities for staff and students (limited computers)	6	11.3%
Improve ICT technical support for staff and students	6	11.3%
Better technical maintenance	6	11.3%
Lecture rooms need to be equipped with laptops and data projectors	5	9.4%
Provide more ICT facilities and teach staff how to use them efficiently and effectively	5	9.4%
Specific training course (e.g. how to use Moodle)	4	7.5%
Wireless network throughout the building	4	7.5%
Improve postgraduate ICT facilities	4	7.5%
Security for protection of ICT equipment	3	5.7%
Regular updates on what resources are available	3	5.7%
Netbooks for staff and students	1	1.9%

* Multiple responses

4.2.6. Summary of academic staff questionnaire results

The questionnaire results showed that most academic staff used the ICT facilities. Thus most academics were of the opinion that the ICTs were very important for their academic teaching. ICT also had a positive impact on student learning. Academic staff provided recommendations on how to improve the ICT facilities for teaching and learning at UKZN.

4.3 Postgraduate students' questionnaire results.

This section presents the results of the postgraduate students' questionnaire.

4.3.1 Section A: Background information

The background information provides more detail about the degree students were registered for, which Schools the students belonged to their gender, age, race, and whether student were full-time or part-time.

4.3.1.1 Degree students registered for

Question 1 asked the students what degree they were registered for. Figure 9 shows that out of 173 respondents, 62 (36.8%) were doing a masters degree, 61 (35.9%) were registered for an honours degree and 24 (13.9%) were PhD students. Only 22 (12.9%) were doing a postgraduate diploma. Thus, a majority of the students were registered for an honours and masters degree respectively.

Figure 9: Degree registered for

N=173
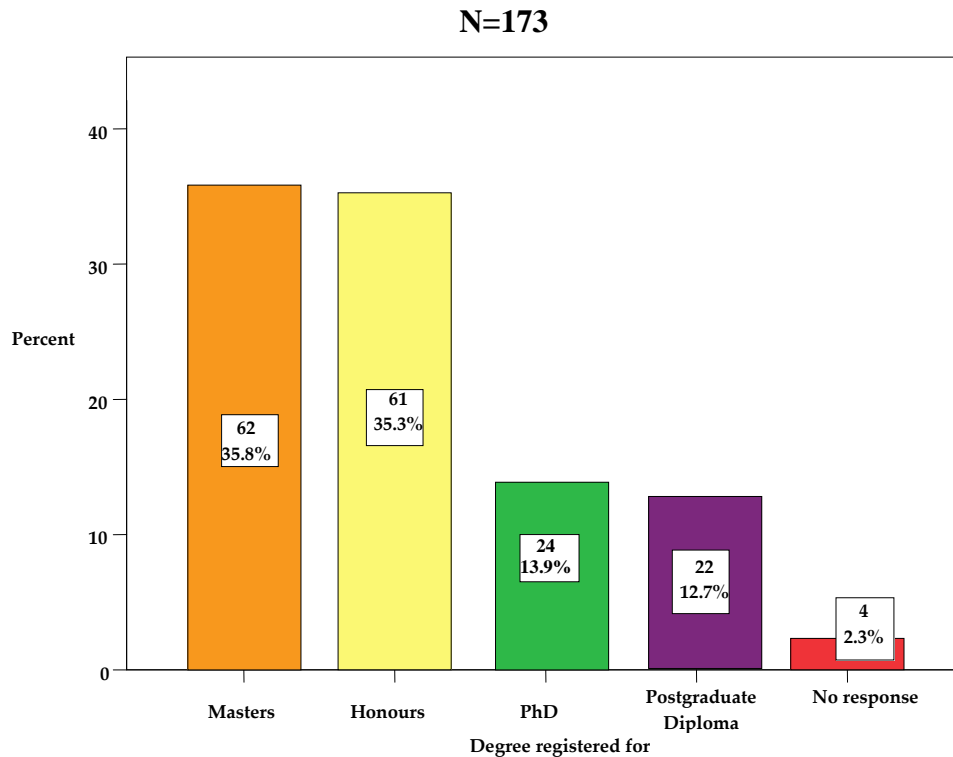
4.3.1.2 Schools students registered in

Question 2 asked the students to indicate in which Schools they were registered. Figure 10 points out that among 173 respondents, 45 (26.9%) were in the School of Religion and Theology, 53 (30.6%) in the School of Sociology and Social Studies, 40 (23.1%) in the School of Psychology,

21 (12.6%) were from the School of Politics and eight (4.6%) in the School of Philosophy and Ethics and six (3.5%) did not respond to the question.

Figure 10: Schools

N=173
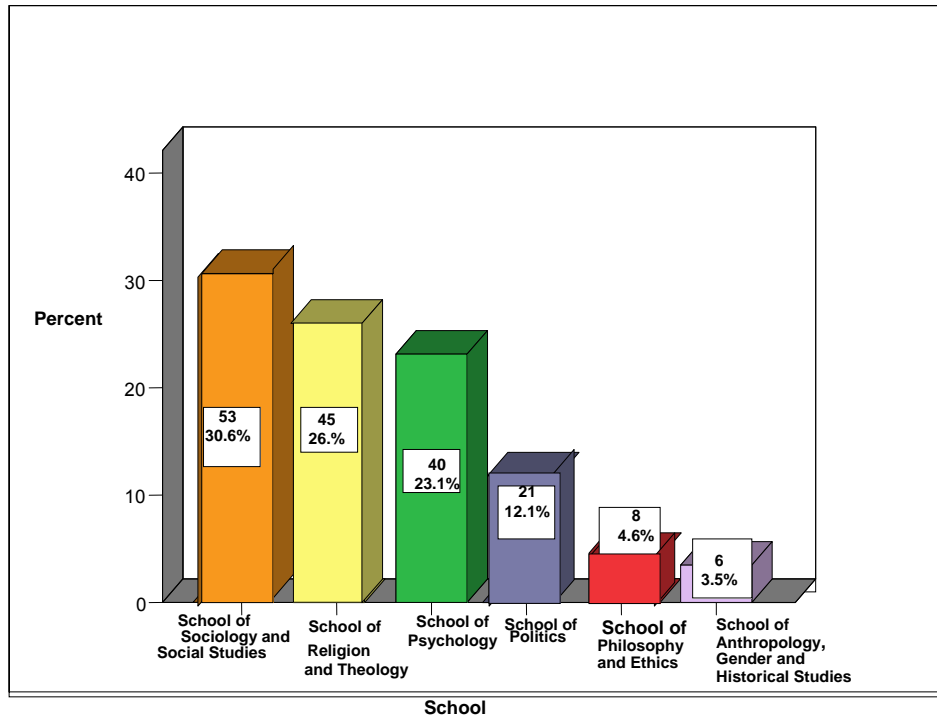
4.3.1.3 Gender of students

Question 3 sought to establish the gender of the students. Of the 173 respondents more than half, 100 (57.8%) were male, 71 (41%) female, and two (1.2%) did not respond to the question.

4.3.1.4 Age and degree registered for

Question 3 sought to establish the age group of the students. Table 32, indicated that a majority of students were between the ages of 21 and 30 years and were doing an honours degree. Similarly most masters students were between the ages of 22 and 30 years. Most postgraduate diploma students were also between the age of 21 and 30 years. However, most of the PhD students were between the ages of 28 and 45 years.

Table 32: Cross tabulation of age and degree registered for

N=173

Age	Degree registered				
	Postgraduate diploma	Honours	Masters	PhD	Total
19	0	1	0	0	1
20	0	1	0	0	1
21	0	10	0	0	10
22	2	7	6	0	15
23	2	10	7	1	20
24	2	8	5	0	15
25	2	4	2	0	8
26	0	0	4	0	4
27	0	1	4	0	5
28	0	2	2	0	4
29	2	1	1	1	5
30	0	2	2	1	5
31	0	0	1	1	2
32	0	1	1	0	2
33	1	0	1	1	3
34	0	2	0	0	2
35	0	0	1	0	1
36	1	0	1	0	2
37	0	0	0	1	1
38	0	0	1	1	2
39	1	0	1	0	2
40	0	1	4	2	7
42	0	0	1	0	1
43	0	0	0	1	1
44	2	0	1	1	4
45	0	0	1	0	1
47	0	1	0	1	2
49	0	0	0	1	1
55	0	0	0	1	1
58	2	0	0	1	3
No response	6	9	16	11	42
Total	23	61	63	26	173

4.3.1.5 Race of students

Question 5 sought to establish the race of the students. Figure 11 below shows that a majority of the students, 128 (74%), were Black followed by 21 (14.4%) White students, 14 (8.3%) Indian students and six (3.6%) students were Coloured while four (2.4%) students did not indicate their race.

Figure 11: Race of students chart showing Percent on Y-axis and Race on X-axis with values: Black 128 74%, White 21 14.4%, Indian 14 8.3%, Coloured 6 3.6%, No response 4 2.3%
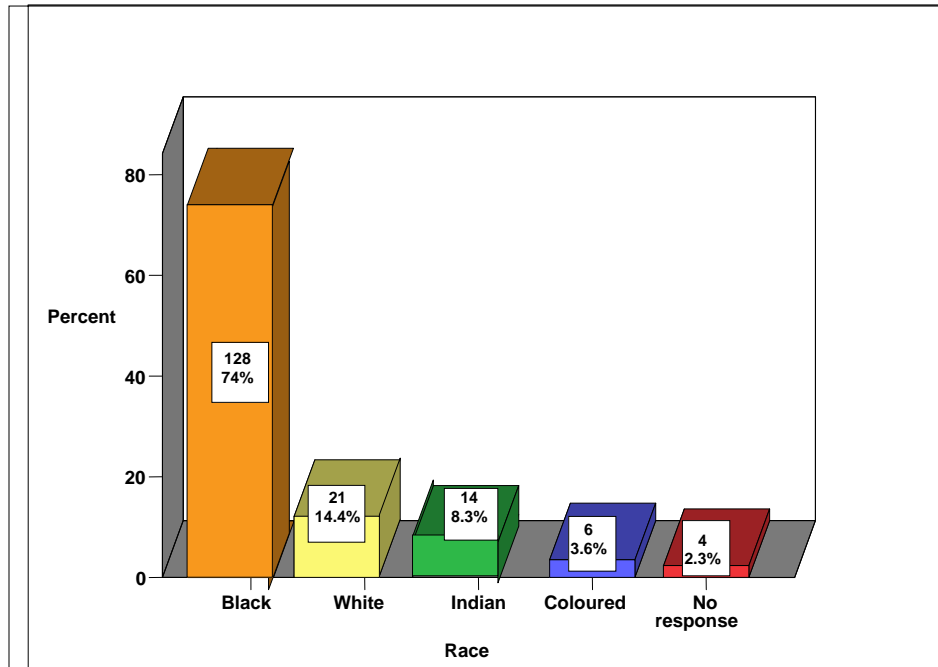
4.3.1.6 Full-time or part-time students

Question 6 sought to establish whether the students were studying full-time or part-time. Figure 12 below indicates that of the 173, a majority of students, 156 (90.2%), were full-time students, while only 15 (8.7%) were part-time and two (1.1%) did not respond to the question.

Figure 12: Full-time or part-time
N=173
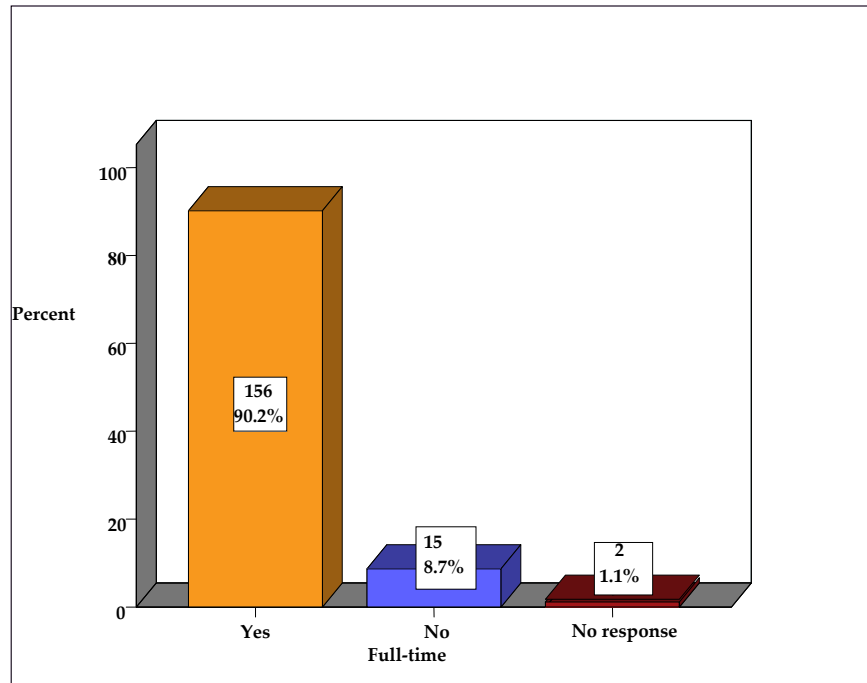
4.3.2 Section B: ICT hardware

Question 7 asked for the location where ICT facilities were used. Of the 173 respondents, a majority of 129 (74.6%) used ICT facilities in the computer LAN, 103 (59.5%) in the postgraduate rooms, 78 (45.1%) in the library and 51 (29.5%) at home.

4.3.2.1 Frequency of use of ICT facilities by students

Question 8 was asked to establish the frequency of use of ICT facilities by postgraduate students. Table 33 shows that 83 (48%) students used the university computer LAN daily while 35 (20%) students used it weekly. However, 15 (8.7%) rarely or never used the LAN. More than half the students, 74 (42.8%) used the postgraduate rooms daily, 34 (19.7%) weekly, 13 (7.5%) rarely or never used the postgraduate rooms. Also, more than half of the students, 45 (26%) used ICT facilities at home daily and 20 (11.6%) rarely or never did. Only 24 (13.24%) of the students used ICT facilities at the library daily while 18 (10.4%) rarely or never did.

Table 33: Frequency of use of ICT facilities by students

N=173*

ICT facility	Daily	Weekly	Fortnightly	Monthly	Rarely or Never
University computer LAN	83 (48%)	35 (20%)	6 (3.5%)	7 (4%)	15 (8.7%)
Postgraduate rooms	74 (42.8%)	34 (19.7%)	7 (4%)	3 (1.7%)	13 (7.5%)
Home	45 (26%)	7 (4%)	7 (4%)	5 (2.9%)	20 (11.6%)
Library	24 (13.4%)	55 (31.8%)	23 (13.3%)	12 (6.9%)	18 (10.4%)

Multiple responses

4.3.2.2 Students' reasons for using the computer LANs

Question 9 asked the students to provide reasons for using the computer LANs. Table 34 shows that a majority of 130 (75.1%) students searched the internet for research information, 115 (66.5%) read and sent e-mails to lecturers, 103 (59.5%) read and sent e-mails to other students, while 88 (50.9%) used ICTs for typing assignments. Only one (1.9%) student used the computer LAN to access social networking sites and for capturing, organizing and sharing knowledge with colleagues and reading the latest news online.

Table 34: Reasons for using computer LAN

N=173*

Reasons	Responses	Percent
Search the internet for research information	130	75.1%
Read and send e-mails to my lecturers	115	66.5%
Read and send e-mails to other students	103	59.5%
Typing assignments and essays	88	50.9%
Use social network sites for capturing, organizing, sharing knowledge with friends and reading the latest news online	1	0.6%

Multiple responses

4.3.2.3 Importance of use of computer LANs for learning by students

Question 10 sought to establish the importance of the computer LANs for students' learning. Figure 13 highlights that from a total of 173 students, a majority of 123 (71.1%) regarded use of the computer LANs as very important and 20 (11.6%) as important. Only eight (4.7%) regarded use of the computer LANs as not important while a further five (2.9%) regarded use of the computer LANs as not at all important.

Figure 13: Importance of use of computer LAN for students' learning

N=173
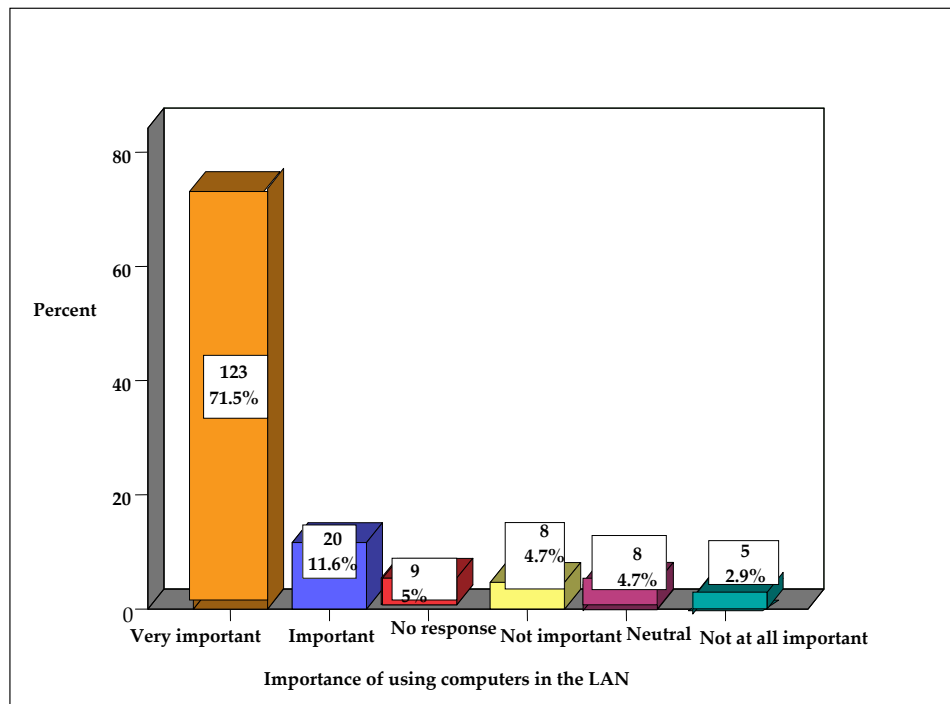
4.3.2.4 Students' reasons for using postgraduate rooms

Question 11 sought to establish the main reasons the students were using the postgraduate rooms. Table 35 below shows that, 117 (30.8%) students used the postgraduate rooms to search the internet for research information, 92 (24.2%) for reading and sending e-mails to the lecturers and 86 (22.6%) for reading and sending e-mails to fellow students. A further 82 (21.6%) students used the postgraduate rooms for typing assignments and essays and three (8%) students used the postgraduate rooms for knowledge management and reading the latest news.

Table 35: Reasons for using postgraduate rooms

114

Reasons for using postgraduate rooms	Responses	Percent
Search the internet for research information	117	67.6%
Read and send e-mails to lecturers	92	53.2%
Read and send e-mails to other students	86	49.7%
Typing assignments and essays	82	47.4%
For knowledge management, reading latest news	3	1.7%

*Multiple responses

4.3.2.5 Importance of use of ICTs in postgraduate rooms for learning

Question 12 was asked to establish the importance of using the ICTs in the postgraduate rooms for learning. Figure 14 below shows that out of 173 respondents, a majority of 118 (68.2%) said it was very important for their learning to use the computer in the postgraduate rooms. Twenty one (12.1%) students regarded it as important, three (1.7%) regarded it as not at all important while two (1.2%) regarded it as not important. Also, 21 (12.1%) students did not respond to the question.

Figure 14: Importance of students using ICTs in postgraduate rooms for learning
N=173
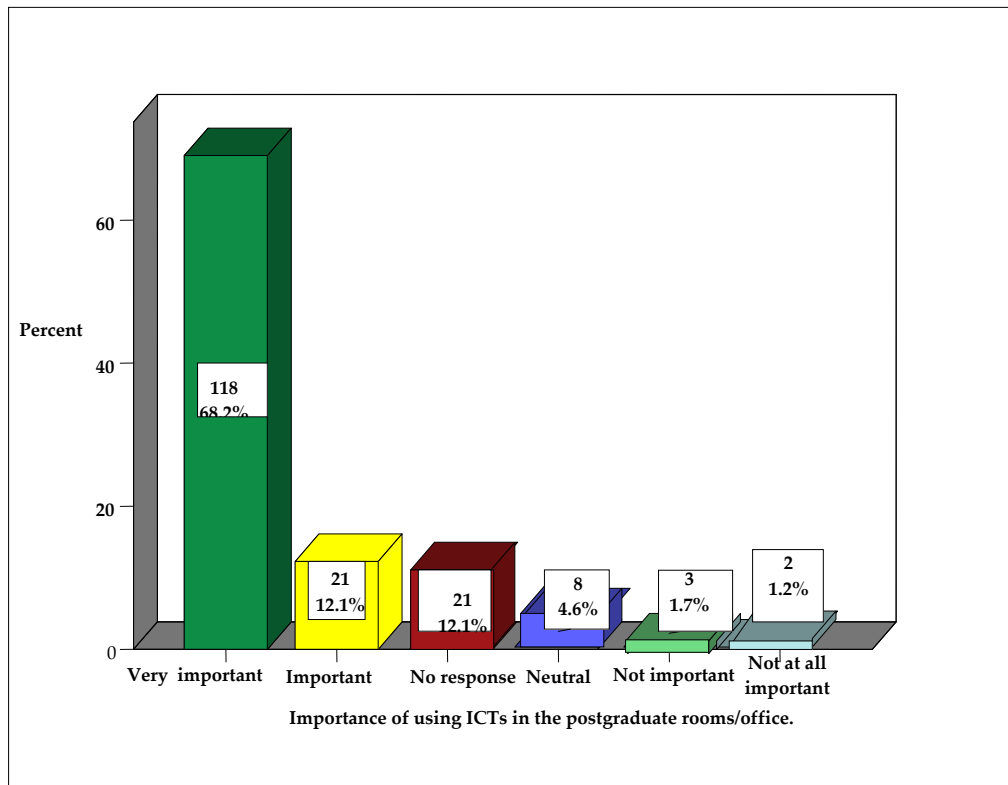
4.3.2.6 Students reasons for using ICTs in the library

Question 13 asked students to state their reasons for using the computers in the library. Table 36 shows that a majority of students used the library, 130 (75.1%) for searching the internet for research information, 115 (66.5%) for reading and for sending e-mails to lecturers, 103 (59.5%) for reading and sending e-mails to other students and 88 (50.9%) indicated that they used the library computers for typing assignments and essays. Only one (1.6%) student used the library computers to access social networking sites for capturing, organizing, sharing knowledge with friends and reading the latest news.

Table 36: Students' reasons for using ICTs in the library

N=173*

Reasons for using ICTs in the library	Responses	
	N	**Percent**
Search the internet for research information	130	75.1%
Read and send e-mails to lecturers	115	66.5%
Read and send e-mails to other students	103	59.5%
Typing assignments and essays	88	50.9%
Use social networking sites for capturing, organizing, sharing information, also read latest news online	1	0.6%

*Multiple responses

4.3.2.7 Importance of students using ICTs in the library

Question 14 asked the students to rate the importance of using ICTs in the library for their learning. Figure 15 below indicates that more than half of the students, 102 (59%), rated them as very important, 35 (20.2%) important, while seven (40%) rated them as not important and four (2.3%) regarded them as not at all important for their learning.

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Figure 15: Level of importance of students using ICTs in the library for learning

N=173
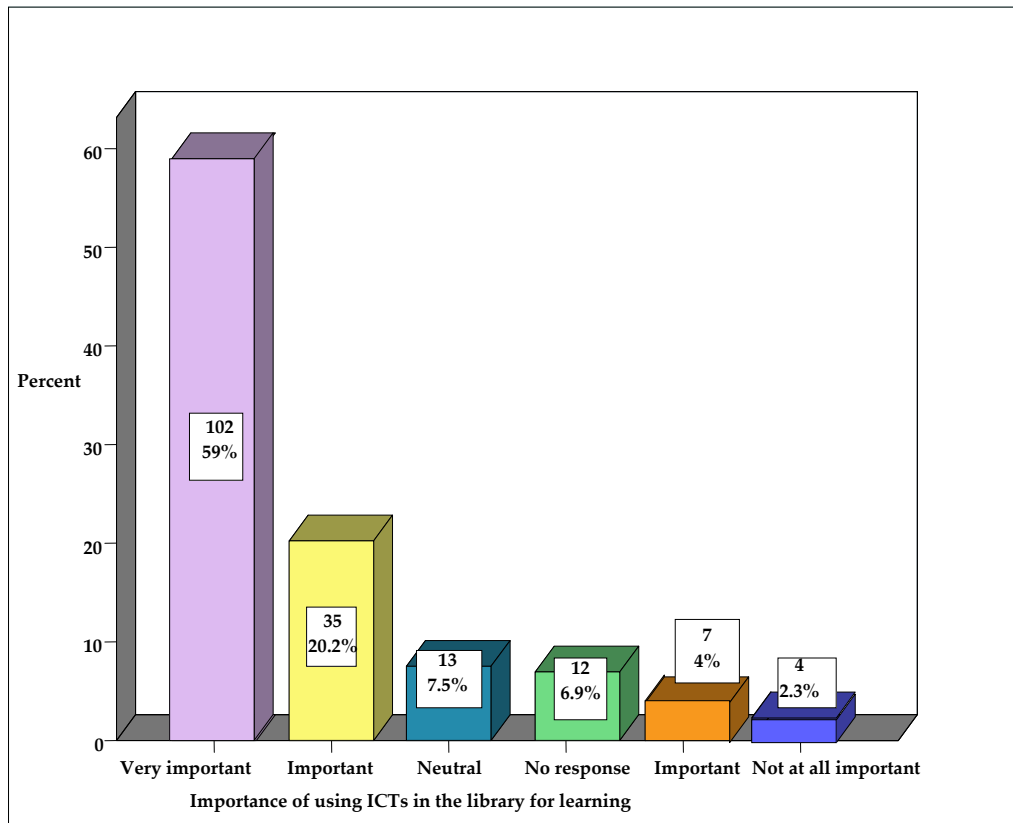
4.3.2.8 ICT hardware used by students for learning

Question 15 asked how often ICT hardware was used by students for learning. Table 37 shows that three ICT hardware devices such as a Desktop PC, mobile/cell phone and laptop/ notebook/netbook were used most frequently by students.

Table 37: Frequency of ICT hardware used by students for learning
N=173*

Resource/programs	Daily	Weekly	Fortnightly	Monthly	Never used
Desktop PC	106 (61.3%)	30 (17.3%)	4 (2.3%)	1 (0.6%)	8 (4.6%)
Mobile/cell phone	99 (57.2%)	9 (5.2%)	6 (3.5%)	7 (4%)	20 (11.6%)
Laptop/notebook/netbook	83 (48%)	18 (10.4%)	11 (6.4%)	9 (5.2%)	28 (16.2%)
Scanner	10 (5.8%)	19 (11%)	29 (16.8%)	49 (28.3%)	24 (13.9%)
Handheld device/PDA	8 (4 6%)	7 (4%)	3 (1.7%)	6 (3.5%)	71 (41%)
Digital camera	3 (1.7%)	12 (6.9%)	8 (4.6%)	37 (21.4%)	53 (30.6%)
Memory stick and external hard drive	1 (0.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Fax machine	0 (0%)	1 (0.6%)	0 (0%)	0 (0%)	0 (0%)

*Multiple responses

4.3.3 Section C: ICT software

Question 16 asked the students which ICT software they used for their learning. Table 38 below shows that a majority of the students, 157 (90.8%), used internet, 149 (86.1%) used GroupWise, 132 (76.3%) used word processing and 122 (70.5%) used presentations. Less than half the students, 70 (40.5%), used spreadsheets, 62 (35.8%) used Moodle and 50 (28.9%) used Turnitin.

Table 38: ICT software and resources used for learning by students
N=173*

ICT software	Responses	
	N	**Percent**
Internet	157	90.8%
Word processing	149	86.1%
GroupWise	132	76.3%
Presentations	122	70.5%
Spreadsheets	70	40.5%
Moodle	62	35.8%
Turnitin	50	28.9%
SPSS	3	1.7%
Access	1	0.6%
Vision	1	0.6%
Google Chrome	1	0.6%
Firefox	1	0.6%

*Multiple responses

4.3.3.1 Frequency of use of ICT software and resources by students

Question 17 asked how often respondents used ICT software for learning. Table 39 shows that a majority of 146 (84.6%) students used the internet daily, 14 (8.1%) weekly and two (1.2%) fortnightly. A further majority of 123 (71.1%) used GroupWise daily, 18 (10.4%) used it weekly, four (2.3%) fortnightly and 18 (10.4%) had never used GroupWise. Also 113 (65.3%) students had used word processing daily and 29 (16.8%) used it weekly.

Table 39: Frequency of use of the ICT software and resources by students
N=173

ICT software and resources	Daily	Weekly	Fortnightly	Monthly	Never used
Internet	146 (84.6%)	14 (8.1%)	2 (1.2%)	1 (0.6%)	0 (0%)
GroupWise	123 (71.1%)	18 (10.4%)	4 (2.3%)	6 (3.5%)	6 (3.5%)
Word processing	113 (65.3%)	29 (16.8%)	5 (2.9%)	5 (2.9%)	5 (2.9%)
Moodle	16 (9.2%)	13 (7.5%)	4 (2.3%)	11 (6.4%)	41 (23.7%)
Spreadsheets	14 (8.1%)	18 (10.4%)	13 (7.5%)	26 (15%)	35 (20.2%)
Presentations	11 (6.4%)	42 (24.3%)	23 (13.3%)	51 (29.5%)	11 (6.4%)
Turnitin	3 (1.7%)	12 (6.9%)	12 (6.9%)	21 (12.1%)	41 (23.7%)
SPSS	0 (0%)	1 (0.6%)	0 (0%)	1 (0.6%)	0 (0%)
Google chrome	1 (0.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

*Multiple responses

4.3.3.2 Importance of the ICT software and resources for learning

Question 18 asked the students to rank the ICT software in order of importance for learning. Table 40 indicates that 115 (66.5%) ranked the internet as essential for learning, 37 (21.4%) as very important and six (3.5%) as important. More than half, 109 (63%) ranked word processing as essential, 36 (20.8%) as very important and nine (5.2%) as important. GroupWise was ranked by 76 (43.9%) as essential, 44 (25.4%) as very important and 21 (12.1%) as important. Presentations were ranked by 42 (24.3%) as essential, 53 (30.6%) as very important and 37 (21.4%) as important. Only 25 (14.5%) students ranked spreadsheets as very important and 34 (19.7%) as important. The importance of others ICT software are reflected in Table 40 below.

Table 40: Importance of ICT software and resources for learning

N=173

ICT software	Essential	Very important	Important	Somewhat important	Not important
Internet	115 (66.5%)	37 (21.4%)	6 (3.5%)	4 (2.3%)	2 (1.2%)
Word processing	109 (63%)	36 (20.8%)	9 (5.2%)	6 (6.5%)	2 (1.2%)
GroupWise	76 (43.9%)	44 (25.4%)	21 (12.1%)	8 (4.6%)	8 (4.6%)
Presentation	42 (24.3%)	53 (30.6%)	37 (21.4%)	11 (6.4%)	4 (2.3%)
Spreadsheets	25 (14.5%)	25 (14.5%)	34 (19.7%)	17 (9.8%)	20 (11.6%)
Turnitin	19 (11%)	15 (8.7%)	11 (6.4%)	21 (12.1%)	34 (19.7%)
Moodle	18 (10.4%)	9 (5.2%)	15 (8.7%)	26 (15%)	34 (9.7%)

*Multiple responses

4.3.3.3 Students personal use of social networking tools

Question 19 (a) asked about the students' personal use of social networking tools. Table 41 shows that 133 (76.9%) students used Facebook. YouTube also received a higher frequency and was used by 76 (43.9%) students. Both Wikis and Twitter were used by 39 (22.5%) students each respectively. Blogs were used by only 36 (22.8%) of the students.

Table 41: Students personal use of social networking tools
N=173*

Social networking tools	Responses	
	N	**Percent**
Facebook	133	76.9%
YouTube	76	43.9%
Wikis	39	22.5%
Twitter	39	22.5%
Blogs	36	20.8%
Search life	2	1.2%
Ohi5	2	1.2%
Badoo	1	0.6%
LinkedIn	1	0.6%

*Multiple responses

4.3.3.4 The use of social networking tools by students for learning

Question 19 (b) asked students about the use of social networking tools for learning. Table 42 shows that, 48 (27.7%) students used Wikis for learning. Facebook and YouTube were used by 29 (16.8%) students each respectively. Only 28 (16.2%) students used Blogs for learning and 11 (6.4%) students used Twitter for learning.

Table 42: Student use of social networking facilities for learning

N=173*

Social networking tools	Responses	
	N	**Percent**
Wikis	48	27.7%
Facebook	29	16.8%
YouTube	29	16.8%
Blogs	28	16.2%
Twitter	11	6.4%
Search life	1	0.6%
LinkedIn	1	0.6%

*Multiple responses

4.3.4 Section D: ICT skills and training

Question 20 sought to find whether students had sufficient skills to access the ICT facilities available on campus. A majority of 114 (81.5%) students declared they had sufficient skills to access ICT facilities and 26 (15%) did not.

4.3.4.1 Why students did not have sufficient ICT skills

Question 21 asked those students who did not have sufficient ICT skills to provide reasons. Out of 26 students only two (7.7%) provided reasons. Both students said they had not received sufficient ICT training.

4.3.4.2 Problems encountered by students when using ICT facilities for learning

Question 22 asked students to elaborate on the problems they encountered when using ICT facilities for learning. Table 43 shows that among the 173 students, a majority of 132 (76.3%), experienced problems with limited access to computers and 100 (57.8%) experienced problems with printing (shortage of paper, paper jams, printers not working). Less than half of the students, 84 (48.6%), had difficulties with slow connections to the internet, 78 (45.1%) experienced a lack of technical support from ICT staff who were not there to help. Fourty nine (28.3%) had problems logging onto the LAN. Other problems encountered by students are reflected in Table 43.

Table 43: Problems encountered by students

N=173*

Problems encountered when using ICT facilities	Responses	
	N	**Percent**
Limited computers	132	76.3%
Printing (shortage of paper, paper jams, printers not working)	100	57.8%
Slow connection to the internet	84	48.6%
Lack of technical support (technical staff are not there to help)	78	45.1%
Logging onto the LAN	49	28.3%
Too much noise in the student LANs	1	0.6%
Many computers are out of date	1	0.6%

*Multiple responses

4.3.4.3 Students level of computer literacy

Question 23 asked students to indicate their level of computer literacy. Figure 16 indicates that amongst 173 respondents, less than half, 69 (39.9%), regarded themselves as were competent, 46 (26.6%) as highly competent and 46 (26.6%) as average. Only six (3.5%) saw themselves as not competent. Only one (0.6%) of the students was unsure of their level of computer literacy and five (2.9%) of the students did not respond to the question.

Figure 16: Students' level of computer literacy

N=173
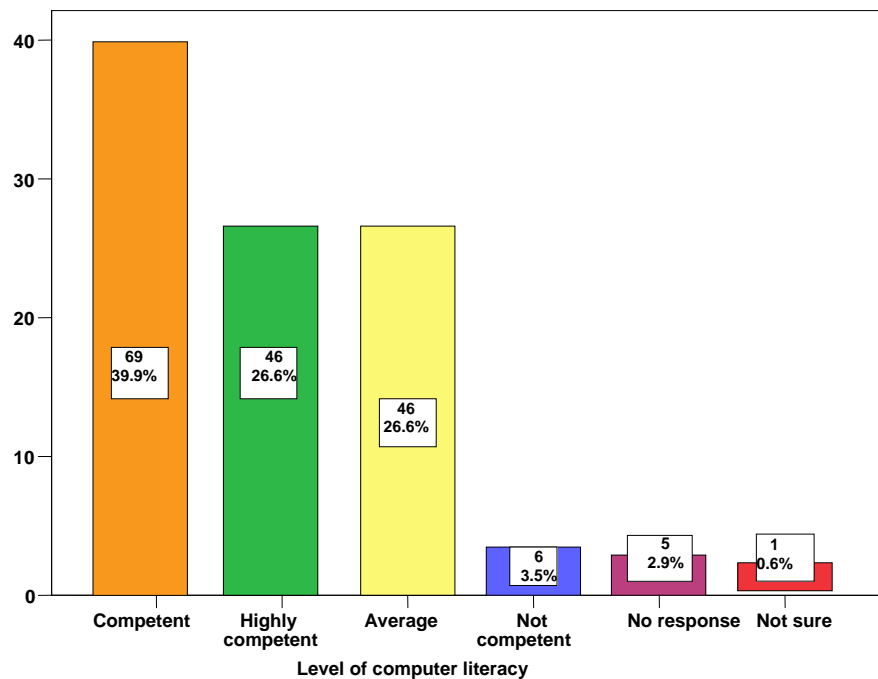
4.3.4.4 ICT training received by students

Question 24 asked the students whether they had received any ICT training. Of the 173 students, more than half, 94 (56.3%), had received ICT training while 72 (43.7%) had not and six (3.5%) students did not respond to the question.

4.3.4.5 Type of ICT training received by students

Question 25 was asked of the 94 students who received training to indicate the types of training the 94 students had received. Table 44 below shows the types of ICT training had received.

Table 44: ICT training received by students

N=94*

Type of training	Frequency	Percent
Introduction to computers	23	24.5%
MS Word	20	21.3%
PowerPoint presentation	7	7.4%
Software training	6	6.4%
Excel	5	5.3%
International Computer Drivers License	4	4.3%
Introduction to Windows XP	4	4.3%
Computer life skill	2	2.1%
EndNote	1	1.1%
SPSS	1	1.1%
No response	19	20.2%

Multiple responses

4.3.4.6 Section E: Impact of ICTs

Question 26 asked whether ICTs had a positive or negative impact on the students learning. Table 45 below shows that, a majority of students, 146 (84.4%), claimed that ICTs had a positive impact on their learning, while only three (1.7%) considered that ICTs had a negative impact on their learning.

Table 45: Impact of ICTs on students' learning

N=173

Impact of ICTs	Frequency	Percent
Positive	146	84.4%
Mixed	16	9.2%
Negative	3	1.7%
Don't know	2	1.2%
No response	6	3.5%
Total	173	100%

4.3.4.7 Positive impact of ICTs on students' learning

Question 27 asked the 146 students to give examples of how ICTs had a positive impact on their learning. Table 46 below shows that 51 (34.9%) students regarded fast access to information a positive, 47 (32.2%) regarded improved communication a positive, 46 (31.5%) increased ability to word process, 42 (28.8%) easy access to information, 38 (26%) received ICTs skills, 37

(25.3%) accessed online journals for their thesis while 32 (21.9%) could access information at any time. Also 28 (19.2%) students noted that ICTs had enabled them to use computers more effectively. Furthermore, nine (6.2%) pointed out that ICTs had helped them with conducting research, and three (2.1%) mentioned that ICTs had increased their ability to analyze data for their research.

Table 46: Examples of the positive impact of ICTs on students' learning

N=146*

Examples of positive impact of ICTs	Responses	
	N	Percent
ICTs enable fast access to information	51	34.9%
Improve communication	47	32.2%
Improved word processing skills	46	31.5%
Easier access to information	42	28.8%
Improve ICT skills	38	26%
Help to access online journal for my thesis	37	25.3%
Makes information available at all times	32	21.9%
ICTs enable the use of computer effectively	28	19.2%
Assists with research process	9	6.2%
Easier analysis of research data	3	2.1%

*Multiple responses

4.3.4.8 Effect of ICTs on students' academic performance

Question 28 sought to establish the effect of ICTs on the students' academic performance. Figure 17 below shows that 72 (41.6%) students strongly agreed that ICTs had a positive effect on their academic performance and a further 26 (16.8%) students somewhat agreed. Of the 173 students, 29 (16.8%) strongly disagreed that ICTs had a positive effect on their academic performance while a further 12 (6.9%) disagreed.

Figure 17: Positive effect of ICTs on students' academic performance

N=173
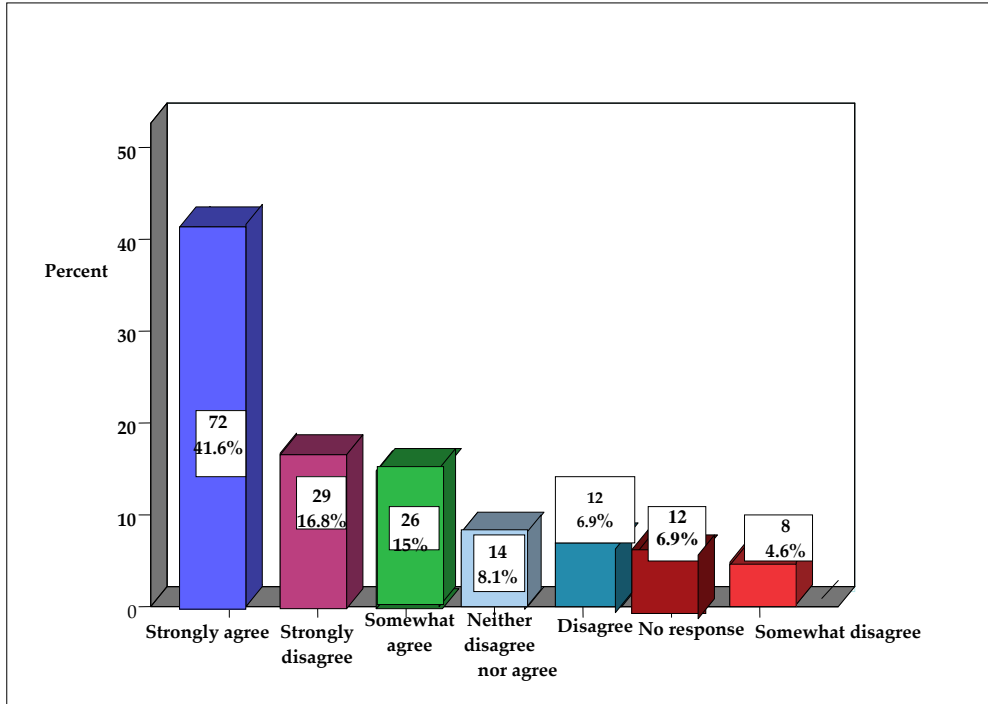
4.3.4.9 Recommendations to improve ICTs for learning at UKZNP

Question 29 asked the students to make recommendation to improve ICTs for learning at UKZNP. Of the 173 social science students at UKZNP, 82 (47.4%) recommended an increase in the number of computers in the LANs and 62 (35.3%) students saw the need for more LANs in residences. Students made other recommendations that related to the repair of ICT hardware in the LANs, improved access to ICT facilities and improved support from ICT technical staff. These recommendations are reflected in Table 48 below.

Table 47: Recommendations by students regarding ICT facilities
N=173*

Recommendations	Responses	
	N	Percent
Increase the number of computers in the LANs	82	47.4%
Provide more LANs in residences	61	35.3%
Provide wireless connections in the residences	33	19.1%
Make sure printers are working during the weekends	22	12.7%
Provide ICT help desk staff with customer care skills	21	12.1%
ICT training for non-ICT literate students and staff	19	11%
Technical staff must check which computers and printers are not functioning and repair them	17	9.8%
ICT technical staff should be available throughout the day	15	8.7%
Add more PCs in the Malherbe LAN	14	8.1%
More access to the other faculty LANs (Postgraduate LAN on main campus is full most of the time)	9	5.2%
Non-functioning computers, scanners and printers should be repaired immediately	8	4.6%
Employ qualified technical support staff	8	4.6%
Provide various software on computers and update software regularly	8	4.6%
Collaboration between faculties and Schools to avoid clashes with LAN bookings	7	4%
Allow access on printing credit on Sunday when library is closed	5	2.9%
Keep the LANs at the Arts faculty open 24hrs	5	2.9%
LANs are too noisy. Technical staff should assist with maintaining silence	4	2.3%
Computers need to be upgraded	3	1.7%
Other anti-virus software should be installed	3	1.7%
ICT training should be compulsory at first level	3	1.7%
Upgrades should be done at night not during peak hours of the day	3	1.7%
Increased access to the postgraduate LAN in the library	3	1.7%
Security services should do all they can to protect computers (security)	2	1.2%
No access to Facebook before 18h00	2	1.2%
There should be security cameras in the LANs to prevent theft	1	0.6%
Special training for the disabled students using special computers designed for them	1	0.6%

*Multiple responses

4.3.5 Summary of postgraduate students' questionnaire results

The questionnaire results showed that most postgraduate students used the ICT facilities. They
were of the opinion that there were limited ICT facilities on the campus, for example, the number

of computers and LAN facilities. A majority of the students acknowledged the positive effect of ICTs on their academic learning.

4.4 Focus group discussion results

The focus group discussion was attended by eight postgraduate students representing all the Social Science Studies Schools in the Faculty of HDSS. The areas covered in the focus group interview included: Schools, years spent using ICTs on the campus, types of ICTs used for learning, which ICTs were used for learning, why and how students used these ICTs for learning, providing examples, how students found out about the existence of ICTs on campus, the involvement of lecturers on advising which ICTs to use, training on the use of ICTs, level of ICT skills, support from the technical staff when students were in the LANs, problems students encountered and their suggested recommendations to improve ICT facilities on campus.

4.4.1 Schools represented at the focus group session

The focus group postgraduate students were from the following Schools: Philosophy and Ethics, Religion and Theology, Politics, Sociology and Social Studies and Psychology. There were no postgraduates in the School of Anthropology, Gender and Historical Studies as mentioned in Chapter Three (see Chapter Three, Section 3.2.1).

4.4.2 Years spent using ICTs on the campus

Some students at the focus group interview had used ICTs for a year while some had used them for four to five years and on other campuses of the University.

4.4.3 ICTs used for learning

Students mentioned different types of ICTs they used for learning such as PCs, scanners, laptops, printers, digital cameras, overhead projectors and cell phones.

4.4.4 How students used different ICT facilities for learning

Students used the following ICTs for learning:
- All focus group participants used computers for word processing.

- A student mentioned that his main reason for using computers was that ICTs were efficiency learning tools.

- Students could search the library catalogue and databases remotely.

- Students could search the internet.

- Statistical packages such as SPSS for data analysis were used to analyze research data.

- ICTs were used to backup information and save documents which could be opened when the students were not on campus. The natural environment was preserved as students did not have to waste paper printing. Also, students e-mailed work to themselves for easy access instead of printing out documents or saved it to memory sticks.

4.4.5 Existence of ICTs on campus

A question was asked to establish how the postgraduate students found out about the existence of ICTs available on campus. Lecturers required the students to type and e-mail their assignments so students were instructed to go to the LANs on campus.

Three students said it was a requirement for their courses to attend an orientation session when they arrived on campus. The course lecturer informed them where the LANs were and how to load credits on the print machines. Students also learnt of the ICT facilities from their friends and subject librarians.

4.4.6 Lecturers advice on which ICTs to use

A question was asked to ascertain whether lecturers advised postgraduate students on which ICT facilities to use in their studies:

- Participants pointed out that lecturers advised students on who to consult at ICT for support or which website to consult. They also referred students to their subject librarians.

- A student mentioned that he was advised by a lecturer to join a workshop to use the EndNote program for his thesis.

- Other lecturers in Psychology offered advice to their students on websites that could be used for academic purposes.

- One student said that he had never experienced any help from lecturers. He was however informed to go to the subject librarians for help.
- In case of new software one participant acknowledged that their lecturer advised them on the use of NVivo which could be downloaded from the University website if problems arose students could go back to the lecturer for help.
- Students who participated in focus group interviews mentioned that the ICT division did not do enough to promote the new ICT facilities on campus.
- Some students concluded that most of the professors were from an older generation when computers were not available so they could not offer much assistance to their students.

4.4.7 Students formal training in the use of ICTs

A question was asked to establish whether postgraduate students had any formal training in the use of ICTs:

- Five students mentioned that librarians assisted them especially in terms of looking for software.
- Four students stressed that they had learnt from friends and colleagues.
- One student said ICT training was part of his curriculum; he had attended a MS Word, MS PowerPoint and Excel training course.
- Three students received formal training in the form of a word processing course, introduction to computers at school in Standard 6 and 7. One student who received formal methods learnt ICTs through practice. The student mentioned that she learnt to use the MS Access program herself.
- One student had completed a compulsory computer course when he did his Bachelor of Education degree at the University of Pretoria. He also completed a computer course in his undergraduate degree in the United States.

4.4.8 Students' level of ICT skills

When students were required to rate their level of ICT skills five students out of eight rated themselves average while one rated themselves as good.

4.4.9 Support from technical staff when in the LANs

A question was asked to determine whether the students received satisfactory support from the technical staff in the LANs:

- It was mentioned that support is received usually before 16h30 when the offices are open. ICT technical staff only did maintenance, for example, replenished paper in the printers or repaired a printer. However, in relation to information searching there was no assistance thus assistance was only offered on the maintenance of hardware devices.

- It was mentioned that students had to wait a while before the ICT technical staff helped them. Students received help from their friends or colleagues in the LAN rather than the technical staff.

Most students had bad experiences with the ICT help desk and made the following comments:

- One student mentioned that the ICT help desk staff could not assist her with her problem and commented "They are not helpful."

- A further example that a student had was with a Zulu speaking LAN assistant. When the student did not speak Zulu to the assistant, the assistant did not respond and would not assist. The student now goes to the Agriculture LAN for assistance. The LAN assistant based at the Agriculture LAN is very helpful and efficient.

- A student mentioned that when she asked for assistance at the help desk she was told that she could not be helped because the technical assistant was writing a report. Other staff ignored her request for help and stood around chatting to colleagues.

- Another student mentioned that the ICT help desk needed customer care skills.

- Another student mentioned that she was glad that she did not have to go to the LAN but if she has to go to the LAN she does so reluctantly. Communicating with the technical assistant was a problem and most of them were not friendly at the LAN. When students ask for assistance the technical assistants make it seem as though the students are bothering them.

- A student had downloaded a large file from the internet which resulted in her access to the internet being suspended for several days. When she approached the ICT manager to explain the suspension he informed her that he was too busy to explain to her why her internet access was suspended.

- One student mentioned that students were charged varying amounts for the ICT services, for example, the downloading of anti-virus software for laptops.

- One student mentioned that he is fortunate that he did not have to use the LAN as he uses the postgraduate room in the New Arts Building. The student mentioned that if a fault is logged telephonically it is difficult to get hold of an operator and one waits a while before faults are attended to by technical staff.

4.4.10 Problems students encountered when accessing ICTs

A question was asked to determine the problems students encountered when accessing ICTs. The following problems were experienced by students.

- Shortage of computers in the LANs.

- Most students used the available computers for social networks while others are waiting to use them for academic purposes.

- Occasionally the server or network is down.

- Hardware was a problem, in the postgraduate LAN out of 12 computers only eight were working.

- Limited server capacity results in delays in terms of providing access to the file server.

- Printers were problematic. Technical assistants did not check daily if there was paper and toner available.

4.4.11 Students' comments on how to improve ICT facilities on campus

A question was asked on how to improve the ICT facilities on campus. Participants pointed out the following improvement of ICTs which should be made:

- ICT help desk staff need training in customer care.

- Computers need to be upgraded in terms of processing speed and capacity.

- The e-mail address of the Head of the ICT division should be made available to students to make suggestions and complaints about the services.

- Academic staff each had a computer but computer resources for students are limited.

- The network is very slow and the internet bandwidth should be increased.

- Larger LANs should be built in the library.

- All Schools should have postgraduate rooms with ICT facilities for their students.

- A large postgraduate LAN should be built for postgraduate students so postgraduates do not have to compete with undergraduates for ICT facilities.

4.4.12 Summary of the focus group interview

The results of the focus group discussion with the postgraduate students indicated that the Faculty of HDSS postgraduate students from all the Social Science Schools used the ICT facilities for learning. Students were not happy with services offered by the ICT help desk and technical assistants in the LANs. The problems students experienced when using the ICTs for learning were identified. Students suggested important points which needed to be taken into consideration in order to improve ICT facilities for learning on the UKZNP campus.

4.5 Summary of the chapter

This chapter presented the results of the study which set out to assess the use of ICTs for teaching and learning by the academic staff and postgraduate students from the Faculty of HDSS Social Science Schools. The results of the study have sufficiently responded to the key research questions of the study. Questionnaire results presented the background information of the respondents, their use of ICTs for teaching and learning. Recommendations for the improvement of ICTs for teaching and learning were also presented.

CHAPTER FIVE: INTERPRETATION AND DISCUSSION OF RESULTS

5 Introduction

Chapter Five provides an interpretation of the research findings presented in Chapter Four. The findings of the study are considered in the light of the research problem which was presented in Chapter One. The purpose of this study was to investigate the use of ICTs for teaching and learning by academic staff and postgraduate students at the UKZNP campus. The study sought to answer the research questions of the study as indicated in Chapter One (see Chapter One, section 1.3).

The questionnaires were divided into five sections and the results will be discussed according to the research questions of the study. In view of the excellent response rate for both questionnaires, it is possible to make generalizations about the whole population of social science academic staff and students of the Faculty of HDSS at the UKZNP campus.

5.1 ICT facilities available at UKZN

This section explores the findings related to different ICT facilities that are available at UKZNP, whether they are accessible, where they are used and how they are used for teaching and learning.

5.1.1 ICT facilities available for teaching and learning at UKZN

ICTs in education are becoming more and more important and this importance will continue to grow and develop in the 21st century. Oliver (2002) argues that the types of hardware facilities used for teaching and learning are very important. The study's findings revealed that out of 53 academic staff who responded to the question, a majority of 45 (84.9%) used a computer for teaching, 42 (79.2%) academic staff used data projectors, 40 (75.5%) used printers for teaching and more than half, 30 (56.6%) used scanners. It is worth noting that other hardware devices such as documentary film projectors, music systems and video players were also used by some academics for teaching. Thus these older ICT devices were not as popular amongst the teaching

staff. Consequently, ICT hardware devices such as a Desktop PCs, mobile/cell phones and Laptop/notebook/netbooks were used most frequently by students for learning.

To support the findings of the student questionnaire the students from the focus group interview also mentioned various types of ICT hardware they used for learning such as PCs, scanners, laptops, printers, digital cameras, overhead projectors and cell phones. Consequently both academic staff and postgraduate students used PCs, scanners, laptops, printers, digital cameras and cell phones to support their teaching and learning at UKZNP, (see Chapter Four, Section: 4.2.2, 4.4.3 and 4.3.2.8 Table 7 and 37). Similar studies such as Achimugu, Oluwagbemi and Oluwaranti (2010) also reported that tertiary institutions use computers in their academic programs in order to produce good quality research output and learning. The findings of this study are consistent with the IDRC (2000:26) study which pointed out that in some countries like South Africa, some sectors of higher learning are using computers in education on a par with the developed world, while others are only beginning to explore the possibilities of introducing higher learning networking.

5.1.2 Physical access and use of ICT hardware for teaching and learning
Research findings revealed that academic staff used different ICT facilities available to them to teach different levels of students on the campus (see Chapter Four, Section 4.2.2.2 Table 18, 19, 20, 21, 22, 23, 24, 25 and 26).The present study also established that although academic staff had physical access to various ICT hardware facilities some academics did not use them to support their teaching (see Table 9 and 10).

A majority of 48 (90.6%) academics had access to a desktop PC, while 44 (83%) academics had used a desktop PC. A majority of 47 (88.7%) academics also had access to a photocopier while data projectors and photocopiers were used by 43 (81.1%) of the academics respectively. Most academics had physical access to a scanner (43 or 81.1%) while 41 (77.4%) had used scanners. A majority of academics had physical access to a laptop/notebook/netbook (42 or 79.2%) while only 35 (60%) had used them. Most academics 40 (75.5%) had physical access to and used a black and white printer, 38 (71.7%) had access to a CD/DVD writer while 30 (56.6%) had used it and 36 (67.9%) had physical access to computer speakers 30 (56.6%) had used them. Of the 53

academics, 35 (60%) had physical access to a laser jet printer while one (1.9%) academic staff had not used one. More than half the academics (34 or 64.2%) had both physical access to and had physically used a digital camera. More than half the academics, 30 (56.6%) had both physical access to and had used a color printer, 24 (45.3%) used an inkjet printer. Only six (11.3%) had access to a handheld/PDA. In addition, a majority of the academic staff taught across the undergraduate and postgraduate levels. Thus academic staff were using the ICTs available to them to support both undergraduate and postgraduate teaching.

The findings of the current study showed that a majority of the academic staff, 49 (92.5%) accessed ICTs in their office; 39 (73.6%) used ICTs in lecture rooms; 34 (64.2%) used ICTs at home and less than half, 26 (49.1%) used ICTs in the library. Only14 (26.4%) academics used ICTs in the LAN for teaching. Other locations where ICTs were accessed by academics included airports when academics travelled, and during workshops, presentations and at conferences (See Chapter Four, Section 4.2.2.1, and Table 8). In terms of the postgraduate students, the findings of the present study showed that the computer LAN was the predominant place where a majority of postgraduate students, 129 (74.6%) accessed ICT facilities, followed by the postgraduate rooms where 103 (59.5%) postgraduate students accessed ICT facilities, while less than half the students, 78 (45.1%), accessed the ICTs in the library and only 51 (29.5%) accessed ICTs at home. This reveals how important on-campus access is tertiary institutions. Thus most academics accessed the ICT facilities from their office on campus while most students accessed the ICT facilities from the student LANs. Thus, 64.2% academics had access and very few postgraduate students had access to ICT facilities at home to support their teaching and learning (See Chapter Four See section 4.2.2.1, Table 8 and Section 4.3.2.1 Table 33).

Results from the student questionnaire and focus group interview revealed that students were informed of the availability of ICT facilities from academic staff, who required their students to use the ICT facilities to support their learning for their modules, and subject librarians in the library. Furthermore, some lecturers required the students to type and e-mail their assignments to the academic staff. Students also learnt from friends about the ICT facilities that were available on campus. Orientation and training sessions also informed the students of the available ICT facilities on campus. Hong, Ridzuan and Kuek (2002) also found in their study that lecturers

actively encouraged the use of information technology, especially the internet, for the teaching and learning processes. Hence, students were provided with computer facilities and were required to complete two compulsory generic courses in information technology.

5.1.3 ICT software used for teaching and learning

The findings showed that all the academic staff (53 or 100%) used word processing. Presentations, searching the internet and Novell GroupWise were used by more than 80% of the academics. However, there were other important ICTs which received lower usage percentages such as Moodle and Turnitin which were used by 22 (43.4%) academics each respectively. As a result of this the academics requested further training on these specialist software which revealed that many academics were not using the software because they were not familiar with these programs. This also had direct implications for teaching modules online and enforcing the University's anti-plagiarism policy.

A majority of the students 157 (90.8%) used the internet for learning, while 149 (86.1%) used GroupWise, 132 (76.3%) used word processing and 122 (70.5%) used presentations. Less than half the students, 70 (40.5%), used spreadsheets, 62 (35.8%) used Moodle and 50 (28.9%) used Turnitin (see Chapter Four, Section 4.2.3.1 and 4.3.3 Table 12 and 38). The low usage of the Moodle and Turnitin programs correlate with that of the academic staff who were also not using these programs which were available to support teaching and learning. However, results of the current study showed that a majority of academic staff and postgraduate students used other ICT programs for teaching and learning at UKZNP. A similar study by Achimugu, Oluwagbemi and Oluwaranti (2010) noted that the internet was used to deliver courses or lectures to students. Jones *et al.* (2008) highlighted that the internet facilitated e-mail communication between students and academic staff.

Czerniewicz and Brown (2006) and Soudien *et al.* (2007 cited by Brown *et al.* 2008) also found that the use of ICTs for teaching and learning were limited to familiar technologies such as the internet, e-mail and desktop packages. Furthermore, Muhirwa (2009) noted that students were unfamiliar with word processing and computer technology which was not the case with the postgraduate students in this study. Apart from different ICT facilities available for teaching and

learning the present study revealed that the following ICT facilities were used in other universities: Web-based materials were used for teaching and learning by Curtin University of Technology in Australia and at the University of Pretoria in SA (Macchiusi 2001) and de Villiers (2001). Given that very few academics were using Moodle, the open online learning system, one could argue that although online learning software was available it was not being used to its full potential to support teaching and learning.

5.2 The potential role ICTs can play in both teaching and learning

In general academic staff and students considered that ICTs had a positive impact on their teaching and learning (see Chapter Four, Section 4.2.5.1, 4.2.5.2, 4.2.5.3, 4.2.5.4, 4.3.4.6, 4.3.4.7 and 4.3.4.8, Figures 8 and 17, Tables 29, 30, 45 and 46)

A majority of 47 (88.7%) academic staff ranked word processing as essential while a further four (7.5%) ranked word processing as very important for teaching. More than half the postgraduate students, 109 (63%), ranked word processing as essential. Furthermore the internet received the second highest importance ranking by academics, with 39 (73.6%) ranking it essential and nine (17%) as very important for teaching while 115 (66.5%) postgraduate students ranked the internet essential for learning. GroupWise received the third highest ranking for academics with 34 (64.2%) academics considering it essential and 10 (18.9%) as very important while 76 (43.9%) students ranked GroupWise as essential, 44 (25.4%) as very important and 21 (12.1%) as important. The findings of the present study also showed that presentations software was ranked fourth highest by academics, with 23 (43.4%) ranking it as essential and 19 (35.8%) ranking it as very important. Compared with the academics, 42 (24.3%) postgraduate students ranked presentations software as essential, 53 (30.6%) as very important and 37 (21.4%) as important (see Chapter Four, Section 4.2.3.2 and 4.3.1, Table 13 and 39). Thus the use of word processing, e-mail, the internet and presentations software were regarded as essential and important to support the teaching and learning activities of the academic staff and postgraduate students. The findings of this study were not similar to Muhirwa's (2009) who found that students were unfamiliar with word processing and computer technology. Jones *et al.* (2008) found that students generally reported positive opinions about the internet's usefulness for academic work. Furthermore Jones *et al.* (2008:4) argued that e-mail had become an important

source of contact for student staff interaction. In the current study, more than half the academics acknowledged that ICTs had a positive impact on their student learning, while 84.4% of the students acknowledged that ICTs had had a positive impact on their student learning.

Social networking tools were used to a limited extent to support teaching and learning in the current study. In terms of their usage by academics, 14 (26.4%) indicated that they used YouTube for teaching, 13 (24.5%) used blogs for teaching and nine (17. %) used Wikis for teaching. Only eight (15.1%) academics used Facebook for teaching while five (9.4%) used Twitter and one other social network, Vimeo (video sharing social network), was used by only one (1.9%) academic for teaching. In terms of students' use of social networks for learning, 48 (27.7%) students used Wikis for learning, while Facebook and YouTube were used by 29 (16.8%) students each respectively. Only 28 (28.8%) students used Blogs for learning and 11 (6.4%) students used Twitter for learning. It was evident from the study's findings that both academics and students used different social network tools for teaching and learning (see Chapter Four, Section 4.2.3.5 and 4.3.3.4, Table16 and 42).

5.3 The utilisation of ICTs by staff and students in their teaching and learning

As noted earlier a majority of the social science academic staff and postgraduate students used ICTs for teaching and learning at UKZNP. All of the academic staff, 53 (100%) used ICTs for searching for further information, a majority of 51 (96.2%) used ICT resources for research, 49 (92.5%) used them for making presentations, 48 (90.6%) for preparing lectures, 47 (88.7%) for communicating with students, and 45 (84.9%) for communicating with other lecturers. In addition, 43 (81.1%) used ICT software for preparing research papers, 39 (73.6%) for collecting handouts and reference material and 38 (71.7%) for accessing online teaching resources. Limited use was also made of other ICT programs for analyzing data (e.g. SPSS or NVivo), for managing references (EndNote), for accessing and using online assessment tools (e.g. Moodle) and conference presentations.

More than half, 117 (30.8%), of the students used the postgraduate rooms to search the internet for research information. The study's findings showed that 92 (24.2%) postgraduate students used postgraduate rooms for reading and sending e-mails to the lecturers, 86 (22.6%) for reading

and sending e-mails to fellow students. Furthermore, 82 (21.6%) students used the postgraduate rooms for typing assignments and essays and three (8%) students used them for knowledge management and reading the latest technology news. Out of 173 postgraduate students, a majority of 118 (69%) said it was very important for their learning to use the ICT facilities in the postgraduate rooms. Also 21 (12.3%) students regarded use of the ICT facilities in the postgraduate rooms as important (see Figure 14). This result correlates with the earlier discussion as to where students were accessing the ICT facilities on campus. Similarly, most students used the ICT facilities in the library for searching the internet for information, for communicating with academic staff and other students via e-mail (Table 36).

It is evident from the findings that the postgraduate students used the computer LAN and ICT facilities in the postgraduate rooms and the library for academic reasons. (see Chapter Four Section 4.3.2.1, 4.3.2, 4.4.3 and 4.4.4, Table 35, 36 and Figure 14 and 15). Odogwu and Nyala (2010:554) also found that a majority of the students used the computers in their study to type word documents, but only a few browsed the internet which was not the case with this study.

5.4 Challenges faced by staff and students when using ICTs

The results from the current study revealed that a lack of ICT skills was one of the challenges highlighted by both academics and students. 22 (44.9%) academics admitted that they did not have sufficient ICT skills to utilize the ICTs to support their teaching. To support this finding some academics mentioned they did not have sufficient skills because no training was offered by the University (see Chapter Four Figure 5 and Section 4.2.4.3). With regard to the students, 26 (15%) admitted they did not have sufficient ICT skills. To support this conclusion two students said they had also not received sufficient ICT training from the University. However, five out of eight students at the focus group session rated their computer literacy levels as average while one rated themselves as good.

The findings of this study were also similar to other studies conducted by Ingutia-Oyieke (2008) which showed that access to and use of ICTs was affected by the lack of access and there was a need for training in this area. Another study conducted by Hwang (2004 cited by Mutula and van Brakel 2007) on ICT skills concluded that it was important to deploy ICT-related skills through

traditional education systems because most business enterprises provide little or no formal training. The main findings of Achimugu, Oluwagbemi and Oluwaranti's (2010) study on the evaluation of the impact of ICT diffusion in Nigeria's higher educational institutions also found that there were inadequate ICT skills amongst staff and students. Ojedokun's (2001) study also revealed there was a need for ICT training to facilitate more use of ICTs for teaching and learning.

The current study's findings further noted that slow internet connection was a challenge experienced by both academic staff and students when using ICTs for teaching and learning. More than half, the academics 30 (56%) and less than half, 84 (48.6%) of the students had difficulties with slow internet connections (see Chapter Four Table 17 and Table 43). In addition, students from the focus group session pointed out that occasionally the servers or the network were down and they also experienced limited server capacity resulting in delays in terms of providing access to the file server. This finding is in corroborates with the results of a study carried out by Brink (2008) who found that major challenges were network and server capacity. With regard to slow internet connectivity the current study supports the findings of Achimugu, Oluwagbemi and Oluwaranti (2010) study who found that the bandwidth at most tertiary institutions in Nigeria was insufficient to support any meaningful academic activity during peak periods. However, this was not the same in the present study. These findings are consistent with the research findings of Hiltz and Wellman (1997 cited by De Villiers 2001) who found that a major problem especially for the postgraduate engineering students, was the download time for accessing their course due to large graphics and the limited bandwidth available in SA.

Further findings of the present study showed that the majority of the academics 17 (32.1%) felt that ICT technical staff are not always available for help. With regard to students, 78 (45.1%) experienced a lack of technical support from ICT staff who were not there to help (see Chapter Four, Table 17 and 43). The findings from the focus group also pointed out that students had to wait a while before the ICT technical staff helped them. Students receive help from their friends/colleagues in the LAN rather than from the technical staff. It is clear from the findings of the present study that many students had bad experiences with the ICT help desk and one student

mentioned that the ICT help desk staff could not assist her with her problem and commented "They are not helpful".

A further example that a student had, was with a Zulu speaking LAN assistant. When the student did not speak Zulu to the assistant, the assistant did not respond and would not assist. These findings are consistent with the research findings of Hoque and Alam (2010) who reported that in terms of technical support received almost equal numbers of respondents gave their opinion in favour and disfavour of the adequacy of experts. Jaffer, Ng'ambi and Czerniewicz's (2007) study also concluded that technical staff should be multilingual in order to assist both staff and students. Other problems experienced by academics included problems with password requirements reported by 15 (28.3%) academics and 49 (28.3%) students had problems with logging into the LAN. Similar to the findings of this study, Achimugu, Oluwagbemi and Oluwaranti (2010) found that inadequate ICT technical personnel was a major problem in Nigerian tertiary institutions.

Furthermore, the current study's findings revealed that 14 (26.4%) academics encountered limited access to PCs while a majority of 132 (76.3%) students experienced problems with limited access to computers. Students who attended the focus group interview also highlighted the shortage of computers in the LANs. Students mentioned that most students used the available computers for social networks while others waited to use the PCs for academic purposes. Hardware was a problem, as in the postgraduate LANs only eight of the 12 PCs were working. These findings correspond with Achimugu, Oluwagbemi and Oluwaranti (2010) who found that, PCs are available in most Nigerian tertiary institutions, but they are not readily accessible to students because of the low PC student ratio which was on average about 1 to 40. Furthermore Muhirwa (2009) noted that there was limited student access to computers in the study they conducted. The student's in the focus group also pointed out that printers were problematic since the technical assistants did not check daily that there was paper and ink available.

5.5 Recommendations to improve the use of ICTs for teaching and learning

Both academic staff and postgraduate students made recommendations to improve ICT facilities for teaching and learning. Of the 53 academics, 12 (22.6%) identified the need for academic staff

to be given regular workshops, while eight (15.1%) academics requested improved internet access (increased bandwidth), seven (13.2%) saw the need for more seating and computers in the LANs to support student learning. The findings further indicated that to improve ICT facilities for staff and students was important and that the ICT technical staff need to provide better technical support and maintenance. Further suggestions and comments were that lecture rooms need to be equipped with laptops and data projectors and training provided for academic staff and students so that the ICT facilities could be used more efficiently and effectively for teaching and learning. (see Chapter Four, Section 4.3.4.9, Table 47).

Of the 173 students, 82 (47.4%) recommended an increase in the number of computers in the LANs and 62 (35.3%) students saw the need for more LANs in the residences, while students also required wireless access in the residences. Students made other recommendations that related to the repair of ICT hardware in the LANs. Further recommendations included keeping the LANs at the Arts building open for 24 hours. Students wanted access to ICT facilities to be improved including the support from the ICT technical staff. Students were of the opinion that the ICT help desk staff did not possess the necessary customer care skills and should be provided with such training to better support both staff and students. ICT technical staff should routinely check for computers and printers and other hardware devices which were not working. In addition, ICT technical staff should be available to assist students throughout the day.

More access to the LANs in other faculties should be arranged since the postgraduate LAN on the main campus was always full. Improved collaboration between faculties and Schools should occur to avoid clashes in the LANs. Students saw the need for employing qualified ICT staff who could assist them with their queries for efficiency and recommended that access be made available to the printing credit system on Sundays when the library was closed. Postgraduate students suggested that ICT staff need to assist in controlling the noise levels in the LANs. There was also a need for the University to make an ICT module at first level compulsory. Students were of the opinion that software upgrades should be done at night not during peak hours of the day and increased access to the postgraduate LAN in the library should be provided. Security in the LANs should be improved to protect the ICT equipment. Security cameras should be installed to prevent the theft of ICT equipment and more effective anti-virus software should be

installed. Students also felt that social network facilities (e.g. Facebook) should not be accessible before 18h00. Special training for the disabled students using special computers designed for them should be provided by the ICT division. Therefore there is a major need for ICT division management and the University at large to pay attention to these problems since this affects the role ICTs can play in supporting teaching and learning at the University.

The results of the focus group session supported the findings of the questionnaires since the students maintained that the ICT help desk staff needed training in customer care, as they were not helpful. Computers needed to be upgraded in terms of processing speed and capacity. Students mentioned that the contact details of the ICT person who was in charge should be made available to students to make suggestions and complaints about the services. Also, the network was very slow and the bandwidth should be increased. Finally, students at the focus group session suggested that all Schools should have postgraduate rooms with ICT facilities for their students.

5.6 Summary of the chapter

This chapter discussed the results of the study. The discussions were applicable to the key research questions that the study attempted to answer. The aim of the questionnaires was to investigate the use of ICTs for teaching and learning by academic staff and postgraduate students at UKZNP. The interpretations of the findings were done in accordance with the results obtained. The major areas covered in the chapter included, ICT hardware, ICT software, ICT training and the impact of ICTs on teaching and learning. Suggestions of what is needed to improve the use of ICTs for teaching and learning at UKZNP were made. Generally, different ICT facilities available at UKZN were used by the academic staff and postgraduate students as tools to facilitate teaching and learning.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6 Introduction

The purpose of this study was to investigate the use of ICTs for teaching and learning at UKZNP by the academic staff and postgraduate students of the Faculty of HDSS. Based on the data presented and interpreted in the two previous chapters this final chapter presents a summary of the findings, revisits the key research questions of the study, provides an overview, and conclusions, recommendations and suggestions for further research. The recommendations are followed by a discussion of how the conceptual framework guided the purpose of this study

6.1 Revisiting the key research questions of the study

The study was guided by the following research questions:

6.2 Summary of the study

Chapter One provided an introduction and a brief background of the study and the statement of the problem was highlighted. Furthermore, the research questions which were asked as well as the broader issues to be investigated in the study were highlighted. The rationale for the topic was explained and the conceptual framework which guided the study was discussed. Delimitations of the study were outlined, and finally, the key terms relevant to the study were defined.

In Chapter Two various studies of a similar nature, many of them involving the use of ICTs for teaching and learning were discussed. The literature review discussed ICTs in higher education and their importance in teaching and learning and the impact of ICTs on teaching and learning were elaborated on. Factors influencing the use of ICTs for teaching and learning in higher learning institutions were examined. Furthermore, ICT policy in institutions of higher learning was discussed and ICT infrastructure and higher education, as well as academics learning how to use ICTs were examined. Likewise the challenges facing the implementation of ICTs in higher learning institutions, and related studies conducted on the use of ICTs in teaching and learning were reviewed. The researcher first looked at studies conducted on the use of ICTs in teaching

and learning generally, then looked at studies done overseas, studies completed in Africa and other developing countries. The chapter concluded by discussing studies conducted in South Africa.

Chapter Three described the research methodology used in the study. The approach that the research undertook was a triangulation approach where both qualitative and quantitative data were collected. The researcher used questionnaires and a focus group interview as data collection instruments. As the chosen method the advantages and disadvantages of survey research were discussed as well as the data collection instruments. The quantitative data was analyzed using SPSS and the qualitative data was analyzed using thematic content analysis.

The results of the study were presented in Chapter Four. The results of the questionnaires for the academic staff and postgraduate students were presented in the form of tables and figures and the results of the focus group interview were presented. Various problems relating to the use of ICTs for teaching and learning were revealed. Recommendations as to how ICTs could be improved for teaching and learning were given by the academics and students.

Chapter Five presented the interpretation of the findings of the study. These showed that although the academic staff and postgraduate students used the ICTs for teaching and learning, not all were given ICT training. Problems experienced related largely to a lack of knowledge and skills as a result of insufficient training. Access to ICT facilities was also identified as a problem in the use of ICTs for teaching and learning. In summary the chapter showed how the results of the study sufficiently responded to the research questions of the study.

Finally, this chapter, Chapter Six, provides an overview of the study together with the conclusions and recommendations. It also presents further related research that could be undertaken.

6.3 Conclusions
The following conclusions can be made:

6.3.1 ICT facilities available for teaching and learning at UKZN

In terms of hardware facilities the study found that academic staff were using the available ICT facilities provided by the University to support their teaching. Most of the academics used computers, data projectors and various printers and scanners to support their teaching. However, more academics used these ICT hardware facilities in their offices than in the lecture rooms. Although the academic staff had access to many ICT hardware devices they did not use all of these devices provided by the University to support their teaching.

Likewise, the top three ICT hardware devices used by students to support their learning were desktop PCs, mobile/cell phones and laptop/notebook/netbook PCs. Thus the findings revealed that similar hardware devices were used by both academics and students to support teaching and learning in the Faculty of HDSS Social Science Schools. Most students accessed the University's hardware facilities in the computer LANs. Unlike the academic staff very few students had accessed ICT facilities from their homes. One could conclude that ICT facilities were used as tools to facilitate the constructivist teaching and learning of the academic staff and postgraduate students of the study. Most academic staff were using these ICT tools to teach across both the undergraduate and postgraduate levels in the Schools studied.

6.3.2 The potential role ICTs can play in both teaching and learning

Both academic staff and postgraduate students confirmed that ICTs had a positive impact on their teaching and learning. Hence Vygotsky's theoretical framework used by the study was appropriate. Almost half the academics considered that ICTs affected their teaching to a very large extent. ICTs had improved the communication, while communication between students was also facilitated. The creation of course materials and the searching for current information on the internet had facilitated teaching and learning while students' ICT skills improved as a result of their use of the ICT facilities provided by the University. Also, research processes were expedited as software facilitated data analysis and current information could be retrieved online. In terms of frequency of use of ICT facilities almost half the students used the university computer LANs daily while very few of the postgraduate students had never used the LANs. Not many of the postgraduate students had used the ICT facilities in the postgraduate rooms or the Library.

6.3.3 Utilisation of ICTs by Postgraduate students and academic staff at UKZN

With regard to the postgraduate rooms only certain disciplines within the School under study had postgraduate rooms with ICT facilities for their students, thus they were used by only a few students. Also, the library's opening and closing times prevented students from accessing the ICT facilities in the Library during certain times.

In terms of frequency of use of ICT software facilities provided on the campus, academics mostly used word processing daily and on a weekly basis. Only three academics had never used word processing. The second most used ICT resource by academics was the internet which was also used on a daily basis by most academics. Only one academic admitted they had never used the internet. The e-mail software, GroupWise, received the third highest usage by academics and, as with word processing and the internet, it was used daily by academics. However, special software for online learning such as Moodle was not used that often by academics nor was the Turnitin anti-plagiarism software. Academics requested training on how to use these software packages in order to use them to support their teaching. Given that the University spends considerable amounts of money to renew the annual license fees to these software packages more should be done by the ICT technical staff management to ensure use of these packages.

Social networking facilities were used to a limited extent by academic staff for teaching. Web 2.0 tools such as YouTube, blogs, wikis and Facebook were used by only a few academics in their teaching. Similarly, very few students made use social networking facilities to support their learning. Of the students who did use social networks, wikis, Facebook, blogs and Twitter were used by the students.

6.3.4 Challenges encountered by staff and students when using ICTs at UKZN

Academic staff and students encountered a number of problems when using the ICTs for teaching and learning. The top three problems which were encountered by the academics were slow internet connection, technical support staff that were not always available to help and password requirements. Likewise the top four problems encountered by students were, limited computers, problems with printing (shortage of paper, paper jams) slow internet connection and a lack of technical support (ICT technical staff were not available to help). These problems prevented academic staff and the postgraduate students from fully benefiting from the usage and potential use of the ICT facilities.

Based on the results of the study it may be concluded that, despite the various problems encountered by both academic staff and students, the ICTs provided by the University were used. While many institutions may focus on the number of computers available for students, it is really the conditions of access that make the difference for students. This suggests that institutions may be better off focusing on practical conditions such as opening hours and technical support

In conclusion, ICT is undeniably instrumental in promoting teaching and learning activities in higher learning institutions. It could help solve problems relating to quality, equity, and access to higher learning institutions. ICT could also promote resource sharing and therefore improve efficiency and productivity while at the same time help increase access to a global resource of knowledge and information. Given the above conclusions and drawing on the conceptual framework of the study one would argue that both academic staff and postgraduate students used ICTs for teaching and learning. Most academic staff and postgraduate students had the ability to use ICT facilities provided by the university. Despite all the challenges they encountered it is evident that they put their ability to use.

6.4 Recommendations

Based on the findings of the study, the following recommendations have been made by academic staff and postgraduate students to assist the UKZNP to improve the ICT facilities so that they may be used to support teaching and learning. These recommendations are grouped according to the following categories:

- Infrastructure
  - The number of computers in the student LANs needs to be increased;
  - The number of LANs on the campus needs to be increased;
  - The number of postgraduate LANs on the campus needs to be increased;
  - LANs should be built in the residences;
  - Access to the postgraduate LAN in the library and other LANs on campus should be improved by increasing the opening hours for student access;
  - Wireless access should be provided in the residences;
  - Access to the internet should be increased with improved bandwidth;
  - Security in the LANs should be increased by the installation of cameras; and
  - Other anti-virus software should be installed to protect data files and hardware.
- ICT technical support
  - Technical staff should be provided with customer care training in order to improve the service offered to academic staff and postgraduate students;
  - LAN technicians should be available throughout the day to assist students with queries;
  - The turnaround time for attending to faults logged should be improved;
  - The printers should be regularly checked for problems such as insufficient paper and paper jams;
  - Malfunctioning hardware such as PCs should be immediately repaired; and
  - Software upgrades should not be carried out during peak usage times since this limits access to the ICT facilities.
- Training
  - Basic ICT training for both staff and students should be compulsory and should be offered during orientation sessions.
  - Ongoing training in the use of the latest software upgrades should be provided; and
  - Training on specialist software, such as Moodle and Turnitin should be provided for both staff and students who are required to use the software.

6.5 Suggestions for further research

The following are suggestions relating to other research studies that should be conducted:

- A broader user satisfaction survey of the ICT division's support service should be done on the provision of ICT facilities for both academic staff and postgraduate students;
- A similar study should be done on the use of ICTs for teaching and learning, focusing on all the Schools in the Faculty of HDSS; and
- A similar study should be done on the use of ICTs for teaching and learning focusing on academic staff and postgraduate students in other faculties on the UKZNP campus.

6.6 Summary of the chapter

This final chapter provided a summary of the findings, conclusions and recommendations of the study that examined the use of ICTs for teaching and learning at UKZNP by academic staff and postgraduate students of presented.

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APPENDIX 1: Informed consent form

14th October 2010

My name is Restituta T. Mushi and I am an Information Studies Masters student at the University of KwaZulu-Natal (UKZN), Pietermaritzburg. As part of my Masters studies I have to conduct research on a particular topic. My chosen topic concerns use of Information and Communication Technologies (ICTs) by postgraduate students and academic staff for teaching and learning at the UKZN. I am inviting you to participate in the research because of the valuable contribution you can make in terms of highlighting the problems that postgraduate students and academic staff can encounter with regard to use of ICTs for teaching and learning.

If you choose to participate I would like you to complete the attached questionnaire. Should you change your mind about partaking in this research, you have a right to withdraw at any time. The researcher will respect your decision at all times. Your withdrawal will not have any negative consequences.

Please understand that you have the right to decide not to answer any question if you so wish. Confidentiality and anonymity are guaranteed. Information collected will be compiled into a research report which will be of significance in influencing the University management/ teaching and learning unit in future planning. A copy of this report will be available upon request. The questionnaire will take 10 minutes to complete.

While participation in this study is voluntary, wide participation is essential for the validity of the results and the success of the study. Your cooperation is highly appreciated considering your time constraints.

If you have any questions about the research please contact me.
Thank you.
Yours sincerely,
Restituta Mushi (Ms)
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DECLARATION

I………………………………………………………………………… (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT   DATE
……
NOTE:
 Potential subjects should be given time to read, understand and question the information given before giving consent. This should include time out of the presence of the investigator and time to consult friends and/or family.

APPENDIX 2: Postgraduate student questionnaire

Use of Information and Communication Technologies (ICTs) by postgraduate students and academic staff for teaching and learning at the University of KwaZulu-Natal, Faculty of Humanities, Development and Social Sciences

Instructions: Please complete the following questionnaire by clearly ticking or crossing the relevant boxes or by filling in the information requested clearly and legibly. If the space provided for the written response is not enough please use the back of the questionnaire and clearly number the response.

Section A: Background information
1. Degree registered for:
1.1. Postgraduate Diploma   [   ]
1.2. Honours   [   ]
1.3. Masters   [   ]
1.4.   PhD   [   ]

2. What School are you in?
2.1. School of Religion and Theology   [   ]
2.2. School of Sociology and Social Studies   [   ]
2.3. School of Psychology   [   ]
2.4. School of Philosophy and Ethics   [   ]
2.5. School of Politics   [   ]
2.6. School of Anthropology, Gender and Historical Studies [   ]

3. What is your gender?
3.1. Female   [   ]
3.2. Male   [   ]

4. What is your age?

     _____

5. What is your race?
5.1. White   [   ]
5.2. Indian   [   ]
5.3. Black   [   ]
5.4. Coloured   [   ]
5.5. Other, (*Please specify*)_____

6. Are you a full time student?
6.1. Yes   [   ]
6.2. No   [   ]

Section B: ICT hardware

7. Where do you access ICT facilities? (*Please tick all those that apply*)
7.1. Computer LAN   [   ]
7.2. Postgraduate rooms   [   ]
7.3. Library   [   ]
7.4. At home   [   ]

8. How often do you use these ICT facilities? (*Please tick all those that apply*)

ICT facility	Daily	Weekly	Fortnightly	Monthly	Rarely or never
University computer LAN					
Postgraduate rooms					
Library					
Home					

9. If you use the computer LAN, what are your main reasons for using the LAN? (*Please tick all those that apply*)
9.1.   Typing my assignments and essays   [   ]
9.2. Read and send emails to other students   [   ]
9.3. Read and send emails to my lecturers   [   ]
9.4. Search the Internet for research information   [   ]
9.5. Other, (Please specify)

_____
_____
_____

10. How important is the use of the computer LAN for your learning?
10.1. Very important   [   ]
10.2. Important   [   ]
10.3. Neutral   [   ]
10.4. Not important   [   ]
10.5. Not at all important   [   ]

11. If you use the computers in your postgraduate rooms/office in your discipline, what is your main reason for using these computers? (*Please tick all those that apply*)
11.1. Typing my assignments and essays   [   ]
11.2. Read and send emails to other students   [   ]
11.3. Read and send emails to my lecturers   [   ]
11.4. Search the Internet for research information   [   ]
11.5. Other, *(Please specify)*

_____

How important is the use of computers in the postgraduate rooms/office for your learning?

11.6. Very important   [   ]
11.7. Important   [   ]
11.8. Neutral   [   ]
11.9. Not important   [   ]
11.10. Not at all important   [   ]

12. If you use the library computers, what is your main reason for using the computers in the library? (*Please tick all those that apply*)
13.1. Searching the OPAC   [   ]
13.2. Search electronic databases   [   ]
13.3. Search Internet for research information   [   ]
13.4. Other, (*Please specify*)

_____
_____
_____

14. How important is the use of computers in the library for your learning?
14.1. Very important   [   ]
14.2. Important   [   ]
14.3. Neutral   [   ]
14.4. Not important   [   ]
14.5. Not at all important   [   ]

15. How often do you use the following ICT hardware to assist you with your learning? (*Please tick all those that apply*)

Resource/facility	Daily	Weekly	Fortnightly	Monthly	Never used
Desktop PC					
Laptop/Notebook/ Netbook					
Handheld device/PDA					
Digital camera					
Scanner					
Mobile/ cell phone					
Other, (*Please specify*) _____					

Section C: ICT software

16. Which ICT software /resources have you used to assist with your learning (*Please tick all those that apply*)

16.1. Word processing   [   ]
16.2. Presentations   [   ]
16.3. Spreadsheets   [   ]
16.4. Internet   [   ]
16.5. Moodle   [   ]
16.6. Novell GroupWise   [   ]
16.7. Turnitin   [   ]
16.8. Other, (*Please specify*)

_____
_____
_____

17. How often do you use the following ICT software/resources for learning? (*Please tick those that apply*)

ICT Software/resources	Daily	Weekly	Fortnightly	Monthly	Never used
Word processing					
Presentations					
Spreadsheets					
Internet					
Moodle					
GroupWise					
Turnitin					
Other, (*Please specify*) _____					

18. Please rank each of the following software/ resources in order of importance for your learning.

ICT software/resources	Essential	Very important	Important	Somewhat important	Not important
Word processing					
Presentations					
Spreadsheets					
Internet					
Moodle					
GroupWise					
Turnitin					
Other, (*Please specify*) _____					

19. Do you use the following social networking facilities?

Social networking facilities	Personal use		Use for learning	
	Yes	No	Yes	No
Facebook				
Twitter				
Blogs				
Wikis				
YouTube				
Other, (*Please specify*) _____				

Section D: ICT skills and training

20. Do you have sufficient skills to access ICT facilities available to you on campus?

20.1. Yes   [   ]

20.2. No   [   ]

21. If No, please explain why?

_____

_____

_____

22. What problems do you encounter when using ICT facilities for learning? (*Please tick all those that apply*)

22.1. Logging into the LAN   [   ]

22.2. Lack of technical support (ICTs staff are not there to help)   [   ]

22.3. Printing (shortage of paper, paper jams, printers are not working) [   ]

22.4. Limited computers   [   ]

22.5. Slow connection to the Internet   [   ]

22.6. Other, (*Please specify*)

_____

_____

_____

23. How do you rate your level of computer literacy?

23.1.   Highly competent   [   ]

23.2. Competent   [   ]

23.3. Average   [   ]

23.4.   Not competent   [   ]

23.5. Not sure   [   ]

24. Have you ever received any ICT training?

24.1. Yes   [   ]

24.2. No   [   ]

25. If Yes, please list the type of training

_____

_____

_____

Section E: Impact of ICT

26. In general has ICT had a positive or a negative impact on your learning?

26.1. Positive   [   ]

26.2. Negative   [   ]

26.3. Mixed   [   ]

26.4. Don't know   [   ]

27. If ICT has had positive impact on your learning, please provide examples.

_____
_____
_____
_____

28. The use of ICT services or lack thereof (printing, computers, internet, e-mail) affects your academic performance?

28.1. Strongly disagree   [   ]
28.2. Disagree   [   ]
28.3. Somewhat disagree   [   ]
28.4. Neither disagree nor agree   [   ]
28.5. Somewhat agree   [   ]
28.6. Strongly agree   [   ]

29 What recommendations can you make to improve the use of ICTs for learning at UKZNPMB.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Thank you for completing this questionnaire

APPENDIX 3: Academic staff questionnaire

<div align="right">**ID—**</div>

Use of Information and Communication Technologies (ICTs) by postgraduate students and academic staff for teaching and learning at the University of KwaZulu-Natal, Faculty of Humanities, Development and Social Sciences.

Instructions: Please complete the following questionnaire by clearly ticking or crossing the relevant boxes or by filling in the information requested clearly and legibly. If the space provided for the written response is not enough please use the back of the questionnaire and clearly number the response.

Section A: Background information
1. What School are you in?
1.1.   School of Religion and Theology   [   ]
1.2.   School of Sociology and Social Studies   [   ]
1.3.   School of Psychology   [   ]
1.4.   School of Philosophy and Ethics   [   ]
1.5.   School of Politics   [   ]
1.6.   School of Anthropology, Gender and Historical Studies   [   ]

2. What is your gender
2.1. Female   [   ]
2.2. Male   [   ]

3. What is your age? _____

4. What is your race?
4.1. White   [   ]
4.2. Indian   [   ]
4.3. Black   [   ]
4.4. Coloured   [   ]
4.5. Other, (*Please specify*)_____

5. Designation?
5.1. Tutor   [   ]
5.2.   Lecturer   [   ]
5.3. Senior Lecturer   [   ]
5.4. Professor   [   ]

6. Academic levels taught (*Please tick all those that apply*)
6.1. Undergraduate   [   ]
6.2. Postgraduate   [   ]

Section B: ICT Hardware

7. What hardware facilities do you use for teaching? (*Please tick all those that apply*)
7.1. Computer   [   ]
7.2. Data projector   [   ]
7.3. Scanner   [   ]
7.4. Printer   [   ]
7.5. Digital camera   [   ]
7.6. Mobile/cell phone   [   ]
7.7. Other, (*Please specify*)

_____

_____

_____

8. Where do you generally use ICT resources? (Please tick all those that apply)
8.1. In the office   [   ]
8.2. Lecture rooms   [   ]
8.3. Computer LAN   [   ]
8.4. Library   [   ]
8.5. Home   [   ]
8.6. Other, (Please specify)

_____

_____

9. Please indicate whether you (i) have or do not have access; and;
(ii) use or do not use the following ICT facilities in your School:

ICT facilities	Access (have physical access)		Use	
	Yes	**No**	**Yes**	**No**
Data projector				
Laptop/ Notebook/Netbook				
Desktop PC				
Digital camera				
Photocopier				
Handheld/PDA				
Colour printer				
Black and white printer				
Laser jet printer				
Inkjet printer				
Scanner				
CD/DVD writer				
Computer speakers				
Other, (*Please specify*) _____				

Section C: ICT software
10. What ICT software/resources have you used for teaching? (*Please tick all those that apply*)
10.1. Word processing   [   ]
10.2. Presentations   [   ]
10.3. Spreadsheets   [   ]
10.4. Internet   [   ]
10.5. Moodle   [   ]
10.6. Novell GroupWise   [   ]
10.7. Turnitin   [   ]
10.8. Other, (*Please specify*)

_____
_____
_____

11. How often do you use the following ICT software/resources for teaching?
     (*Please tick these that apply*)

ICT software/resources	Daily	Weekly	Fortnightly	Monthly	Never used
Word processing					
Presentations					
Spreadsheets					
Internet					
Moodle					
Novell GroupWise					
Turnitin					
Other, (*Please specify*) _____					

12. Please rank each of the following ICT software/resources in order of importance for your teaching.

ICT software/resources	Essential	Very important	Important	Somewhat important	Not important
Word processing					
Presentations					
Spreadsheets					
Internet					
Moodle					
GroupWise					
Turnitin					
Other, (*Please specify*) _____					

13. What do you use these ICT software/resources for in your teaching? (*Please tick all those that apply*)
13.1. For making presentations   [   ]
13.2. For searching for information   [   ]
13.3. For research   [   ]
13.4. For preparing lecture materials   [   ]
13.5. For analyzing data   [   ]
13.6. For managing references   [   ]
13.7. For accessing online teaching tools   [   ]
13.8. For communicating with students   [   ]
13.9. For communicating with other lecturers   [   ]
13.10. For accessing and using online assessment tools   [   ]
13.11. For preparing research papers   [   ]
13.12. For collecting handouts and reference materials   [   ]
13.13. For checking students plagiarism   [   ]
13.14. Other, (*Please specify*)

_____
_____
_____

14. Do you use the following social networking facilities?

Social networking facilities	Personal use		Use for teaching	
	Yes	No	Yes	No
Facebook				
Twitter				
Blogs				
Wikis				
YouTube				
Other, (*Please specify*) _____				

15. What problems do you experience when using ICTs for teaching? (*Please tick all those that apply*)
15.1. Password requirements   [   ]
15.2. Difficulties in using ICTs   [   ]
15.3. Technical staff are not always available to help   [   ]
15.4. Limited computers (personal)   [   ]
15.5. Slow Internet connection   [   ]
15.6. Other, (*Please specify*)

_____
_____
_____

16. List the modules in which you use ICTs as a teaching tool.

_____
_____
_____

Section D. ICT skills and training
17. Have you ever received any ICT training?
17.1. Yes   [   ]
17.2. No   [   ]

18. If Yes, what training have you received?

_____
_____
_____

19. Do you have sufficient skills to access ICTs facilities available to you?
19.1. Yes   [   ]
19.2. No   [   ]

20. If No, Please explain why?

_____
_____
_____

21. How do you rate your level of computer literacy?
21.1. Highly competent   [   ]
21.2. Competent   [   ]
21.3. Average   [   ]
21.4.   Not competent   [   ]
21.5. Not sure   [   ]

22. Please rate your expertise in the use of the following ICT facilities for teaching.

ICT facilities	Excellent	Very Good	Good	Fair	Not capable
Word processing					
Spreadsheets					
Presentations tools					
E-mail					
Internet browsing					
Statistical tools					
Graphics					
Web page designing					
Programming					
Database management					

Section E: Impact of ICTs
23. To what extent do ICTs affect your teaching?
23.1.   To a very large extent   [   ]
23.2.   To a large extent   [   ]
23.3.   Neutral   [   ]
23.4.   To a little extent   [   ]
23.5.   To no extent   [   ]

24. In general has ICT had a positive or a negative impact on your teaching?

24.1. Positive   [   ]
24.2. Negative   [   ]
24.3. Mixed   [   ]
24.4. Don't know   [   ]

25. If ICTs have had a positive impact on your teaching, please provide examples.

_____
_____
_____
_____

26. In general has ICT had a positive or a negative impact on your students' learning?
26.1. Positive   [   ]
26.2. Negative   [   ]
26.3. Mixed   [   ]
26.4. Don't know   [   ]

27. If ICTs have had a positive impact on your students' learning, please provide examples.

_____
_____
_____

28. What recommendations can you make to improve the use of ICTs for teaching at UKZNP.
_____
_____
_____
_____
_____
_____
_____
_____
_____

Thank you for completing this questionnaire

APPENDIX 4: Focus group interview questions

Focus group interview questions on the **use of ICTs for learning by postgraduate students in the Faculty of Humanities, Development and Social Sciences at the University of KwaZulu-Natal, Pietermaritzburg campus.** Please feel free to speak about your experiences, issues and/or concerns. All opinions are welcome and all suggestions will be considered. Please note: all responses will be confidential and anonymity is guaranteed.

1. What discipline are you from?

2. How many years have you been using ICTs on the campus?

3. What ICTs do you use for learning?

4. Why and how do you use these ICTs for learning? (*please provide examples*)

5. How did you find about the existence of ICTs on campus?

6. Do your lecturers advise you on which ICTs to use?

7. Have you had any formal training in the use of ICT?

8. How would you rate your ICT skills

9. Do you get support from the technical support staff when you are in the LAN?

10. Do you encounter any problems when accessing ICTs?

11. How would ICT facilities be improved on campus?

Thank you very much for your time