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SCHOOL OF EDUCATION
GRADUATE SCHOOL OF HUMANITIES

HIGH ACCESS TO AND LOW USE OF INFORMATION COMMUNICATION TECHNOLOGY: A CASE STUDY OF STUDENTS IN HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA

Submitted in partial fulfillment of the requirements for the degree of Masters in Education (ICT in Education)

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Abstract

This study is a response to the need to understand the meaning behind some of the unanticipated behaviour displayed by students in higher education institutions who have high access to information communication technologies (ICTs), but yet display limited use. The main objective of the study is to explore and highlight reasons why students privileged with high access to ICTs make such limited use of them.

Fifteen respondents identified in a National Research Foundation funded regional study of ICT access and use in what were then five higher education institutions (HEIs) in South Africa (Czerniewicz and Brown, 2008) were interviewed telephonically to establish the demographic and psychological attributes that characterize them as high access but low ICT users. The study made use of Azjen's Theory of Planned Behavior (1985), the Self Reactive Theory (Bandura and Cervone, 1986) and the Perceived Instrumentality Theory (Miller, DeBacker and Greene, 1999) to analyze other psychological attributes that might be possible contributors to the unexpected behaviour of low ICT use in situations of high access.

Drawing on the works of Czerniewicz and Brown (2007b) and Enoch and Soker (2006) as well as the theoretical concepts derived from the theories mentioned above, a conceptual framework was developed that was anchored on two main pillars: demographical composition and psychological composition of the 15 students. With respect to the demographical aspect of the conceptual framework, several attributes were explored including: age, gender, educational background and social economic setting. As regards the psychological component of the conceptual framework, three main attributes were explored namely: attitude; knowledge and skills; and motivation.

The study highlighted that the unexpected behaviour displayed by students who made limited use of ICTs even though there were opportunities of high access, was a phenomenon that could not be credited to demographical attributes as there were no great variations in ICT practices in terms of age, educational background or socio-economic status among the group of students that were studied. However, the study suggests that the students' behavioural pattern of low ICT use even in the

face of high access can be attributed to the lack of psychological resources, as it was discovered that students did not possess highly positive attitudes towards ICTs; they had partially developed skills and incomplete knowledge in ICTs; and they were also only partially motivated to use ICTs. Though the findings cannot be generalized, they help shed light and understanding on how and why students might or might not use ICTs in HEIs.

Key words: ICT access; ICT use; Higher Education Institutions; Motivation; Self-efficacy; Subjective norm, Theory of Planned Behavior, Self-reactive theory and Perceived Instrumentality theory

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Plagiarism declaration

I, Regina Monyemangene, hereby declare that the work contained in this dissertation is my own work, and that it has not been submitted for any degree or examination at any other university.

Signed: Signed by candidate Date: 15 February 2012

Signature removed

Declaration by candidate for the degree of Master in the Faculty of Humanities

I, Regina Monyemangene of Makongo Juu Dar es Salaam, do hereby declare that I empower the University of Cape Town to produce for the purpose of research either the whole or any portion of the contents of my dissertation entitled: High access to and low use of information communication technology: A case study of students in higher education institutions in South Africa

Signed: Signed by candidate Date: 15 February 2012

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Abbreviations and Acronyms

CA : Content Analysis

HE : Higher Education

HEI : Higher Education Institution

ICTs : Information and communication technologies

JISC : Joint Information Systems Committee

PHEI : Public Higher Education Institution

NRF : National Research Foundation

Contents

List of Tables

List of Figures

Chapter 1

Overview of the Study

1.1 Background

Higher education institutions (HEIs), the world over have sought to integrate various information and communication technologies (ICTs) into higher education based on the assumption that ICTs are relevant to the students' learning experience. To some extent, ICTs are applicable in the lives of the students both in terms of academic use and for personal use such as entertainment and social interaction (Selwyn, 2010). As a result the subject of ICT use in HEIs has received a high profile in the research field (Thinyane, 2010). Furthermore educational technology is viewed as a "young field" (Czerniewicz, 2008: 171) subsequently, practitioners in the field and researchers alike are seeking to gain a better understanding of 'who has access or not' as well as 'who is making much or little' use of ICTs and 'why'. Examples of such research activities include the research study conducted in the United Kingdom by the Joint Information Systems Committee (2008) which focused on how HEIs are measuring up in terms of ICT use. Similarly in South Africa, Thinyane (2010) conducted a study that analyzed the experiences of first year students with technology.

The question of who has access to ICT has fuelled the digital divide debate (Selwyn, 2004) and has subsequently won itself a wealth of literature including Hargittai (2002), Lenhart and Horrigan (2003) and Warschauer (2003). However, the question of 'who is making much or little use of ICTs and why' is relatively under researched and has many gaps that still need to be addressed. As some researchers have put it, "the inter-state divide [who has access] has many special issues, and even whole journals, devoted to it, [whereas] the intra-state divides [who is making use of ICT and why] are less well documented or analysed and suggest a number of areas that have received insufficient attention up until now" (Cushman and McLean, 2008: 214). On one hand, some researchers hold the opinion that ICT use is enabled or constrained by factors including age, gender, aptitude, supportive networks as well as disposition (Czerniewicz & Brown, 2009;Enoch & Soker 2006). Another group of scholars on the other hand is convinced

that access and use of ICTs is also dependent upon or constrained by socio-economic factors as well as cognitive resources (Hargittai, 2003; Peter & Valkenburg, 2006; Dijk, 2002 & 2006). These scholars identify more with the concept of 'digital differentiation' (which refers to measuring and analyzing access through socio-economic and cognitive resources) than the digital divide theory (Peter and Valkenburg, 2006). Similarly Brown and Czerniewicz (2007a) also contend that digital differentiation is a better concept for assessing ICT use than the notion of the "digital divide". Researchers like Warschauer who are in support of the digital differentiating concept put forward the argument that "the key issue is not unequal access to computers but rather unequal ways that computers are used" (2003a:46). Considering the lack of clarity about 'who is making much or little use of ICTs and why', the likes of Selwyn have concluded that there is a lack of a "systematic and objective understanding of individuals' non-use of new technologies" (2003: 99).

1.2 Research focus

Selwyn's (2003) views are eloquently illustrated by the results of a regional research project that was conducted among five HEIs in South Africa by Czerniewicz and Brown (2008). The analysis of their research project contrasted the use of information and communication technology (ICT) among students with low and high access and found, with little surprise, that students privileged with high access tend to have a higher record of ICT use as well as a more varied use of ICTs than students whose access was low or restricted. However, an element of surprise surfaced when the results reflected that among the group of students with high access a significant number of them did not make effective use of ICTs for their learning purposes. At many HEIs, there seems to be a general assumption that high ICT access will necessarily result in extensive use (Czerniewicz & Brown, 2009), however Czerniewicz and Brown's (2008) research findings show that this is not necessarily true. Their findings suggest that some students, although provided with good access to ICT, still do not make use of ICT diversely and or frequently. It is therefore important to study this group of students further in order to try and better understand their practices. The current study is therefore part of Czerniewicz and Brown's larger National Research Foundation funded study which was conducted in 2007 among five universities across South Africa. Data from this regional study was analyzed in order

to identify students to interview with the objective of understanding why a category of "high access low ICT use" students in higher education (HE) exists.

1.3 Research question

The particular research question that framed and guided the study is:

Why are students in Higher Education with high access to ICTs and adequate ability to use them, sometimes characterized by low and or limited use?

This main research question prompted the following secondary questions:

- Which students are categorized as high access-low ICT users?
- Why do students categorized as having high access display low and or limited ICT use?
- Can patterns of low ICT use among students in HEI be a result of psychological and individual needs such as motivation, attitude and or lack of knowledge and skills?

1.4 Research Objective

In order to answer the research question and thus reach an informed conclusion of why pockets of high access low ICT students exist in HEIs, it was important to focus the research objectives toward:

- Exploring contemporary issues of ICT access and use in higher education institutions
- Identifying and evaluating attributes that characterize students privileged with high access, but who are associated with low patters of ICT use
- Exploring and analyzing factors that act as barriers to in-depth use of ICT in higher education institutions.

The overall objective of this study was to formulate recommendations that would help educators and practitioners to understand issues of low ICT use in order to better inform HEIs about how to support students use ICT when it is critical to their learning.

1.5 Conceptual framework

In many studies exploring the issues of ICT access and use, researchers have employed various theoretical and conceptual frameworks to guide their studies. Ajzen (1985) utilized theoretical constructs such as attitude and subjective norm to explore issues of human behaviour. Other researchers in the field have addressed issues of human behaviour in relation to ICT use by exploring theoretical concepts such perceived usefulness, network externality and self-efficacy (Lee, 2006). The subject of ICT access and use in relation to human behaviour and in particular the aspect of motivation has also been explained by using Bandura and Cervone's (1986) self - reactive theory. Other researchers have applied the perceived instrumentality theory as a suitable theoretical framework to guide their studies which were focused on issues of intrinsic motivation in human behaviour (Husman, Derryberry, Crowson & Lomaxd, 2004).

Some research studies (Pew, 2003; Soker, 2006) have used the approach of assessing the demographical composition (such as race/ethnicity, age, gender, educational attainments, community type and household income) of the research subjects to formulate a conceptual framework that informed their studies on ICT access and use. In South Africa, some researchers who have conducted studies on ICT access and related them to demographical issues have also relied on diverse conceptual frameworks including Laurillard's (2002) conversational framework and classification framework (Czerniewicz and Brown, 2007b) to analyze different concepts including age, gender and academic fields.

Adopting from the work of Czerniewicz and Brown (2007b) and Soker's (2006) demographical classification conceptual framework approach, as well as the theoretical concepts articulated in the Azjen's Theory of Planned Behavior (1985), the Self Reactive Theory (Badura & Cervone, 1986) and Perceived Instrumentality theory (Husman, 2004), the researcher was able to formulate a conceptual framework was that was anchored on two main pillars: demographical composition and the psychological make-up of the students. With respect to the demographical aspect of the conceptual framework, the researcher explored several attributes including: age, gender, educational background and social economic setting. Three main attributes namely:

attitude, knowledge and skills as well as motivation were explored under the psychological leg of the conceptual framework.

1.6 Research Design

In order to adequately address the research question at hand, which called for an understanding of the students' perceptions of ICT, the researcher adopted a hermeneutic/interpretative research orientation as well as a qualitative research method because this approach offered the researcher the opportunity to understand students' actions and subjective views in the use of ICTs. A semi-quantitative approach was also used in order to isolate particular attributes of the students as well as to determine attributes which occurred most frequently among students with high access to ICTs but who display limited use. A case study methodology was employed because, according to Baxter and Jack (2008), case studies are suitable for tackling studies that seek to answer the "why" question as is the case in the current study. As part of the case study method, telephonic interviews were used to gather data from 15 research participants, male and female students of different age groups, from various academic disciplines and at different academic levels. The participants were drawn from research data from the second phase of a regional survey study (Czerniewicz and Brown, 2008 conducted across South Africa. Once data was collected from the respondents, it was transcribed and the text was analyzed using the content analysis technique because this approach helped builds a bridge between quantitative data and qualitative data (Bauer, 2000). During the content analysis process (ibid.) the data was classified and coded according an analytical framework drawn up by the researcher. The research study also took into account ethical considerations by ensuring that consent was obtained from all the participants and each student was informed of their voluntary participation as well as their right to refrain or withdraw from the research study.

1.7 Research Contribution

As highlighted earlier, extensive effort, debate and research activity around the subject of ICT access and use, have been placed on notions of having or not having ICT access. Selwyn contends that research activity focuses "only on the means rather than the ends of engagement

of ICT use" (Selwyn, 2010:36). This study endeavors to narrow the existing gap in the literature by shedding light on an under researched aspect in the field of ICT access and use, in this particular case by offering explanations as to why students with good access to ICTs choose not to use them.

Furthermore, criticism has also been raised that past studies (such as Van Dijk 2006) on issues of ICT access and use have only concentrated on the context of developed countries (Czerniewicz & Brown 2009) therefore necessitating a repeat of this work in the context of a developing country like South Africa in which the current study is based.

It has also been observed from the literature reviewed that work on ICT adoption and use concentrates mainly on the subject of instructors/teachers, learning management systems and pedagogical debates with much less consideration of students as significant parties of ICT adoption and use. This observation in confirmed by researcher like Thinyane who states that "… a surprisingly small amount of empirical evidence has been published on students' access to and use of technology" (2010: 407). The current study was therefore beneficial because it tapped into three significant areas that are less focused upon, but that clearly need more attention, i.e. differential usage patterns; students; and a developing world context.

1.8 Thesis Structure

Upon identifying the research question, the researcher was then in a position to proceed with the study by reviewing the literature that related to themes set out within the research objectives and drawing up a summary of the findings as well as a conceptual framework for the study as outlined in Chapter two. Once sufficient literature about the research study was obtained and a conceptual framework was devised, the main research activities were carried out through interviews and the findings were analyzed through a qualitative approach and some descriptive statistical quantitative analysis. A detailed report on the entire research methodology is outlined within Chapter three. After successfully gathering and analyzing the research data, the findings of the study were documented in Chapter four. The conclusion of the study and formulated recommendations are detailed in Chapter five. All the pertinent sources of literature that were used in the study are listed immediately after Chapter five.

Additional research material such as consent letters, interview schedule and coding framework are all attached as appendices at the end of the thesis report. The following chapter provides an account on the literature reviewed for the research study.

Chapter 2

Literature Review

2.1 Introduction

In a study conducted by Czerniewicz and Brown (2006) on access and use of ICT at high education institutions in South Africa it was reported that students with high access to ICTs also use them frequently and diversely. Conversely, the study also revealed that students with minimum access used ICTs infrequently (Czerniewicz & Brown 2006). Both these findings come as no surprise because they are logically related. However, a perplexing aspect of the research findings as reported in another extended study by the authors, was that amongst the percentage of students with high access, a "significant percentage (44%) of students ... do not make frequent use of ICTs" (Czerniewicz & Brown 2007a:743). This surprising element of Czerniewicz and Brown's (2006, 2007 and 2008) work (which was conducted in several phases) is the basis for the current research study. The present study therefore set out to understand this perplexing finding by exploring the reasons why students who have high access to ICTs made limited use of them through:

- Exploring and investigating contemporary issues of ICT access and use in higher education institutions
- Identifying and evaluating attributes that characterize users privileged with high access, but who are associated with low uses of ICTs
- Critically analyzing factors that act as barriers to in-depth use of ICT in higher education institutions.

The discussions below are a summary of a range of literature that was reviewed concerning issues of access and use of ICTs, especially in higher education institutions; demographical attributes of high access low ICT users; as well as issues of attitude, knowledge and skills in relation to the use of ICTs. Another aspect drawn from the literature and discussed below is the issue of motivation (Azjen, 1985) in relation to ICT use. This literature review also provides an

account of the methodologies employed by other researchers who have conducted similar studies as well as the theoretical perspectives and conceptual frameworks that have been used in other comparable studies. After exploring the views of other scholars on issues pertaining to the research question at hand, the researcher was able to highlight several emerging issues and situate the current study in an appropriate conceptual framework.

The discussions below can be categorized into three main focus areas as reflected in the Figure 1. These focal areas are centered on four thematic areas as outlined in the box below:

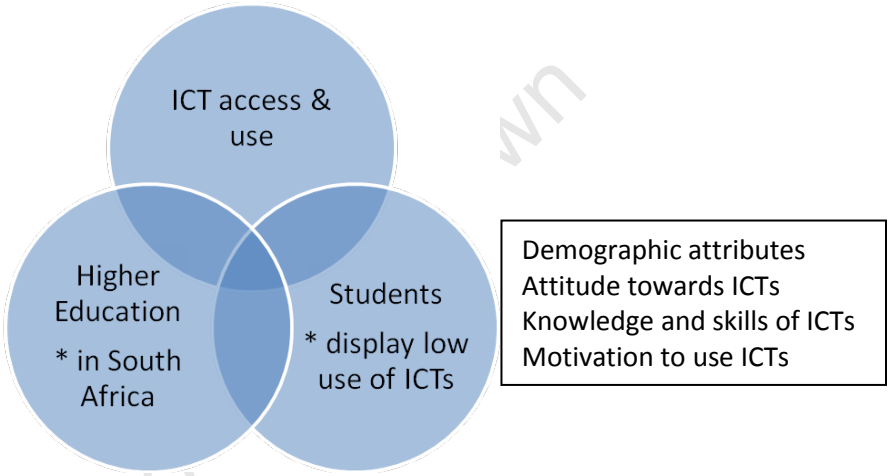

Figure 1 Research focus area

2.2.1 ICT access and use from a global perspective

The term 'access' has been defined using varied descriptions ranging from simple views such as the one denoted in the Becta study, viz.: possessing "infrastructure" (2008:18), to more sophisticated and multifaceted concepts such as the ones highlighted by Van Dijk (2002:2) including: 'mental access' which refers to interest and attractiveness of ICTs; 'material access' which means possession of a computer and network connectivity; 'skills access' which relates to digital skills and education; and lastly 'usage access' denoting usage opportunities or equal distribution of these opportunities.

The most common view of access that has held the reigns in academic discourse is the simplistic notion that 'ICT access' equates to the availability of hardware, software and

connectivity (Valkenburg, 2006). Academic debates addressing ICT issues have concentrated on notions such as the 'digital divide' and have related it to the gap between those who have and do not have physical access to information and communication technologies (ibid.). This common view of access surfaces even in policy documents such as the draft White Paper on e-education in South Africa which states that "the impact and effectiveness of ICTs rest on the extent to which end-users (learners, teachers, managers and administrators) have access to hardware, software and connectivity. For e-learning to be successful, learners must have regular access to reliable infrastructure" (Department of Education 2003: 17). At the core of this perspective is the assumption that issues of low use of ICT are due to the lack of physical infrastructure and connectivity to ICTs. Supporters of this view believe in the disappearing digital divide theory which argues that once every individual is supplied with a computer and access to the internet then the discourse on access will fade away (Peter & Valkenburg, 2006). The "disappearing digital divide approach suggests that everybody uses the internet similarly to get information, to connect with other people, and to find entertainment" (Peter & Valkenburg, 2006: 296). It is difficult to agree with the disappearing digital divide theorists because at the very rudimentary level of reasoning, when we consider human nature that is characterized by diverse tastes, needs and interests, how possible would it be for all users to utilize ICTs similarly? Such reasoning seems somewhat shallow especially when one considers arguments offered by other researchers who state that "users, individual and organization[s], selectively utilise the Internet according to their political, commercial and social interests and preferences" (Werle, 2005:317).

As we have seen in the discussions above, the conventional reasoning related to access suggests that efforts should be channeled toward providing infrastructure and once this is secured all ICT related benefits and advantages will be reaped. However, research activity in other parts of the world seems to suggest otherwise. Czerniewicz and Brown (2007a:730) concluded in one of their studies that "high access does not guarantee high use", in fact their study revealed that instances of low access and extensive use also exist in society. Similarly, Peter and Valkenburg (2006) reject the digital divide theory that presents 'access' as an issue that has to do with the presence or absence of infrastructure only, in favour of the digital

differentiation theory because a study that they conducted showed that ICT patterns of use were dependent upon several factors, viz.: cognitive ability, socio-economic environment and cultural background, (ibid.) and not just the availability of network or computers. Other researchers like Czerniewicz and Brown (2010) draw on the sociologist Bourdieu's concept of 'Capital' in order to provide a more nuanced account of access and use. The researchers use expressions such as 'objectified and embodied cultural capital' to describe the notion of ICT access. What is commonly known as access to goods, texts as well as material objects (e.g. access to infrastructure), is referred to by the authors as 'objectified cultural capital' while alternative concepts to ICT access such as knowledge, skills or disposition, are referred to as 'embodied cultural capital' (ibid.). Despite the different perspective or terminology used to describe the notions of ICT access, these authors also oppose the narrow digital divide definition and vindicate the digital differentiation theory by arguing that "technology as objectified capital means nothing on its own – it is only through embodied cultural capital or social capital that the technology can be appropriated and used in accordance with its specific purpose" (Czerniewicz & Brown, 2010: 864).

It is therefore highlighted from the discussion above that access and use of ICTs is not only dependent on the provision of adequate infrastructure as practitioners, educators and researchers alike have to consider socio-economic and cognitive resources when evaluating issues of ICT use (Peter & Valkenburg, 2006).

2.2.2 ICT access and use in High Education Institutions (HEI)

The current study is located within the setting of higher education (HE) therefore it is fitting to explore the literature on ICT use within the context of HE in general first. The advent of ICTs in HEIs has introduced or proposes considerable changes in the environment noted by several scholars (Selwyn, 2010; Oliver, 2002). Those who hold optimistic views state that there will be a diversity of learning opportunities (Selwyn, 2010) and it is predicted that ICTs will transform how, where and when students learn (Oliver, 2002), i.e. a more student-centered learning process will take form and students will also be able to learn anytime and from anywhere. Oliver (2002) points out that ICTs will affect the educational curriculum. He argues that unlike

the traditional approach where the curriculum concentrated on consolidating and rehearsing content, the use of technologies will support and encourage, to a greater extent, competency and performance based curricula.

On a more pessimistic note, researchers such as Oliver (2002) comment that the new approach to teaching and learning brought about by ICTs is likely to result in tensions between teachers and students as the traditional approach is gradually replaced by student-centered learning. Others contend that the introduction of ICTs in the educational sphere and especially in the student arena will bring about a situation where "clicking replaces thinking [and students'] scholarship [will] consist of little more than 'Googling their way' through degree courses" (Selwyn, 2010: 35) and engaging in forms of "accelerated smash and grab scholarship" (Brabazon 2007, cited in Selwyn, 2010: 35).

Although some of the members of the ICT community hold optimistic views that ICT will soon naturally penetrate HEIs and bring about a positive transformation in student learning as related in some of the discussions above, other parts of the ICT community have met with challenges (especially in the developing world) which seem to hamper the proliferation of ICTs in HEIs. Tusubira and Mulira (2004: 3) highlight 'disillusionment', 'skepticism' 'reduced organisational commitment' and limited 'resources to support ICT services and systems' as some of the challenges that they have encountered. Despite the challenges that seem to hamper the progress of ICTs in education, some researchers content that HEIs have only two options for the way forward: they can either transform and embrace technology or refuse to "transform … [and] die" (Bates, 2004 cited in Selwyn, 2010: 34).

2.2.3 ICT access and use in HEIs in South Africa

At a more local level, research shows that in South Africa the emergence of e-education frameworks and policies can be dated as far back as 1995. However these policies have been criticized for concentrating mainly on schools and what is known as Further Education Training colleges while neglecting the higher education sectors (Isaacs, 2007). Some of the state universities and private tertiary institutions at a regional level have therefore tried to respond to the deficiency of a national ICT HE policy by formulating ICT related programmes, policies

and or strategies individually. In the Western Cape some universities have taken strides and introduced ICT initiatives like the University of the Western Cape and the AVOIR project, which is a collaborative initiative bringing together several African HEIs (Keats and Schmidt, 2009). Similarly the University of Cape Town is also collaborating with international institutions to promote the use of a Collaborative Learning Environment known as Sakai (Cox, 2008).

Czerniewicz and Brown (2009) document the contemporary scene of ICTs in HE and note three main issues:

- Challenges facing HEIs
- The role of ICTs in alleviating HEIs challenges
- Factors enabling and constraining ICT access and use in HEIs.

According to Czerniewicz and Brown (ibid.) HEIs have to respond to three challenges including: 'The need to participate in a new global order, specifically in the form of the information society' (2009:8); increased social interests from the student community; and the need to equip students with the basic knowledge and skills required to survive in a knowledge society.

Additionally, South African (SA) HEIs have to cope with intensified social demands resulting from an increased student audience coming from diverse backgrounds (especially after the apartheid regime) and limited resources to support the technological environment. Thinyane adds that not only do students entering HEIs come from diverse backgrounds but that they do so "with differing levels of access to and use of technology" (2010: 413). HEIs in SA are therefore endeavour to assist students from previously disadvantaged groups who have brilliant academic records, by securing access to equitable educational opportunities.

Czerniewicz and Brown (2009) highlight that ICTs are viewed as central to securing the desired new global order and alleviating many of the existing challenges. Despite the apparent growth of ICT access and use in HEIs in South Africa, Czerniewicz and Brown (2009) maintain that ICT use can be constrained by a lack of several issues including:

Equitable access on campus; positive dispositions; supportive networks; and curriculum integration.

Research activity documented in the Pew report (2003) raise arguments that suggest that the solution to unlocking the mystery around ICT access and use in HEIs lies not in analyzing policies strategies, frameworks or multiple resources, but by rather concentrating on issues of demography. It was therefore import to also explore the relationship between demography and ICT use and access.

2.3 Relationship between Demography, ICT Access and Use in HEIs

Before launching into demographical discussions about low ICT users, it is necessary to provide a preamble that highlights the uniqueness of the focal research participants (i.e. students) in the study in relation to ICT use. Many of the studies tackling the issues of ICT use and access seem to concentrate on general users of ICTs and or instructors as the unit of analysis of their study.

In comparison there seem to be fewer studies focusing on students as the prime subject in the discussions of ICT use in HEIs. Neal points out that "direct investigations of student opinions about the use of ICT and learning are generally missing from the literature" (2005: 1). The current study seeks to address this research gap by concentrating on students in HE as the research participants. The question at hand then is what attributes characterize these students that are referred to as high access low ICT users? Using a demographical approach to identify these students was deemed beneficial because as some scholars argue that "demography is destiny when it comes to predicting who will go online" (Pew, 2003: 68).

Several demographical factors have been identified as determinants of ICT access and use and these include: socio-economic status, level of educational, academic discipline, age and gender.

Socio-economic status

In terms of socio-economic status users who have low earnings or are unemployed tend to be associated with low levels of ICT use (Pew, 2003). Soker (2006) seems to second this opinion by

stating in his findings that students coming from higher socio-economic standing use ICT more than students with a low socio- economic background.

Level and line of study

In the Pew report (2003), people with low levels of educational attainments were linked with limited use of ICTs, thus suggesting that low educational levels can result in low levels of ICT usage. Another study conducted by Czerniewicz and Brown (2007b) focusing on disciplinary differences in the use of educational technology, revealed that there are no disciplinary differences in information seeking behaviour between disciplines, i.e. the students' line of study is not a factor that influence access and use of ICTs.

Age

With reference to age, some research work carried out in Israel, revealed that younger students profit more from ICT use in their studies than adult students (Soker, 2006). Other studies (Pew, 2003; Valkenburg, 2006) seem to be consistent with Soker's (2006) findings because they also either report that older students are more averse to ICT use than younger students or that adolescents have greater ICT skills than non-adolescent users. Similar arguments are put forward by other researchers who report that "digital skills are not primarily related to educational levels but to age and gender" (Van Dijk & Hacker, 2000: 8). In Austria, Donat, Brandtweiner and Kerschbaum (2009) found that younger students had more positive attitudes towards ICTs than older students. Conversely, in South Africa, Czerniewicz and Brown (2010:1) argue "that age is not a determining factor in students' digital lives". Similarly in another study carried out in Nigeria, Jegede (2009) found no correlation between ICT use and age.

Gender

According to the results of a study conducted in Israel on ICT access and demography, Soker (2006) reported that there is a gender-based digital divide among students because it was discovered that male students profited more from ICT services than their female counterparts. However other research activity in South Africa revealed contradictory findings that showed

subtle gender differences in terms of access to technological resources (Czerniewicz & Brown, 2006).

In the overall discussions above two opposing lines of thought seem to emerge throughout each demographical subject. One group of scholars present the notion that demographics affect ICT usage patterns, whilst another group of intellectuals oppose the idea that demographics influence ICT use. What is interesting and left to uncover then is where the current study situates itself within the debate.

2.4 Barriers to in-depth use of ICT in higher education institutions

As stated earlier one of the main objectives in this study is to discover factors that hamper in-depth use of ICT in higher education setting. This was important because as it has been noted in the literature that "much of the discussion surrounding the digital divide has concentrated on the characteristics of those individuals who are using ICTs or, at best, simply pathologised the 'have nots' in terms of individual deficits. Yet developing a systematic and objective understanding of individuals' non-use of new technologies constitutes a major challenge for those seeking to map and understand the social realities of the 'information age'" (Selwyn, 2003: 101). A review of the literature yielded a combination of issues including attitude towards and interests in ICTs, skills in ICTs as well as motivation factors for ICT use.

2.4.1 Attitudes towards ICTs

The notion of students' attitude toward ICT use is approached from two dimensions in literature: one aspect leaning heavily on theoretical frameworks and another aspect tending towards a practical stream.

From a theoretical point of view, research activity around the notion of attitude has been framed within Ajzen and Fishbein's theory of reasoned action (1980 cited in Ajzen, 1991). The theory asserts that "the immediate antecedent of any behaviour is the intention to perform the behaviour in question" (Ajzen & Madden, 1986: 454). It is believed that the greater one's intention to perform a particular behaviour, the more it will be expected of the person to try to perform or to actually perform the behaviour. When the theory is unpacked a little further, we

find that there are two keys determinants of a person's intention, viz. 'Attitude' and 'Subjective Norm' (the latter is discussed in detail under the motivation section that follows below). Attitude is defined as "the degree to which a person has a favorable or unfavorable evaluation of the behaviour in question" (Ajzen, 1991: 188). Ajzen articulates that "intentions to perform behaviours of different kinds can be predicted with high accuracy from attitudes toward the behaviour" (1991: 179). Taking the issue of ICT use, the theory of reasoned behaviour or planned behaviour would unfold in the following manner: a favourable or unfavourable attitude towards ICTs will influence an individual's intentions, which ultimately impacts their use or non-use ICTs.

The theory of reasoned action described above, is practically demonstrated in numerous case studies within the literature review (Wood et al., 2001; Hagel & Shaw, 2007). These case studies help explain the various attitudes that students display. The debate on attitudes seems to run along two themes; positive attitudes and negative attitudes. In relation to positive attitudes scholars like Wood et al. (2001) have linked positive attitudes with proper identification and use of learning styles. Hagel and Shaw (2007: 373) add that "students are likely to differ in their preferences, and consequently, their willingness to embrace ICT-based learning opportunities". An interpretation of Wood et al.'s and Hagel et al.'s views would be that if a particular student called Y prefers learning through visual material and encounters that the learning material in the electronic format consists of a variety of visual aids, then this student is likely to be attracted to use the provided ICT learning opportunities because they match with his/her personal learning style. Conversely, it should not be surprising to find another student, X, who is orientated towards aural learning style failing to embrace ICTs as effectively as student Y because the electronic learning material is more appealing for people with a visual learning style learning style than for students with audio learning styles.

Others researchers (Bebetsos & Antoniou, 2008) point out that in educational settings, having confidence leads to more positive attitudes towards the use of ICTs. Lenhart and Horrigan (2003: 33) also highlight that possession of a "positive and outward orientation toward the world" are attributes associated with ICTs use. Werle (2005) refers to the general favourable

attitudes towards new technologies as 'socio-cultural resources' and points out these resources are among the causal factors that affect the initial diffusion of ICTs in HEIs.

On the other hand, negative attitudes towards the use of ICTs have been associated with low awareness levels. In their discussion on the factors contributing to the unfavourable situation of ICT integration in HEIs, Tusubira and Mulira from Uganda, cite lack of awareness as one of the greatest barriers that has to be addressed before a change for the positive (in terms of using ICTs) can be experienced. The authors argue that there is a "vague knowledge about ICT [and] people tend to be stuck to the old ways of doing things" (Tusubira & Mulira, 2004: 4). Similarly, in countries like Libya it was also found that low ICT awareness levels have resulted in low adoption rates of ICTs among students and lecturers (Rhema & Miliszewska, 2010).

Negative attitudes towards ICTs have also been contributed by the "techno-rational discourse that ICTs are not only the key to a better economic performance on the national level but also to a more fulfilled and richer life" (Cushman & Klecum, 2006: 3). This popular notion about ICTs has been critiqued for failing to acknowledge that not all users will engage with ICTs for its prescribed purpose, but that individual usage patterns will be based on personal experiences and dispositions (ibid.). Cushman and Klecun (2005) share an account on general non-users of ICTs and report that non-users rule out the use of ICT for two main reasons: some refrain because they are deterred by anxiety and fear, whereas another group abstains from using ICTs because ICTs do not make sense in their lives. Selwyn (2003) also adds to the discussions by stating that perhaps the greatest oversight regarding the negative attitudes displayed by people towards ICT is the assumption that societal benefits derived from ICTs will be equally experienced by an individual user. Selwyn (2003) cautions that we need to move away from the mindset of viewing ICT users as "simply 'end users' with no role to play in the technological process [who simply accept] ready-made technological artifacts, [but we should rather move towards exploring] processes underlying how technologies are consumed and used" (2003: 107).

Hagel and Shaw (2007) also counsel that students' acceptance and utilization of ICTs will be best understood when their preferences for alternative modes of instruction such as face-to-

face and print-based learning are considered. Subsequently in their study investigating students' preference of modes of instruction in HEIs, Hagel and Shaw (2007) discovered that face-to-face ranked first; a combination of face-to-face and print ranked second; and web-based study was the least preferred mode of instruction. This suggests that students still prefer conventional methods of teaching over contemporary approaches that are inclusive of ICTs. Furthermore, a JISC (2007) study revealed that prospective students at HEIs have a mindset of ICT as a tool that affords them more access to information and resources, but think less of it as a new approach to teaching and learning or environment facilitating increased collaboration between peers and or educators.

Some researchers have attributed the failure of ICTs to thrive in HEIs to "the mismatch between user-needs and the complexity of ICT products" (Robertson, 2003: 339). Others have related low use of ICTs to be an issue caused by "shortfalls in cognition, personality, knowledge, resourcing, social situation or personal ideology" (Selwyn 2003: 107). Furthermore, some scholars highlight that interest alone is a factor that impacts the students' use of ICTs. Ainley (2001, cited in Neal 2005: 11) argues that "interest increases students' attention to task, and they show greater concentration and enthusiasm". Other scholars concur with the previous researchers' views by stating that "low interest [is one of] the key barriers to uptake of provision for individuals, once issues of access had been resolved" (Cushman & Klecun, 2006: 3). This means that as practitioners, once we have secured access for our students then we need to attend to issues of interest.

In light of the research question at hand, one wonders what kind of socio cultural resources or attitudes the students possess. This is an important question to answer when one considers arguments such as the one noted by Donat, Brandtweiner and Kerschbaum (2009:37), which states that attitudes "serve as an important dimension when explaining the adoption and diffusion of new technologies". Similar sentiments are echoed by other researchers who believe that "the impact of computer attitudes on computer knowledge is still a key component to the understanding of information science" (Compton, Burkett, & Burkett, 2002: 219 cited Donat et al.,2009: 38). It has been recommended that when carrying out investigations centred on issues of attitudes, three components should be considered: a cognitive aspect which includes an

individual's perceptions and knowledge; an emotional or affective dimension which relates the individual's feelings towards the attitude object; and lastly, the behavioural or conative component which helps reveal the individual's reaction towards the attitude object (Donat et al., 2009).

2.4.2 Skills to use ICT

Some researchers (Donat et al., 2009) have described a second order digital divide phenomenon occurring in society as a result of lack of skills to use ICTs. The authors attest that "an amazingly large number of people do not have the abilities to use the ICTs in a proper way and, therefore, cannot draw advantages from its usage" (Donat et al., 2009: 37). These findings seem to suggest that 'skills' and not 'accessibility' is actually the key issue. Society also seems quite aware of the repercussion of lacking ICT skills as pointed out by the research participants in Cushman's findings: "if you don't know how to use a computer you are lost ... things will get more difficult for those without computing skills in the near future ... you would feel like an illiterate" (Cushman & Klecun 2006: 19). But what is meant by ICT skills? Selwyn (2010) refers to ICT skills as the general knowledge as well as the social and technical skills in ICTs which he also collectively terms as 'mental resources'. Trindad et al. (2001) have gone to the extent of pin-pointing the actual ICT skills that influence students' attitude, i.e. Internet search skills and typing skills. It is further argued that ICT skills can be acquired more readily through adequate motivation and practice rather than formal education (Van Dijk & Hacker, 2000).

Despite the prominent debates above, defining the second order digital divide as a result of lack of ICT skills, other researchers still strongly voice contradicting opinions stating that in society there are sects of people known as the 'self-conscious indifferents' who have negative attitudes towards ICT despite that fact that they possess both access and skills in ICTs (Verdegem & Verhoest, 2008). The existence of self-conscious indifferents in society seems to suggest that despite the favourable conditions, where access to ICT and skills are not an issue, ICTs can still be underutilized. As a researcher seeking to understanding barriers to in-depth use of ICT in higher education institutions, two questions surface that need to be answered in order to shed some light on issues of low ICT use in HEIs. Firstly, do students in HEIs lack ICT skills and/or is

the limited use of ICTs in HEIs a result of negative attitudes displayed by self-conscious indifferent students?

2.4.3 Motivation to use ICTs

Scholars like Benhabrim (2008) argue that issues of low or limited use of ICTs should not only be computed in terms of limited infrastructure and connectivity, but should also be assessed along other lines of research topics such as motivational access. Furthermore, other researchers attest that there is a 'gap of motivation' among the ICT population (Van Dijk & Hacker 2000: 4). In the literature, the subject of motivation is presented from two dimensions; a theoretical as well as a practical dimension. In the case of the former, leading theorists embed the subject of motivation within the theories of planned behaviour and reasoned action (Azjen, 1991). At the core of these theories is the need to understand "the individual's intention to perform a given behavior. [Furthermore] intentions are assumed to capture the motivational factors that influence a behaviour"(ibid.: 181). According to the theory of planned behaviour (Azjen, 2002), an individual's behaviour is guided by three principles namely behaviourial beliefs which refer to favourable or unfavourable attitudes towards a behavior; normative beliefs or subjective norm which refers to social pressure as well as motivation to comply to the social pressures in relation to the behaviour in question, e.g. pressure from friends and family as well as motivation from friends and family to engage with ICTs. The final principle is 'control beliefs' which relates to factors that facilitate or impede a particular behaviour, e.g. academic advantage of using ICTs. The key tenet of this theory is that: "the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person's intention to perform the behaviour in question" (Azjen, 2002: 1). In the case of the current research study, it can be argued that a favourable attitude towards ICTs, pressure or motivation from friends and family to use ICTs and other favourable factors facilitating the use of ICTs are key principles feeding into the prediction that students will use ICTs and the opposite of these principles is also true.

Referring to the concept of normative belief, which refers to pressure or motivation from society to engage in a particular behaviour, other scholars agree that this principle is a key

motivation element. Zhang (2008: 2) states that relevant motivational needs in the use of ICTs are social and psychological sources of motivation which "facilitate ones desire to be influenced by others". Verdegem et al. (2008: 7) also found in their study "that family still is the most important determinant for the appropriation of computer and internet". Similarly, Lee (2006: 524) reasons that "Social influence profoundly affects user behaviour ... A person's subjective norm is determined by her perception that salient social referents think he/she should or should not perform a particular behaviour". Lee argues further that people are "motivated to comply with the referents even if he/she herself does not favour the behavior ... [and that in some cases] an individual tends to conform to the expectations of others to strengthen relationships with group members or to avoid a punishment" (2006: 524). In relation to the current study, Lee's framing of the subjective norm concept can be interpreted that students sometimes use ICTs, not out of personal interest or motivation, but in response to pressure from peers or in fear of facing punishment. This concept of subjective norm seems to suggest a negative connotation in the sense that students are at times not intrinsically motivated to use ICTs, but are merely influenced by the crowd.

Closely related to the subject of subjective norm is the concept of 'external network influences' which, according to Lee (2006: 522), refers to an "increase in the value of a product or service to a consumer, not because of the inherent quality of the product or service, but because of increasing numbers of others adopting". In other words HEI students could be motivated to use ICTs because they realize that increasing numbers of their peers are using them.

Another major motivational component highlighted by Azjen (2002) is 'control beliefs' which, as mentioned before, relates to factors that facilitate or impede a particular behaviour. Many other scholars also seem to agree with Azjen that there are many other factors that influence motivational access. Lee (2006) identifies 'perceived usefulness' as one of the factors that influences one's motivation. His notion of perceived usefulness, when applied to the context of ICT use in HEIs, holds that students will be motivated to use ICTs if they for instance, think that it will help improve the learning performance. Husman et al. (2004) and Miller, DeBacker and Greene (1999) add to the debate by introducing the concept of 'instrumentality' as another useful motivational construct based on the perception that fulfilling a current task will directly

impact the probability of attaining a future goal. For instance, students would be motivated to use ICTs if they perceived them as a means of achieving future goals. Cushman (2006) concurred with the previous authors after discovering in his study that the research participants were willing to take up ICT courses on the assumption that this would improve their chances of securing jobs or obtaining promotions. Interestingly, however, Raymond also points out a contradiction by stating that "although future goals have incentive value, they are typically viewed as too far off, or too general, to shepherd specific actions in immediate situations that present many uncertainties and complexities" (1999: 2). For instance, in the context of the current research study, even if the future applications and role of ICTs in the students' careers would be made apparent, it might not serve as an incentive for them to use them currently because the incentive is too far in the future.

The literature review also revealed that apart from extrinsic motivational factors like subjective norm or external network influences, there are also intrinsic motivational constructs such as self-efficacy (Bandura & Cervone, 1986) which highly influence an individual's motivation towards a behaviour. Hsieh and Schallert (2008: 2) regard self-efficacy as the "beliefs that individuals have about their capabilities to complete a particular task successfully". The authors also argue that self-efficacy influences people's choices of challenges to undertake, the efforts to expand on the challenges as well as the levels of perseverance in the face of difficulties related to the challenges. The theory of self-efficacy also asserts that individuals who do not trust their own capabilities get discouraged very easily by failure and conversely, people who have high self-efficacy intensify their efforts in the face of difficulties and also persevere until victory is gained (Bandura & Cervone, 1986). In the context of ICT use at HEIs, a logical interpretation of the self-efficacy theory would be that students with high self-efficacy will believe in their ability to use ICTs. They will also be confident enough to continue using them despite ICT problems that they might encounter. Similarly those with low self-efficacy will display low levels of confidence and in due course they easily refrain from using ICTs. In study conducted by Hsu, Chiu and Ju (2004) and McIlroy, Sadler and Boojawon (2007), low self-efficacy is correlated with limited use of ICTs.

Furthermore, in relation to ICT use, Lee (2006) also adds to the notion of self-efficacy by introducing an element called "generalisability of computer self-efficacy" which refers to the perception that individuals have of themselves regarding their ability to use a variety of computer software and hardware. The use of a limited ICT software and hardware denotes low generalisability of computer self-efficacy and similarly students who have high generalisability of computer self-efficacy will be confident in using various types of hardware and software.

2.5 Conceptual and theoretical frameworks in literature

The nature of the current study revolves around issues of behaviour. It was therefore sensible during the literature review, to also pay some attention on conceptual and theoretical frameworks as well as research methodologies on behavioural studies that have been used by other scholars and researchers. One of the prominent theoretical frameworks on behaviour highlighted in literature was the theory of planned behavior (Ajzen, 1985). In his approach, Ajzen employs a variety of methodologies including questionnaire, observation and self-reports to define the elements of behaviour. In another similar study exploring factors affecting e-learning adoption, Lee (2006) extended Davis' (1989) Technology Acceptance Model and using the questionnaire methodology accessed the following constructs: behaviour, perceived usefulness, network externality, self-efficacy and subjective norm. Other researchers (Husman et al., 2004) approached the subject of human behaviour by using the theory of instrumentality and through self-reported questionnaires measured three variables including: motivational strategies for learning, endogenous instrumentality scale and time on task. Other researchers like Czerniewicz and Brown (2007a) who have conducted studies on access to and use of ICTs for learning found Laurillard's (2002) conversational framework to be a useful tool for categorizing the use of ICTs within teaching and learning processes. Apart from the various theoretical frameworks on human behaviour discussed above, the literature review identified several conceptual frameworks that inform ICT access studies concentrating on demographical issues. In a study related to academic discipline, Czerniewicz and Brown (2007b) formulated a framework that was centered around discipline classification in order to inform their research constructs on educational fields. Similarly, Soker (2006) also uses a classification framework to categorize research participants into young, regular, adult and mature students in order to

assess the relationship between age and web-based instruction. What seemed to be a common methodological approach in many research studies was the use of questionnaires to gather information on different research constructs derived from a variety of conceptual and theoretical frameworks.

2.6 Emerging issues

It is apparent from the overall discussions above that issues of ICT access and use are influenced by a variety of factors. The discussion has highlighted that access is a multifaceted concept, therefore practitioners and scholars alike should steer away from the narrow definition of access as merely the presence of physical infrastructure and connectivity. The literature review has also brought to light the fact that access can be impacted upon by several demographical issues including gender, age, education level and line of study and/or social economic standing. The body of literature reviewed also revealed that ICT access and use is dependent on a wide spectrum of resources including psychological resources, skills as well as motivational resources. In the context of the current research study several assumptions emerge which help inform the rest of the study. Some of the emerging assumptions are as follows:

1. Low ICT users can be defined along the lines of gender, age, education and or socio-economic status.

2. Students lack the necessary psychological resources to access and use, i.e.:

    - Students in the study have negative attitudes towards ICTs which impacted their use of ICTs.

    - The students in the study have low levels of ICT awareness and therefore could not make use of ICT adequately.

    - Students have low or limited interest in the use of ICTs which affects their use of ICTs

    - Students lacked sufficient skills to use ICTs and this impacts their use of ICTs.

3. Students lack the necessary motivational resources to access and use, i.e.:

    - Students have low subjective norm to compel them to use ICTs
    - Students have limited external network influence to encourage them to use ICTs
    - Students do not perceive the use of ICTs as an instrument to attaining future goals
    - Students have low self-efficacy to motivate them to use ICTs effectively.

The emerging issues highlighted above together with some of the conceptual and theoretical frameworks from other research studies helped to inform the development of the conceptual framework of the current study (Figure 2). Two main emerging issues seemed to be significant factors that helped offer an in-depth analysis of the high ICT access but low use apparent in some HEIs. These included the psychological resources of the students as well as their demographic composition.

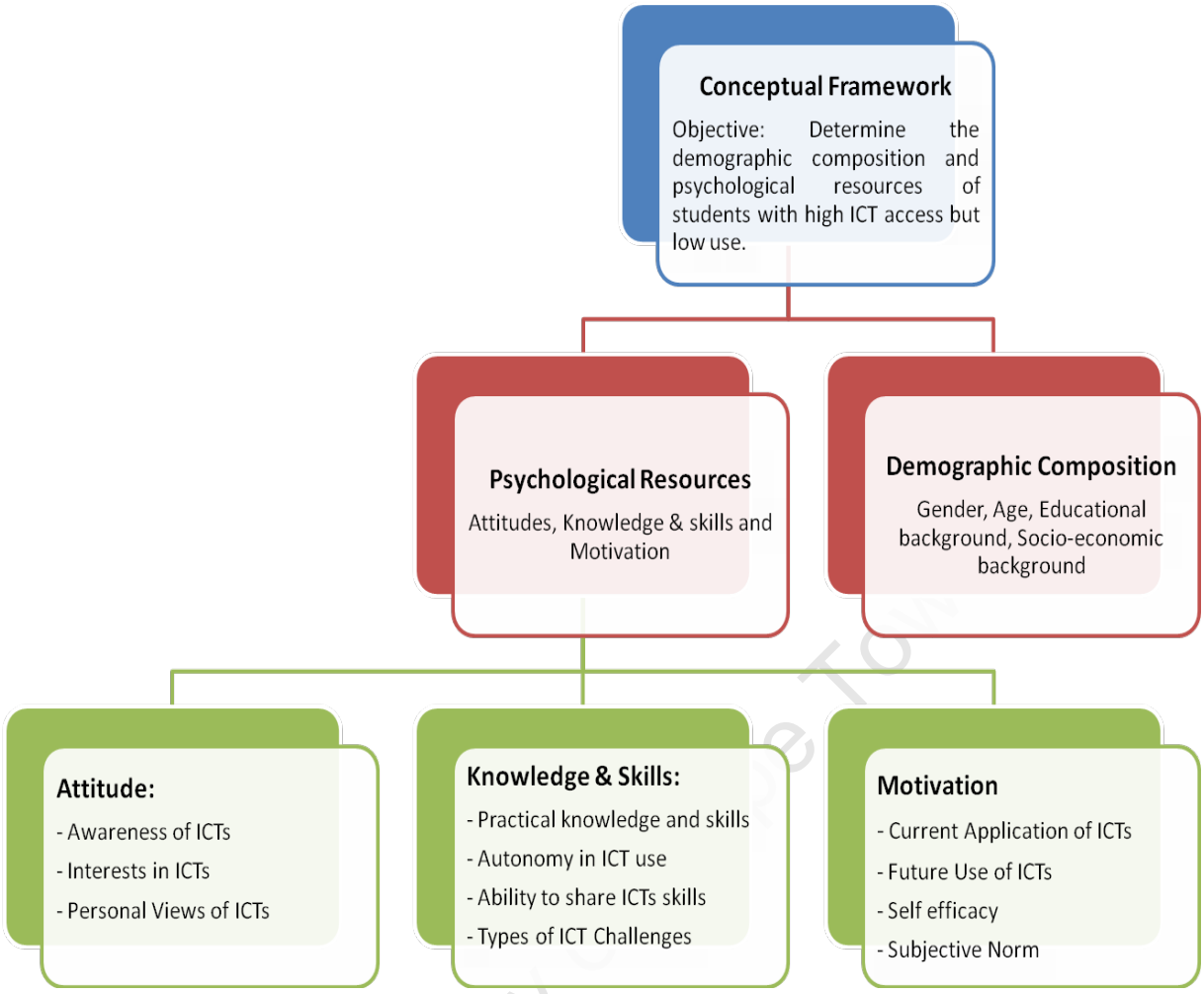

Figure 2 Conceptual Framework

The demographical analysis was formulated through the consultation of works, thoughts and conceptual frameworks of researchers like Czerniewicz and Brown (2007b), Soker (2006) as well as other research activities like the Becta study (2008), that highlight issues of gender, age, academic discipline and educational background as well as social economic standing as significant constructs that need to be included in a demographical analysis. The psychological resource analysis on the other hand borrowed from the classical theoretical frameworks including Theory of Planned Behaviour (Azjen, 1985), Self Reactive Theory (Badura and Cervone, 1986) and Perceived Instrumentality theory (Miller et al., 1999) to come up with a structured investigation into psychological issues of attitudes, skills and motivational needs that

the research participants possessed. With this conceptual framework the researcher commenced with the research process, using the methodology outlined in the following chapter.

Chapter 3

Research methodology

3.1 Introduction

This chapter provides an overview of the methodology used to conduct the study including the research orientation, research approach, an overview on the research participants and the data collection processes as well as data analysis methods. The chapter also covers the analytical framework that was used in the study, issues of validity, ethical considerations and challenges encountered. The main objective of the study was to establish why some of the students who have high access to ICTs report low ICT use.

3.2 Research Orientation

The researcher discovered from the work of Usher (1996) that a hermeneutic/interpretative approach was more appropriate for this study because it was more in line with the nature of the study which was a small-scale research study that focused on the individual, sought to understand human actions as well as their subjective views towards the use of ICTs. As indicated by the main research question ("Why are students in Higher Education with high access to ICTs and adequate ability to use them, sometimes characterized by low and or limited use?") there is a need to interpret and understand the meaning behind human actions within the context of human practices and such an account is provided through hermeneutic/interpretative epistemology (Usher, 1996). In other words an interpretative and qualitative approach was necessary because the nature of the study called forth an in-depth analysis of 'why' pockets of high access low ICT users exist in society.

A combination of quantitative and qualitative methods were utilised in the research process because both approaches helped capture valuable perspectives of the study. The quantitative approach offered numeric evidence that supplemented the qualitative analysis. The researcher made use of qualitative methods because they provided a perspective on the way human being

make meaning about the world in their lives, i.e. the way students make meaning of ICTs in their lives and particularly in their academic sphere.

3.3 Research Approach

A case study, which made use of telephonic interviews, was used as the main tool for eliciting data. Literature guidelines (Baxter & Jack, 2008) highlight that case studies are suitable for tackling studies that seek to answer the "why" question, they also help uncover contextual conditions and ensure that the researcher does not manipulate the behaviour of the participants. The researcher was further persuaded to opt for a case study approach because other sources of literature (Cohen, Manion & Morrison, 2007) indicated that case studies help portray, analyse and interpret the uniqueness of real individuals as they capture the complexity of behaviour, and they present as well as represent the reality.

3.4 Research Participants

The current research study was sparked off by results of the first phase of a regional study conducted by Czerniewicz and Brown, which was initiated in 2005

(http://www.cet.uct.ac.za/files/file/ResearchOutput/2008_wwwApps_UseTrends.pdf).

A second phase of this regional study sponsored by the National Research Fund (NRF) was subsequently conducted between April and June 2007 and it consisted of research subjects drawn from five (5) higher education institutions in SA. Data from the second phase of the Czerniewicz and Brown's regional study was then used to obtain the research sample for the current study. Data was drawn from a survey where students were asked to provide contact details should they be interested in participating in further research. Preliminary telephonic interviews were then conducted in order to ascertain firstly whether this group of users was still reachable through contact details that they provided in the regional study and secondly whether they were willing to participate in the new (current) study.

The sample size was determined by two criteria:

- Number of students who met the 'high access low ICT use' criteria

- Number of students who were willing to participate in the new study.

Czerniewicz and Brown (2006) defined high access users as students who had access to computer and the internet even if they are off campus. A total of 33 students from the phase two regional study (Czerniewicz and Brown, 2008) fell in the category of high access low ICT users however, only 15 students ultimately participated in the current study. Three main reasons contributed to the reported reduction. Firstly, not all the students who fitted the criteria of high access low ICT users were reachable on the available contact details that they provided in the original study, so the research sample size was narrowed down to students whose cell phone numbers were still reachable. Secondly, one of the eligible participants was eliminated because she was used as part of the pilot study. Thirdly, although some of the students met the criteria of high access low ICT users and were reachable through the provided contact details, they did not provide consent (openly refused) to participant in the current research study. As a result of these three factors only 15 students made up the research sample as indicated in Table 3.1.

Table 3.1 Research Participants and their biographical details

Item	Gender	Age	Academic discipline	Level of Education	Historical background of the HEIs
1.	Male	20	Science	Undergraduate	Public Higher Education Institution (PHEI) Previously advantaged institution by political system
2.	Female	23	Humanities/ Arts	Undergraduate	(PHEI) Previously disadvantaged institution by political system
3.	Female	22	Humanities/ Arts	Undergraduate	(PHEI) Previously advantaged institution by political system
4.	Female	24	Humanities/ Arts	Post graduate	(PHEI) Previously advantaged institution by political system
5.	Female	22	Humanities/ Arts	Undergraduate	(PHEI) Previously advantaged institution by political system
6.	Female	22	Humanities/ Arts	Undergraduate	(PHEI) Previously advantaged institution by political system
7.	Male	21	Science	Undergraduate	(PHEI) Previously advantaged institution by political system
8.	Female	21	Humanities/ Arts	Undergraduate	(PHEI) Previously advantaged institution by political system
9.	Male	22	Humanities/ Arts	Undergraduate	(PHEI) Previously advantaged institution by political system
10.	Female	27	Humanities/ Arts	Undergraduate	(PHEI) Previously disadvantaged institution by political system
11.	Male	21	Science	Undergraduate	(PHEI) Previously advantaged institution by political system
12.	Female	22	Science	Post graduate	(PHEI) Previously advantaged institution by political system
13.	Male	23	Science	Undergraduate	(PHEI) Previously advantaged institution by political system
14.	Female	21	Science	Undergraduate	(PHEI) Previously disadvantaged institution by political system
15.	Female	25	Humanities/ Arts	Undergraduate	(PHEI) Previously disadvantaged institution by political system

The final research sample size comprised of five male and ten female students who originated from five public higher education institutions some of which had previously been advantaged and or disadvantaged by the political system in South Africa. The categorization of HEI into advantaged and disadvantaged groups is drawn from the work of Cooper and Subotzky (2001). The author refers to South African previously black universities as previously disadvantaged universities and conversely terms previously white universities as previously advantaged universities. The students ranged between 20 to 25 years of age. Six (6) students came from the Science academic discipline and nine (9) students came from the Humanities and Arts background. Majority (13) of the research subjects were undergraduate students and only two participants were post graduate students.

3.5 Data collection

At the start of the study, the researcher was also faced with the decision of selecting the main tool to be used for gathering data from the participants. The suitable data collection tool had to address several aspects of the research study. Firstly, the tool had to accommodate the fact that the study comprised of various HEIs that were geographically dispersed. Secondly, the researcher was not in a financial position to travel to the various institutions for face-to-face interaction with the participants

Cohen et al. (2007) suggest that telephonic interviews are an efficient means of collecting data for a study with a description such as the current one. According to Cohen et al. (2007) telephonic interviews:

- Can at times workout to be cheaper than face-to-face interactions
- Allow the researcher to select respondents from a wider pool of geographically dispersed regions.
- Allow the researcher not have to travel to meet the interviewees
- Ensure anonymity of the respondents than in the case of personal interviews.

- Can be used for obtaining rapid responses to structured questionnaires.

Telephonic interviews were therefore deemed as the most suitable means of gathering data because this approach enabled the researcher to reach the various students in their diverse regions more effectively in terms of time and cost.

Two separate sessions of interviews were carried out. The first interview session aimed at identifying the research participants. During the initial round of interviews, the researcher set up subsequent appointments with the participants and on the scheduled date the second round of interviews were conducted in order to establish the participants' responses.

A telephone with an inbuilt recording device was used to both carryout the interviews as well as record the conversations. Each interview lasted for about 45 minutes and consisted of 29 probing questions (Appendix A) which aimed at determining any striking attributes of the users in question as well as discovering the reasons why these users behaved in the unexpected manner reported in the original study.

After collecting data the researcher attempted personally to transcribe it but soon it was apparent that the exercise required a lot of time and effort. Arrangements were then made by the Centre for Educational Technology at the University of Cape Town and student assistants were recruited to handle the task of transcribing data. Unfortunately due to time constraints in transcription, the participants did not review their transcripts.

Though telephonic interviews were an optimum approach for collecting data the researcher met several associated challenges. At times the interviewer and interviewee could not hear or understand each other due so some inexplicable echoes in the background. This prolonged the interview session because the questions and answers had to be repeated several times. The recording device used a cassette tape and in some instances the flow of the interview was interrupted when the tape had reached the end and needed to be changed. As a result the researcher had to repeat some of the questions that had already been covered in order to ensure that all the information was captured which also prolonged the interview sessions.

3.6 Content analysis (CA)

According to Bauer (2000), content analysis is a suitable technique for text analysis because it builds a bridge between statistical formalism and the qualitative analysis of the research material, i.e. it serves as a hybrid technique that mediates between the qualitative and quantitative approaches. Bauer (2000) also highlights that unlike other traditional approaches to textual analysis (e.g. semiotic analysis of advertisements), content analysis helps reduce the complexity of a collection of texts. The two basic purposes of content analysis (CA) are to serve as a medium of expression (i.e. public opinion) as well as a medium of appeal. A CA method can be applied using three different strategies including: 1) setting up an open system in order to pick up trends and changing patterns, 2) utilizing comparison that help reveal differences and 3) establishing casual relations between phenomena by the construction of indices. Based on these advantages and possibilities, the researcher decided to adopt CA for the current study.

However, despite the advantages of CA, the researcher also had to be alert of pitfalls associated with this technique of textual analysis. Firstly, it focuses more on frequencies that at times the 'rare' and 'absent' occurrences in the data are neglected. The researcher also had to deal with the fact that the CA method which utilises categorization, results in the loss of the sequentially of the language and text. According to Bauer (2000) this method of text analysis exposes the data to over scrutiny.

The research data collected, was therefore manipulated based on the CA principles of classification and or coding in order to create a link between the theory and students' responses. The researcher made use of a predefined coding framework to address the research material (see Appendix B) The process of formulating a coding framework required rounds of re-grouping concepts, merging identical themes, expanding as well as collapsing various research headings and notions in order to come up with a predefined coding framework. Ultimately, there were seven categories of coding in total with 27 sub-categories, each with its corresponding coding identity. Once the coding process was complete, the researcher converted the transcribed material – which was saved in MS Word - into Excel spreadsheets in order to facilitate an efficient analysis processes. The step that followed was to collapse and

combine the numerous Excel spreadsheets into one spreadsheet that was inclusive of all the interview questions and responses and codes. A pivot table was then used to identify the relationships between the various constructs.

3.7 Analytical Framework

The analytical framework composed of two main section namely; psychological variables - which addressed the main objective of the research question; 'why' students with high access to ICTs showed persistent low use of ICTs, and demographical variables which helped to determine whether the students' behaviour in question was a result of demographical composition. Each of these variables (psychological and demographical) is elaborated upon the discussions below.

3.7.1 Demographical analytical framework

Of the various demographical details that categorise the subjects in the study, an analysis of the gender distribution helped determine whether the apparent ICT practices of the students were due to gender related factors or not.

The age factor was also taken into consideration as a possible explanation of the students' behaviour in question and to this end the students were categorised into groups equal to or younger than 25 years of age or into a group above 25 years.

The academic background of the students was also taken into account. The researcher categorised the students' academic background according to their line of study and their level of study. The line of study consisted of two main groups i.e. students from Humanities and Arts disciplines as well as students from the Science and Technology fields. With regards to the level of study, the researcher investigated whether there was a difference between undergraduate and post graduate students' ICT practices. Table 3.2 provides a summary of the demographic distribution in the study.

Table 3.2 Summary of the students' demographic composition

Number of respondents	Gender	Age		Academic background		Social Economic Background
				Line of study	Level of study	Low
5	Male	< or = 25	> 25	Science	Post-graduate	Middle
10	Female			Humanities	Undergraduate	Upper

The last demographical factor that was considered by the researcher was the socio-economic background of the students. According to researchers in the field, determining social economic status is a very complex issue (Czerniewicz & Brown, 2006). The researcher therefore relied on previous studies that assessed 'social economic background' (Higgs, 2002; Czerniewicz & Brown, 2006; Peter & Valkenburg, 2006) and borrowed an approach that is based on the potential income of the primary breadwinner to derive a rudimentary classification of their social economic status in society. This approach measured variables like the students' breadwinners' occupation and education. Subsequently the students were categorised according to three social economic backgrounds namely: Low socio-economic status, middle socio-economic status and high socio-economic status. The criteria used to designate or allocate students to their respective socio-economic status is summarised in Table 3.3.

Table 3.3 Classification of the students' social economic status

Socio-economic background	Criteria
Low socio-economic status	Unemployed breadwinner/s Uneducated breadwinner/s
Middle socio-economic status	Self-employed breadwinner/s **OR** Breadwinners employed by private or public institution /organisation

	BUT With only primary or high school level of education
High socio-economic status	Self-employed breadwinner/s or breadwinner/s with inherited business **OR** Breadwinners employed by private or public institution/ organisation **BUT** With a higher education qualification

3.7.2 Psychological analytical framework

The psychological analytical framework consisted of an analysis of the students' attitudes towards ICTs, their skills and knowledge in ICTs as well as factors that motivate them to use ICTs. Each of these main analytical themes was further broken-down into sub-sections.

3.7.2.1 Attitudes towards ICTs

The researcher's preliminary assumption about the students' attitude towards ICT was that they had a negative attitude towards ICT and this in turn was contributing to the low use patterns prevalent among some of the HEI students who were privileged with high access to ICTs. In order to determine the students' attitude towards ICTs, the researcher considered three measures namely: their awareness of ICTs, interest in ICTs and their personal views of ICTs.

Awareness of ICTs

The students' awareness of ICTs was determined by looking at the research participants' general and personal exposure to ICTs.

The term 'general exposure' referred to the students' exposure to new and or available ICT products or programs on the market. The question posed to the students in the interview schedule was: "Which of the following new technologies; Skype and Second Life or Facebook, have you tried using?"

The researcher determined the students' general exposure to ICTs by selecting software programs (including FaceBook, Second Life and Skype) which were considered as relatively new on the ICT market at the time and asking students if they were aware of them or had used them. If a student claimed to use or was aware of only one of the ICT programs mentioned by the researcher they were considered to have 'limited' awareness or exposure of ICTs. This term also included students who were not aware of or who did not use any of the ICT programs that were mentioned by the researcher. If the students were aware of two of the listed programs then they were considered to have 'some' awareness or exposure of ICTs. The third and last category that was used to determine general exposure to ICTs consisted of students who were aware of and/or had used all three of the programs that the researcher presented. This category was referred to as the group of students with 'extensive' exposure to or awareness of ICTs.

Conversely the aspect of 'personal exposure' to ICTs was addressed by posing the following interview question: "Are there any other technologies that you consider as new and I'm not only talking about communication technologies but other general technologies that you have tried using or are aware of?" The term 'personal exposure' differed from the term 'general exposure' to ICTs in the sense that the former gave students an opportunity to list their own personal new ICT programs that they were aware of. Through the exercise of providing student with the opportunity to name their own list of new ICT programs, the researcher hoped to eliminate any bias that could have arisen from the researcher's personal preference for or estimation of new and available ICT programs. In order to establish the students' personal exposure to ICTs three categories were devised. The first one consisted of students who could name only one ICT program that they used or were aware of and this group of students was regarded as users with 'limited' personal exposure or awareness of ICTs. If students could name two ICT programs they fell in the category of students with 'some' personal exposure or awareness to ICTs. The final group consisted of students who were aware of three or more ICT programs and this group of students was referred to as users with 'extensive' personal awareness or exposure of ICTs.

Interest in ICTs

The second indicator of student's attitudes towards ICTs was their interest in ICTs which was determined by analysing the students' explorative behaviour, their willingness to invest in ICT, their willingness to learn new ICTs as well as looking at how frequently ICTs were accessed.

i. Explorative Behaviour

As reported in the previous section on awareness of ICTs, students were asked to provide names of new ICTs that they used or were aware of. The researcher then asked a subsequent question, requesting students to explain how they were introduced to the ICT that they mentioned, i.e. "Who introduced you to these new technologies, was it someone else or did you find them out yourself?"

With this question the researcher hoped to learn more about the students' explorative behaviour towards ICTs. Students who had not adopted any new technologies (either via personal choice or external influences by family of friends) were considered to have 'limited' interest in ICTs. Students who were introduced to new technologies though the influence of friends or people in their immediate environment were considered to have 'some' interest in ICTs. The final category which represented students with 'extensive' interest in ICTs included those who initiated some personal action to discover new ICTs.

ii. Willingness to invest

The students' interest in ICTs was also determined by studying their willingness to invest in technologies. During the interview session students were asked the following question: "If you had to buy a new computer how much would you be prepared to pay?"

Students, who openly stated that they would not spend money on ICTs or those who would not exceed spending five thousand Rand on ICTs, chose to make low investment in ICTs and were therefore termed as individuals with 'limited' interest in ICTs. Students who were willing to spend at least R5000.00 to R10000.00 revealed a willingness to make some investment in ICTs and they were therefore viewed as users with 'some' interest in ICTs. The final group consisted of students who were prepared to make a substantive investment in

ICTs - spend more than R10000.00- and these were regarded as students with high or 'extensive' interest in ICTs.

iii. Willingness to learn

During the interview sessions respondents were asked to name ICT programs that they would like to learn, i.e. "Which programs would you like to learn how use?" Students who indicated a desire to learn only one other program or no program at all seemed to show an attitude of low interest in ICTs and the researcher designated them as individuals with 'limited interest'. Those who mentioned at least two to three new programs that they would like to learn showed 'some interest in ICTs' and students who reflected very high or 'extensive' interest in ICTs were those who listed at least four or more programs that they were willing to learn.

iv. Frequency of use

The final means used to measure students' interest in ICT was to study the frequency at which they used or accessed ICT. This was deduced through an implicit question during the interview schedule that was phrased as follows: "Which computer programs do you use on a daily basis?" The emphasis was on the word 'daily'. If students responded positively to this question then the researcher assumed that students had high frequency because they accessed ICTs on a daily basis. Students who indicated that they accessed ICTs every other day represented the medium frequency rate and they were considered as students with 'some' interest in ICTs. Students with a low frequency of ICT use were those who stated that they did not access ICT on a daily basis but on rare occasions. This group of students was viewed by the researcher as users with 'limited' interest.

Personal Attitude

Close scrutiny of the sections above will reveal that the researcher employed deductive measures to try and ascertain the students' attitude towards ICT through the exploration of themes such as ICT awareness and interest. However during the interview proceedings, the researcher also posed questions that elicited explicit responses about the students' personal

attitudes towards ICTs. The students' personal attitudes were further subdivided into personal beliefs and perceptions. Personal beliefs were explored by asking the following question: “What are your personal views or beliefs about using or not using computers?” The students' responses were clustered into three groups including; negative, mixed and positive beliefs. Students with pessimistic views about ICT were labeled as students with negative views towards ICTs. If students expressed optimistic views about ICTs then they were considered to have positive beliefs towards ICTs. Students who had a combination of both positive and negative beliefs were considered as students with “mixed” beliefs (see Appendix C for examples).

The second measure used to ascertain students’ personal attitudes towards ICT was to explore their personal perceptions towards the use of ICTs. This was derived by asking the following question during the interview schedule: “Would you use computers if you were not required to?” Students who responded that they would not use ICTs were it not for HEI mandates, were viewed as students with ‘negative’ personal attitudes towards ICTs. Students who stated that they were not sure if they would use ICTs if they were not required to or who reasoned that circumstances would dictate whether or not to use ICT, were considered to have ‘mixed’ personal attitude about ICTs. Those who responded that they would continue using ICTs regardless of HEI requirements, were considered to have ‘positive’ personal attitudes towards ICTs.

3.7.2.2 Knowledge and Skills in ICTs

The students’ proficiency in ICTs was determined by evaluating their self-report on four factors that gave an indication of their competency in ICTs. These included: practical knowledge and skills that they possess in ICTs; autonomy in using ICTs; their ability to assist others to acquire the skills that they had in ICTs; and by analysing the types of ICT challenges they encountered.

i. Practical knowledge and skills

In order to determine the students' practical knowledge and skills the research participants were asked to provide names of ICT programs that they used on a daily basis and in which they were proficient. The question posed at the interview session was phrased as follow: “Which

computer programs do you use on a daily basis?" Students who claimed proficiency in one or two ICT programs were said to have 'limited' ICT knowledge and skills. Those who were capable of using three to five ICT programs were considered to have 'some' ICT knowledge and skills. A third category consisted of students who were proficient in more than six ICT programs and these were regarded as users with 'extensive' ICT knowledge and skills.

ii. Autonomy to use ICTs

As a way of determining the autonomy that students possessed over ICTs, the interviewer posed the following question to the respondents: "Do you rely on assistance and support from other people when using computers, do you find other people helpful when you're using it or are you a person who works independently?". Students who stated that they depended on assistance from others when using ICTs were considered to have 'limited' autonomy. Students who said that they generally worked independently but from time to time required help from other people, were viewed as the group with 'some' autonomy over ICTs. The last category consisted of students who claimed to work independently with no additional support whatsoever and the researcher designated them as users possessing 'extensive' autonomy over the use of ICTs.

iii. Knowledge and skills that can be shared with others

The researcher further endeavoured to discover the students' competency in ICTs by analysing their self-reported ability to assist others to acquire ICT skills and knowledge. This evaluation was carried out by requesting the participants to provide names of ICT programs that they were able to teach another person. Based on the interview question; "Which programs would you be prepared to teach someone else?", the researcher devised three categories for the respondents. If a student was not able to teach other people what he/she knows in ICTs or if they could only teach one program then the student was considered to have 'limited' skills in ICTs. A student who was able to teach two or three ICT programs was considered to have 'some' ICT skills and lastly, all users who were capable of teaching more than four or all the ICT programs in which they were competent, were regarded as individuals with 'extensive' knowledge in ICTs.

iv. Types of ICT Challenges

The final means used to evaluate students' skills and knowledge in ICT was to analyse the kinds of ICT challenges that they encountered. ICT challenges were categorised into two basic groups namely hardware and software challenges. A student, who failed to carry out basic operations such as using the mouse or keyboard, turning the computer on and off, using the printer and photocopy machines, was said to have hardware challenges. Software challenges included any problems encountered by the student while using software applications e.g. operating Office documents, software installations, internet use, etc. Ultimately ICT challenges were categorised into Hardware, Software and Mixed problems. If students reported that they encountered both hardware and software challenges, they were designated as users with mixed ICT challenges. In order to determine the allocation of students to their respective groups, the researcher asked them the following question: "What frustrates you the most about using ICT?" The students' response then helped the research determine whether they experienced hardware or software challenges.

3.7.2.3 Factors motivating students to use ICTs

Several themes were identified by the researcher as possible motivating factors that influenced the students to use of ICTs. These included: current applications of ICTs; future applications; self-efficacy; and subjective norm.

Current Application

The researcher categorised current applications into academic and personal applications.

i. Academic applications

In order to determine the academic usefulness of ICTs in the students' lives, the participants were required to state whether their use of ICTs resulted in increased efficiency, productivity and performance. If students said that ICTs were of no academic use then they were considered to have 'limited' motivation to use ICTs. However, if students claimed that ICTs results in any one or two of the alternative benefits (efficiency, productivity or performance) of ICTs then they were considered to have 'some' motivation to use ICTs. Finally if it was reported that the

use of ICTs brought about all three benefits of increased efficiency, productivity and performance in the academic lives of the students, then they were considered to have 'extensive' motivation to use of ICTs.

ii. Personal applications

In order to determine the students' use of ICT in their personal lives, the participants stated how ICTs benefited them in their individual lives (i.e. outside of their academic sphere) by answering the following question: "Apart from your academic life or your varsity life how do computers help you meet your daily needs?" Students who stated that ICTs were not beneficial to their personal lives were considered to have 'limited' motivation to use ICTs. Those that could identify at least two applications of ICTs in their private life were regarded as users with 'some' motivation to use ICTs whereas students that mentioned multiple (3-5) uses of ICTs in their personal lives where viewed as users with 'extensive' motivation.

Future Use of ICTs

Alongside the present role of ICTs in the lives of students as a motivating factor to use ICTs, the future role of ICTs in the lives of the participants was also considered as a possible motivation or demotivating factor for students to use ICTs. In order to determine the role of ICT in the future lives of the students, the interview schedule included the following question: "Would you say that computer skills will be relevant in your future work?" Students were categorised as those with a definite future use and those with no future use of ICTs.

Self-efficacy

Two measures were used to determine students' self-efficacy; the efforts required to use ICTs as well as the research participants' reactions to ICT challenges.

i. Effort required to use ICTs

In order to assess how students rated their abilities to use technologies, they were asked how much effort they required to use ICTs. Students who viewed engaging in ICTs as a process that required a lot of effort with very little return seemed to distrust their abilities and were

therefore considered to have 'low self-efficacy'. Students who said that the effort they required to use ICTs equalled their ICT results or productivity were considered as users with 'some self-efficacy' and lastly, students who claimed to use little effort but achieved a lot of their ICT goals showed that they did not doubt their abilities and these signified a category of students with 'high self-efficacy'.

ii. Reactions to ICT challenges

The respondents' self-efficacy was further determined by assessing the students' self-reported reaction to ICT challenges and or their levels of perseverance in the face of challenges. In order to establish the students' reactions to ICT challenges, the research participants related how they reacted when they were faced with an ICT challenge or problem by answering the following question: "What do you do when a computer program does not work as it is intended to?" Those who reacted negatively by quitting easily or those who initially attempted to solve the particular ICT problem but gave up during the course of time, were said to have 'low self-efficacy'. Students who showed mixed reactions by personally trying to solve the ICT problem at hand but upon failing sought assistance from other people, were regarded by the researcher as users with 'some self-efficacy'. The final group consisted of students with positive reactions who firstly, were able to distinguish between ICT problems that they could solve and those that were due to external factors such as limited bandwidth, viruses etc. Secondly, this group of students when faced with ICT challenges stated that they persevered or personally solved the ICT problem at hand. These were considered as users with 'high self-efficacy'.

Subjective Norm

The students' subjective norm was determined based on two measures which included social influences that compelled the research participants to use ICTs, i.e. pressure received from family and friends to use ICTs and secondly social influence that encouraged research participants to use ICTs, i.e. external network influences.

i. Pressure to use ICTs

In order to assess the pressure received by the students to use ICTs, the researcher asked the following question: "Do your family members and your friends encourage you to use information and communication technologies?" Three categories were then identified including students with low, medium and high subjective norm. Students who did not feel any pressure from family or friends to use ICTs were said to have 'low subjective norm'. If students were encouraged or pressured by family or friends to use ICTs then they were considered to have 'medium subjective norm'. The last category consisted of students with 'high subjective norm' and this referred to users who solely utilised ICTs to satisfy expectations of friends and family.

ii. External Network Influence

The external network influence was determined by asking the following question: "Would you say that your classmates and your friends or your family members make use of computers more than you do?" External network influence was also categorised into low, medium and high influence. If students used ICT more than the people in their immediate environment, they were regarded to have 'low external network influence' and a low subjective norm. If some of the people in the students' lives used ICTs more than the students, then they were considered to have 'medium external network influence' and medium subjective norm. If all the people in the students' networks used ICT more than the students, it was regarded as a situation of 'high external network influence' and high subjective norm. An elaborative account of the psychological analytical framework used in the study is summarized in Appendix C.

3.8 Research Validity

This study made use of both qualitative and quantitative approaches to research. With reference to the quantitative approach, Maxwell (2008) highlights that controls that anticipate threats to validity are often embedded within the design prior to the commencement of the research study. However in the case of the qualitative approach, validity controls are often introduced after the research starts. This is because the main threats to validity encountered within qualitative studies have to do with issues of "researcher biasness" and "reactivity" and

both these themes cannot be addressed before conducting the research. According to Maxwell (2008) the subject of bias refers to the distortion of the data collection process or analysis resulting from the researcher's personal theories, perceptions and values. Conversely reactivity refers to the "effect of the researcher on the setting or individuals studied" (Maxwell, 2008: 243).

Maxwell (2008) recommends that the validity of qualitative research is strengthened by processes such as "collecting rich data" and rich data is obtained through intensive interviews. With this in mind, the interviewer endeavoured to secure rich data by conducting intensive interview sessions that lasted 45 minutes and consisted of 29 probing questions with each research subject. The data collection tool of choice (telephonic interviews) helped lessen the researcher influence of effect on the research setting and or the research participants.

3.9 Ethical Considerations

In order to ensure that ethical grounds were covered in the research process, the researcher endeavoured to secure consent from all the participants in the study. A letter of consent (Appendix D) which detailed the proceedings of the research study and informed the students of their right to refrain or withdraw from the study, was prepared by the researcher, emailed to the various participants who had to read it and if they agreed to participate they were requested to email back their affirmation or sign the consent letter and scan it to the researcher. Some of the participants failed to email back their affirmation or consent letters within the required time. Several reasons contributed to this outcome. When students were reminded to send their consent letter some stated that they were on vacation and they could not access mail or internet even though they were willing to participate. Other students who opted to download and sign the consent letter reported that they were experiencing difficulties in scanning and re-emailing the signed document.

In order to assist these students, the researcher acknowledged their lack of written objection as a form of consent to participant in the research project and this decision was communicated to the research participants, i.e. the research participants were informed via mail that if they did object in a written form to their interviews being used in the study, it would be taken that they

are consenting to participate in the study. Confidentiality was maintained at levels of the research process. None of the participant's names or institutions to which they belonged were disclosed in the study. All forms of queries that students had regarding the study were courteously responded to by the researcher and students were informed that they could obtain a copy of the research findings if they so wished. A copy of this thesis will be placed in the UCT Library for public use and other research activity.

3.10 Summary

Based on the discussions above, it is evident that the study sought to address the question of "Why are students in Higher Education with high access to ICTs and adequate ability to use them, sometimes characterized by low and or limited use? ?" by employing qualitative and quantitative approaches to research. Taking into account the nature of the case study – i.e. research participants location at five different higher education institutions, telephonic interviews seemed the most suitable method for data collection because it was both cost and time effective. The discussions above also include a framework that details the analytical process that was used in the study.

Chapter 4

Findings

4.1 Introduction

This chapter deals with the analysis of the data collected in the study. The main objective of the study is to determine why students with high access to ICTs show persistent low use of ICTs. This research question was tackled by analysing the attitudes students display towards ICTs, the skills and knowledge they possess in ICTs and lastly the factors that motivate them to use ICTs. In further pursuit of an explanatory answer to the research question the researcher makes a subsequent analysis of several demographical factors in order to determine whether demographical factors might be associated with why students behave the way they do. The demographical factors that were considered include: gender, age, academic background and socio-economic status.

4.2 Attitudes towards ICTs

The researcher's preliminary assumption about the students' attitude towards ICT was that they had a negative attitude towards ICT and this in turn was contributing to the low use patterns prevalent among some of the HEI students who were privileged with high access to ICTs. In order to determine the students' attitude towards ICTs, the researcher considered three measures namely: their awareness of ICTs, interest in ICTs and their personal views towards ICTs. A detailed table representing statistical findings on the students' attitude towards ICT and the demographical analysis is attached is displayed in Appendix E.

4.2.1 Students' awareness of ICTs

The findings reveal that despite having 'high access' to ICTs, the majority of the students have only limited or some awareness of ICTs. In response to one of the awareness questions posed: "Are there any other technologies that you consider as new ... that you have tried" [using]?, the general answers that students gave were similar to the following quotation below: *"umm apart from MXit I don't really do anything else" (Middle-class female, 23-year-old Science*

undergraduate). Another example of a student's response to the question posed was: *"umm, currently I don't get onto the internet very often so I haven't really gotten into most those [list of technologies mentioned by the interviewer], umm so yah" (Middle-class male, 21-year-old Science undergraduate).* In order to establish whether this awareness is perhaps linked to the students' gender, age, line or level of study or socio-economic background, a more detailed analysis was undertaken and the results are displayed in Figure 3.

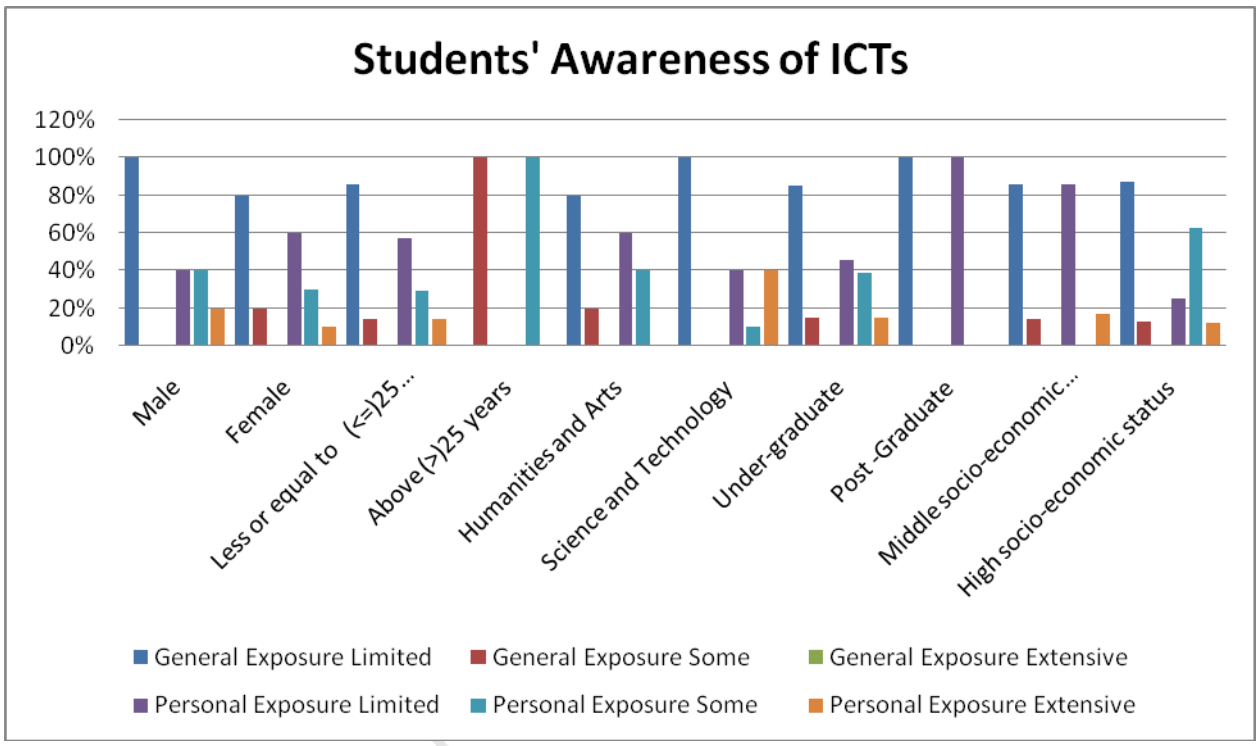

Figure 3 Students' Awareness of ICTs

4.2.1.1 Gender and ICT Awareness

Through the research analysis it was discovered that all male students and 80% of female students have limited 'general exposure' to ICTs. These findings show that there was only a 20% difference between male and female students' 'general exposure' to ICTs. Similar tendencies were manifested by students in terms of 'personal exposure'. The majority of both male (40%) and female (60%) students had 'limited' personal exposure to ICTs.

4.2.1.2 Age and ICT Awareness

Eighty-six percent of the students who were 25 or younger reported having 'limited' 'general exposure to ICTs whilst all the students aged 25 years and older showed evidence of 'some' general exposure to ICTs. In terms of personal exposure to ICTs, 57% of the respondents aged 25 or younger, reported having limited 'personal exposure. Conversely among the age group of students over 25 years, all the respondents reported having some 'personal exposure'.

4.2.1.3 Line of study and ICT Awareness

Many of the students from both academic disciplines (80% Humanities/Arts and 100% Science/Technology) reported to have limited 'general exposure' to ICTs. In essence there was a 20% difference between the awareness levels of the Humanities/ Arts students and the Science/Technology students. With regards to 'personal exposure' most of the students (60% Humanities/ Arts and 40% Science/Technology) have limited 'personal exposure' to ICTs.

4.2.1.4 Level of Study and ICT awareness

The pattern of having the majority of students reporting limited awareness in terms of 'general exposure' still persisted even along the lines of the students' level of study. The findings on the comparison between the students' level of study and their level of awareness of ICTs, specifically general exposure', showed very little difference (15%) between undergraduate and post graduates students. In terms of personal exposure to ICTs, again the greater percentage of students from both undergraduate (46%) and postgraduates (100%) reported having limited 'personal exposure'.

4.2.1.5 Social Economic Background and ICT Awareness

When the social economic background of the respondents was compared to their level of awareness, it was discovered that none of the students had a low socio-economic status. This was the case throughout all the findings in the research study and therefore no further comments are recorded on this class of students. However the study did reveal that in terms of 'general exposure' most of the students (86% of the students with middle socio-economic status and 87% of high socio-economic status) had limited awareness of ICTs. With reference to

'personal exposure' to ICTs, the bulk of the students (86%) with middle socio-economic status reported having limited awareness of ICTs. Students from a high socio-economic background reported that 63% had some awareness of ICTs.

4.2.1.6 Summary of student ICT Awareness

Although there are no noticeable patterns arising from the data analysis in relation to the students' general exposure to ICT, the findings seem to highlight in terms of personal exposure, a slight tendency for male undergraduate students, 25 or younger studying Science and Technology to be more aware of ICTs.

The overall findings, however, reveal that the majority of the students have limited or some awareness of ICTs. This conclusion is supported by several demographical results including the findings that there is only a 20% difference between the awareness patterns ('general exposure' and 'personal exposure') of male and female students. In terms of age distribution, all students over 25 have some awareness whereas the majority of the students 25 or younger have limited awareness. With reference to academic discipline, the majority of both Humanities/Arts and Science/Technology reported having limited awareness in both respects of 'general exposure' and 'personal exposure'. Limited awareness levels prevailed among the research participants regardless of their level of study or social economic background.

Based on the findings above the researcher concluded that at most students have 'some' awareness of ICTs, but otherwise they generally have limited awareness of ICTs. In summary the lack of general and personal exposure to ICTs may be a contributing factor to students' low use of ICTs despite favourable access to ICTs.

In light of the findings on the students' levels of ICT awareness, the researcher is inclined to reason that perhaps the explanation as to why the majority of students reported having limited or some awareness is that at the time the research participants were interviewed (in 2008), programs such as FaceBook, Second Life and Skype had not reached the high popularity levels that they have soared to in the contemporary ICT market. Therefore it should not be altogether surprising that students were not aware or these programs.

However what is interesting about the findings in the current study is that the phenomenon of low or some awareness of ICTs among students seems a common occurrence experienced by various institutions in other regions of the world. Countries such as Libya (Rhema & Miliszewska, 2010) are also lamenting the lack of ICT awareness among students and teachers at HEIs. The study carried out in Libya did not only reveal lack of awareness as a factor crippling the success of ICTs utilization but it also revealed that lack of awareness or exposure leads to lack of motivation to use ICTs. In their South African study, Czerniewicz and Brown (2008) also encountered a surprising element in their study on low use of social software tools of which FaceBook, Second Life and Skype are good examples. Tusubira and Mulira (2004) similarly relate in their findings that the society in developing countries generally has limited awareness of ICTs. The current study seems to confirm the current findings in empirical studies in Africa that the majority of the students report having fairly limited or only some awareness of ICT.

4.2.2 Interest in ICTs

The second factor that the researcher used to evaluate the students attitude towards ICTs was their level of interest in ICTs. The researcher hypothesised that the low interest in ICTs was indicative of a negative attitude towards ICTs which could be a possible contribution to the low usage of ICTs witnessed among some of the students in HEIs. Four criteria were used to ascertain the students' interest in ICTs and these included: the students' explorative behaviour; willingness to invest in ICTs; willingness to learn new ICTs; and how frequently they used ICTs.

The findings from the data analysis seem to confirm the researcher's original assumption that students have low interest in ICTs. One of the student's comments on the use of computers and social media was that: *"you just need to know a bit of computer anyway, now with friends let me just say I mean on Facebook right I don't really like it basically. I'm never really on it because you know I don't have really interest to use the thing" (Middle-class male, 22-year-old Science undergraduate)*. In response to question whether individuals would use computers if they were not required to a student responded that: *"I don't think I would use them as often as I am, I'd probably use it once in a while" (High Socio-economic Status female, 24-year- old Science postgraduate)*. Such a response suggests a lack personal interest in ICT and perhaps students

feel more compelled than self-motivated to use ICTs. A more thorough analysis on students' interest in ICTs is discussed below and also summarized in Appendix E.

4.2.2.1 Gender and Interest in ICTs

In terms of 'explorative behaviour', 80% of the female students exhibited some explorative behaviour, whilst only 40% of the male students displayed the same behaviour. With reference to the students' willingness to invest in ICTs, 80% of the male and 70% of the female students showed 'some' interest in investment in ICTs as displayed in Figure 4.

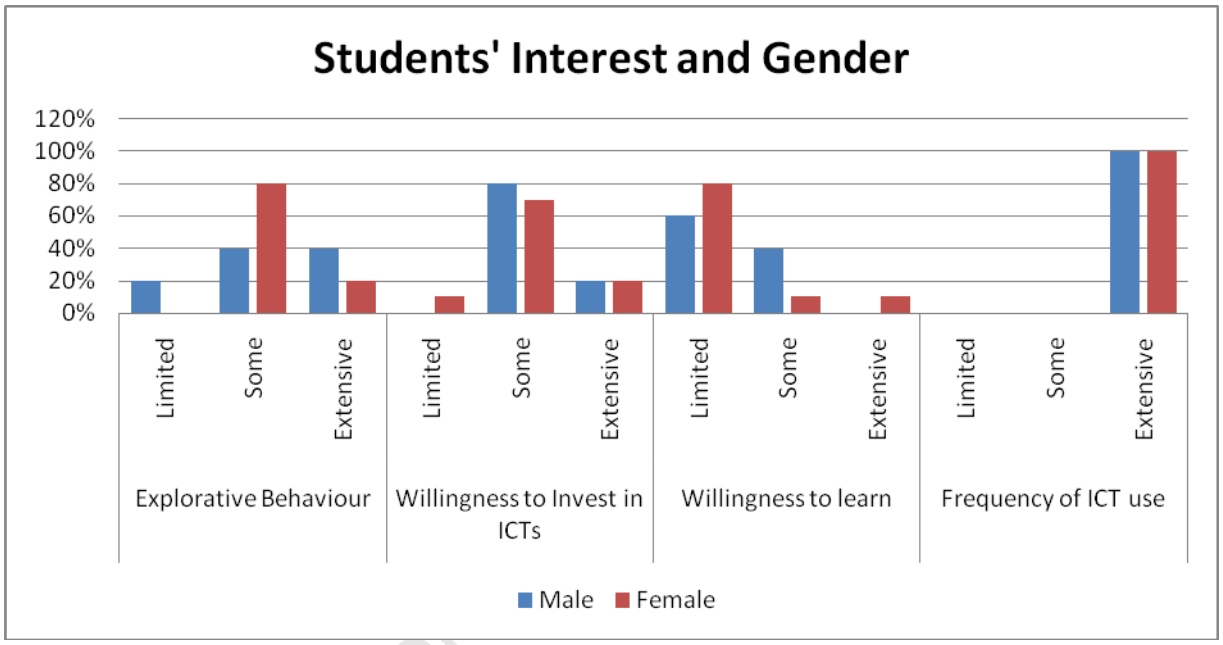

Figure 4 Students' Interest and Gender

The research findings also showed that the majority of the students (60% male and 80% female) were not very keen to learn new ICT programs. Despite the students' exhibition of limited and some interest in ICTs, 100% of the students (male and female) showed high or extensive interest in ICTs in terms of how frequently they accessed and used them.

4.2.2.2 Age and Interest in ICTs

The research findings revealed that 64% of the students 25 or younger and all the students over 25 had some 'explorative behaviour as displayed in Figure 5.

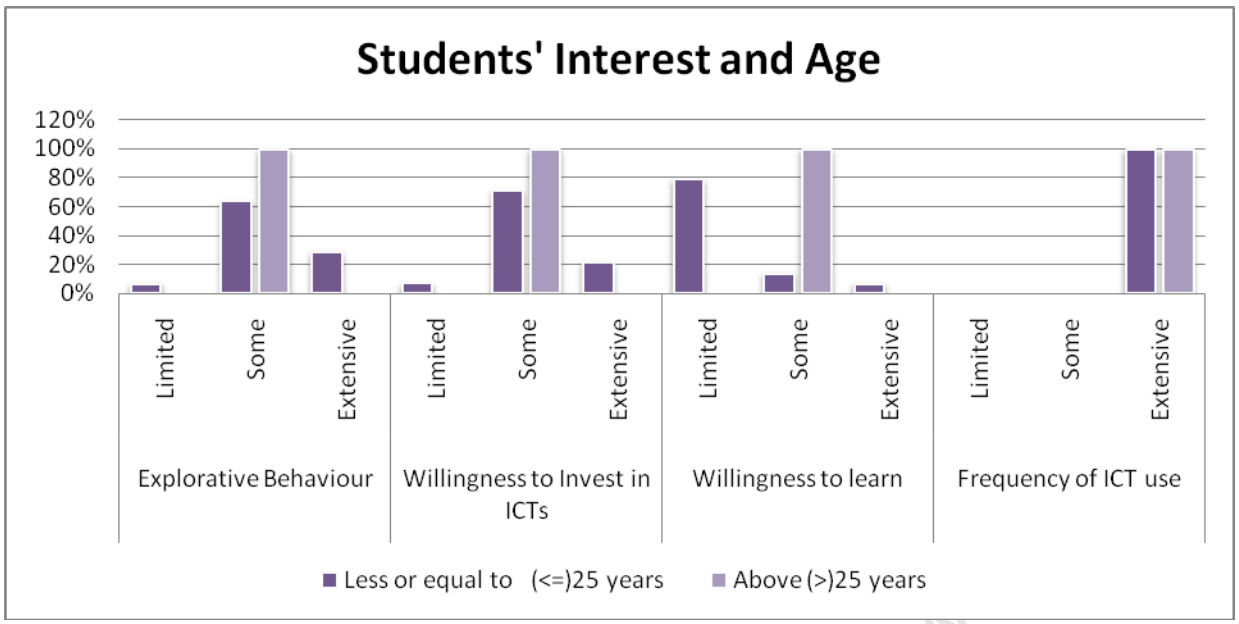

Figure 5 Students' Interest and Age

Further analysis also showed that the bulk of the students (71.4% of the students 25 or younger and all students over 25) showed some willingness to invest in ICTs. Similarly in terms of willingness to learn new ICTs, all of those in the older student group showed some interest whilst 79% of the students 25 or younger reported to have limited in learning new ICTs. Likewise, as reported earlier in the section on gender and interest in ICTs, all students' frequency of ICT access and use was very high, irrespective of age group.

4.2.2.3 Line of study and Interest in ICTs

In terms of academic 80% of the Humanities/Arts students and 40% of the Science/Technology students displayed some explorative behaviour. Data analysis of the students' willingness to invest in ICTs showed that the majority of students (80% and 60% of Humanities/Arts and Science/Technology students respectively) had some interest in investing in ICTs as displayed in Figure 6.

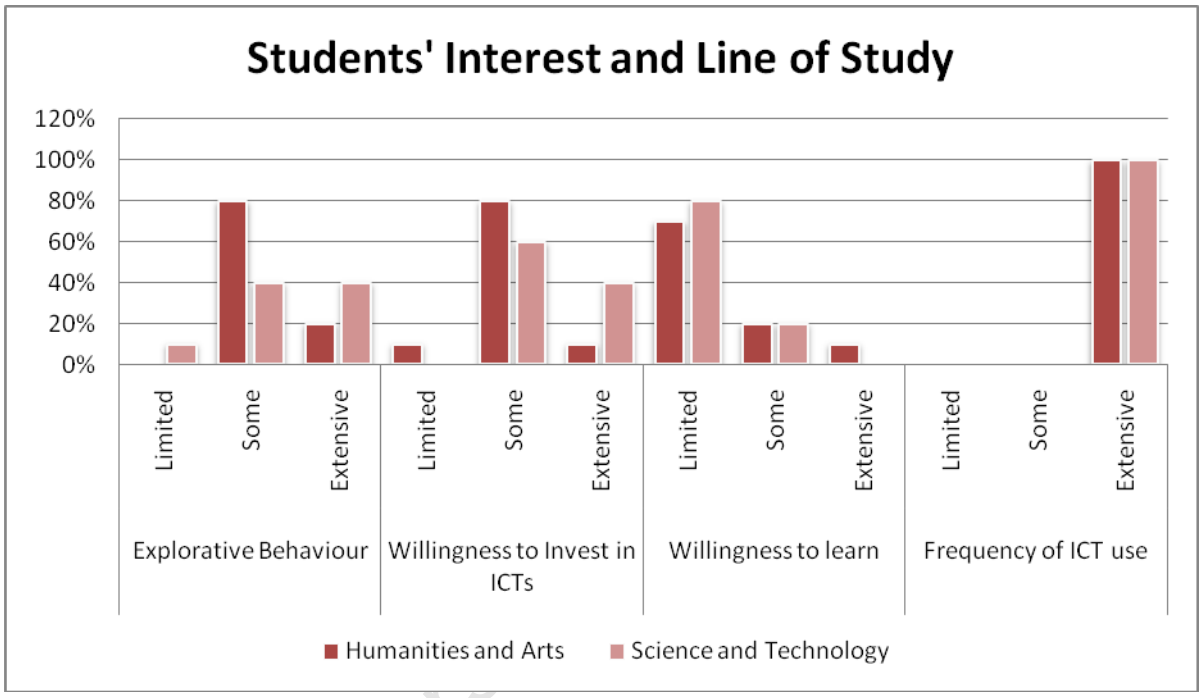

Figure 6 Students' Interest and Line of Study

Regarding the students' willingness to learn new ICT programs, the majority of the students (70% and 80% of the Humanities/Arts and Science/Technology students respectively) showed limited interest in learning about new ICTs. It was also revealed in terms of academic discipline that all students (both Humanities/Arts and Science/Technology) made extensive use of ICTs.

4.2.2.4 Level of study and Interest in ICTs

Regarding the students' explorative behaviour the research findings revealed that 69% of the undergraduate students and 50% of the postgraduate students have 'some' explorative

behaviour. In terms of willingness to invest in ICTs, 69% of the undergraduate and all the postgraduate students showed interest in investing in ICTs as reflected in Figure 7.

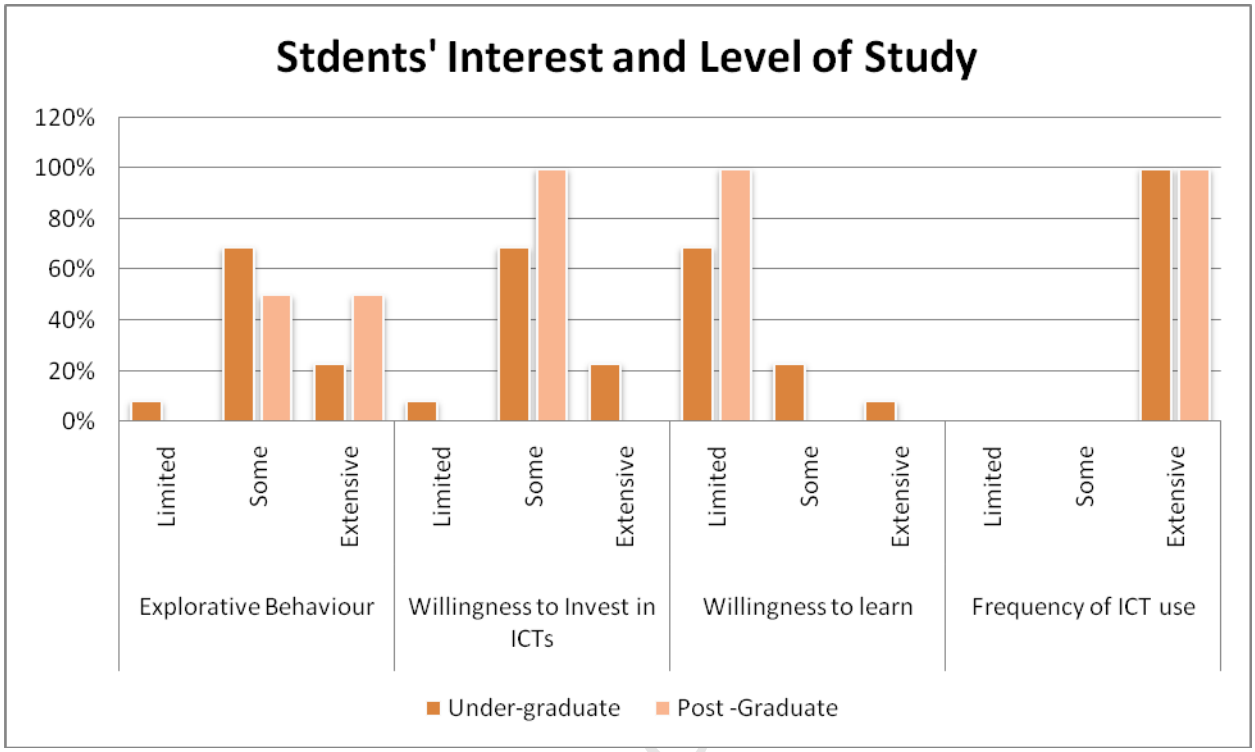

Figure 7 Students' Interest and Level of study

With reference to students' willingness to learn new ICTs, 69% of undergraduate students and all the postgraduate students expressed limited interest in learning new ICT programs. Similar to other analysis findings on the frequency of ICT use, all the students, regardless of their level of study reported using ICT frequently.

4.2.2.5 Social economic background and Interest in ICTs

The students' interest in ICTs was also contrasted with their socio- economic background. In terms of explorative behaviour, the majority (87%) of students with a high social economic status had extensive interest and in ICTs whilst only 43% of the middle socio-economic status 43% had 'extensive' explorative behaviour as displayed in Figure 8.

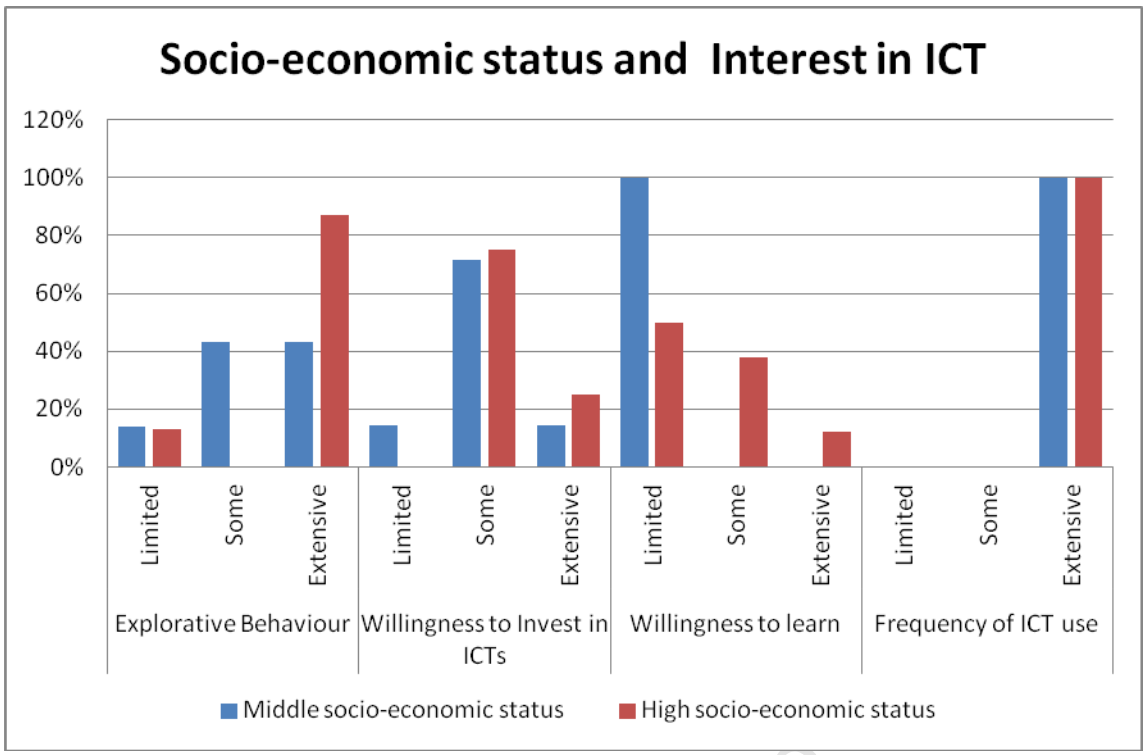

Figure 8 Student's interest and socio-economic status

In terms of willingness to invest in ICTs, 75% of the students with high socio-economic status had some interest whereas among the students with middle socio-economic status, 71.4% had some interest in ICT investment. With reference to students' willingness to learn new ICT programs, all the respondents with a middle socio-economic background reported having limited interest whereas 50% of the students with high socio-economic status had limited interest in learning new ICTs. The data analysis also revealed all students with middle and high socio-economic status reported using ICT frequently.

4.2.2.6 Summary students' interest in ICTs

In terms of demographical aspects, female students show more explorative behaviour than male students though they are also less willing to learn new ICTs. There is very little difference between male and female students' willingness to invest in ICTs. Older students exhibit more explorative behaviour, and they have a greater willingness to invest and learn new ICTs than younger students. With regards to academic discipline, Arts/Humanities students display more

explorative behaviour and willingness to invest in ICTs than the Science/Technology students, though there is very little difference in interest to learn new ICTs between both groups of academic discipline. The findings also revealed that postgraduate students show more explorative behaviour and willingness to learn new ICTs than undergraduate students. Students with high social economic status exhibit more explorative behaviour and willingness to learn new ICTs than students with middle socio-economic status. Overall with the exception of the analysis on how frequently students use ICTs - which reflected that students have extensive interest in ICTs - the remaining three variables (Explorative Behaviour, Willingness to invest in ICTs, Willingness to learn) used to measure students' interest in ICTs showed that the respondents generally have 'limited' and or 'some' interest in ICTs.

The findings seem to confirm the researcher's original thoughts that students have low interest in ICTs and this could be a possible factor contributing to the low use of ICTs experienced at some HEIs. Similar findings were obtained by researchers who reported on the Ever-Shifting Internet Population (2003). It was commented in their report that one of the significant reasons why people stay offline is due to lack of desire. Others such as Selwyn, Gorard and Furlong (2006) add to the discussion by stating that one of the reasons for non-engagement in ICTs is a lack of interest. Similarly Czerniewicz and Brown (2009), also highlight in their findings that lack of interest constrains ICT use. Perhaps the message in the JISC report (2008) should be taken to heart which recommends that practitioners should capitalise on the few ICT programs in which student have shown interest and use them for academic applications.

4.2.3 Personal views

In the previous sections the researcher deduced the students' attitude towards ICTs by using an indirect approach of evaluating their level of awareness and interest in ICTs. However the researcher also endeavoured to obtain explicit responses from the students regarding their personal views i.e. personal, beliefs and perceptions about ICTs. In order to ascertain their personal perceptions, the students were asked whether they would continue using ICTs, even if they were not required to use them.

Based on the students' responses to the interview questions, one is lead to conclude that students have positive beliefs and perceptions of ICTs as most of the respondents offered positive remarks such as: *"my personal view is they make things a lot easier" (High Socio-economic Status male, 23-year-old Science undergraduate)* or comments like: *"I feel that it saves a whole lot of time and it's more convenient" (High Socio-economic Status female, 24-year-old Science postgraduate)* when referring to the use of computers and ICTs. However, when one takes a deeper look at the overall responses of the students, the findings seem to be somewhat misleading as these very students, when probed deeper, seem to provide contradicting and conflicting views about their beliefs and perceptions of ICTs. Some of the students who gave positive reviews about the use of ICT also commented negatively elsewhere in the interview. One said: *"I mean one thing is about computers is they stop people from reading cause you don't read I mean if I want to know about cars I go to Google and type cars you know, whatever it may be, ... good part about it is it makes it easier, but that kinda makes people lazy... I don't really like it because people tend to be on break the whole day." (High Socio-economic Status male, 23-year-old Science undergraduate).* The student continued to say "*on the personal or private point of view I think one should try not to use [computers] as often"* and "*I don't know it frustrates me but personally I wouldn't want to be in front of the computer, but I have to*". These comments suggests that although at face value students seem to have positive views about ICTs, an in-depth analysis reveals that there are certain underlying factors about ICTs that are not so pronounced which promote a negative attitude towards ICTs among students. The students' personal attitudes towards ICTs are discussed in relation to their gender, age, academic background and socio-economic status in the findings below and they are also summarized in Figure 9.

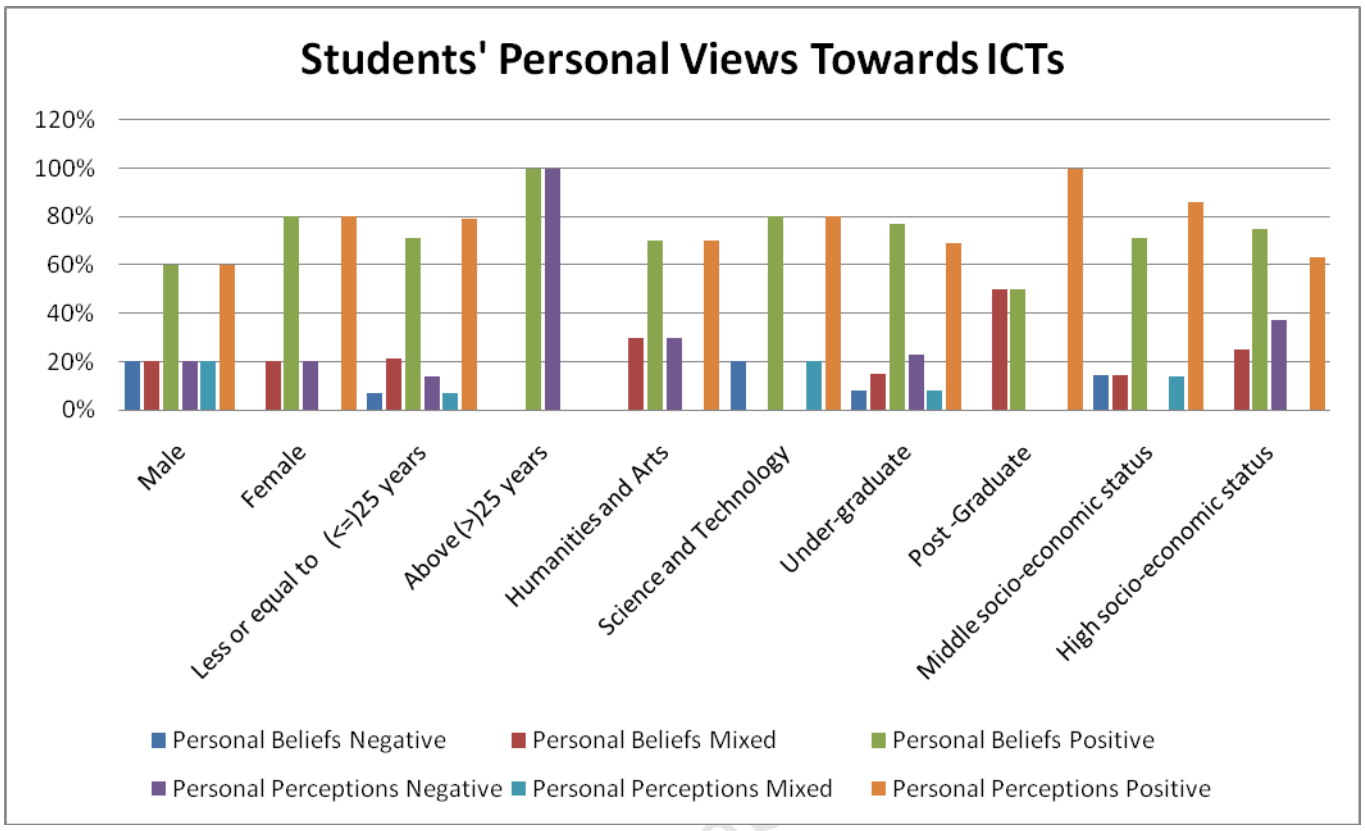

Figure 9 Students' Personal Views Towards ICTs

4.2.3.1 Gender and Personal views

In terms of personal views, the data analysis revealed that the majority of the students (60% male and 80% female) held positive personal views towards ICTs. With reference to personal perceptions again it was discovered that most of the students (60% male and 80% female) had positive personal perceptions towards ICTs.

4.2.3.2 Age and Personal views

In the comparison between the students' age distribution and their personal beliefs it was revealed that the majority (71.4%) of students 25 or younger and all students over 25 reported having positive beliefs about ICTs. Conversely, the comparison between age and personal perceptions showed that all (100%) students older than 25 held negative perceptions towards ICTs. The majority (79%) of the younger students had positive perceptions.

4.2.3.3 Line of study and Personal views

The research findings contrasting students' line of study with their personal attitudes, particularly their personal beliefs towards ICTs, revealed that the majority (70%) of the Humanities/Arts and Science/Technology (80%) students reported having positive views towards ICTs. Similarly in terms of personal perceptions, the majority of students (70% and 80% from the Humanities/Arts and Science/Technology disciplines respectively) reported having positive perceptions towards ICTs.

4.2.3.4 Level of study and Personal views

Findings from the research study showed that in terms of personal beliefs, the bulk (77%) of undergraduate and half (50%) of postgraduate students held positive beliefs towards ICTs. Similarly, with regards to personal perceptions, the majority of undergraduate students (69%) and all postgraduate students (100%) had positive personal perceptions towards ICTs.

4.2.3.5 Socio-economic background and Personal views

The data analysis report on the comparison between the students' socio-economic background and their personal attitudes showed that most of the students from both socio-economic backgrounds (71.4% middle socio-economic status and 75% high socio-economic status) held positive personal beliefs. In terms of personal perceptions towards ICTs, it was discovered that majority of all the subjects in the study (86% of the students with middle socio-economic status and 63% of the students with high socio-economic status) have positive perceptions towards ICTs.

4.2.3.6 Summary on Personal views

In terms of demographical analyses both male and female students have positive beliefs and perceptions towards ICTs with only a 20% difference between the genders. Older students have more positive belief towards ICTs, whilst younger students have more positive perceptions towards ICTs.

The current study also revealed that students from both the Arts/Humanities and Science/Technology disciplines generally have positive beliefs and perceptions about ICTs with only a 10% difference between the two academic fields. Undergraduate students have more positive beliefs (e.g. they think computers are the way forward) whilst postgraduate student reported having more positive perception (i.e. would still use computers even though they are not required to) towards ICTs. Lastly, the findings also revealed that students with high socio-economic status reflect greater positive beliefs while the middle socio-economic group has more positive perceptions towards ICTs.

Generally, the majority of the students had positive beliefs and perceptions towards ICTs. This was a remarkable difference compared to the findings in previous sections on the students' attitude towards ICTs which reflected a limited or some awareness and interest in ICTs. The findings on students' personal attitudes seem to coincide with the sentiments revealed in the JISC (2008) report which highlighted that "students are receptive to new types of ICT in principle [in this case students' views], although their level of familiarity [in this case awareness and interest] with each application of technology … varies" (JISC, 2008: 16).

4.2.4 Conclusion on students' attitudes towards ICTs

The relevance of a positive attitude towards ICTs has been highlighted in other research activity (Rhema & Miliszewska, 2010: 430) where it is stated that a "positive attitude towards ICTs is … a necessary condition for the effective implementation [of ICTs]. However the findings of the current research study, which analysed three sub categories of the students' attitudes namely: their level of awareness; level of interest in ICTs and their personal views towards ICTs revealed that there is a varied range of attitudes as opposed to a clear positive attitude towards ICTs. It was discovered that while students display positive personal beliefs about ICTs, they are not fully aware of ICTs available to them, nor are they particularly interested in ICTs.

One therefore wonders why these attitudinal differences that are possible contributors to the failure of effective implementation of ICTs exist. Perhaps taking a deeper look at the students' responses could be a source of explanation as to why students don't have a positive attitude (manifested through low levels of interest and awareness in) towards ICTs.

In the extracts below, the 'fear' of possible addiction to ICT programs and 'fear' arising from perceived lack of privacy on the internet or 'fear' of ICTs interrupting the daily schedule, are just three of the cited reasons why students seem to have negative attitudes towards ICTs.

> Extract 1: *umm apart from MXit I don't really do anything else, it's just that I'm afraid of things that are very addictive, I easily get addicted to things* (Middle-class female, 23-year-old Science undergraduate)
>
> Extract 2: *so you always have that thing if you're logged onto the internet your privacy may be invaded* (High Socio-economic Status female, 24-year-old Science postgraduate)
>
> Extract 3*: I'd like to maybe [learn something that] interest me that but for now I don't think I'd actually get into it cause I don't want things that are gonna mess up my schedule … not mess like in a bad way but takes up some time* (Middle-class female, 23-year-old Science undergraduate)

These fears seem to affect both the students' level of interest as well as their level of awareness. Donat et al. (2009) also found in their study that non users tend to regard internet use a more unsafe practice than regular users of the internet. If students associate the use of ICTs with increased risk of unfavourable consequences it then follows that they might be less interested in exploring or learning new ICTs and less exposure might ultimately have an impact of their levels of awareness. One therefore wonders how many more unmentioned 'fears' exist and contribute to the low use of ICTs in the students' mindsets? In one of their research reports, Donat et al. state that "negative feelings that might hinder the acceptance of new technologies are much harder to overcome" (2009: 51). At the same time the researchers also highlight that a 'positive fearless attitude' is a necessary precondition for attracting more ICT users. It is therefore apparent that future researchers and practitioners are faced with several challenges that need to be tackled.

4.3 ICT Knowledge and Skills

In the continued pursuit to address the issue of why some students at HEIs display trends of low ICT use despite high access opportunities, the researcher explored the participants' knowledge

of and skill in using ICTs with the objective of assessing whether these might be possible contributing factors to the students' currently inexplicable behaviour. Among the various reasons why the subjects in the study were selected to participate in the research project was that they claimed to be knowledgeable and skilled in ICTs. This claim automatically removes or reduces concerns of whether the low use patterns in ICTs prevalent at some HEIs among students are due to lack of ICT knowledge and skills. The researcher, however, decided to elicit their perceptions about their levels of ICT skills in order to confirm the validity of their claim about ICT knowledge and skills. The students' proficiency in ICTs was determined by evaluating their self-reports on four factors that were used to infer their competency in ICTs. These included: practical ICT knowledge and skills that they possess; their autonomy in using ICTs; their ability to assist others in acquiring ICT skills and by evaluating the types of ICT challenges they encountered. A graphical presentation of the statistical findings on the analysis of the practical ICT skills and knowledge that students possess, is attached as Appendix E.

4.3.1 Practical ICT knowledge and skills

The overall findings revealed that students generally have limited or some practical ICT knowledge and skills, contradicting their initial claims. The researcher's preliminary thoughts were that students who were knowledgeable and skilled in ICTs will tend to work and solve ICT problems independently and that they will be using a variety of ICT programs. However the findings showed (as indicated in the extracts below) that students in fact rely on assistance from other people and they use a small selection of the software, tools and ICT resources available. In response to the question "What is it that you do on the computer on a daily basis?" students reflected mundane activities such as: *"well I mean I'm always doing assignments, essays typing out things that I need for work, always typing and printing" (Middle-class female, 22-year-old Humanities undergraduate).* Another student also gave a similar response and stated that: *"I use Microsoft word specifically because we have assignments that we type on okay almost every time (High Socio-economic Status female, 22-year-old Humanities undergraduate).* Similar sentiments were expressed by another student who said that on a daily basis he used the computer to access *"ITunes, for my apple and then Microsoft word cause I*

gotta do my assignments" (High Socio-economic Status male, 21-year-old Science undergraduate).

In response to the question: "when you use computers do you rely on assistance and support from other people?" Some typical responses from the students included remarks such as: *"I rely on the assistance from others (High Socio-economic Status female, 24-year-old Humanities postgraduate)* and *"generally you can do something but when I get a problem I usually phone my boyfriend and he talks me through it" (Middle-class female, 22-year-old Humanities undergraduate).*

These behavioural trends (i.e. limited use of available ICT applications and dependence on external assistance) were interpreted by the researcher as indicative of poor practical knowledge of and skills in using ICTs. The findings on the students' knowledge of and skills in ICTs in relation to their demographics are summarised in the discussions below and displayed in Figure 10.

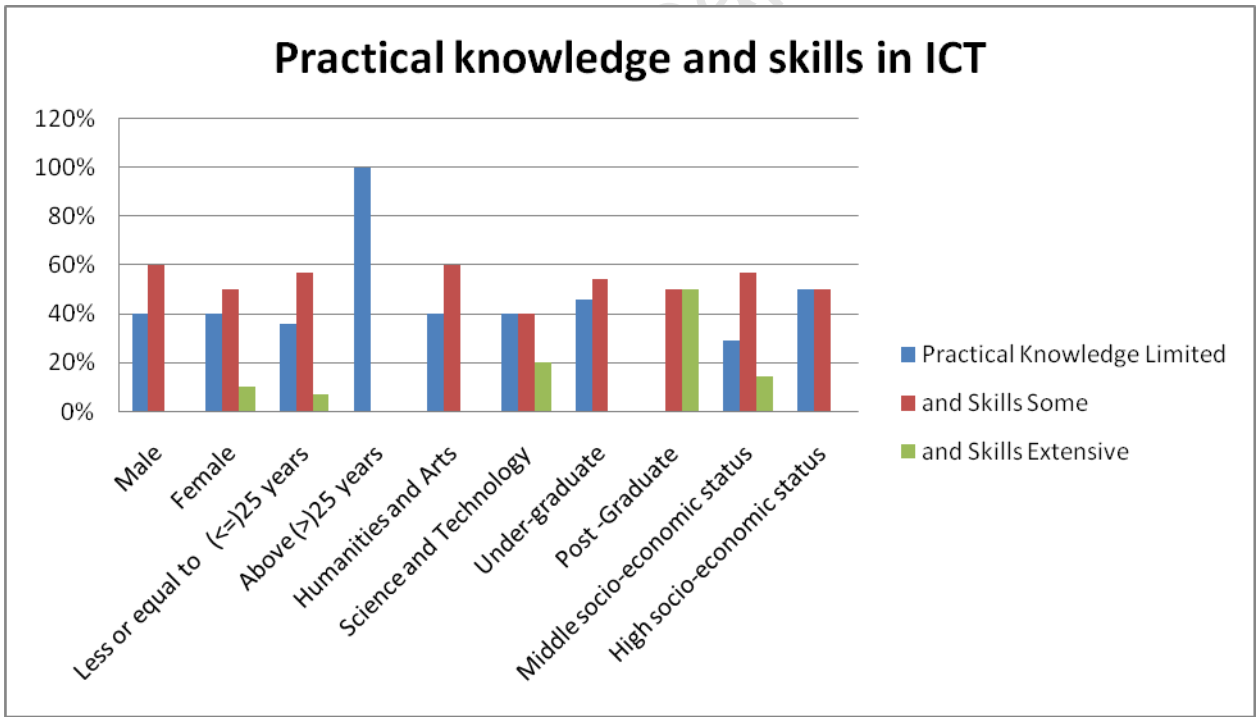

Figure 10 Practical knowledge and skills in ICT

4.3.1.1 Gender and Practical ICT knowledge and skills

The findings from the research study revealed that the majority of the students (60% male and 50% female) possess some practical ICT knowledge and skills in ICTs.

4.3.1.2 Age and Practical ICT Knowledge and Skills

When the students' age distribution was compared to their ICT skills, it was discovered that all students over 25 reported having limited practical ICT knowledge and skills while 57% the students 25 years or younger said they have some practical ICT knowledge and skills whilst.

4.3.1.3 Line of study and Practical ICT Knowledge and Skills

Data analysis comparing the students' line of study and their practical ICT knowledge and skills revealed that 60% of the Humanities/Arts students and 40% of the Science/Technology students reported having some practical ICT knowledge and skills. Forty percent of the Humanities/Arts students and 40% of students from the Science/Technology discipline displayed limited skills in ICTs. Only 20% of the Science/Technology students revealed having extensive skills in using ICTs.

4.3.1.4 Level of study and Practical ICT Knowledge and Skills

The findings in the research study showed that most (54%) of the undergraduate and half of the postgraduate students have some practical ICT knowledge and skills while the remaining 50% of the postgraduate students and 46% of the undergraduate students have extensive and limited practical ICT knowledge and skills respectively.

4.3.1.5 Socio-economic background and Practical ICT knowledge and skills

In terms of the students' socio-economic background and their practical ICT knowledge and skills, data analysis revealed that the 57% of students with middle socio-economic status and 50% of the students with high socio-economic status claimed to have some practical knowledge of and skills in using ICTs.

4.3.1.6 Summary on students' practical ICT knowledge and skills

In terms of demographical analysis it was discovered that similar (10% difference) trends of practical ICT knowledge and skills are displayed between male and female students, however younger students possess greater practical ICT knowledge and skills than older students. Science/Technology as well as postgraduate students possess more extensive practical ICT knowledge and skills than the Arts/Humanities and undergraduate students respectively. Middle socio-economic status students reported having slightly more "extensive practical ICT knowledge and skills" than students with a high socio-economic background.

Overall findings revealed that students generally have limited or some practical ICT knowledge and skills in ICTs. These findings seem to contradict the students' self-report of ICT competency. Furthermore through an in-depth analysis of the students' responses, it was discovered that the majority of the students reported use of the MS Word program more frequently than any other program. It would therefore follow that that the practical ICT knowledge and skills that students possess are more developed around the program that they use the most, in this case word processing rather than in any other area such as internet browsing.

4.3.2 Autonomy in ICT use

The overall research findings on the students' autonomy to use ICTs seem to confirm their claim of possessing ICT skills, in the sense that most of the students reported having "extensive" autonomy in ICT. One of the indicators of autonomy in the use of ICT was the analysis of whether students worked independently when using ICTs or depended on assistance from other people. The extract below is a classic example of the response that students gave which indicated that they have extensive autonomy in the use of ICT: *"I think I work independently maybe because I'm doing computer science" (High Socio-economic Status female, 22-year-old Science postgraduate).* The researcher also explored whether autonomy to the use of ICT was related to demographical composition as related in the following discussions and in Figure 11.

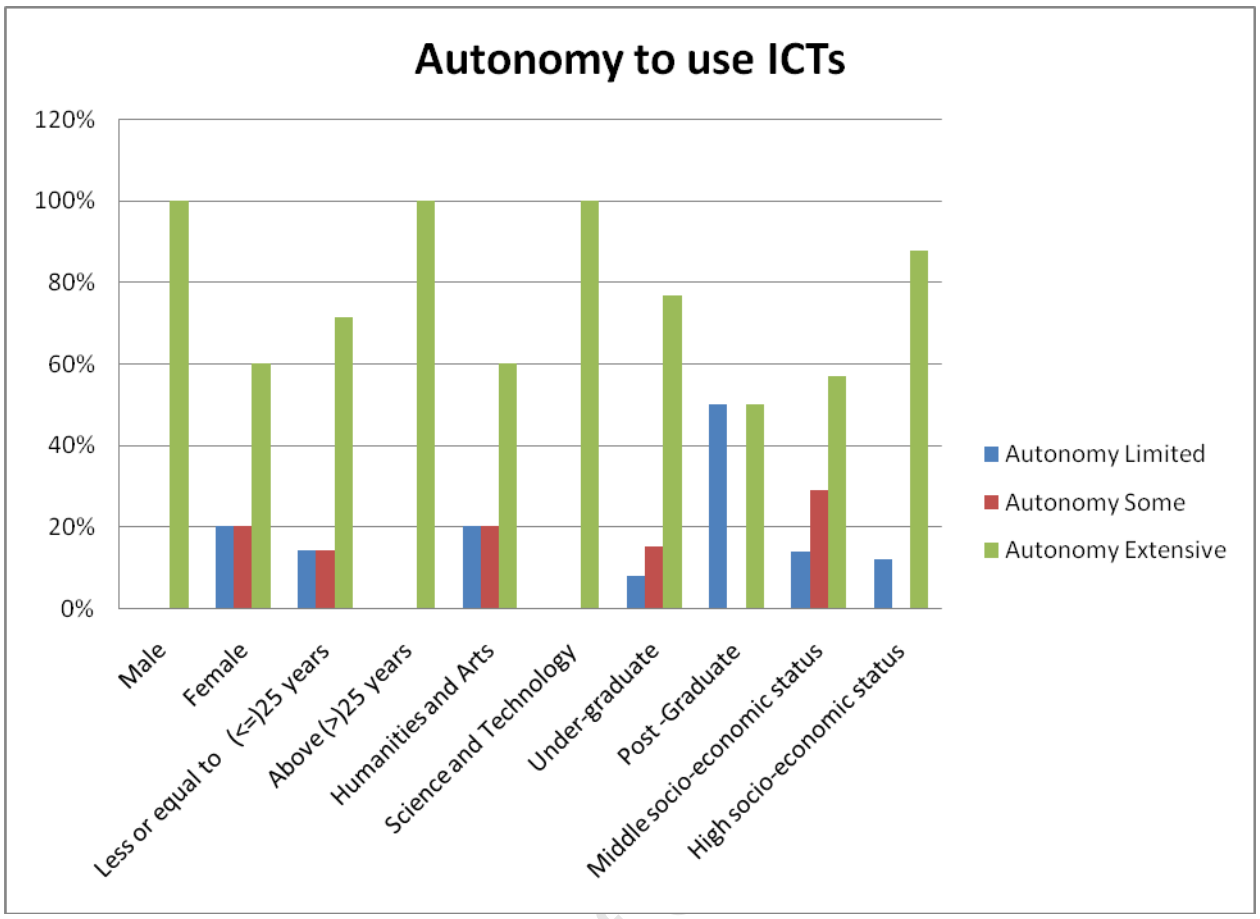

Figure 11 Autonomy to use ICTs

4.3.2.1 Gender and Autonomy in ICT use

The data analysis report revealed that the majority of the female students (60%) and all male students reported having extensive autonomy in ICT use.

4.3.2.2 Age and Autonomy in ICT use

The comparison between the age distribution of the respondents and their autonomy in the use of ICTs, showed that 71.4% of the students 25 or younger as well as 100% of the over 25 state that they have “extensive” autonomy in ICT use.

4.3.2.3 Line of study and Autonomy in ICT use

In terms of academic discipline and students' autonomy in ICT use, the data analysis revealed that 60% of the Humanities/Arts students and all the Science/Technology students assert having "extensive" autonomy over their ICT use.

4.3.2.4 Level of Study and Autonomy in ICT use

With regards to the level of study, it was discovered that 77% of the undergraduate students and 50% of the post graduate students claimed to have "extensive" autonomy in ICT use.

4.3.2.5 Social economic background and Autonomy in ICT use

With reference to the students' social economic background and their autonomy in ICT use, the research study revealed that most of the students (57% and 88% of the students with middle and high socio-economic resources respectively) reported having "extensive" autonomy in ICT use.

4.3.2.6 Summary on the students' autonomy in ICT use

According to the demographical analysis male students and older students possess greater autonomy in ICT use than their female and younger counterparts. Students from the Science/Technology discipline also reported having "extensive" autonomy in ICTs use. Undergraduate students on the other hand seem to have greater autonomy in ICT use than postgraduate students, while students with a high socio-economic background possess more autonomy in ICTs than students with a middle socio-economic status.

The overall research findings detailed above show that the majority of the students have "extensive" autonomy in ICT use and this somewhat confirms the students' claim to possessing ICT skills. These findings however seem to be in direct contradiction to the previous findings on students' knowledge of and skills in ICTs which suggested that students have limited or only some practical knowledge and skill in ICTs.

4.3.3 ICT knowledge and skills that can be shared with others

The overall research findings show that students possess some or limited ability to teach or share with other people ICT skills they possess. It was discovered that though students mentioned a variety of ICT programs that they could use, only a hand full indicated that they could share their skill with a third party. Many of the students, such as the one quoted in the extract below, expressed a lack of confidence, uncertainty and doubt in their ability to share the skills they possess; *"ah I don't know, would I be able to teach them Microsoft word that's about it" (High Socio-economic Status female, 22-year-old Science undergraduate).* Similar remarks were echoed by another student who, when asked which programs he would be able to share, stated that: *"The ones that I have done, I would teach them Word, Word is very easy, maybe Excel, no, no, PowerPoint" (High Socio-economic Status male, 22-year-old Humanities undergraduate).* In the latter quote, the student starts off confidently listing programs that he has used and ought to be able to share the skills with other people, but as the statement progresses some uncertainty and or reluctance is discernible. The discussions that follow and Figure 12 summarise the findings on students' ability to share ICTs in relation to their demographics.

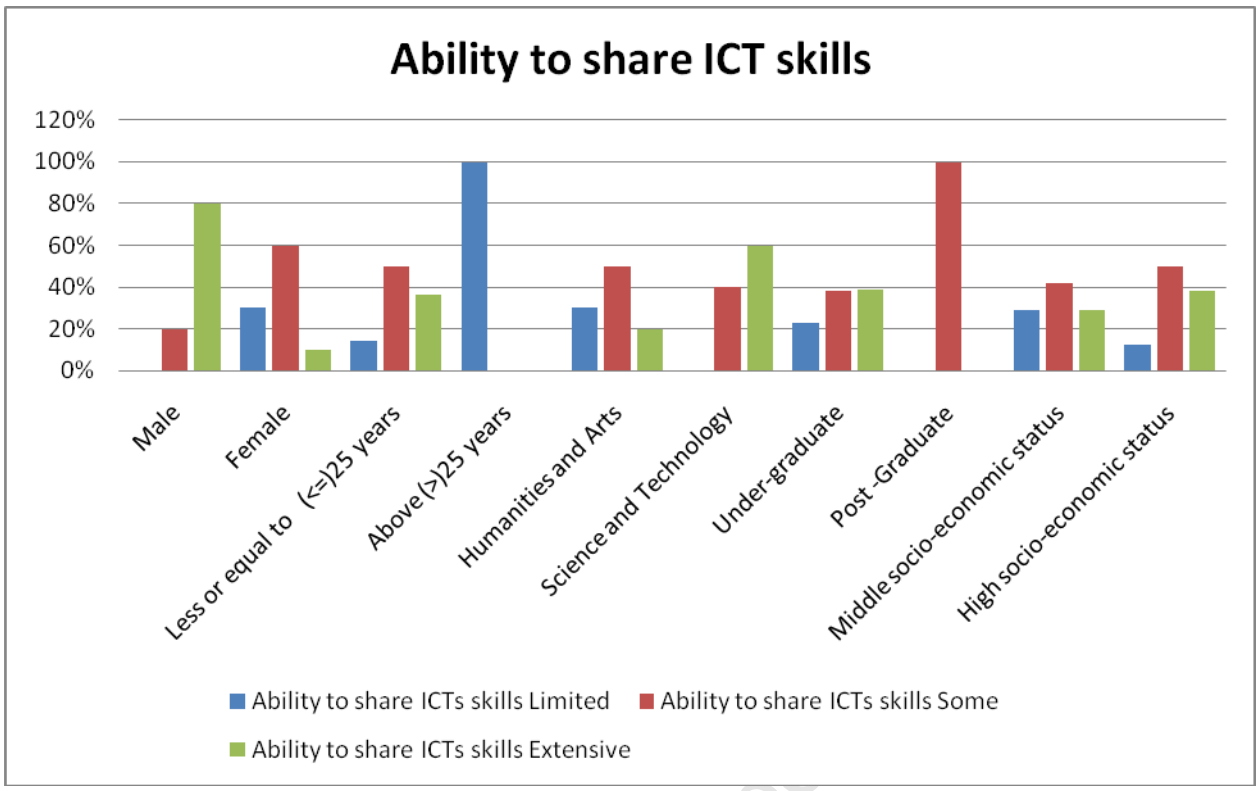

Figure 12 Ability to share ICT Skills

4.3.3.1 Gender and students' ability to share ICTs skills

Data analysis on the students' ability to share ICT skills and their gender showed that 80% of the male students reported having extensive ability to share their knowledge of ICTs whilst 60% of the female students had some ability to teach or share with other people what they knew in ICTs.

4.3.3.2 Age and students' ability to share ICTs skills

The students' age distribution was compared to their ability to share or teach their ICT skills. It was discovered all the students in the age group over 25 reported having "limited" ability to share their ICT skills and 50% of the students in the younger age group claimed to have some ability in teaching other people about ICTs.

4.3.3.3 Line of study and students' ability to share ICTs skills

In terms of the students' academic discipline and the ability to share their ICT skills with other people, the research analysis showed the majority (60%) of the Science/Technology students claimed having "extensive" ability to teach other people ICT skills. Conversely, 50% of the Humanities/Arts students have some ability to teach other people about ICTs.

4.3.3.4 Level of study and students' ability to share ICTs skills

The students' level of study was compared with their ability to teach ICT skills and it was found that all postgraduate students claimed to have some ability whilst of the undergraduate students, 39% had extensive, 38% had some and 23% reported having limited ability to assist other people acquire their ICTs skills.

4.3.3.5 Social economic background and students' ability to share ICTs skills

When the students' social economic background was analysed in relation to their ability to teach ICT skills, it was discovered that the majority of the students (42% with middle socio-economic status and 50% of the high socio-economic status) claimed some ability in assisting others to acquire ICT knowledge.

4.3.3.6 Summary on students' ability to share ICTs skills

The demographical data analysis revealed that male students report having greater ability to share their ICT skills than female students. Older students reported having more "limited" ability than younger students in helping others acquire ICT knowledge. The Science/Technology as well as postgraduate students are more confident about their ability to share ICT knowledge and skills with other individuals than the Art/Humanities and undergraduate students. The findings also revealed that students with high socio-economic status claim to have greater ability to teach ICT programs that they know than students with middle socio-economic status.

The research findings show that by and large students possess some or limited ability to teach or share with others the ICT skills they possess. These findings are surprising considering the fact that most of the students earlier on (in section 4.3.2) claimed to have "extensive"

autonomy in ICT use. One would expect that students with such high levels of confidence would follow through with claims of "extensive" ability to share the skills that they possess with other people.

4.3.4 Types of ICT Challenges

The overall analysis on the types of ICT challenges faced by the research participants revealed that students are more challenged by the less visible software problems than they are by the more visible hardware problems. The nature of ICT challenges faced by the students (i.e. ICT challenges being invisible or unknown to the surrounding environment) introduces a scenario where students forego available assistance in ICT because the relevant "help-lines" (teachers, lab technicians, peer students etc.) are unaware of the problems students are facing. The prevalence of such a scenario is revealed in some of the reactions of the students to ICT challenges, as reflected in the extracts below. In response to the question "what is the most frustrating thing about using ICTs?", one respondent stated the following: *oh the frustrating thing, I just suppose random problems, I don't know like just problems that you can't take cause sometimes you've got problems and you don't know what to do and you have to put the computer down ..." (Middle-class male, 20-year-old Science undergraduate).* This scenario clearly reveals how the use of ICTs is sometimes deterred by ICT challenges that students don't know how to handle and which are imperceptible to existing "helplines". In the discussions below and in Figure 13, is a summary of the findings on the types of ICT challenges faced by students in relation to their demographic details.

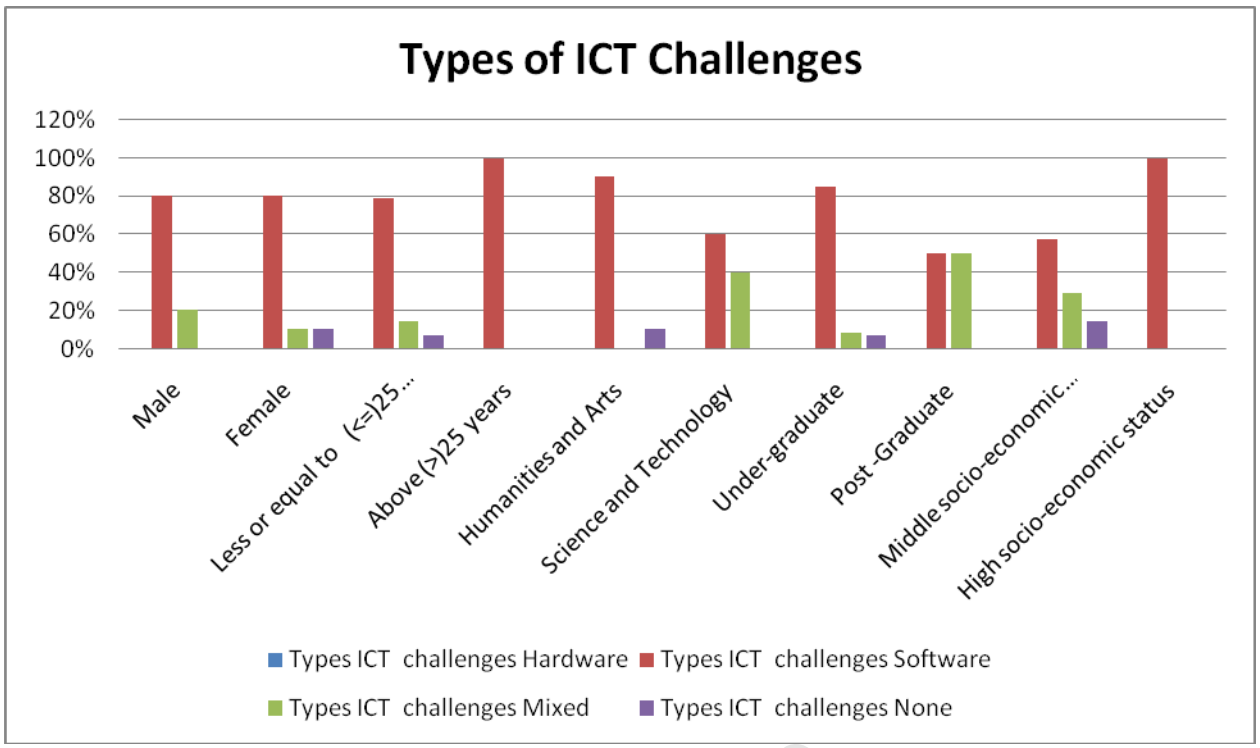

Figure 13 Types of ICT challenges

4.3.4.1 Gender and ICT challenges

The data analysis comparing the types of ICT challenges students encountered and gender distributions showed that the majority of the students (80% male and 80% female) experienced software challenges or problems.

4.3.4.2 Age and ICT challenges

The research findings pertaining to students' age distribution and the types of ICT challenges they encountered showed that all students over 25 encountered software challenges whereas of those 25 or younger, 79% had software challenges.

4.3.4.3 Line of study and ICT challenges

The findings derived from the analysis of the students' line of study and the types of ICT challenges they encountered brought to light the fact that 90% of Humanities/Arts and 60% of the Science/Technology students in the study experienced software challenges.

4.3.4.4 Level of Study and ICT challenges

The research analysis on students' level of education and the kind of ICT problems they face revealed that 85% of undergraduate students and 50% of the postgraduate students experienced software challenges.

4.3.4.5 Socio-economic background and ICT challenges

When the socio-economic background of the respondents was analysed in relation to ICT challenges that students encountered, the researcher discovered that none of the students reported having hardware challenges, but rather the majority (57% of the middle socio-economic status and 100% of the high socio-economic status) experienced software problems.

4.3.4.6 Summary of types of ICT challenges

The findings on the kinds of ICT challenges that students encountered revealed that none of the students experienced hardware specific challenges, but that the majority of the students faced software challenges. In terms of demographical analysis it was revealed that an equal number of both male and female student experienced software ICT problems. More of the older students, Arts/Humanities students as well as undergraduate students experienced software ICT challenges than younger students, Science/Technology students and postgraduate students respectively. A greater number of the students with a high socio-economic status faced software problems than students with a middle socio-economic status.

These findings show that students are more challenged by the less visible software problems than they are by the more visible hardware problems. This scenario could bring about a situation whereby the software challenges students face are even imperceptible to people such as lecturers, fellow peers or ICT support staff who could lend a helping hand. Therefore students who have high access to ICTs could be characterised by low use patterns because to the onlooker they seem to be coping with ICTs, whereas in reality they are grappling with less visible software challenges and this makes them reluctant to use ICTs effectively .

4.3.5 Conclusion on students' ICT knowledge and skills

From the beginning of the study the research participants claimed that they possessed ICT knowledge and skills therefore the decision to interrogate their competency in ICTs was the researcher way to confirming the students' assertions. As mentioned before four factors were used to evaluate students' proficiency in ICT and these included: practical ICT knowledge and skills; autonomy over ICT use; ability to assist other people to acquire the respondents' ICT skills and the types of ICT challenges encountered by students when using ICTs. This was a different approach from other researchers (Trinidad et al., 2001) who used internet search skills and typing as a measure of student's ICT skills.

Of all four factors evaluated in the current research study, two (autonomy over ICT use and types of ICT challenges) seemed to support the students' claim of competency in ICT skills. The other two variables (practical ICT knowledge and skills as well as the ability to teach or share what they know) negate the students' claim to proficiency in ICT skills. This equally balanced report suggests that students do not entirely possess the knowledge and skills required to engage in ICTs. The repercussions of the findings detailed above are noted by other researchers such as Czerniewicz and Brown (2009), who relate that lack of aptitude constrains the use of ICTs. The researcher therefore argues that the students' level competency in ICTs could be a possible contributor to the low ICT use patterns that are sometimes experienced at HEIs among students with high access to ICTs.

One of the possible reasons for the limited ICT knowledge and skills is that students select only ICT skills and knowledge that they presume to be necessary.

> *Let me inform you a bit - I only teach myself what I think I need to know* (Middle-class female, 23-year-old Science undergraduate)

Some students on the other hand (such as the one in the extract below) find ICT so complicated that even with available help they are simply 'frustrating' to use.

I find it hard even if it shows you that you can do this and this I find it hard and you need assistance so it's frustrating (High Socio-economic Status female, 27-year-old Humanities undergraduate).

Other studies such as the Pew report (2003) have also shown that students who lack ICT skills tend to use them less. Similarly when we consider concepts such as mental access (Selwyn, 2010) related in earlier discussions, which encompasses notions of ICT knowledge and skills as a factor influencing ICT access and use, it is possible that the partial competence displayed by the students in the study contributes to low usage of ICTs, i.e. students lack sufficient knowledge and skills or mental access to engage optimally with ICTs.

4.4 Factors motivating students to use ICTs

The final factor that was taken into consideration by the researcher as a possible contributor to the perplexing behaviour of some of the students in HEIs privileged with access to ICTs but characterised by tendencies of low use, was the issue of motivation. The researcher hypothesized that students could be lacking in motivation to use ICTs and this was in turn manifest through low use of ICTs. Several themes were identified by the researcher as possible motivating factors that influenced the students to use of ICTs. These included: current applications of ICTs; future applications; self-efficacy; and subjective norm. A detailed table representing statistical findings of ICT motivating factors together with the demographic relation is attached as Appendix E.

4.4.1 Current Application of ICTs

The overall findings on the students' current utilization of ICTs revealed that in terms of academic use, the majority of the students found some and or extensive application of ICT in the courses of their studies. In terms of personal applications the majority of the students reported having some useful applications of ICTs for their non-academic or private activities. One would imagine that the positive outlook reported by the students towards the use of ICTs would encourage student to engage extensively with ICTs, however as the main research question indicates, the opposite is true (i.e. students are not extensively engaging with ICT

despite the apparent advantages). The extracts below provide some possible insight as to why students might chose to minimally engage with ICTs:

> *I was saying basically I'll say they do slow me, it's like you get tired because the eye you know, it affects you your eyes* (High Socio-economic Status female, 27-year-old Humanities undergraduate).

> *They can take up quite a lot of time but I think they don't affect my efficiency that much* (High Socio-economic Status male, 23-year-old Science undergraduate).

The students' applications of ICTs were also analysed through demographical composition detailed in the discussions below and displayed in Figure 14.

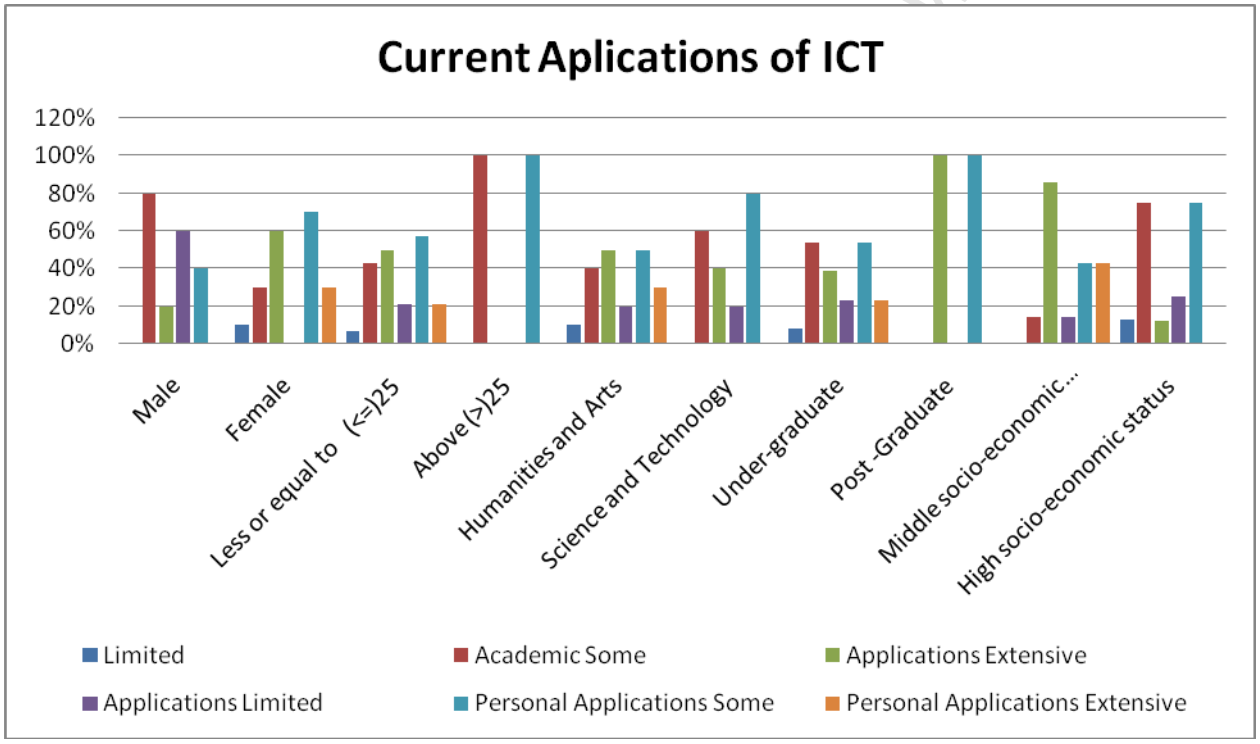

Figure 14 Current Applications of ICT

4.4.1.1 Gender and Current Applications of ICTs

The data analysis revealed that of the male students 80% found “some” academic application for ICTs. Conversely, 60% of the female students claimed to have “extensive” academic application. With regards to personal applications 60% of the male students had limited use of ICTs in their personal lives. Of the female students 70% had some personal application of ICTs. The findings revealing limited or some personal applications of ICT seem counter intuitive as many people nowadays assume that students are online for mostly personal reasons.

4.4.1.2 Age and Current Applications of ICTs

The students’ age distribution was compared to their current applications of ICTs and it was discovered that all students over 25 found “some” application of ICTs in their academic sphere whereas 50% of the students 25 or younger used ICTs “extensively” for academic purposes. In terms of personal use of ICTs, it was again discovered that all students over 25 found ‘some’ personal use of ICTs while 57% of the students 25 or younger reported a similar claim.

4.4.1.3 Line of Study and Current Applications of ICTs

An analysis process carried out to determine relational patterns between the students’ line of study and their applications of ICTs revealed that 60% of the Science/Technology students claimed to have “some” academic application whereas 50% of the Humanities/Arts students found “extensive” academic use of ICTs. Similarly, the majority (80%) of the Science/Technology students reported to have “some” use of ICTs in their personal lives and 50% of the students from the Humanities/Arts discipline also found “some” use of ICT in their personal lives.

4.4.1.4 Level of study and Current Applications of ICTs

The findings on the students’ level of education matched against their current applications of ICTs showed that all postgraduates found extensive use of ICTs in the academic sphere whereas 54%, of the undergraduate students found some of ICTs in their academic life. In terms of personal applications of ICTs the research study also revealed that all postgraduate students and 54% of the undergraduate students found ‘some’ useful applications of ICTs in their personal lives.

4.4.1.5 Socio-economic background and Current Applications of ICTs

The analysis contrasting the students' socio-economic background and their current applications of ICTs revealed the majority (86%) of the students with middle a socio-economic status found "extensive" academic applications of ICTs. Conversely, most of the students (75%) with a high social economic background reported to have "some" useful academic application of ICTs. In terms of personal applications of ICTs the research study showed that most (75%) of the students from a high social economic background reported to have "some" useful application of ICTs in their personal life.

Conversely, students with a middle socio-economic status reported having "some" personal application of ICTs, 43% claimed having "extensive" personal use and another 43% asserted that they have "some" useful of application of ICTs in their personal lives. Only 14% reported having "limited" application of ICTs in their personal lives.

4.4.1.6 Summary of student's current applications of ICTs

The research findings revealed that in terms of demographical breakdown, female students as well as younger students found ICTs more useful in their academic and personal lives than male and older students respectively. Science/Technology students found ICTs more useful in their academic life, whereas students from the Arts/Humanities discipline found more personal application of ICTs in their lives. Postgraduate students found ICTs more useful for academic purposes whereas undergraduate students used ICTs more in their personal lives. Students with a middle socio-economic status found ICT more useful for their academic and personal lives than their counterparts from a high socio-economic background.

The general findings on the students' current utilization of ICTs revealed that in terms of academic use the majority of the students found some and or extensive application of ICT and in terms of personal applications the majority of the students reported having some useful applications of ICTs. The positive response regarding the students' application of ICTs in their academic and personal life seems to contradict the researcher's original thoughts which asserted that academic and personal usefulness of ICTs would encourage the high use of ICTs. Apparently, students in the study find ICT useful in their academic life and personal life and yet

still use it minimally. The findings are not only contradictory to the researcher's hypothesis, but they are also contradictory to other reported studies. In the JISC (2008) report it was discovered that students go out in search of new technologies to help their learning process. Other researchers also found that "students will use the system [e-learning system] only if they perceive that its use will enhance their learning performance" (Lee, 2006: 520). In the research studies cited above, student are moved to use ICT because they relate its use to an academic advantage or progress whereas in the current study, the academic value of using ICTs does not seem to stimulate students into a sustainable and meaningful use of ICTs.

Why then would students who acknowledge the use of ICTs as advantageous towards their academic performance – a factor which could be regarded as an incentive for them to access and use ICTs - engage with them in a limited manner? This practice of low ICT use suggests that there might be reasons that override the apparent advantages. In the extracts below students highlight certain elements of ICT use that could be possible contributors to low ICT use practices.

> *... with me it's just transferring what I have written on the paper to the pc so it's like the same thing, it's the same amount of work though it takes longer because I have to write something and transfer it again …* (High Socio-economic Status female, 22-year-old Humanities undergraduate).
>
> *... well I don't think in my life my work has ever been efficient because of computers, or run so… the computer didn't even read my USB when I'm supposed to be submitting* (High Socio-economic Status male, 21-year-old Science undergraduate).
>
> *... yah when they're slow it just frustrates me because I see computers as something that'll be convenient for you I don't want to wait there to get information for whatever I want to get done* (High Socio-economic Status female, 22-year-old Science undergraduate).

Based on the general findings in the study on the students' opinion of the academic usefulness of ICTs, it appears that on a conscious level technologies are generally accepted as an efficient

tool of services, however ICTs are also considered be time consuming, unreliable and at times, they do not meet the expectations of the students. Perhaps these negative attributes of ICTs subconsciously discourage students from extensive use ICTs.

4.5.2 Future Use of ICTs

The overall findings on students' perceived usefulness of ICTs in their professional careers showed that the majority of the students envisioned a definite application of ICTs in their future professions. According to the researcher's assumption this factor would have served as an incentive for students to invest in or engage with ICTs heavily at the present moment in order to prepare for the future. However in-depth analysis revealed that although students were aware of the future significance of ICTs, some of them retained their personal views about not using ICTs. In the extract below a student is quoted agreeing to the future importance of ICTs while in his present practice his actions advocate minimal ICT use:

In response to the question "Do you think computer skills will be relevant in your future career?", the student had the following to say: *"Yah definitely I mean I'm going to like be a giant archaeologist, definitely they'd like help a lot so yah definitely" (Middle-class male, 20-year-old Science undergraduate).* However the same student when asked if he currently used ICTs outside of his academic sphere explained that: *"Well I pretty much don't use computers outside my [school] work so I mean in most times it's Facebook, ... I don't need computers outside my work" (20-year-old Science undergraduate).*

This extract implies that although students see the relevance of ICTs in their future careers this fact is not translated into an incentive for them to presently use ICT extensively. The discussions below and Figure 15 are a summary of the findings on students' perceived usefulness of ICTs in their future career in relation to their demographic data.

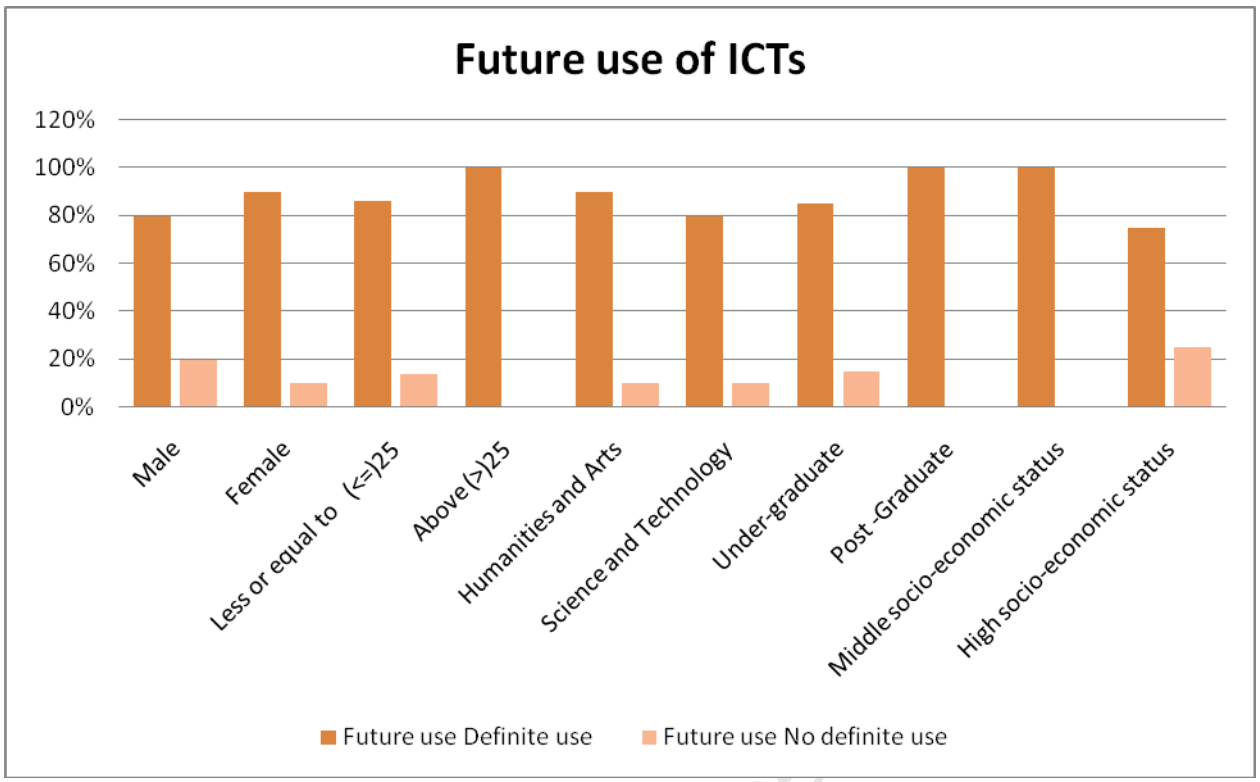

Figure 15 Future use of ICTs

4.5.2.1 Gender and future use of ICTs

With reference to gender distribution and the future use of ICTs, the researcher found that the majority (80% male and 90% female) of the students were aware of a definite role of ICTs in their future career paths.

4.5.2.2 Age and future use of ICTs

The analysis process comparing student age groups with their perceived future use of ICTs revealed that all students over 25 envisioned ICTs as a definite component of their future careers, whereas 86% of the students 25 and younger said that ICTs have a definite role in their future occupation.

4.4.2.3 Line of study and future use of ICTs

The students' line of study was contrasted to the role of ICTs in their future professions and it was ascertained that the majority of the students (90% of the Humanities/Arts and 80% of the Science/Technology) perceived ICT as an integral component of their future careers.

4.4.2.4 Level of study and future use of ICTs

With reference to the students' level of education and the function of ICTs in the future careers, the research findings showed that all postgraduates envisaged a definite application of ICTs in their future careers and 85% of the undergraduate students put forward the same claim.

4.4.2.5 Social economic background and future use of ICTs

Data analysis on the comparison between students' social economic background and their future use of ICTs revealed that all students with middle social economic status envisioned a definite application of ICTs in their future career, whereas 75% of the students from high social economic backgrounds made a similar claim.

4.4.2.6 Summary on future use of ICTs

The findings above on the students' perceived usefulness of ICTs in their future lives or careers showed that the majority of the students envisioned a definite application of ICTs in their future professions. This was true in all aspects of gender, age, line of study, level of study as well as in terms of social economic background. With the positive findings on the students' perceived usefulness of ICTs in their future careers, it would be expected for students to be motivated to use ICT presently. Similar, findings from other studies (Cushman & Klecun, 2006) report that the future use of ICTs served as a motivation for students to use ICTs. It therefore remains a puzzle why students who have an incentive or motivation to use ICTs are characterised as low users of ICTs. The researcher therefore shifted the focus to other possible explanations such 'self-efficacy' in the following section.

4.4.3 Self-efficacy and use of ICTs

According to some researcher's (Bandura & Cervone, 1986) views on self-efficacy, students with high self-efficacy are characterised by confidence in their abilities to reach desired goals and high levels of perseverance in the face of challenges. However, in the study the overall findings showed that the majority of the students did not show a high level of confidence in their abilities to achieve their desired goals. Very few students viewed themselves as users who

required little effort to accomplish their ICT work. Similarly in terms levels of perseverance in the face of ICT challenges, the majority of the students did not react positively to ICT obstacles. The extract below is a classic example of the students' level of self-efficacy in the study:

> *... so I'm slightly computer illiterate so I mean computers slow things... they tend to be slow you know when programs tend not to work sometimes it just doesn't do things that you want it to do or you need to know something to do something so it's a whole computer thing just frustrates me not in a bad way not in a way I'll just go out screaming but it's not something I'll do if I had a choice* (High Socio-economic Status male, 22-year-old Humanities undergraduate).

Another student when asked how they reacted to ICT challenges replied: "*I'm very impatient so ... I would leave the computer and walk out and go*" (High Socio-economic Status female, 21-year-old Science undergraduate). The discussions and Figure 16 below reports on the students' self-efficacy in ICT in relation to their demographic profiles.

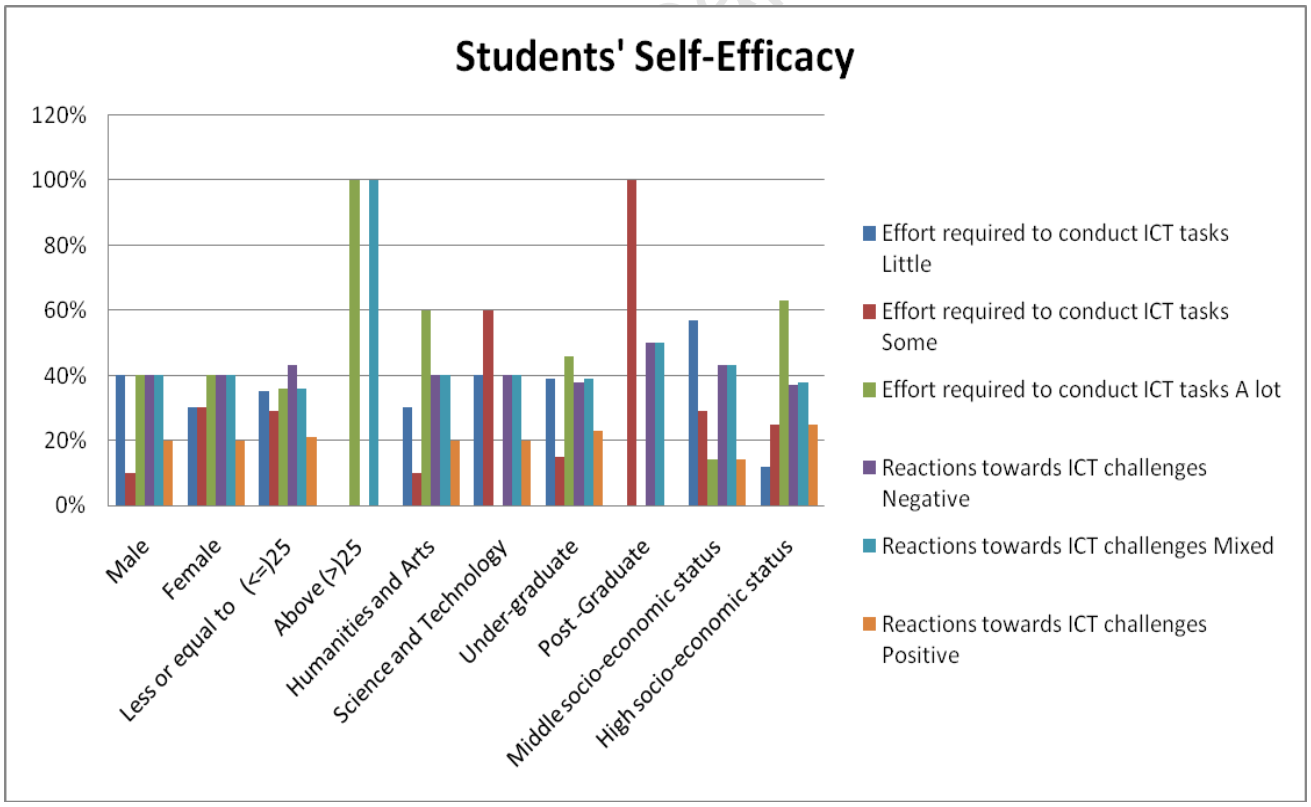

Figure 16 Students' Self efficacy

4.5.3.1 Gender and Self-efficacy

The research findings contrasting the students' self-efficacy and their gender revealed that 40% of the male students and 40% of the female students required a lot of effort to carry out their ICT tasks. However another 40% and 30% of male and female students respectively use little effort to accomplish their ICT assignments.

In terms of the students' reaction to ICTs challenges, the data analysis showed that 40% male and 40% female students reported having mixed reactions towards ICT difficulties. Similarly 40% male and 40% female students reported that they reacted negatively towards ICT challenges.

4.4.3.2 Age and Self-efficacy

The self-efficacy analysis, when compared to the age distribution of the participants in the study, revealed that all the students over 25 required a lot of effort when engaging with ICT activities. Among the students who are 25 years and younger 36%, 35% and 29% required high, low and some effort respectively to carry out their ICT tasks.

With respect to students' reactions to ICT challenges, all students over 25 years reacted positively to ICT problems whereas of students 25 years and younger 43% reacted negatively towards ICT challenges.

4.4.3.3 Line of study and Self-efficacy

Through the data analysis comparing the line of study and student's self-efficacy, the researcher discovered that 60% of the Humanities/Arts students required high effort to accomplish their ICT work. Sixty percent of the Science/Technology students required some effort to carry out their ICT tasks.

4.4.3.4 Level of study and Self-efficacy

Data analysis report associating the students' level of study and self-efficacy showed that all postgraduate students exercised some effort when engaging with ICT tasks. Among the undergraduate students it was revealed that 46% put in a lot of effort to reach their goals in ICT

practices. In terms of reactions to ICT challenges, it was revealed that among postgraduate students 50% react negatively towards ICT challenges. Undergraduate students on the other hand reported that 39% have mixed reactions towards ICT difficulties.

4.4.3.5 Social economic background and Self-efficacy

The students' self-efficacy was contrasted with their social economic background and it was discovered that of the students with high socio-economic status 63% put in a lot of effort to achieve their ICT goals. Among students with middle socio-economic resources 57% required little effort to obtain their ICT objectives.

In terms of reactions to ICT challenges it was discovered that among students with high social economic background 38% had mixed reactions towards ICT challenges whereas among students from a middle social economic background, 43% reacted negatively and another 43% had mixed reactions and towards ICT problems.

4.4.3.6 Summary on students' self-efficacy in ICTs

As stated in earlier discussions students with high self-efficacy are characterised by confidence in their abilities to reach desired goals and display high levels of perseverance in the face of challenges. The research analysis showed that the majority of the students did not show a high level of confidence in their abilities to achieve their desired goals, i.e. very few students viewed themselves as users who required little effort to accomplish their ICT work. With regard to students' levels of perseverance in the face of ICT challenges, again the majority of the students did not react positively to ICT difficulties.

The research findings also revealed that in terms demographical characteristics older students have lower self-efficacy than younger respondents. Science/Technology students also seem to have more self-efficacy than Arts/Humanities students. In terms of levels of study, postgraduate students exhibit some self-efficacy because they require less effort to carry out their ICT tasks. Undergraduate students also seemed to reveal some self-efficacy (although somewhat in a different manner to that of the post graduate students) by reacting positively to

ICT challenges. Students with a middle socio-economic status seem to have more self-efficacy than students from a high socio-economic background.

Based on the general findings on the students' self-efficacy it can be conclude that the students in the research study have some or low but not high self-efficacy. According to Bandura and Cervone (1986) this attribute of the students is associated with behaviour of discouragement. The researcher is therefore inclined to consider the students' patterns of low ICT use at HEIs as maybe a result of low self-efficacy. Perhaps when students are faced with ICT challenges they get discouraged from using them. Hsu, Chiu and Ju also asserts that individuals with "low self-efficacy are less likely to perform related behaviour in the future" (2004: 767). Similar sentiments are echoed by other researchers who found that "students who reported either high computer phobia or low computer self-efficacy were less likely to maximise their use of university computer facilities" (McIlroy, Sadler & Boojawon, 2007: 1285).

4.4.4 Subjective Norm

The overall findings revealed that the majority of the students experienced medium external network influence to use ICTs. These findings could be interpreted to mean that students have some form of positive influence from their social environment to use ICTs. However, the data analysis also revealed that the majority of the students had medium subjective norm which can be translated to mean that these students experienced some form of pressure to use ICTs. This conclusion is particularly pertinent when you consider students' responses such the one captured in the following extract: *"I'm saying if the computer is not required I will not use the computer" (High Socio-economic Status female, 21-year-old Science undergraduate).* Additional evidence that supports the view that students might be feeling compelled to use ICTs include student responses such as one in the following extract: *"the reason I use computers firstly is because I have to … I can't answer it appropriately in the sense of comparing whether my marks improved like when I use computers or when I don't because I don't actually have a choice of using them or not, I have to use computers I have to type out essays, assignments, I have to look for research on internet journals …"(High Socio-economic Status female, 22-year-old Science undergraduate).* The following discussions and Figure 17 provide a summary of findings on the

students' subjective norm in relation to their demographic characteristics.

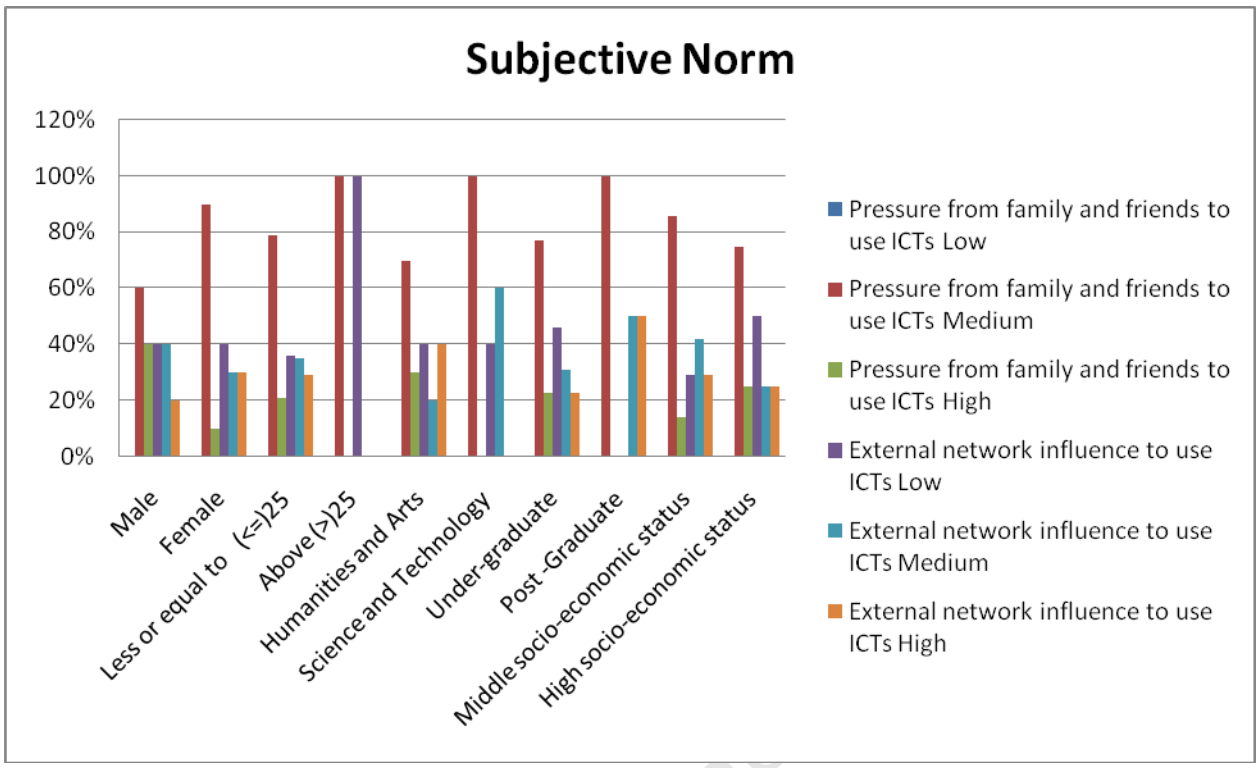

Figure 17 Subjective Norm

4.4.4.1 Gender and Subjective Norm

Data analysis on the subjective norm and gender distribution revealed that the majority of the students (60% male and 90% female) reported a medium level of perceived social pressure to engage with ICTs – medium subjective norm. In terms of external network influence the data analysis revealed 40% of the male and 30% female students experienced medium external network influence. And another 40% of the male students experienced low external network influence and similarly 40% of the female students experienced low social pressure to use ICTs.

4.4.4.2 Age and Subjective Norm

In terms of age distribution data analysis on subjective norm reflected that all students over 25 reported a medium level of perceived social pressure to engage with ICTs, i.e. medium subjective norm and 79% of students who are 25 or younger made a similar claim. With reference to external network influences the researcher found that all students over 25

reported having low external network influence, whereas among students who are 25 or younger 36% claimed having low external network influences to use ICTs.

4.4.4.3 Line of study and Subjective Norm

Data analysis comparing the students' subjective norm and their line of study indicated that all students from the Science/Technology discipline experienced medium subjective norm, whereas amongst the Humanities/Arts students, 70% reported having medium subjective norm. The research analysis also showed that 60% of the Science/Technology students experienced medium external network influence to use ICTs and 40% of the Humanities/Arts students reported having low external network influence. Another 40% of the Humanities/Arts students claimed to have experienced high external network influences.

4.4.4.4 Level of study and Subjective Norm

Research findings based on the contrast between subjective norm and the level of study, revealed that all postgraduate students and 77% of the undergraduate students reported a medium level of perceived social pressure to engage with ICTs, i.e. medium subjective norm.

Conversely, data analysis on the students' external network influences showed that 50% of the postgraduate students' experienced medium external network influences. Among the undergraduate students 46% experienced low external network influence to use ICTs.

4.4.4.5 Social economic background and Subjective Norm

In terms of subjective norm and social economic background, the data analysis revealed that 75% of the students from high socio- economic backgrounds felt highly pressured by people in their immediate environment to use ICTs. With regards to students from middle social economic backgrounds, it was discovered that 86% reported a medium level of perceived social pressure to engage with ICTs i.e. medium subjective norm. With reference to external network influences it was discovered that among students with high socio-economic status 50% had low external network influence. Of the students with middle socio-economic status 42% had medium external network influences.

4.4.4.6 Summary of students' Subjective Norm

The data analysis revealed that in terms of demographical distribution male students report that they receive a lot more pressure from family to use ICTs than female students. Older students also experience a lot of pressure from family members to use ICTs, but this group of students also report being less influenced by their social environment than the younger students. Arts/Humanities students reported having experienced more pressure from their families and greater social influence to use ICTs than Science/Technology students. Postgraduate students are more socially influenced to use ICTs, whereas undergraduate students experience more pressure from the family to use ICTs. A greater number of students from a high socio-economic background experience high pressure from the family and less social influence to use ICTs.

The overall conclusion on the subjective norm supposition - that students are influenced by individuals in their immediate environment to refrain or engage with ICTs - is summarised as follows: In relation to external network influence, the majority experienced medium external network influence to use ICTs. These findings are further interpreted to mean that students have some form of positive influence from their social environment to use ICTs. The findings are also similar to Lee (2006) who reported that students are partially influenced to use ICTs because they see other classmates, friends or family members using ICTs.

In the current study the data analysis also revealed that the majority of students experienced medium subjective norm which can be translated to mean that these students experienced some form of pressure to use ICTs.

Cushman and Klecun (2006) also found in their study that some students used ICTs just so that they could fit in society, i.e. they felt pressured by society to use ICTs. In the JISC (2008) report it was stated that students are hesitant to use ICTs that are forced on them. Drawing a conclusion from the JISC report (2008) and the students' response about how pressured they feel to use ICTS, it can be argued that perhaps the practice of low ICT use among HEIs students with high access opportunities, is partially a result of the fact that students are not self-

motivated to use ICTs, but feel somewhat compelled to use ICTs.

4.4.5 Conclusion on students' motivation to use ICTs

Of the four criteria utilized to assess students' motivation to use ICTs two factors (Current applications and Future use) indicated that they were motivated to use ICTs whereas the other two (Self-efficacy and Subjective Norm) suggested that students were not motivated to used ICTs. It can therefore be concluded that students in the study were partially motivated to use ICTs. According to Rhema and Miliszewska, "personal motivation is one of the main reasons for success or failure in the integration of ICTs and [adaption of] e-learning in teaching and learning" (2010: 430).

In view of the research findings that reflect a partial motivation to use ICTs should we be surprised to have clusters of high access low users in our ICT society? The findings in the study, i.e. lack of full motivation to use ICTs, and the student's practice of low ICT use confirm Czerniewicz and Brown's (2009) findings which maintain that motivation and confidence serve as ICT enablers. These researchers believe that the issue of motivation is a source of explanation for differential use and adoption of ICTs.

Chapter 5

Summary of the overall findings

Within this chapter efforts have been made to sum up the main findings by outlining the main discussion of the study. Through the data analysis findings the researcher endeavored to understand why pockets of students in HEIs privileged with high access to ICT made low use of them by seeking to:

- Identify and evaluate attributes that characterize these students as well as
- Critically analyzing factors that act as barriers to in-depth use of ICT in higher education institutions.

5.1 Findings on Demographical Distribution

The analysis summarised below is not an extensive report, but rather a synopsis highlighting interesting or outstanding demographical aspects of the students in the research study that helps provide an insight as to what attributes characterise high access low ICT users.

5.1.1 Gender

In terms of gender, female students had a more exploratory attitude towards ICTs than their male counterparts. Their personal attitude towards ICTs was more consistent as a group, whilst male students displayed varied personal attitudes towards technologies. However, with regards to autonomy over the use of ICTs, the study revealed that female students have far less autonomy to use of ICTs, but they seem to have greater applications of ICTs in their academic and personal lives. Majority of the students could envisage a definite use of ICTs in the future careers and only a few students from both the male and female group could not find any application of ICTs in their future employment. These findings, however, are questionable as some of the students' responses could be due to their limited understanding of the extent to which ICTs can be applicable in modern careers.

5.1.2 Age

With regards to age distribution, it was discovered that older students seem to have greater exposure to ICTs than younger students. Despite this high exposure to ICTs and the fact that older students showed greater willingness to learn new ICTs, this group of students turned out to possess more limited skills in ICTs than students in the younger age group. Older students also have high personal views, but low perceptions about ICTs in the sense that they have generally positives views about ICTs but they also said they would not use them if they were not required to. Usually age is associated with experience and this affords a certain degree of confidence to an individual in the particular activity they engage in, therefore it was with little surprise to discover that older students have greater autonomy over the use of ICTs than younger students. The findings also highlighted that older students have limited practical knowledge and skills and this seems to affect their ability to share with other people what they know in ICTs as it was discovered that older students have limited ability to teach or share their knowledge. Older students also showed tendencies of low self-efficacy because they were not very confident in their abilities to accomplish various ICT activities. The findings on younger students on the other hand presented an interesting contradiction where by those in the younger age group showed more willingness to invest in ICTs, but displayed less interest in learning new ICTs. It was also discovered that younger students felt more social pressure to use or adopt ICT than older students.

5.1.3 Line of study

In terms of educational background and particularly with regards to academic discipline, it was discovered that Science/Technology students have less general exposure but more personal exposure to ICTs than Arts/Humanities students. The Science/Technology group of students also reported to have greater autonomy over the use of ICTs than the Humanities/Arts group. Responses from the Science/Technology students suggested that their line of study exposes them to more opportunities of ICTs use that they gain confidence in using technologies or view them as an integral part their life. Similarly Czerniewicz and Brown (2007b) also report that students from the Health Science discipline use ICT more frequency and with greater breadth than students from the Humanities and Business fields.

Arts/Humanities students on the other hand show less explorative behaviour with ICTs than the Science/Technology students. Although the findings reflect that majority of the Science/Technology students utilized ICTs more extensively in their personal lives than the Arts/Humanities students, their engagement included common day activities such communication and entertainment. Arts/Humanities students on the other hand, reported more authentic engagement such as visa process, ICT as a personal organizer and on-line shopping. Arts/Humanities students also experienced more family pressure and social influence to use ICTs.

5.1.4 Level of study

With regards to the students' level of study, postgraduate students have less explorative behaviour than the undergraduate students, however the postgraduate group of students was the only one that possessed extensive practical knowledge and skills as they were competent in programming, utilized a wide range of office packages and also made use of the Internet on daily basis.

5.1.5 Social Economic Background

The findings revealed that student with high socio-economic status have greater personal exposure to ICT than students with a middle socio-economic background. It was also interesting to discover that in the case of the former, students were more willing to invest in ICTs and yet at the same time they were not willing to learn new ICTs. Students with low socio-economic background have more personal use of ICTs than students with high socio-economic background. Despite the advantage of more social and economic resources, students with a high socio-economic background had low self-efficacy because they viewed ICT as a process that required a lot of effort. However these findings are not too surprising when one considers that this group of students also has limited practical knowledge and skills in ICTs. The students from a high socio-economic background faced more pressure from the family to use ICTs, but where less influenced by their social network to use ICTs.

5.2 Factors that act as barriers to in-depth use of ICT in higher education institutions

The researcher also explored three possible contributory factors (attitudes, skills and motivation) that influenced low ICT use among students with high access at HEIs. Overall the findings helped us understand:

- The extent to which students' attitudes explain their low use of ICTs despite high access.
- The extent to which students' ICT knowledge and skills explains their low use of ICTs despite high access.
- The extent to which students' motivation towards ICTs explains their low use of ICTs despite high access.

5.2.1 Attitude

Based on the findings on the students' attitude towards ICTs, the researcher realizes that there is a possible link between the lack of a positive attitude and low use of ICTs. From the outset of the study the students were regarded as low users of ICTs and the findings have revealed that they lack a positive attitude towards ICTs. Although their personal views in principle are not opposed to ICTs, their practical life portrays a different story. The students have limited to some awareness of available ICTs and do they express extensive interest in ICTs.

5.2.2 Knowledge and Skills

It was also discovered that there is a possible relationship between competency in ICT and low usage of ICTs. The findings revealed that although students claimed to be competent in the use of ICTs they in displayed partial competency in the field as they could not teach other people what they know in ICTs and they did not display great practical knowledge and skills in ICTs. This suggests that their under-utilisation of ICTs could be a result of their lack of full competency in the field.

5.2.3 Motives to use ICTs

The research findings also revealed that motivation can influence low use of ICTs. The participants in the study were found to be only partially motivated to use ICT as they had low levels of computer self-efficacy and felt somewhat pressurized rather than self-motivated to use ICTs.

Chapter 6

Conclusion and Recommendations

This chapter details what the main findings of the study bring across in response the question why students who have high access to ICTs make limited use of them. This concluding chapter also highlights issues that need to be addressed as recommendation for the way forward. Future research activities that can be undertaken in light of the research findings are also elaborated on within the chapter.

6.1 Main research conclusions

There are four main findings reported in this study that helps us understand why some students with high access to information communication technologies report low use.

Firstly, the findings in this study revealed that low use of ICTs in situations of high access is not a result of the demographical composition of students. In an analysis that included several demographical variables such as gender, age, academic background and socio-economic background the research findings revealed that there were no great variations in ICT practices in terms of demographic patterns.

Secondly, there is a positive relationship between low use of ICT where there are opportunities of high access and lack of positive attitude towards ICTs. This deduction is based on research findings which revealed that students who are characterized as high access and but low ICT users do not have highly positive attitude towards ICTs.

Thirdly, incidences of low ICT use in the face of high access can be credited or associated with lack of adequate knowledge and skills to use ICTs. This conclusion was reached based on the findings in the current study which revealed that the research participants who are viewed as users with high access to ICTs but make limited use of them, only have partial skills and knowledge in ICTs.

Lastly, low use of ICTs in spite of high access opportunities is positively correlated to low levels of motivation to use ICTs. This conclusion is derived from findings in the current study revealing that high access students with low ICT use are partially rather than highly motivated to use ICT.

It can therefore be concluded that there are at least three factors that contribute to the low use of ICTs among HEIs students who have high access opportunities namely: lack of positive attitude towards ICTs; lack of adequate knowledge and skills to use ICTs and low levels of motivation to use ICTs. With the aid of the conceptual framework and analytical framework that were formulated for this study the findings were able to answer (to some extent) the question of why some of the students in HEIs privileged with high access report low levels of ICT use.

6.2 Emerging issues that need to be addressed

- One of the issues that arouse in the discussions as a contributor to low use of ICTs was lack of ICT awareness. Special intervention is necessary to raise ICT awareness which will in turn increase interest and motivation among students HEIs.

- Although the students in the study are not highly motivated; knowledgeable and skilled in ICTS nor possess highly positive attitudes towards ICTs, the findings showed that these students are still likely to use particular ICT application such entertainment media extensively. Therefore ICT practitioners should capitalize on devising ways of utilizing and or tailoring the few ICT applications that students currently enjoy using into all aspects of the academic sphere.

- In order to increase the students' motivation to use ICTs, encourage a positive attitude towards ICTs and increase their knowledge and skills in ICT it is recommended that educationalists, ICT practitioners and policy makers take into consideration at all times the fact that successful use and implementation of ICTs calls for more than just the presence of infrastructure. It also incorporates a positive presence of psychological resources.

6.3 Possible future research pursuits

The current study is a small scale case study which comprised of participants drawn from five HEIs in South Africa and as such the findings here revealed cannot be generalized for they serve mainly the purpose of informing and providing better understanding to researchers and practitioners on ICT access and use patterns by students in HEIs. A subsequent representative study that comprises of a substantial number of students cutting across the county needs to be conducted so as to validate, add and or refute the findings in the current study.

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Student Motivation for using Information and Communication Technology (ICT) at Higher Education Institutions in South Africa

This research project is aimed at understanding students' motivation for engaging or not engaging with Information and Communication Technologies (such as computers, the Internet and cell phones) in higher education institutions in South Africa. The researcher therefore is conducting this interview session in order to assess factors that encourage you to use or discourage you from using ICT.

Section A: Personal Information

Previous research findings in the literature reflect that social and economic backgrounds are factors that influence the use of ICT. For this reason you are kindly requested to provide the following personal information. Please note that this information will remain confidential.

1 Name and Surname
.....
.....

2 Name of your institution
.....
.....
.....

3 Qualification for which you are studying
.....
.....

4 Current level of study
.....
.....

5 Occupation of the primary bread- winner /guardian in your family
.....
.....

6 Highest level of education of the primary breadwinner /guardian in your family
.....
.....

7 Gender .....

8 Age.....
.....

Section B: Student's intention to use ICT

Attitude

Which of these new technologies have you tried using: skype, second life, facebook?

.....
.....

2. Which other new or latest technologies have you tried using?

.....
.....

3. Who introduced you to these new technologies? Was it someone some else or do did you explore them by yourself?

.....
.....

4. How much money would you be prepared to spend on a new computer?

.....
.....

5. What are your personal views or beliefs about using or not using computers?

.....
.....

Subjective norm

6. Do your friends and family encourage you to use ICTs? Why do you think this is so?

.....
.....

7. Would you use computers just to satisfy the expectations on your friends and family?

.....
.....

Perceived Behavioural control / computer self efficacy)

8. Do you rely on assistance and support from others when you use computers or do you work independently?

.....
.....

9. Which computer programs do you use on a daily basis?

.....
.....

10. Which programs would you like to learn to use?

.....
.....

11. Which programs would you be prepared to teach someone else?

.....
.....

12. What frustrates you the most about using ICTs, computers?

.....
.....

Perceived Network externality

13. Do your class mates, friends and family members make use of computers more that you do?

.....
.....
.....

Section C: Student Foresight

Perceived Usefulness

1. How do computers affect your performance? Give examples?

.....
.....

2. How do computers affect your efficiency (how well you do your work)? Give examples.

.....
.....

3. How do computers affect your productivity (Do they help you get more or less work done?) Give examples.

.....
.....

4. Will computer skills be relevant to you in your future work?

.....
.....

5. How useful are ICT in your daily life outside varsity, i.e. How do computers help address your daily needs?

.....
.....

Section D: Self Reactive

1. How do you feel after you finish working on something complicated using technologies like computer, cell or PDA?

Do you feel like your efforts are far from what I set out to achieve? (Marked difference)

Or

Do you feel like your efforts are within what you wanted to achieve? (Minimal difference)

Or

Do you feel like your efforts are average to what you set to achieve? (Moderate)

2. What do you do when a computer program does not work as it is intended? Do you

Try hard until you get a positive solution?
Get satisfied with which ever solution you come up with?
Quit and give up the activity?

Section E: Student's Individual perceptions

1. Would you use computers if you were not required to, i.e. do you want to use computers?

Yes□□□
.....
.....

No□□□
.....
.....

2. Are there any other reasons that motivate you to use or discourage you from using computers?

.....
.....

Appendix B

Construct	Sub Construct	Indicator	Code	Definition
Biographical details	Gender	Male	M	Students gender
		Female	F	
	Age	Age	< = 25	Students who are 25 years of age and below.
			> 25	Students who are over 25 years of age.
Academic information	Line of study	Humanities & Arts	LH	All areas of studies embracing philosophy, arts, literature excluding the science and technology field.
		Science & Technology	LS	All areas of study including mathematics, physical and material world as well as technology.
	Level of study	Undergraduate	LU	Students who have not completed the first higher education degree.
		Post Graduate	LP	Students who are pursuing further/advanced studies after the first higher education degree.
Institutional Context	Historical institutional type/context	Previously advantaged institution	HAI	Historically White Universities and Technikons
		Previously disadvantaged institution	HDI	Historically Black Universities/Technikons
	Institutional language	Afrikaans	LA	Afrikaans is the medium of instruction
		English	LE	English is the medium of instruction
		None known	NK	Not known
Social class	Bread winner occupation	Unemployed	BE	Does not have a job
		Self employed	BS	Makes a living from personal profession or business
		Working class	BW	Social class working for wages.
		Upper class	BU	High ranking class in society

	Bread winners Level of education	Uneducated	UE	Did not complete high school
		High school graduate	HS	Completed high school
		Obtained higher education	HE	Obtained a HE qualification
		Not known	BN	Not known
Attitude towards ICTs	Awareness of ICTs	Limited	AL	Limited – mentions only 1 name of ICTs they he/she is aware of or does not know anything
		Some	AS	Some = 2-3 names of ICTs
		Extensive	AE	Extensive = mentions more than 3 names of ICTs and or gives different examples from the interview ones.
	Interest in ICTs	Limited	IL	Limited – indicates very little interest (not explorative)
		Some	IS	Indicates some interest (introduced to ICT by friends)
		Extensive	IE	Indicates keen interest (e.g. self explorative)
	Name of ICTs used	Facebook	FB	Name of ICTs used
		Skype	SK	
		Other	OT	
		None	NN	
	Investing in ICT	Limited investment	IL	Not willing to spend money on ICT or below R5000
		Average investment	IA	Willing to spend R5000-10000
		Full/high investment	IF	Willing to spend over 10000
	Ideological/ Personal views	Positive	PP	Computer are useful and or are a necessity
		Negative	PN	Computers are bad and useless
		Mixed	PM	Computer have advantages and disadvantages
		Unknowledgeable	PU	Does not know much about ICT to comment
		Positive	IPP	Would still use ICT if he/she was not required

	Individual perceptions	Negative	IPN	Would not use ICT if he /she was not required
		Mixed	IPM	Would use ICT /computer only if it is beneficial
	Willingness to learn ICT	Low interest	WL	Does not want to learn anything new or mentions only 1 program that they would like to learn how to use
		Some interest	WS	Mentions 2-3
		Very interested	WV	Mentions 4 and above or willing to learn anything
Motivation	Subjective norm	Low	SBL	Does not feel pressured by family and friends to use ICT.
		Medium	SBM	Encouraged or pressured to use ICT by friends and family
		High	SBH	Uses ICT solely to satisfy the expectation of friends and family.
	External network influence	Low	EL	Uses ICTs as much as the same as people around or uses ICTs more than people in his/ her network area
		Medium	EM	Superseded by some people in his/her network area in the use of ICT
		High	EH	Superseded by all people in his/her network area in the use of ICT
	Academic use	None	AN	Does not perceive ICT as academically beneficial
		Some use	AS	ICTs are productive or efficient or improve performance
		Very useful	AV	ICT are academically productive, efficient and improve performance
	Future use	None	FN	Not aware of future ICT application in the future or ICT will not be applied in the future
		Uncertain	FU	Does not have definite knowledge of how ICT will be used in the future.

		Definite	FD	Definite about the future application of ICT in his or her personal career.
	Personal use	None Some High	PN PS PH	No use of ICTs in personal life Mentions 1-2 personal applications of ICT Mentions multiple (3-5) personal uses of ICT
Use of ICTs	Autonomy	Limited Some Extensive	AUL AUS AUE	Depends on the assistance of others when using ICT Works independently but also needs assistance from others from time to time Works independently and does not need assistance from others.
	Practical knowledge and skills	Limited Some Extensive	PKL PKS PKE	Limited – mentions only 1-2 names of ICTs they he/she can use Some = 3-5 names of ICTs Extensive = more than 6
	Transferable skills	Limited Some Extensive	TL TS TE	Cannot teach others what he/she knows or can only teach one program Can only teach 2-3 ICT programs Can teach 4 and more programs or prepared to all he/she knows about ICT
	Frequency of use	Low Medium High	FL FM FH	Does not use computers and ICTs daily Uses ICTs every other day Uses ICT daily
	Effort required to use ICT	Low Medium High	ERL ERM ERH	Puts in little effort but achieves a lot Effort put is equal to results/productivity Puts in a lot of effort but achieves very little or average
	Self reactions to ICT	Negative Mixed	SN SM	Quitter/ tries solving the problem and then gives up First tries solving the problem or and then asks for

	challenges	Positive	SP	assistance Solves the problem personally or waits for the problem to resolve
	Types of ICT Challenges	None	TCN	Experiences no problems
		External/ Technical/	TCE	Experiences problems caused by the hardware/power cuts/ignorance
		Internal	TCI	Experiences problems caused by the Software / internal ICT systems

Appendix C

The psychological analytical framework with examples

Attitude	Awareness of ICT	General exposure	Limited	" yah facebook, skype, ahh second life I haven't heard of"
			Some	"Facebook, Skype I've tried"
			Extensive	None of the respondents had extensive GE, i.e. knew/used all three programs; facebook, second life and Skpe
		Personal exposure	Limited	"we have the new I guess high speed..."
			Some	"umm well right now I can think of IPod and... wi-fi"
			Extensive	"I am using MixIt...eh tag and high five."
	Interest	Explorative Behaviour	Limited	"umm, currently I don't get onto the internet very often so I haven't really gotten into most those [ICTs], umm so yah"
			Some	" umm a friend of mine [introduced me to ICTs] and she uses everything, mxit, facebook she introduced it to me I think a year ago or something yah "
			Extensive	"well at times I probably discover them on the internet"
		Willingness to Invest in ICTs	Limited	" I wouldn't want to spend a lot to get the latest computer I'll just get like you know the basic"
			Some	"probably about 7 thousand [Rand]"
			Extensive	"if I had money I would be prepared to spend 15 grand [R 15,000] on an apple mac"
		Willingness to learn	Limited	"I don't need [to learn] anything at the moment" or " a program I'd like to learn how to use properly is maths lab"
			Some	"PowerPoint, and internet something and Microsoft excel "
			Extensive	"I would like to learn anything that is interesting about the computer" or
		Frequency of ICT use	Limited	"on a daily basis I would say Microsoft office at home"
			Some	There were no examples of such students in the interview.
			Extensive	There were no examples of such students in the interview.
	Personal Views	Personal Beliefs	Negative	"I mean one thing is about computers is they stop people from reading cause - don't read - I mean if I want to know about cars I go to Google and type cars you know…it is it makes

				it easier that kinda makes people lazy…I don't really like it because people tend to be on break the whole day…if I'm not at school or if I'm not at work I never mess with the computer, for me for now it doesn't help me in any way"
			Mixed	"there's an element of privacy that is involved so you always have that thing if you're logged onto the internet your privacy may be invaded but I feel that it saves a whole lot of time and it's more convenient"
			Positive	" computers are the way forward, yah I think everyone should be using them it's better than writing notes or type writers or anything like that so I think yah everyone should start using computers"
		Personal Perceptions	Negative	"no"
			Mixed	" if not required to use it I think I'll see if it's beneficial to use it or not "
			Positive	"yes I would"
Skills	Practical knowledge and skills	Limited		"most frequently use Microsoft word"
		Some		"Microsoft office at home so I mean I'll be using PowerPoint I'll be using Microsoft word, excel so that's about it"
		Extensive		"microsoft office package"
	Autonomy in ICT use	Limited		"oh yah a lot [of assistance from] my boyfriend actually [he] just fixes my computer all the time"
		Some		"I work independently … but if it's like stuff like very technical stuff I do consult somebody but if just the use of computers and like reception and stuff like that I do it on my own by if it's something like it's software and hardware whatever I do ask somebody to help me but apart from that I don't I always rely on my own knowledge"
		Extensive		"no I think I work independently maybe because I'm doing computer science"
	Ability to share ICTs skills	Limited		"probably Microsoft word"
		Some		"PowerPoint or word and just the basics yes maybe excel"
		Extensive		" I can teach most of the Microsoft office package and basic programming with Pascal"
	Types of ICT Challenges	Hardware		There were no examples of such students in the interview.
		Software		" Okay, right now the only thing that frustrates me is … ehm … downloading something, when I am trying to download something and I can't that's the only thing that frustrates me, otherwise I am very happy I think."

		Mixed		"the fact that at times you forget to save things and you find that they are saved in other place and also lastly the power cutting the computer just shut down you wonder what's happening and the fact that you cannot fix the computer so when something goes wrong you don't know what has gone wrong, what are you supposed to do so yah"
		None		" there's nothing really" [that frustrates me]
Motivation	Current Application of ICTs	Academic Applications	Limited	" I think I'm more productive without the computer actually" "I can't say that it improves it" [my performance]
			Some	" I think definitely computers have improved my performance, in general terms like learning all the programs and getting a lot of general knowledge I think yah it's probably more efficient "
			Extensive	Performance: "definitely makes it a lot easier to perform" [well]. Efficiency: " umm well yah it does pretty much everything else for you than the work you know, so it counts words for you." Productivity: "well yah I can do absolutely anything, I can order a book, send some e-mails, I can do facebook like ( ), go onto Wits get my things sorted out, download the journal articles I need to read, type up my essay. It's so much easier and actually at the moment everything just happens through that computer"
		Personal Applications	Limited	' I can communicate with friends abroad"
			Some	" I receive Zulu news paper on e-mail every Thursday ...I have to apply for a visa every now and then to see my boyfriend and I suppose it's just waiting there for me I don't have to go and wait in queue and deal with people that don't want to deal with me you know"
			Extensive	"I like to just put the computer on and listen to music or like go onto facebook, go and Google stuff on the internet anything like that."
	Future Use of ICTs	Definite use		" if I'm in the social field I mean Psychologist obviously I'll have to enter information about employees you know, I have to use excel for calculating stuff money and things like that, I have to use PowerPoint for presentations umm yah basically"
		No definite use		" yah a very minimal part maybe when I get to management"

	Self efficacy and use of ICTs	Effort required to conduct ICT tasks	Little	" it's like I always put in little effort and I get too much"
			Some	" I feel like most times I put in a lot of effort and receive like average"
			A lot	"nah I don't think I mean to put in that much effort in or it's pretty much there in front of me but I definitely get a lot back"
		Reactions towards ICT challenges	Negative	"you see I'll just get up and go do something else" or "umm I normally get irritated and leave the computer for a while and sort of just stop working with it"
			Mixed	"yah I would try again I mean if it doesn't work I'll have to try from another source and get it" or "if I know what the problem is I obviously go back and start again but if I don't know then I'll have to ask around for the information and get help on how to do it properly"
			Positive	"I'll try harder" or "I hardly ever have problems with that I think about, when I can't do something I just I don't know I find ways of doing it. I'm very efficient, self efficient yes so I'll just try and you know more what I do with my tool, my toy and then I yah I achieve what I want to achieve what I wanted to achieve at the end of the end of the day."
	Subjective Norm	Pressure from family and friends to use ICTs	Low	"umm no"
			Medium	"well he's doing, he's studying computers at school and he's doing genetics and he's always on the computer, he probably thinks that technology is the way forward so he's trying to encourage me to use the computer and yah like if you like the computer is the way forward so he'll be encouraging me to use it"
			High	"umm well in the sense of my boyfriend's family yes cause it's the only way I really get to know them better you know I only see them on holidays"
		External network influence to use ICTs	Low	" I'd say much more than my friends much more"
			Medium	"my friends use the computer more than I do and family members they don't use a lot"
			High	"my classmates yah they use computers more than I do"

Case study on ICT access and use at
Higher Education Institutions in South Africa

July 2008

Dear Sir/Madam

VOLUNTARY CASE STUDY INTERVIEW FOR A MASTER'S THESIS PROJECT

What is this project about?
This research project is about access and use of information and communication technology (ICT) by students in higher education institutions in South Africa. The aim of this project is to investigate what motivates students to use computers, in other words this study will explore factors that encourage students to use or discourage students from using computers. The information received from this project will be used to inform the Centre of Educational Technology at University of Cape Town as part of its ongoing research projects sponsored by the National Research Fund. Primarily, the information in this study will be used as a case study in a Master's thesis paper by the researcher.

What is expected of you?
You are requested to respond to telephonic interview questions regarding different factors that influence your use of computer.

What are your rights as a participant?
It is not compulsory for you to participate in this case study therefore you can withdraw from this study at any point you wish to.

Anonymity and confidentiality
In order to ensure anonymity, data that will be used in the research project will not include information that identifies you as a participant in the study. Your informed consent form will be filed and will only be accessible by the researcher and her supervisors.

Sources of additional information
If you have any questions regarding this study, please do not hesitate to contact Regina Monyemangene: rmonyemster@gmail.com

I hereby confirm that the researcher, Ms Regina Monyemangene, has informed me of the nature of this study. I understand that:

- I am free to withdraw from the interview of this case study at any point, without giving any reason for my termination.
- I will have sufficient opportunity to ask questions before and after the interview.
- I will, upon request, have the opportunity to review the information I provide.
- I will have the opportunity to review and comment on my responses before this information is included in a final paper.

I, ... declare myself prepared to
(Participant's name - PLEASE PRINT) participate in the case study on ICT access and use at Higher Education Institutions in South Africa

Participant's signature: ..... Date:

I, Ms Regina Monyemangene, hereby confirm that the participant has been informed in full of the nature and the manner in which the questionnaire and interviews on computer access and use at Higher Education Institutions in South Africa will be conducted.

Researcher's signature: ..... Date: 08 July 2008

Appendix E

Students' attitudes towards ICTs and demographics

Students' attitude towards ICTs and demographics												
Demographics ⇨			Gender		Age		Line of Study		Level of Study		Socio-economic background	
Attitudes ⇩			Male	Female	Less or equal to (<=)25	Above (>)25	Humanities and Arts	Science and Technology	Under-graduate	Post - Graduate	Middle socio-economic status	High socio-economic status
Awareness	General Exposure	Limited	100%	80%	86%	0%	80%	100%	85%	100%	86%	87%
		Some	0%	20%	14%	100%	20%	0%	15%	0%	14%	13%
		Extensive	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Personal Exposure	Limited	40%	60%	57%	0%	60%	40%	46%	100%	86%	25%
		Some	40%	30%	29%	100%	40%	10%	39%	0%	0%	63%
		Extensive	20%	10%	14%	0%	0%	40%	15%	0%	17%	12%
Interests	Explorative Behaviour	Limited	20%	0%	07%	0%	0%	10%	08%	0%	14%	13%
		Some	40%	80%	64%	100%	80%	40%	69%	50%	43%	0%
		Extensive	40%	20%	29%	0%	20%	40%	23%	50%	43%	87%
	Willingness to Invest in ICTs	Limited	0%	10%	7.1%	0%	10%	0%	8%	0%	14.3%	0%
		Some	80%	70%	71.4%	100%	80%	60%	69%	100%	71.4%	75%
		Extensive	20%	20%	21.4%	0%	10%	40%	23%	0%	14.3%	25%
	Willingness to learn	Limited	60%	80%	79%	0%	70%	80%	69%	100%	100%	50%
		Some	40%	10%	14%	100%	20%	20%	23%	0%	0%	38%
		Extensive	0%	10%	7%	0%	10%	0%	8%	0%	0%	12%
	Frequency of ICT use	Limited	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Some	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Extensive	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Personal Views	Personal Beliefs	Negative	20%	0%	7.1%	0%	0%	20%	8%	0%	14.3%	0%
		Mixed	20%	20%	21.4%	0%	30%	0%	15%	50%	14.3%	25%
		Positive	60%	80%	71.4%	100%	70%	80%	77%	50%	71.4%	75%
	Personal Perceptions	Negative	20%	20%	14%	100%	30%	0%	23%	0%	0%	37%
		Mixed	20%	0%	7%	0%	0%	20%	8%	0%	14%	0%
		Positive	60%	80%	79%	0%	70%	80%	69%	100%	86%	63%

Students' ICT knowledge and skills in relation to Demographics

Students' ICT skills and Demographics											
Demographics ⇨		Gender		Age		Line of Study		Level of Study		Socio-economic background	
⇩ Skills		Male	Female	Less or equal to (<=)25	Above (>)25	Humanities and Arts	Science and Technology	Under-graduate	Post - Graduate	Middle socio-economic status	High socio-economic status
Practical Knowledge and Skills	Limited	40%	40%	36%	100%	40%	40%	46%	0%	29%	50%
	Some	60%	50%	57%	0%	60%	40%	54%	50%	57%	50%
	Extensive	0%	10%	7%	0%	0%	20%	0%	50%	14%	0.00%
Autonomy	Limited	0%	20%	14.3%	0%	20%	0%	8%	50%	14%	12%
	Some	0%	20%	14.3%	0%	20%	0%	15%	0%	29%	0%
	Extensive	100%	60%	71.4%	100%	60%	100%	77%	50%	57%	88%
Ability to share ICTs skills	Limited	0%	30%	14%	100%	30%	0%	23%	0%	29%	12%
	Some	20%	60%	50%	0%	50%	40%	38%	100%	42%	50%
	Extensive	80%	10%	36%	0%	20%	60%	39%	0%	29%	38%
Types of ICT challenges	Hardware	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Software	80%	80%	79%	100%	90%	60%	85%	50%	57%	100%
	Mixed	20%	10%	14%	0%	0%	40%	8%	50%	29%	0%
	None	0%	10%	7%	0%	10%	0%	7%	0%	14%	0%

Students' Motivating factors to use ICTs and demographics

Students' Motivating factors to use ICTs and demographics												
Demographics ⇨			Gender		Age		Line of Study		Level of Study		Socio-economic background	
Motivation ⇩			Male	Female	Less or equal to (<=)25	Above (>)25	Humanities and Arts	Science and Technology	Under-graduate	Post - Graduate	Middle socio-economic status	High socio-economic status
Current Applications	Academic Applications	Limited	0%	10%	7%	0%	10%	0%	8%	0%	0%	13%
		Some	80%	30%	43%	100%	40%	60%	54%	0%	14%	75%
		Extensive	20%	60%	50%	0%	50%	40%	39%	100%	86%	12%
	Personal Applications	Limited	60%	0%	21.4%	0%	20%	20%	23%	0%	14%	25%
		Some	40%	70%	57.1%	100%	50%	80%	54%	100%	43%	75%
		Extensive	0%	30%	21.4%	0%	30%	0%	23%	0%	43%	0%
Future use	Definite use		80%	90%	86%	100%	90%	80%	85%	100%	100%	75%
	No definite use		20%	10%	14%	0%	10%	10%	15%	0%	0%	25%
Self efficacy	Effort required to conduct ICT tasks	Little	40%	30%	35%	0%	30%	40%	39%	0%	57%	12%
		Some	10%	30%	29%	0%	10%	60%	15%	100%	29%	25%
		A lot	40%	40%	36%	100%	60%	0%	46%	0%	14%	63%
	Reactions towards ICT challenges	Negative	40%	40%	43%	0%	40%	40%	38%	50%	43%	37%
		Mixed	40%	40%	36%	100%	40%	40%	39%	50%	43%	38%
		Positive	20%	20%	21%	0%	20%	20%	23%	0%	14%	25%
Subjective Norm	Pressure from family and friends to use ICTs	Low	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Medium	60%	90%	79%	100%	70%	100%	77%	100%	86%	75%
		High	40%	10%	21%	0%	30%	0%	23%	0%	14%	25%
	External network influence to use ICTs	Low	40%	40%	36%	100%	40%	40%	46%	0%	29%	50%
		Medium	40%	30%	35%	0%	20%	60%	31%	50%	42%	25%
		High	20%	30%	29%	0%	40%	0%	23%	50%	29%	25%