

**THE ADOPTION OF TECHNOLOGY TO SUPPORT TEACHING AND LEARNING IN  
A DISTANCE LEARNING PROGRAMME AT AFRICA NAZARENE UNIVERSITY**

**By**

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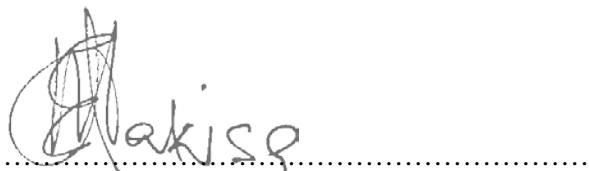
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## CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the University of South Africa a thesis entitled: ***The Adoption of Technology to Support Teaching and Learning in a Distance Learning Programme at Africa Nazarene University***, in fulfilment of the requirements for the degree of Doctor of Education in Didactics of the University of South Africa.

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## **ACKNOWLEDGEMENT**

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I acknowledge the support and cooperation of the administration and students of Africa Nazarene University who gladly accepted to be part of this study.

## **DEDICATION**

This work is a special dedication to my loving husband, Mr. Nixon Ooko that the good Lord may continue to bless him for his patience, understanding and sacrifice.

## **ABSTRACT**

The current increasingly changing world shows the influence and effects of technology in all aspects of learning. In developed Western countries, the Higher Education institutions believe that these developments offer valuable opportunities for improved learning as a result of technological advancements and innovations in the learning environment. This has in turn placed the responsibility on developing countries, in order to strive better competitively in international markets, even under tremendous pressure, to similarly embed suitable blends of technologies within their own learning and curriculum approaches, and consequently enhance and improve new learning opportunities. The positive increasing growth in access to and use of technology has caused more approaches to be developed in e-learning and is manifested in different forms. This has supplemented or replaced the traditional methods in learning, enabling engagement of learners with their learning through various web technologies alongside face-to-face delivery, and sometimes completely replacing direct face-to-face contact. However, the success of use of technology in learning depends, to a significant extent, on how the students actually use them for learning purposes.

The purpose of this study is to examine the extent that technology is accepted, adopted and used to enhance learning and teaching in a distance education context. The study employed an extended version of the Technology Acceptance Model (TAM) in its investigation of the underlying factors that affect students' use of technological systems in learning. It explored students' perception and experiences of using technology for learning and teaching to guide the Institute for Open Distance Learning (IODL) in Africa Nazarene University (ANU) to develop strategies for implementation of technology-enhanced learning. This study revealed that students' attitudes and perceptions on the use of technology in learning and teaching were diverse and were both positive and negative. While positive attitudes and perceptions of users to adopt Technology in learning and teaching can simplify their understanding and use of the technology in learning and teaching, negative attitudes would instead complicate this making adoption difficult. A deeper focus on the factors that affect adoption and technology use in e-learning as well as their associations is a pre-cursor to a better knowledge and understanding of student acceptance of e-learning technological systems.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

\$	American Dollar
ANU	Africa Nazarene University
APT	Questions under Attitude and Perception (APT1 to APT26).
APT3	Attitude and Perception on Technology
CAMS	Comprehensive Academic Management System
CDROMs	Compact Disc Rom
CDs	Compact Discs
E-learning	Electronic learning
<i>E-mail</i>	Electronic mail
e-Naz	Customised e-learning software for Africa Nazarene University
ERP	Enterprise Resource Planning
FGD(s)	Focused Group Discussion(s)
GDP	Gross Domestic Product
ICT	Information Communication Technology
IDT	Innovation Diffusion Theory (Adoptions of Innovation Model)
IODL	Institute of Open and Distance Learning
IT	Information Technology
K-R	Kunder- Richardson
LMS	Learning Management System
M-learning	Mobile learning
MP3 players	Media Player Three, that can reduce a file to lower size to fit 150 items
ODL	Open and Distance Learning
PCs	Personal Computers
PDA(s)	Personal Digital Assistant(s)
PEOU	Perceived Ease of Use
PhD	Doctor of Philosophy
PU	Perceived Usefulness
SMS	Short text Message Service

SPSS	Statistical Package for Social Sciences
TAL	Questions under Technology adoption level (TAL1 to TAL13)
TASTL	Technology Adoption to Support Learning and teaching
TAT	Technology Acceptance Theory
TRA	Theory of Reasoned Action
TTD	Theory of Transactional Distance
TV	Tele-Vision
UNESCO	United Nations Education and Social Commission
UOT	Questions under Use of Technology (UOT1 to UOT15)
US	United States
USA	United States of America

## **DEFINITION OF KEY TERMS**

**Adoption:** Successful integration and use of new technology by an organization, individual or even a group of people. For the purpose of this study, the organization/group/individual will those engagedin e-learning.

**Attitude** is an expression of favor or disfavor toward a person, place, thing, or event (in this study, will refer to e-learning)

**Effective teaching:** Teaching pedagogies that result in observable student achievement and offers a variety of contextual contexts.

**Effective technology integration:** The use of technology in education as an integral tool for the purpose of enhancing student achievement.

**E-learning:** a general term covering many different approaches that have in common the use of information and communication technologies.

**Experience** is the knowledge or mastery of an event or subject, in this case ability to use technology in teaching and learning through experience.

**Internet:** A publicly available computer network consisting of a worldwide network of computer networks that use the TCP/IP network protocols to facilitate data transmission and exchange: its synonyms are cyberspace and Net.

**Learning Process:** Perceptions of technology's impact on learning processes; includes enhanced student-teacher interaction, enhanced student-content interaction, and enhanced student-student collaborative learning.

**Learning:** the activity or process of gaining knowledge or skill by studying, practicing, being taught, or experiencing something; the activity of someone who learns.

**Perception** is the organization, identification, and interpretation of sensory information to represent and understand the learning environment for the case of this study.

**Psychological space** refers to the notion of space as experienced. In this case, the space a learner or a teacher will experience while using e-learning platform.

**Teaching:** refers to an arrangement and manipulation of a situation in which there are gaps or obstructions, which an individual will seek to overcome, and form ways, which he will learn in the course of doing so.

**Technological Pedagogical Content Knowledge (TPACK)** is a framework to understand and describe the kinds of knowledge needed by a teacher for effective pedagogical practice in a technology enhanced learning environment.

**Technology Users:** For the purpose of this research; technology users are lecturers and students.

**Technology:** high-tech media utilized in instruction such as computers, e-mail, Internet, list-serves, CDROMs, software, laser disc players, interactive CDs, digital cameras, scanners, digital camcorders, etc.

**Transactional Distance** is a term used in educational setting, especially in distance education to refer to the theory of cognitive space between instructors and learners formulated by Michael G. Moore at University of Wisconsin-Madison

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 BACKGROUND**

The contemporary trend that has seen the ever-increasing demand for university education, overstressing the few residential facilities and the need for advanced learning, has led to the emergence of Open and Distance Learning (ODL) in most higher education institutions in Kenya. This transition is highly influenced by the swift development of information and communication technologies (ICTs) all over the world. In recent years, many of these institutions have invested extensively in their technological infrastructure. This has drawn attention towards a greater use of the technological infrastructure for education purposes. Effective integration of technology in learning and teaching involves the interaction of the knowledge areas of technology, better methods of teaching, and adding to the content on the part of the teacher (Pierson 2010: 24). Paradigm shifts that have occurred in the field of offering instruction through technology has shown a growing emphasis on curriculum integration of technology (Hargrave & Hsu 2010: 15). Massey (2009: 78) states that “it is the promise and anticipation of what technology can do in the future that is now affecting attitudes and ideas about how we can teach and learn”.

The magnitude of new technologies introduced over the last ten years or so has also impacted tremendously on Open and Distance Learning practices (Weumin & Dhanarajan 2006). Bollag and Overland (2001), assert that many educational institutions are answering the challenge of increased enrolment and lack of physical space, by developing distance learning programs. The acquisition of quality higher education through technology within distance education has found remarkable levels of praise from various scholars. Moore et.al (1990) argue that through the integration of technology in distance learning, quality education has been made accessible at very low cost to people who are engaged in other activities of daily living that are likely to bar them from attending schooling on a regular basis (Bollag & Overland 2001).

Kenya has witnessed an unprecedented expansion of distance learning programmes to cater for the great number of people determined to enhance their skills and positions in the work place while still desirous of working and supporting their families. Technology has been hailed in the context of distance education as a variable that maximizes the use of limited physical and human resources and facilities used in these accepted institutions (Ayot 2005).

The increased trend towards use of distance education among conventional higher education institutions has been fuelled by two major factors: institutions are seeking to enrol non-resident learners; and the increasing need by adult learners to seek and acquire qualifications while overcoming the constraints inherent in conventional education (MOEST 2006). The Africa Nazarene University (ANU) heeded this need by establishing The Institute of Open and Distance Learning (IODL). The Institute was founded in 2008 to deal specifically with distance education, targeting students in Kenya and beyond. The Institute was created to provide learning opportunities for those aspiring to study at university level but who are unable to commit their time to study through the conventional mode of study; to provide alternative and innovative education which is not limited by space and time; to provide opportunities for people to learn at their own pace, and to provide the much needed manpower for development (Athoye2013).

## **1.2 CONTEXT OF THE STUDY**

Africa Nazarene University is essentially a contact institution which also offers distance education provision. It has a student population of over 4,000, with four departments and two schools, six campuses, offering support to distance education students. Currently, the distance student enrolment stands at 600. The IODL strives to keep abreast of developments in the rest of the world by putting more emphasis on the use of technology to support learning and teaching. There are presently over 500 personal computers on campus, but it is aimed to be increased to 1000 personal computers; creating a 1:1 ratio of computers to staff and a 1:5 ratio for students (Athoye 2013). The university also has embarked on putting up more computer laboratories, training of staff and students on using technologies for learning and teaching. To achieve this, the Institute has a Learning Management System (LMS), called the Comprehensive Academic Management System (CAMS) which they use for registration, student finance, and examinations. This allows students to check their assignment, examination and feedback results online. The institution has also established a Corporate SMS service, which allows students to communicate with the institution in obtaining fee balances, fee statements, examination results, important dates and emergency alerts. This has increased efficiency, effectiveness, and convenience in the means of communication between students and the university (Athoye 2013).

The university also has a Sage Accpac Enterprise Resource Planning (ERP) system which has seen integration of all financial data and processes in a single consolidated system. The Human Resource Management Information System (HRMIS) is used to capture staff records and staff-related processes. In the past, more focus was placed on enhancing the ICT infrastructure, hardware, and administration systems; the institution subsequently progressed on to use technology for e-learning and has recently introduced video-conferencing facilities to link its main campus to the Meru campus. This was made possible by the enhancement of the fibre-optic connection between the city of Nairobi and Meru town.

ANU has introduced e-learning using the e-Naz Moodle platform. More than 50 lecturers and facilitators have received appropriate training on the use of the e-Naz platform, while new students are provided computer literacy training, use of internet technology, and the use of the e-Naz platform. The university also regularly holds several training programmes seminars and meetings, to raise awareness of e-learning among lecturers (Athoye 2013). The institution's library catalogue is accessed through the University's Website. Other services accessed from the Website, include information on courses, programme, fees and so on. Mobile telecommunications and land lines are used for tutorials and other related services. The learners can also e-mail their queries to administrative staff. Despite the efforts of the IODL to encourage appropriate use technology to support learning and teaching, the author, currently the Director of the IODL since its inception, has observed apparent challenges posed by the use of technology in relation to these purposes. There has also been an observation of resistance to the use of technology by some staff members and students.

One of the main challenges of using technology to support distance learners is that there are very few people who have the necessary skills to teach and learn using ICT in universities. The demand for e-learning has grown tremendously but the number of tutors and lecturers trained to guide learners on ICT has failed to meet the demand requirements. More students are willing to be taught and guided through computing skills than there are teachers to guide them in acquiring the skills (Singh & Means 2000). Most of the lecturers are not comfortable with using a computer. The perception, especially by the older generation, that computers require highly skilled personnel in their operations is strong. Even if this may not be true in some cases, management also fear that their students may be in danger when they access undesired sites while using the internet. The threat of virus infection to users' computers leading to data loss has also caused fears among the users. While this may be true to some

extent, appropriate training on the proper use of computers to ensure safety can help alleviate some of these fears (Martin 2011).

Availability of ICT infrastructure is the first step towards adoption and use of technology in Universities. However, a study by Hennessy (2010) revealed that there is lack of adequate facilities like hardware, software and internet limited accessibility of ICT to a large segment of the population in sub-Saharan Africa. The study also found that other factors such as transport networks, electricity, import duties, network configuration and technical faults compounded the problem.

Nchunge et al. (2013) noted that in Kenya some universities have computers but they are limited in number and can only be accessed by the office of the heads of departments. This problem is further compounded by the fact that in Kenya computers are still costly, with a GDP of \$1600, most people and institutions of learning cannot easily purchase computers considering computers as a luxury item. Used computers cost about US \$150 and branded new computers are sold at US \$500 or higher (Martin, 2011). Since computers are very expensive in Kenya, they are often stolen by thieves who usually sell them on the black market. This has caused many institutions of learning to incur extra expenses trying to secure the computer rooms from burglars (Martin 2011). In addition, most institutions of learning do not have the internet due to the high connectivity costs. On average, it costs approximately \$120 per month to connect effectively 15 computers on a bandwidth of 128/64kbps (Martin 2011).

The other challenge in developing and implementing Educational Management Information systems (EMIS) in Kenya is that technological innovation outruns the pace of institutional innovations. If planners do not think and act at the speed of the technological divide, they are likely to be always left behind by the technology. Martin (2011) concluded in his study that very few universities in Kenya have sufficient ICT tools for learning and teaching. The study on “The twelve challenges facing computer education in Kenyan schools” (Martin 2011), found that the student-computer ratio was high and this was a challenge faced during integration of technology in teaching.

### **1.3 PROBLEM STATEMENT**

Despite challenges, most universities are equipped with modern technological equipment such as computers and internet connectivity which are updated on a fairly regular basis. However,

this does not in itself guarantee the use of the technology to support learning and teaching without challenges. It appears that technology has not brought about the widespread changes in teaching methodologies that was hoped for. The successful implementation of the use of technology in learning and teaching is a complex process, attributed to pedagogical values, attitudes, curriculum needs and physical infrastructure (Granger et al. 2002). The way in which students are taught and what they are taught, requires adjustments to and around technology (Watson 2003). However, most distance learning programs in Africa are seemingly failing due to lack of technological pedagogical knowledge among students and lecturers. Although students and lecturers acknowledge the value of technology, difficulties continue to be experienced in adopting and using technology for learning and teaching. Balanskat *et al.* (2006) and Mueller et al. (2008) argue that, although many students are becoming aware of technology in general, they still may not be ready or capable to use it.

A substantial body of research asserts that students have difficulty in using technology because of various obstacles or barriers (Balanskat *et al.* 2006 and Becta 2004). These difficulties and barriers, such as lack of computer skills, time and accessibility of technological devices, if not addressed, could result in profound impacts on the use of technology to support learning and teaching in main stream educational systems and open educational systems. At Africa Nazarene University there have been many e-learning platforms that have been implemented but which have not lasted the test of time because there has never been a formal framework for adoption of new technologies.

Despite the ubiquity of technologies for learning and teaching in education today, evidence supporting their use is said to be anecdotal especially in developing countries. Particularly, very little research has been done on use of technologies to support learning in ODL and how instructors and trainers have influenced student learning in Kenya. Many researchers have cited lack of theoretically grounded and extensively done research as a key challenge to be addressed (Alavi & Leidner 2001; Piccoli, Ahmad & Ives 2001).

The successful implementation of the use of technology in learning and teaching is a complex process, determined by teaching values, attitudes, curriculum needs and physical infrastructure consequently impacting on the rate of its adoption (Granger *et al.* 2002). A substantial body of research asserts that obstacles such us lack of electricity, computer skills, network configuration and accessibility to technological devices have a profound impact on the use of technology to support learning and teaching (Balanskat *et al* 2006); Becta (2004;

Nchunge *et al* 2013). Most distance learning programs in Africa seemingly fail due to lack of technological pedagogical knowledge among both students and lecturers.

The infrastructural challenges facing developing countries in relation to the developed world such as lack of connections in the rural areas, frequent power interruptions, the high initial cost of technology for learning and teaching in universities has not in itself guaranteed the adoption and use of technology to support learning and teaching in higher learning institutions. Although students acknowledge the value of technology, various higher learning institutions including ANU found that their students are not adopting and using technology optimally for improved learning and teaching.

The way in which students are taught, instructional methods used, competence of their lecturers and what they are taught directly impacts on their attitude and perception towards the use of technology in learning and teaching, thus calling for constant adjustments to and around technology (Watson 2003). It may also be true that other factors such as gender, age, background in computing technology, individual intention and effort to play a role in the students' adoption of technology may be impacting on adoption of technology in learning and teaching in Africa Nazarene University. This may lead to the assertion made earlier that most distance learning programs in Africa are seemingly failing due to lack of technological pedagogical knowledge among students and lecturers.

Although students acknowledge the value of technology, various higher learning institutions such as Africa Nazarene University still experience difficulties in adopting and using technology for learning and teaching. This is partly because E-leaning platforms that have been implemented do not last to the test of time because of lack of a formal framework for adoption of new technologies among other possible factors that this study unveils and hence inadequate support and guidance for both students and lecturers in making the transition from contact to e-learning. Therefore this study determines how students at a distance education institution in Kenya perceive the use of ICTs to support learning and teaching in distance education and establishes the extent and use of ICTs in their learning.

## **1.4 RATIONALE**

While one can adopt various technological strategies and use different tools to support the learning environment, deployment of technologies in distance education is known to result in more effective and efficient practices within institutions. Research indicates that effective use

of technologies in distance education promotes learner centeredness (Mudasiru 2006). This can improve the efficiency and effectiveness of learning processes and outcomes. According to Masizana *et al.* (2008), universities are increasingly introducing learning platforms that enable learners to access course materials and communicate among themselves. This, it is said, improves communication and collaboration between students and saves time as students are capable of engaging in learning opportunities outside the face-to-face context (Cole 2005). Lecturers in distance education can effectively integrate technology into learning and teaching activities in a systematic way which is important for transforming pedagogical activities. Lecturers who have adopted technologies in teaching can support distance learners more effectively. Online learning provides students with better accessibility to learning material. Similarly students can share their concerns or passion of the subjects with their peers.

Research studies indicate that distance learning is equally or even more effective than traditional instructional methods when the appropriate technologies are used in the instructional tasks; when there is student-to-student interaction and when there is timely lecturer-to-student feedback (Moore & Thompson 1990; Verduin & Clark 1991). This aspect of accessibility helps students to continue learning irrespective of their professional obligations and on top of saving their time, while cutting down their financial expenses. In addition, courses offered in distance learning are usually cheaper than regular learning (Singh & Means 2000).

It is for the above reasons that this study seeks to investigate the adoption of technology to support learning and teaching in a distance learning program at Africa Nazarene University as experienced by students when engaged in learning and teaching. The concept of distance learning has been frequently debated in developing countries in the recent past. Most developing countries previously offered distance learning correspondence courses where printed learning materials used to be dispatched to the students at regular intervals. The basic philosophy was that teachers would be separated physically from their students but could still conduct the teaching process from a distance. With the development of the computing sector of the technological industry and internet networks during the recent decades, things have changed and global communication has reached greater levels (Sagarmay 2011). With these great developments, great opportunities have come to the surface to impart learning efficiently and interactively.

Use of technology in media and internet connections have changed the whole philosophy of learning and distance learning and provided us with the opportunity for close interaction between learners and their teachers with better enhanced standard of learning facilities in comparison to the traditional facilities; which were often limited only to the printed media. This has led to creation of virtual classrooms where teachers and students are scattered all over the world. This developing countries are faced with an up-hill task of purchasing these facilities due to the higher costs, placing developed countries in a better position to take advantage to impart better learning facilities to those students in the developing world. This has resulted in an increasing degree of cross-border higher education provision offered by institutions in the developed economies. Due to low internet connectivity and computerization in the developing countries, e-learning remains greatly challenged, however. (Sagarmay 2011).

This aspect of accessibility helps students to continue learning irrespective of their professional obligations. This not only saves time but also cuts down on financial expenses for students (for example through savings on accommodation, travel and materials costs). Moreover, most courses offered as part of distance learning method are cheaper than their regular counterpart according to Singh and Means (2000). Therefore this study sought to find out how technology adoption can be harnessed to support students who are studying at a distance. The online method of delivery does not only save time and money often associated with travelling costs to places of learning but it also offers flexibility in learning schedules. Distance learning programs typically attract mature students and many of the courses offered are skills- based. This makes it easier for the student to relate the content with day to day work and own experiences. The Kenya Institute of Open Learning (KIOL) is an example of a leading model distance learning institution founded on a theme of reaching everyone who aspires to learn. Its core pillars include flexibility, accessibility and affordability while maintaining quality (Kiol, 2013).

Emerging trends in technology have shown greater signs of curbing the barriers that have for a long time restricted access to higher education. The use of computer applications and proper learning strategies, together with more expansion on the content delivery, increase the effectiveness of the existing academic programmes. Through emerging trends in communication technology, the effectiveness of computer-delivered coursework can be improved at the same time developing access to scientific and technical information (Anyona, 2009).

Some of the renowned open universities in the world include the UK Open University, Korea National Open University, Anadolu University's Open Educational Faculty in Turkey, and the Open University of Japan which all began as institutions of this second generation. When these institutions started operating, they selected broadcast media, television and radio, as a mode of instruction (Anyona, 2009) that enabled them to reach a mass audience, and supported their mission to expand educational opportunities for many students who were unable to attend full time study (Bates, 2005 and Peters, 1994). Unlike the previous technologies that were used to deliver content, the internet has made it possible to enable interaction as well as provision of more varied content. These new technologies have made it possible to provide interactivity between learner and content, as in CD-ROM and web-based materials provision while maintaining interactivity between lecturers and students through email and/or online forums. This method facilitates content personalization to match learning preferences, according to Bates (2005).

Over the years, distance education has been involved in using technology to deliver content and to improve interaction between the students and the lecturer. Taylor (2001) suggested five distance education generations which started with the Correspondence model which was based on traditional technology, in this case, print; the second model was technology on media model which used print, audio, and video. The third model was referred to as the Tele-learning model which used telecommunications that provided fast communication and the fourth, Flexible learning model, was based on Internet delivery. The last was referred to as an Intelligent, flexible learning model which focused on the interactivity of the Internet.

## **1.5 RESEARCH OBJECTIVES**

The general objective of this research is to establish and examine the extent that technology is accepted, adopted and used to enhance learning and teaching in a distance education context.

The specific objectives of this research are:

- To assess the level of adoption of technology amongst students in an ODL environment.
- To examine how students are using technology in learning and teaching processes.
- To explore the students' attitudes and perceptions about using technology in learning and teaching.

- To identify factors influencing implementation of technology to support learning and teaching in an ODL environment.

In this study, the following questions were responded to:

- What is the level of adoption of technology among students in a specific ODL environment
- What are the students' attitudes and perceptions in using technology for Learning?
- What factors influence the implementation of technology to support learning and teaching in an ODL environment?
- What is the association between technology users' attitude/perception and adoption of technology in studying process?

## **1.6 THEORETICAL AND CONCEPTUAL FRAMEWORKS**

There has been a long existing challenge regarding the adoption of technology in learning and teaching generally, even though technology has been used successfully over the years in various specific contexts. For the purpose of understanding the study, it is important to use theories and models that demonstrate "willingness within a user group to employ Information Technology for the tasks it is designed to support" (Dillon & Morris 1996). Several user acceptance theories and models such as: Innovation Diffusion Theory (Adoptions of Innovation Model), Theory of Reasoned Action, Technology, Technology Acceptance Theory and Theory of Transactional Distance (Baraghani 2007) have been developed to study technology adoption. This study will touch on all of these models and theories, but will focus on the Technology Acceptance Model (TAM).

Since mainstream technology use in higher education is relatively new, it is important to use the Technology Adoptions Model to explain the interactions between environment and strategic choices made by organizations via strategies to control the resource dependence condition (Rogers 2003). Upon choice to adopt a particular innovation by an individual or organisation, there are both positive and negative outcomes expected. Rogers (2003) further argued that to avoid bias on positive attitudes associated with the adoption of a new

technology, further research needs to be done in this area. He argues that similarity between adoption and diffusion is close except that diffusion deals with the psychological processes an individual goes through, rather than an aggregate market process (Rogers 2003).

The Technology Acceptance Model (TAM) was used to determine the extent of technology adoption or use by individuals and organisations. The Technology Acceptance Model attributes two main factors, which are perceived usefulness (PU) and perceived ease of use (PEOU) as the main factors affecting attitudes towards a new technology (Eben & Achampong 2010). Davis et al. (1989) argues perceived usefulness will have a direct influence on the behavioural intention whenever the technology is free of effort, people will realize its usefulness. The Technology Acceptance Model (TAM) is “an adaptation of Theory of Reasoned Action (TRA) specifically tailored for modelling user acceptance of information systems” (1989). TAM is widely considered to be one of the most useful models related to accepting and using technology; it has shown great potential in explaining and predicting user behaviour of information technology and making it the most preferable model to explore the acceptance of e-learning (Park 2009). These two fundamental elements - perceived ease of use (PEOU) and perceived usefulness (PU) are considered to be the basics of TAM and the main mechanisms underlying perceived ease of use are system design and features, whereas the core means underlying perceived usefulness is effort decreasing (Davis et al, 1989; Moore 2012).

Since this study focussed mainly on the use of technology in a distance education context, Moore's theory of transactional distance was used in conjunction with these models to conceptualise the study. Distance education provision, considered as a transaction in this case, is "the interplay between people who are lecturers and learners, in environments that have the special characteristic of being separate from one another, and a consequent set of special learning and teaching behaviours" (Moore and Kearsley 1996: 200). The degree of transactional distance is dictated by as many factors such as how much and what kinds of instructor-provided dialog and structure will be required to accommodate the transactional distance (Moore & Kearsley 1996). Physical distance is an essential feature in distance education causing communication gaps, possible misunderstandings between the behaviours of lecturers and those of the learners caused by psychological space (Moore & Kearsley 1996: 200). In order to overcome the threat posed by transactional distance, which is pedagogical not geographically affected, Moore and Kearsley (1996: 200) recommended designs that are instructional and not interactional in procedure. This study tried to relate the Theory of

Transactional Distance with the Technology Acceptance Model through the researcher's argument for a framework that addressed technology adoption, perception and usage by students in learning and teaching in open distance learning.

## **1.7 RESEARCH METHODOLOGY.**

To answer the research questions, a mixed methods approach that encompasses the usage of both quantitative and qualitative data was extensively employed in this study (Creswell 2009). To address the objective of the study on the technology adoption to support learning and teaching in a distance learning program at Africa Nazarene University, data was collected both qualitatively and quantitatively. In accordance to McMillan and Schumacher (2010) and Schulze (2003), researches in the wider area of education require both quantitative and qualitative research approaches in enhancing the understanding of learning, teaching and other human phenomena. The targeted population of this study were students in the Institute of Open and Distance Learning of African Nazarene University, ANU. In this study, qualitative research was used to explore students' perceptions of technology while quantitative research was used to determine the extent to which technology is used. Interviews were used to explore the students' experiences in using technology while the questionnaire was used to validate the extent to which technology is used by the learners in learning and teaching in ANU.

### **1.7.1 THE MIXED METHOD RESEARCH APPROACH**

The mixed research design was purposely used in this study to provide a deeper sense of the information collected concerning the extent that technology is adopted, accepted and used to enhance learning and teaching in a distance education context. To investigate the wide array of information on adoption and implementation of technology processes, both qualitative and quantitative data were therefore used in this study. Quantitative research is suitable for theory testing and universal statement development. Quantitative studies provide results that are contextually generalizable across the study area. On the other hand, qualitative research was a source of in-depth knowledge in the area of the study but could not easily be generalised. Qualitative research was used to explore students' perceptions of technology while quantitative research was used to determine the extent to which technology is used. The qualitative research explored contexts from a phenomenological perspective specifically articulating participants' understandings and perceptions and generation of tentative concepts

and theories in connection to particular environments. The use of a multi-method approach in this study was helpful as it provided richness and detail to the study exploring specific features of each method.

In education research, Erickan and Roth (2006) argue for an integrated approach to research inquiry by suggesting that the two methods should be used as a continuum rather than a dichotomy. All phenomena and all knowledge simultaneously have quantitative and qualitative dimensions (Erickan & Roth 2006: 22). Qualitative research addresses small scale, behavioural aspects whereas quantitative research provides large scale, structural features of social life. Therefore, in education research, mixed methods can be used to expand an understanding from one method to another. The researcher extensively used qualitative data collection with an aim to understand the perceptions and attitudes of the learners concerning the use of technology in teaching and learning. The interests of the researcher were, not only to understand the learners' attitudes and experiences, but also to establish what will create a stable e-learning environment. The use of quantitative data further revealed more information on the relationships established through qualitative data.

These research paradigms taken together reveal the conscious and the unconscious views, perceptions, values and beliefs of students. The idea is to achieve a good degree of reliability, so that results could be replicated by other researchers employing the same methods. Quantitative and qualitative methods can also be used to triangulate each other. Triangulation is the combination of several methodologies, theoretical perspectives, empirical material, and analytical methods to study the same phenomenon through various lenses (Denzin 1970: Bryman 1988: Hammersley & Atkinson 1995). In this study, methodologic triangulation was used so that both qualitative and quantitative approaches were employed in a single study aimed at investigating the specific research phenomenon (Denzin 1978).

According to Kelle (2001), the combination of qualitative and quantitative methods may lead to more valid results. Triangulation does not only check the validity of data, but it can be used to discover which inferences from those data are valid (Hammersley & Atkinson 1995). Therefore, triangulation in this instance was used as a means in the production of a more complete picture of the investigated phenomena. If used for complementary purposes, triangulation should be used in cross-checking if data has validated the picture of the investigated phenomenon in a complete way compared to a single method (Kelle 2001). That way, triangulation made it possible to validate the different results from different methods.

The validity of one method was checked against the validity of the other method in order to get results through a planned and systematic collection, analysis and interpretation of data. The multi-method approach does not only narrow the gap between quantitative and qualitative methods, but also offers a better understanding of the processes taken in investigating the students' experiences of using technology. The research findings were obtained using triangulation methods, encompassing questionnaires and interviews. Thus methodological triangulation in this case means the use of several research methodologies when examining an issue, affording an opportunity to combine the qualitative method with the quantitative one (Guion, 2002). Furthermore, it ensures the authenticity, credibility, validity and robustness of results and could mitigate researcher bias (Denzin, 1978) and (Carter, 1990). Similarly, Yin (1994) advocates the use of multiple sources as desirable in research.

### **1.7.2 Research Population**

Data was collected from the students in the Institute for Open and Distance Learning (IODL) at ANU. Students enrolled in the distance education programme of ANU are 600 and data was collected only from these students not those who attend contact sessions. The study focused only on distance learning students because they have substantial experience of the technology usage in learning and teaching in ANU because all distance education students are expected to use computers for their learning.

Therefore the sample of this study was drawn from the population of distance education students. As Kombo and Tromp (2006) point out, an effective sample population should be diverse, representative, accessible and knowledgeable on the topic being investigated. This is because by studying a sample as a finite part of a statistical population, properties of the sample are studied that are helpful in gaining information about the whole population. A sample is a subset of the target population from which the researcher intends to generalize the findings (Cohen & Marion 2000). To effectively select a representative sample, the researcher first obtained a sample frame; a list of all academic departments in ANU. A multistage random sampling technique was then carried out in selecting the study sample due to its various benefits such as inclusivity and comprehensiveness (Creswell 2009; Kombo & Tromp 2006). To ensure this, two stages of sampling procedure were followed:

Stage 1: a purposive sampling method was used to select students from academic departments and schools who were to participate in this study. This method was chosen because the researcher knew that the participants have more knowledge in the area of this research.

Stage 2: Following this process, to explore the students' attitudes and perceptions about using technology in learning and teaching, data was collected from one Focus Group consisting of 12 students. Judgmental and stratified sampling was used to select respondents who have various levels of understanding of the e-Naz, virtual learning platform and who represented different academic departments and schools.

### **1.7.3 Ethical Considerations**

In this research study, during the research process, appropriate attention was addressed to ethical issues to ensure the integrity of the research and protection of the rights of the subjects in line with Garner, Wagner and Kawulich (2009) who assert that ethical considerations inform all the components of the research methods, and hence need to be given special attention. With proper planning and appropriate consultation with individuals and groups prior to the beginning of the research, the research avoided ethical problems (Garner, Wagner & Kawulich 2009; Sing 2007) such as lack of honesty, lack of confidentiality, lack of informed consent, invasion of privacy, deception, plagiarism, anonymity and many others.

The University of South Africa, in accordance to this, makes it a requirement that all projects involving human subjects need to have a complete approval of the University's Research Ethics Committee before conducting the fieldwork. In accordance to the University's Ethics Policy Guidelines, the researcher filled the Ethics Form as required, which was signed by the researcher and approved by the research student's supervisor. Accordingly, the Research Ethics application form was filled and signed by the researcher and supervisors and then submitted to the College of Higher Degrees for ethics approval to conduct this research study.

To conform to the ethics requirements of the university, a covering letter was also attached with the questionnaire stating the purpose of the study. In the covering letter, the names and the address of the researcher, and university were included to increase respondent's confidence and to ensure respondents would know with whom they were dealing as already discussed above. The confidentiality of the respondent's information was maintained and they were not described in any way that allows them to be identified. To maintain confidentiality and privacy of the respondents in accordance with Garner, Wagner and Kawulich (2009), only aggregate results were used in the report of this study. The personal information of the participants was not identified in any of the study findings. In addition, the data collected was strictly used for the purpose of this study and its objectives, which is for academic research for fulfilment of the requirements of a PhD dissertation. Before individuals became

respondents of the study, they were notified of the aims, methods, anticipated benefits and the hazards of this study. Secondly, the respondents were informed of their right to abstain from participation in this study and their right to withdraw at any moment they would wish. The confidential nature of their replies was guaranteed.

## **1.8 SIGNIFICANCE OF THE STUDY**

This study is expected to contribute to the existing body of knowledge in the areas of technological adoption in distance learning within a contact institution. The research could contribute to the limited number of empirical researches on adoption of technology in Universities operating in Kenya. This research embarked on an assessment of the current technological usage in the University as a learning and teaching tool in the distance learning institute in African Nazarene University, and hence tried to provide insights into factors that affect the implementation of technology to support learning and teaching in an ODL environment more generally. It also highlighted the potential power of technology as the main tool to promote rapid growth and expansion of distance learning institutes with the simple and convenient facilities guided by the internet.

The study will be useful both to educators and researchers by providing a clearer view and deeper understanding of many of the issues related to technology adoption in distance learning. The university and its authorized personnel are permitted to use this paper for academic reference. The study will hopefully also act as a valuable resource for reference in literature reviews for those intending to do further research on technology adoption related topics and finally, it should contribute value and input to the pool of the already existing knowledge by confirming theories that exist and making recommendations.

## **1.9 ORGANIZATION OF THE DISSERTATION**

This section presents the structure of this research. This thesis is organized into seven chapters. Below is a research summary of chapters of the study.

Chapter 1: The focus of this chapter is a review of the overall technology adoption concept that is relevant in this research. The main aim of this chapter is to provide a background to the

study through reviewing the context of the study, problem statement, research objectives, research questions, rationale of the study, literature review, research design, significance of the study, and organization of the dissertation.

Chapter 2: This chapter discusses a literature review of the adoption of technology by learning institutions. It deals with the analysis of the literature related to the subject of the study with the objective of seeing the concepts, ideas and opinions of scholars/experts regarding specifically the sub-objectives of the study.

Chapter 3: This chapter consists of a review of the generic theories on technology user acceptance models such as Social Learning Theory, Equity Theory, Theory of Reasoned Action, Innovation Diffusion Theory (Adoptions of Innovation Model), Technology Acceptance Theory and Theory of Transactional Distance

Chapter 4: This chapter deals with qualitative research part of this study. The discussion on research design includes the study population, sample size for both qualitative and quantitative study, sampling procedure and ethical considerations.

Chapter 5: This chapter explores the quantitative research, objectives of quantitative study section, data collection instrument, development of survey questionnaire, limitations of the survey questionnaire, validity and reliability in quantitative research, the contributions of the pilot study, data collection procedure, analysis of data and summary of the chapter.

Chapter 6: The sixth chapter gives the results and discussions of both the qualitative and quantitative findings as a result of data analysis. Answers to research questions are also given at this chapter while comparing the findings of both the qualitative and the quantitative study.

Chapter 7: The final chapter includes a summary and conclusions in which various recommendations and final remarks are discussed. The limitations of the study as well as areas for future research are also highlighted and discussed. This chapter is followed by the list of sixteen (16) appendices that were used in this study.

A collection of various appendices relating to this report have been provided for example, Appendix A (Confirmation of Registration at UNISA for 2015), Appendix B (Research Permit), Appendix C (Letter from the National Council for Science in Kenya Granting the Researcher permission to conduct research in Kajiado County of Kenya at Africa Nazarene University), Appendix D (License provided by the Kenya National Council of Science and Technology Permitting the Researcher to conduct research in Kenya), Appendix E (Focus Group Interview Research Schedule), Appendix F (Questionnaire for Quantitative Part of the

Research), Appendix G (Transmittal Letter for the Questionnaire Respondents), Appendix H (Consent Form for Questionnaire Respondents), Appendix I (Transmittal Letter for the Focus Group Discussants), Appendix J (Consent Form for Focused Group Discussion Participants), Appendix K (Student Assistant Confidentiality Form), Appendix L (Declaration), Appendix M (Research Budget), Appendix N (Work Plan), Appendix O (Krejcie And Morgan Table) and ethical approval.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

The aim of this chapter is to present a literature review on distance learning, e-Learning, studies on students' uses of technology, studies of adoption of technology studies in general and on the technology acceptance model (TAM) in particular. This chapter also encompasses a diversity of theoretical views and concepts regarding the technology adoption for distance learning paradigm. Foremost, it exemplifies the development of the utilisation of technology in distance education over the years and it also presents an in-depth explanation of the most important research on technology adoption models/theories, their educational importance as well as their applicability. Finally, the chapter concludes with a brief overview of the use of technology in distance in learning in higher education.

#### **2.2 CONTEXTUALISING DISTANCE LEARNING**

Since this study is focusing on distance learning students, it is important to look at the utilisation of technology in distance provision in order to contextualise the study. For many years, distance education has used technologies to address various challenges related to access to education due to distance, cost and work commitments among others. Although Keegan (1990: 94) reports that Stewart 'sometimes tries to trace distance education back as far as the epistles of St. Paul', and Willis (1994: 5) proposes that 'Itinerant wanderers delivering information by word of mouth were perhaps the world's first distance educators', distance education did not really begin until the rise of the industrial society (Willis, 1994). By the end of the 19th century, it was well established in the form of correspondence study (Keegan, 1990). In 1840, in England, Portman (1978) describes how, in the United States alone, 48 institutions were offering doctorates by correspondence, some of which were offered in such a dubious nature that correspondence study gained a tainted reputation that took decades to erase. With so many sellers flooding the correspondence study market, not only private institutions, but also denominational ones were hard pressed financially. The old or initial definition of distance learning is slowly being transformed as advancement in technology as well as challenges related to the needs of schooling or lifelong learning require new approaches. At the same time, interest in the unlimited possibilities of individualized distance

learning is growing with the development of each new communication technology. Keegan (1980) asserts that learners need to be taught as individuals rather than in groups.

Holmberg (1989: 168) refined the definition by stating that Distance Education is a concept that covers the learning and teaching activities in the cognitive and/or psychomotor and affective domains of an individual learner. It is characterized by non-contiguous communication and can be carried out anywhere and at any time which makes it attractive to adults with professionals and social commitments (Holmberg 1989: 168). As communication technology has evolved, the possibilities for interactivity have increased. But the choices made have often involved the continued use of one-way technologies, which rule out the ‘noise’ that builds a vigorous and active life world (Holmberg 1989: 168).

The first generation of correspondence study arguably evolved from the Biblical Pauline Epistles where word of mouth and letters played a key role (Keegan 1990: 94; Willis 1994: 5). However, formal distance education began during the industrial society in countries such as England and the United States (Portman 1978). Regarding the second generation (multimedia distance education, Holmberg (1989: 1) posits that as new technologies developed, ‘the term correspondence was felt by many to be too narrow’, and ‘distance education’ became the designation of choice for education that was no longer simply tied to print material and the postal service. This second generation of distance education integrated the use of print with broadcast media, cassettes, and to some degree, computers (Nipper 1989).

Keegan (1990: 94) points out that with the growth of new technologies, the opportunities for communicative action via two-way communication increased, but were often squandered by emphasizing the quantity and seamlessness of production over the quality of the learning experience, especially group interaction and social learning. Like the first generation of distance education (Keegan 1990), the main objective of the second generation has been the production and distribution of teaching/learning material to the learners. Communication with the learners has been marginal, and communication amongst the learners has been more or less non-existent (Nipper 1989: 63). Without the interaction to ground communicative action, this second generation has provided few opportunities to serve the needs of real life. A number of factors contributed to the growth of the second generation of distance education including, new communication technologies, growing sophistication in the use of printed materials, improved support services for distance students and the establishment in 1969 of the Open University of the United Kingdom (Keegan 1990).

The beginning of the 21st century moved us deep into the information age. That is what Noble (1995) refers to as the second Industrial Revolution. In the first Industrial Revolution of the 19th century, the context of the economy shifted from homes and household workshops to factories and offices; now it is shifting to the infrastructures of the information highway (Menzies 1996) and back to the home. The harbinger of this second Industrial Revolution, the vehicle of this so-called knowledge-based economy, is the computer. The information highway has made inroads into almost every facet of Western life, including distance education. But in many ways its vaunted promise merely masks the way education is being used to achieve student conformity and adaptation to dominant ideology (Spencer 1998). By creating a dependency on technology and by incessantly repeating the necessity of acquiring the skills needed for the so-called knowledge-based economy, such an education becomes education to serve economic purposes, not social purposes.

In their report on the state of technology usage in higher education, Cunningham *et al.* (2000) argue that “notwithstanding the rapid growth of online delivery among the traditional and new provisions of higher education, there is as yet little evidence of successful, established virtual institutions.” However, in a 2002 survey of 75 randomly chosen colleges providing distance learning programs in California, results revealed an astounding growth rate of 41% per program in higher education distance learning (Primary Research Group 2002).

Gunawardena and McIsaac (2003) also found that in this time of shrinking budgets, distance learning programs are reporting more than 40% average annual enrolment growth. About 30% of the programs are being developed to meet the needs of professional continuing education for adults. These developments signal a drastic redirection of traditional distance education from purely print-based to technology enhanced learning. Sagarmay (2011) estimated that, an IT-based education and the e-learning market across the globe was projected at \$11.4 billion in 2003. With the extended application of information technologies (IT), the several conventional universities have crossed physical boundaries to reach the un-reached through a virtual education system.

The use of technology in the distant mode gives students an opportunity to study through self-learning methods. According to Nicole (2005), “University faculty members have been among the last educators to experience the educational thrust toward technology integration” (p. 36). The study by Nicole (2005) responds to the need to establish the current practices of faculty members in developing nations in relation to technology use for learning and teaching following investments made to boost technology availability in the university. Factors

influencing the utilization of new technologies (such as computers, the Internet and the World Wide Web) have been analysed through the lenses of several theories that have also informed similar research endeavours (Nertha *et al.* 2009).

Within the education sector, Internet use has been widely implemented in universities, high schools, business organisations and even the Not for Profit organisations for more than two decades with real impact in peoples' lives in their learning process. In a survey by the Pew Internet and American Life Project (2005), it was revealed that in the U.S., college students seemed generally positive about the Internet and its impact on their educational experience. The finding showed that for distance learning, projects did not enjoy much success, however. The survey also found that there appeared to be little interest among traditional college students of between 10 to 22 years old to abandon the face-to-face classrooms for online or distance learning. The study further showed that only 6% of students took online courses for college credit, and out of those 6% only half (52%) thought the online courses were worth their time, with the other half saying that they believed they learned less from the online course than they would have from a face-to-face or physical class at campus. Gauging from the above findings, it is clear that for students already enrolled in traditional college courses, online education has a long way to go before it might challenge the traditional classroom.

On study habits, the findings showed that 73% of college students were using the internet as the primary site of their information searches rather than the library. The convenience of the internet was tempting students to rely very heavily on it when searching for academic resources (Pew Internet & American Life Project 2002) as compared to the physical library.

The survey by the Pew Internet and American Life Project (2005) also showed that distance learning projects have not found much success because students have the option of choosing between study in classrooms and online courses. But in remote areas, where the classroom is not available for those who are interested in studying, taking online courses may be the only choice and may be better than nothing. Although the scholar argued that this preference for online courses in remote areas could make distance learning helpful to people in those areas to communicate with others and to increase their knowledge by learning via the Internet since they have no chance to study in traditional classrooms, this may not be necessarily so. One reason could be that if these people genuinely cannot afford to construct a physical classroom, then other facilities such as electricity or computers could be equally challenging to access.

In contrast to the foregoing discussion. According to Donnellan (2002), Information and Communications Technology (ICT) projects run in various parts of the world such as the UK Education Departments have shown that the use of ICT in education provides a number of learning benefits. Such benefits include improved subject learning across a wide range of curriculum areas such as English, mathematics, science, history, geography, modern languages, art, technology, IT and careers, as well as independent study and cross-curricular project work; improved motivation and attitudes to learning; development of independent learning and research skills; improved vocational training; development of network literacy (the capacity to use electronic networks to access resources, create resources and communicate with others, these can be seen as complex extensions of the traditional skills of reading, writing, speaking and listening; and social development).

### **2.3 DISTANCE LEARNING IN KENYA**

The initial policy put forward by the government to address open higher education was the Act of Parliament of 1966, which established the Board of Adult Education. Since independence, however, a number of commissions and reports have highlighted ODL as an alternative mode of education provision. For example, the Ominde Commission of 1964/65 recommended the establishment of an advisory commission on ODL; the Gachathi Report of 1976 emphasized the need for solving large scale educational problems by diversifying education to include ODL; the Mackay Report of 1981, the Kamunge Report of 1988 and the Koech Report of 2000 included the use of ODL in their recommendations.

The latest government initiative as contained in Sessional Paper No. 1 of 2005 recommended the establishment of an Open University and use of ODL in human resource development at all levels (Juma 2003). The practice of ODL in the country has been at all levels of education and provided by different institutions governed by their own institutional policies. Some of the major providers include: the Kenya Institute of Education (KIE); University of Nairobi; the Kenya Institute of Special Education (KISE); Kenyatta University; African Medical Research Foundation (AMREF); Ministry of Health; Ministry of Agriculture; Ministry of Education under school based teacher development program; and a number of cross border institutions.

Furthermore, there are other institutions operating in this country that provide and manage distance learning. For example, the African Virtual University (AVU) which used to run

programs in Francophone and Anglophone Africa but has since changed its mandate from providing distance learning directly to the learners to providing training to staff in institutions offering open and distance learning.

According to Juma (2003), this uncoordinated ODL practice has made some impact on education and development in the training of adult literacy teachers; primary school teachers; training of teachers in special education; cooperative practitioners; training of medical professionals; and primary school enrichment through radio programs and use of electronic modes. While online learning holds promise, a number of challenges would have to be tackled before it can be fully utilized in Africa. There are a number of resource-related and technological constraints that hinder distance learning. Telephone and other communication infrastructures outside of major cities remain inadequate. These challenges are in spite of a policy document by the Government of Kenya on ODL that is yet to be implemented (Republic of Kenya 2006). The current state of the Internet, Internet usage in Africa, internet culture, internet access, the impact of the internet on peoples' lives, and use of the internet in education are critical. A key challenge that has been noted as highly impacting on the effectiveness and efficiency of online and distance education is the internet. This is based on its being a platform through which online and distance learning can be facilitated.

## **2.4 USES OF TECHNOLOGY IN DEVELOPING COUNTRIES**

Kenya is no different from many developing countries in using technologies for learning and teaching. In the developing world, studies show only a tiny percentage of Africans enjoy Internet connectivity (Amoako 1998), perhaps one in ten thousand outside South Africa. These people are effectively invisible in an electronic world. As Roche and Blaine (1997) have observed, if one measures the IT capacity of countries in terms of millions of instructions per second (MIPS), then it has been estimated that most of the developing world suffers from a “MIPS gap ratio” in the order of something like 1:26 with the developed world. Another estimate of the disparity suggests that developing countries, whilst representing around 80 percent of the world population, account for only 2 percent of the total global expenditure on informatics (Hanna 1991; Sagarmay 2011). This translates to the adoption of technologies in Higher education in the developing countries as such distance learning technologies are informatics-based.

The major hindrances are related to insufficient time and to the poor infrastructure which causes some of the registered students to leave without completing the course. The poor infrastructure and inadequate access to new technology is often cited to argue against the strategy for offering higher education to targeted individuals in developing countries through the internet. Statistics on internet usage currently in higher education in the developing countries show, however, that the poor infrastructure and access to modern technology is changing drastically. For example, data collected in 2008 show that in Africa internet usage is 4.7% of the population, in Asia it is 12.4%, in Middle East 17.4% and in Latin America/Caribbean it is 20.5% of the population (Sagarmay, 2011).

A Case Study in Serbia using DeLone and McLean's updated information system model to evaluate the success of an e-Learning system and its courses in a transitional country like Serbia, highlighted the importance of system quality, service quality, content quality, learner perspective, instructor attitudes, and supportive issues. Other issues included system design, user accessibility, easiness of course procedure; interoperability of system and suitability of academy administration; ease of instruction management and appropriateness of multimedia use; flexibility of interaction and test and learner control; variety of communication and test types; user accessibility.

From the findings above, it is clear that features identified by the Usability of e-Learning applications play a significant role in e-Learning success bearing in mind that a consolidated evaluation methodology of e-Learning application does not yet exist or is not well documented and widely accepted (Ardito et al. 2006). In their research Ardito et al. (2006) proposed a methodology for systematic usability evaluation (SUE) for the evaluation of e-Learning applications with 4 dimensions: presentation; hypermediality; application proactivity; user activity. Granic (2008) reported about the experience with the usability assessment of intelligent learning and teaching systems and suggested that the main issues regarding universal design related to e-Learning systems include: learner-centered design paradigm, context of use approach, individualized approach, pedagogical framework, and guideline framework. For the evaluation of e-Learning systems statistical analysis of data used by learners are of great importance.

In the research of Hogo (2010), the Logo Pro tool was used for statistical analysis and description. The pattern obtained from this tool may be very useful in collecting some statistics about the data and the tool provided good feedback to the e-Learning systems about the monthly, weekly, and daily traffic on the site as well as the types of data needed and the

important directories for the students. In the research of Hassanzadeh et al. (2012) combining models and previous studies, a model for analysing e-Learning system achievements entitled MELSS is presented with components suitable for measuring e-Learning systems, such as technical system quality, educational system quality, content and information quality, service quality, user satisfaction, intention to use, user loyalty to system, benefits of using the system, and goal achievement.

## **2.5 USES OF TECHNOLOGY IN DEVELOPED COUNTRIES**

Although many developing countries have not fully embraced technologies for learning and teaching, developed countries, especially in the West, have been using technology to enhance learning. A study from the UK and Australian property academics (Australian Institute of Building (2012), Boyle, Bradley, Chalk, Jones and Pickard (2003), asserted that although the uses of technology in distance education are diverse, including video conferencing, email, e-learning platforms among others, persisting challenges were still pushing students towards preference for blended learning. The Australian Institute of Building (2012) and Boyle, Bradley, Chalk, Jones and Pickard (2003) define blended learning as the use of a range of teaching methods. However, the Australian academics have further determined that the focus of student use of technology learning should be on student learning, rather than teaching (Australian Institute of Building 2012; Boyle, Bradley, Chalk, Jones & Pickard 2003). The common reasons why the property academics in both countries use blended learning are to enhance the students' learning experience and to align with the university's business model(Australian Institute of Building 2012; Boyle, Bradley, Chalk, Jones & Pickard 2003). The Australian property courses are commonly delivered to both on-campus and online students at the same time, while there is a high level of part-time property courses in the UK, therefore, in both countries blended learning is considered a suitable delivery approach in those circumstances. The Australian academics also stressed a pedagogical reason, which is to provide different learning options to suit individuals' learning needs and preferences (Australian Institute of Building 2012; Boyle, Bradley, Chalk, Jones & Pickard 2003).

The majority of early research studies concentrated on students' cognitive outcomes, that is, on academic achievement. Only relatively recently have studies been conducted that focus on students' affective outcomes, their attitudinal development in an ICT-rich environment. For

example, in a review of findings from research, Ringstaff and Kelley (2002) conclude that technology has a positive effect on student motivation, attitudes toward learning, self-confidence, and self-esteem. However, these researchers and others (Coley, 1997; Mandinach & Cline 1997; Russell 1997) contend that due to difficulties resulting from rapid changes in technology and inadequate measures, many of the results from “studies examining the impact of students learning ‘with’ technology are far from conclusive” (Ringstaff & Kelley 2002: 7). What is clear is that few studies have been conducted that are empirical in design and implementation.

The call for research to inform policy and support schools in creating a more diverse and inclusive ICT-rich curriculum that views the development of students holistically, and recognises individual need and capacity, is increasingly widespread. Mandinach and Cline (1997) were among the first to recognize the need for research to focus on longitudinal design, multiple methods, and multiple levels of analysis. In a report to Education Network Australia (EdNA), the need for further research was implicit in the suggestion from Moran et al. (1999).

Many studies have found that female students maintain a more positive attitude towards school than male students, but both decline with age (Christensen 1998; Dix 1999; Dix, 2005; Keeves 1986). On the other hand, it appears likely that female students do not approach computers with the same enthusiasm as male students (Dix 1999; Dix 2005; Liao 1999; OECD 2006). A paper discussing issues and challenges in information technology education in Australian schools noted that: schools are still reporting significant gender imbalance in Computer Studies and courses. It need hardly be stated that while this continues, the countries are missing out on large numbers of potential information technology professionals, and girls are missing out on a wide variety of exciting and worthwhile career opportunities (McDougall 2001: 19).

Schofield (1995) reported that there were clear differences between boys and girls, both in the age they began to use computers and in the nature and degree of exposure to computers at home. Adding further support to the concerns of many educational practitioners about gender equity, Janssen-Reinen and Plomp (1997) concluded that, in comparison to male students, female students knew less about ICT, enjoyed using the computer less, and perceived more software problems. The scholars attributed these gender inequities to “differences in parental support, access to computers (in terms of availability and use), amount of female role models and activities carried out with the computer at school” (Janssen-Reinen & Plomp 1997: 77).

A significant research focus on gender and ICT in the areas of literacy and numeracy was identified by Blackmore *et al.* (2003) in a wide-ranging review of literature on disadvantage, ICT and learning. These authors found little research and few case studies that considered the issue of “How ICT works for different groups of NESB students disaggregated by gender and location, for example, how does English as a second language impact on their attitudes and use of computers?” (Blackmore *et al.* 2003: 71). How students’ language background, age and gender influence their self-esteem in a changing learning environment is clearly an area of research requiring further investigation.

## **2.6 STUDIES OF ADOPTION OF TECHNOLOGY**

In addition to the studies on the uses of technology, there are other studies that focused on how people accepted and adopted technology for learning and teaching. According to Volery (2000: 35), the level of adoption of e-learning is still low in various parts of the world, especially in Africa. Volery (2000) argues that the fast expansion of the internet and related technological advancements alongside limited budgets and social demands for improved access to higher education has produced a substantial incentive for universities to introduce eLearning courses. Volery (2000: 36) adds that if universities do not embrace eLearning technology that is readily available by increasing their level of adoption, they will be left behind in the pursuit of globalisation. A study by Rosen and Weil (1995) and Hadley and Sheingold (1993) found that the level of adoption by lecturers and students is highly affected by lack of teaching experience with ICT, lack of on-site support for teachers using technology, lack of help supervising children when using computers, lack of enough ICT specialist teachers to teach students computer skills, lack of computer availability, lack of time required to successfully integrate technology into the curriculum, and lack of financial support.

Other studies such as by Ribiero (2002: 23) arguing along the same line posit that if learning institutions are to utilize the potential of eLearning as a means of enhancing higher education, they must be fully aware of the critical success factors concerned with introducing online models of education. The identification of critical success factors in adoption is pivotal in increasing the level of adoption of technology among lecturers and students. A review of 150 distance education programs in Sub-Saharan Africa has concluded that traditional, paper-based means of distance learning continues to be more reliable, sustainable, and widely used than online and Web-based methods of learning (Leary & Berge 2006).

According to UNESCO (1999), 42% of the inhabitants of developed countries have telephone connections in contrast with 4.5% in developing countries, and only a mere 1.4% in sub-Saharan Africa. In addition, most single telephone connections in rural areas in developing countries are typically shared among communities, rather than owned by individual households (Mackintosh 2005). The 1998 Working Conference on *Capacity Building for IT in Education in Developing Countries* demonstrated the importance that developing countries' governments place on computer education (Marshall & Ruohonen 1998: 65). The conference representatives identified the need to provide computers to enable students to first develop computer skills, and second to use computers for distance learning. As an example, Botswana policies identify computer education as necessary for the people of Botswana to compete in a modern, IT-driven, global economy (Ojo & Awuah 1998: 25).

According to Laurillard (2003: 176-177), lecturers and students use technology in learning and teaching through various ways. Such ways include audiographic conference environment, audiographic task-based environment on the web, digital discussion environment, webinars, tutorial simulation programs, and interactive programs. Another study by Dela and Bandalaria (2007: 14, 17) found that Philippine educators have used combinations of radio, print, audio, and video recordings for distance education of learners scattered around the Filipino islands since 1952. Yet the country faces typical infrastructural and digital divide challenges between rural-urban populations when it comes to using computers and associated technologies for learning. However, the proliferation of mobile phones in developing countries like the Philippines may enhance the development of mobile learning (m-learning), to educate the masses.

The University of the Philippines' Open University launched an m-learning program in 2004 that offered print and mobile materials for simple and universally relevant health, literacy, and numeracy education. Such mobile learning programs may have potential for growth, but the limited capacity of mobile devices, the cost of synchronous interactions, and the rural-urban divide may hinder further developments.

A survey of 387 students in their final undergraduate year at the Virtual University of Pakistan established in 2002 concluded that the majority of students (over 90%) found learning over the internet and via satellite TV beneficial (Hussain 2007: 10). As of 2004, however, Pakistan had only five internet cafés for every 10,000 people, and most students rely on these locations for access (Syed 2004: 16). The result is that Pakistani students in this study reported difficulties in accessing computers, libraries, friendly learning environments,

and efficient mentors. The majority also reported on electricity failures, computer vision syndrome, finger joint pain, backaches, headaches, and dizziness due to occasional long periods of computer use to compensate for limited access (Hussain (2007: 17). This meant that even though they had a positive attitude, challenges such as infrastructural failure and electricity failures could possibly swing their attitudes and perceptions on using technology in learning to be negative.

At Indonesia's Open University, the University of Terbuka, 320,000 students reported similar limitations in online infrastructure and access (Belawati & Zuhairi 2007: 7). Distance education systems and students continue to rely heavily on post, courier services, and telephones (Belawati & Zuhairi 2007: 9). The widespread use of print, audiocassettes, face-to-face tutorials, and intermittent, government-controlled radio and television broadcasts supports over 600,000 urban, sub-urban, and rural learners attached to the Bangladesh Open University (Islam *et al.* 2006: 9). These traditional methods may be more reliable, but they are often one-way and lack lecturer-student and student-student interactivity (Belawati & Zuhairi 2007: 20).

According to Al-alak and Alnawas (2009: 203-204), for e-learning to be successful, e-learning users have to change their attitudes, belief, behaviour, perspective and habits in order to successfully adopt the use of technology. This shows the association between technology users' attitude and perception and its adoption. Brower (2002) in Al-alak and Alnawas (2009: 203-204) states that teachers' fear and unwillingness to adopt e-learning as a new way of teaching is attributed to their feeling disempowered by the approach. The argument is that in order to teach, they have to touch students and be close to them, and hence, using e-learning may dramatically change the way they teach which is mainly based on getting in contact with learners.

Dabholkar cited in (1994) Al-alak and Alnawas (2009: 203-204) hypothesized that people simultaneously have positive/negative attitudes or beliefs towards technology. A positive belief or attitude would foster individual acceptance towards technology, while a negative attitude or belief might hold them back. This is supported by Rossiter (2007) arguing that since e-learning is mainly based on the use of technology to deliver content via the internet, it has been concluded that e-learning is regarded as radical and challenging for learners, teachers and administrators, and hence, teachers may rise against the adoption the use of such systems.

Different skills which instructors have to be equipped with are also found to influence their attitude towards the adoption of e-learning system. Bonk (2000) points out that instructors should have different skills and play different roles in order to be able to adopt the use of technology in teaching effectively. First, instructors need to understand the application software and the implications of technology in order to be able to adopt such technology and enhance students' learning experience. Second, instructors need to be able to design online courses which should make studies more interesting and interactive, and hence, instructors should adopt the right tool, not just the available one. Finally, instructors have to play a social role to keep students motivated and increase their level of learning. Such skills and roles may be perceived as obstacles which may hinder instructors from utilizing e-learning.

## **2.7 KNOWLEDGE GAPS**

Although there are many studies on ICT adoption from developing countries, they take the Western approach with very few studies linking it to the actual context especially for the developing countries which involves factoring power failures or interruptions, infrastructural availability and quality among others. This study will focus on addressing the actual context of Africa Nazarene University in Kenya by giving specifications based on their technological, human resource, infrastructural, physical and financial resources capability.

Another gap noted in the studies reviewed was that although the use of technology has been applauded by various stakeholders globally, at the local level it has not brought about the widespread changes in teaching methodologies that was initially hoped due to students' attitude towards distance learning. This study will investigate the factors that influence technology adoption and make viable recommendations on how best they can be mitigated in the context of ANU in Kenya.

Yet another gap identified in the literature was that although distance learning is a more advanced process, determined by pedagogical values, attitudes, curricular needs and physical infrastructure consequently impacting on the rate of its adoption, most distance learning programs in Africa are seemingly failing due to lack of technological pedagogical knowledge among students and lecturers. These are some of the gaps that this study intends to fill using the methodology outlined and discussed in the third chapter of this study.

## **CHAPTER THREE**

### **THEORIES AND MODELS**

#### **3.1 INTRODUCTION**

This chapter aims to look at different models that focus on the adoption of technology use. These models are used to provide a framework that guides the research design, implementation and analysis and interpretation of results. According to Eisenhardt (1989) there are three distinct uses of theory: as an initial guide to research design and data collection; as part of an interactive process of data collection and analysis; and as a final product of the research. Since ICT adoption mainly employs positivist approaches, such theories and models have been used at the beginning stage of the research in order to guide the research and interpret its results (Punch 2005). The chapter includes adoption theories and models, Limitations of Previous Theories and Research Findings and a chapter summary.

For the purpose of understanding this study, it is important to understand that although this study is based on the Technology Acceptance Model (TAM), it also discusses other theories and models that demonstrate willingness or desire of a user group to employ Information Technology for the tasks it is designed to support. There are several user acceptance theories and models such as: Innovation Diffusion Theory (Adoptions of Innovation Model), Theory of Reasoned Action, Technology, Technology Acceptance Theory and Theory of Transactional Distance (Baraghani 2007: 19). Although this study touches on all of these models and theories, it is grounded on the Technology Acceptance Model (TAM).

There exist quite a number of theories and models employed in studying individuals' ICT adoption and post-adoption behaviours. Social psychologists have applied theories and models that have been mainly used in this strand of research (Youngseek and Crowston 2011). These theories and models focus on people's intention to engage in a certain behaviour as a major theoretical foundation. Both Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) have been widely used in ICT adoption and use research. As two of the major intention-based theories they provide the basic theoretical backgrounds for other adoption theories including the Technology Acceptance Model (TAM) and enhanced TAM (Zolait & Hussein 2014: 3).

The basic assumption of TRA and TPB is that people consciously determine whether they engage in or do not engage in certain behaviour. In this sense, the adoption and use intentions are usually conceptualized as a major outcome variable that is influenced by various

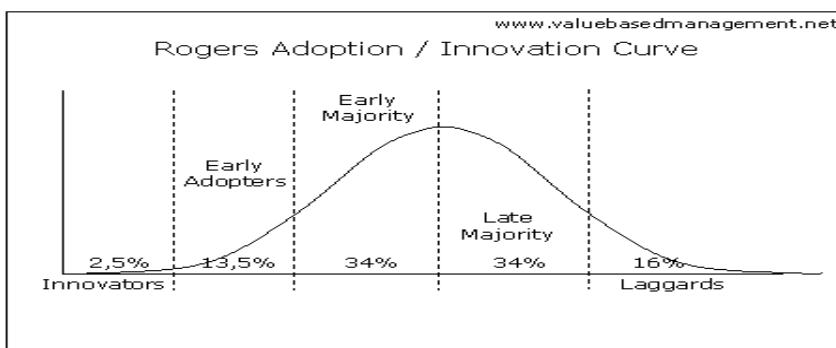
independent variables. The purpose of this chapter is to review the major adoption theories including TRA and TPB and their applied theories, Innovation Diffusion Theory, and Social Cognitive Theory.

### **3.2 ADOPTIONS OF INNOVATION MODEL**

The adoption process model was first introduced by Rogers in 1962 based on the fact that an individual goes through a series of steps which are: knowledge, persuasion, decision, implementation, confirmation. Rogers defines diffusion as a process by which an innovation is communicated through certain channels over time among the members of a social system. Rogers (2003: 36) argues that Adoption is similar to diffusion except that it deals with the psychological processes an individual goes through, rather than an aggregate market process. According to Baraghani (2007: 19), diffusion is the process through which a new idea or new product is accepted by the market. Consequently, according to Rogers (2003) diffusion research focuses on five elements: the characteristics of an innovation which may influence its adoption; the decision-making process that occurs when individuals consider adopting a new idea, product or practice; the characteristics of individuals that make them likely to adopt an innovation; the consequences for individuals and society of adopting an innovation; and communication channels used in the adoption process (Baraghani 2007 and Rogers 2003).

Owing to the relatively new nature of technology use in higher education, some scholars contend that its essential to use the Adoptions of Innovation model to explain the interactions between the environment and the strategic choices organizations make via strategies to control the resource dependence condition (Rogers 2003: 34). Choosing to adopt a particular innovation has both positive and negative outcomes for individuals or organizations. Rogers (2003: 32) states that this is an area that needs further research because of the biased positive attitude that is associated with the adoption of a new innovation.

The Innovation Adoption Curve Diagram is shown in Figure one below:-



**Figure 3.1: Rogers Adoption and Innovation Curve**

Source: [www.valuebasedmanagement.net/methods rogers innovation adoption curve.h](http://www.valuebasedmanagement.net/methods/rogers_innovation_adoption_curve.h)

Rogers' diffusion of technological innovation model suggests that large numbers of faculty are quite slow in adopting technological innovation in their teaching. It identifies five categories of technological innovation adopters.

Ronkowski (2000: 25) identifies two main sub-groups as "mainstream" faculty and "laggards". Assuming eventual 100% adoption of technology, 16% are likely to be "laggards" who are highly suspicious of the innovation, prefer traditional approaches, and will adopt only if they can be certain it will not fail (Ronkowski 2000: 26). In this study, this model is used to establish the level of adoption amongst students. Analysis of this theory however shows it as a more general theory that looks at grouping or categories at the various levels of adoption of technology. This scarcely explains why each individual falls under the various categories such as innovators, early adopters, early majority, late majority, and the laggards mentioned by the proponents. What actually makes the laggards to be slow in adopting new technologies?

### 3.3 INNOVATION DIFFUSION THEORY

Following the development of a model, Rogers developed an innovation diffusion theory which posits that for any idea, practice, or object that is perceived as new by an individual or other unit of adoption to be communicated through certain channels over time among the members of a social system, there must be four elements of the innovation itself: communication channels for that innovation, time, and the social system (context) which all

determine its rate of adoption (Rogers 2003: 436/1995: 1-2). The theory adds that an innovation's adoption rate is affected by relative advantage, compatibility, complexity, trialability and observability to those individuals within the social system. The more the participants of such an innovation create and share information with one another in order to reach a mutual understanding, the faster the adoption rate of the new innovation.

Rogers (1995: 1-2) and Hernandez, Jimenez and Martin (2010) add that because a communication channel is the means by which messages get from one individual to another, mass media channels are more effective in creating knowledge of innovations, whereas interpersonal channels are more effective in forming and changing attitudes toward a new idea, and thus in influencing the decision to adopt or reject a new idea. Most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation. Rogers (2003) argues that for a new innovation to be adopted, time has to elapse for the process of innovation-decision-making which is the mental process through which individuals or institutions move from their initial knowledge about the innovation to forming an attitude towards the innovation, decision to adopt or reject, implementation of the innovation, and finally confirming the benefits of such innovation.

The Innovation Diffusion Theory (IDT) is concerned with the manner in which a new technological idea, artefact or techniques or a new use of an old technique, migrates from creation to use (Rogers 1995; 2003). In this theory technological innovation is communicated through particular channels, over time, among the members of a social system (Clerk 1999). The main goal of IDT is to understand the adoption of innovation in terms of four elements of diffusion including innovation, time, communication channels, and social systems (Clerk 1999). According to this theory, an individual's behaviour in relation to adoption of technology is determined by his or her perceptions regarding the relative advantage, compatibility, complexity, trial ability, and observation ability of the innovation, as well as social norms (Rogers 2003: 436).

A number of studies have used the IDT as their theoretical framework such as Youngseok Kim and Kevin Crowston(2012) who, in their study on Technology adoption and use of theory review for studying scientists' continued use of cyber-infrastructure, identified factors that might increase the likelihood of adoption. Another study by Surry, D.W. & Farquhar, J.D. (May 1997) in their study of Diffusion theory and instructional technology discusses how theories of innovation diffusion have been incorporated into instructional technology.

Information Systems scholars mentioned that in the context of end-user computing many of the classical diffusion assertions were valid (Ritu, Agarwal & Prasad 1997; Brancheau & Wetherbe 1990). The five main constructs of IDT were employed and found to have significant relationships with other factors in ICT adoption. Relative advantage was found to have a positive relationship with attitude (Agarwal & Prasad 2000), and relative usage intention (Lin, Chan & Wei 2006). Compatibility was found to influence Perceived Usefulness (A Bhattacherjee & Hikmet 2007), PEOU (Hernandez, Jimenez & Martin 2010), attitude (Ritu Agarwal & Prasad, 2000; Lee, Kozar & Larsen 2003) and intention (Saeed & Muthitacharoen 2008; Wu & Wang 2005). Complexity was found to have a negative relationship with the technology adoption intention (Beatty, Shim & Jones 2001; Son & Benbasat 2007).

Moreover, innovation has been described as an idea, a product, a technology, or a program that is new to the adopting unit. The diffusion of innovation theory suggests that perceptions of technology characteristics, such as its relative advantage, compatibility, complexity, triability, and observability impact the adoption of any new product. A number of researchers have applied Rogers' theory in their studies, for instance Raisinghani and Schkade (1998) to explain the adoption of Internet, intranet, extranet technologies for electronic commerce applications, and Tan and Teo (2000) to describe factors influencing the adoption of internet banking in Singapore.

The Innovation Diffusion Theory (IDT) developed by Rogers (2003) has also been employed by students studying individuals' technology adoption. While this theory can be seen to be bringing in the dimension of the reasons as to why individuals adopt technology, Scholars such as Damanpour (1996), Plsek and Greenhalgh (2001), Downs and Mohr (1976), and Lyytinen and Damsgaard (1998) argue that technologies are discrete packages developed by independent and neutral innovators, and technologies diffuse in a homogenous fixed social ether called a diffusion arena which is separate from the innovations locale. The diffusion rate is a function of push and pull; it is difficult to quantify diffusion because humans and human networks are complex, Damanpour (1996), Plsek and Greenhalgh (2001), Downs and Mohr (1976), and Lyytinen and Damsgaard (1998). Measuring what exactly causes adoption of an innovation is extremely difficult, if not impossible. The same scholars also assert that diffusion theories can never account for all variables, and therefore might miss critical predictors of adoption and the variety of variables which has led to inconsistent results in

research and has consequently reduced its heuristic value. Green (2004) critiqued IDT by arguing that the diffusion of a practise depends on the decisive justifications used to rationalise. Compagni ,Mela and Ravasi (2000) stated that early experience with the implementation of an innovation influences later adoptions. These practices eventually trigger and support the isomorphic diffusion of the innovations even in the presence of persistent and certainty about its technical or economic benefits (Compagni ,Mela and Ravasi 2000).

### **3.4 THEORY OF REASONED ACTION**

Following Roger's theory, there were other theories that were developed that were related to the adoption theories. A Theory of Reasoned Action (TRA) which was developed by Fishbein and Ajzen in (1975) presented a broader range of behaviours based on particular situations, combinations of individual beliefs and attitudes, and the effect of beliefs of other relatives to the individual. As social psychologists, Fishbein and Ajzen (1975) were concerned with explaining an individual's behaviour based on his or her behavioural intention, which is influenced by his/her attitude toward the behaviour and perception of the subjective norms regarding the behaviour. Fishbein and Ajzen (1975) argue that the belief is concerned with the behaviour that is more important rather than the beliefs about the objects in the world. Some relevant beliefs influence an individual's attitude toward behaviour, other beliefs are normative in nature, that is, beliefs where references think the individual should or should not execute the behaviour.

A person's behavioural intention appears as a factor of their attitude toward behaviour and their subjective norm Fishbein and Ajzen (1975). Attitude and subjective norm affect the individual behavioural intention, and the intentions consequently impinge on an individual's behaviour (Figure 2). Fishbein and Ajzen (1975) also demonstrate that one can build new beliefs by performing some behaviour; these beliefs provide the basis for the construction of the attitude toward the objects, attitude in turn determines the individual's intention to perform the behaviour in future and this intention leads to performance or non-performance of the behaviour. This theory is mostly used in health-related fields and medical innovation (Beadnell & Baker 2008; Hale *et al.* 2003; Hoffman 1999).

While concurring with the scholars that beliefs and evaluations combined would help develop attitude towards behaviour and subjective norms that eventually sire behavioural intention and actual use of technology, in the Theory of Reasoned Action (TRA) Fishbein & Ajzen (1975)

posit that individual behaviour is driven by behavioural intentions. They argue that Attitude toward the behaviour is defined as the individual's positive or negative feelings about performing behaviour (Fishbein & Ajzen 1975). It is determined through an assessment of one's beliefs looking at the consequences arising from behaviour and an evaluation of the desirability of these consequences. Formally, overall attitude can be assessed as the totality of the individual consequence and desirability assessments for all expected consequences of the behaviour (Bagchi, Kanungo & Dasgupta 2003).

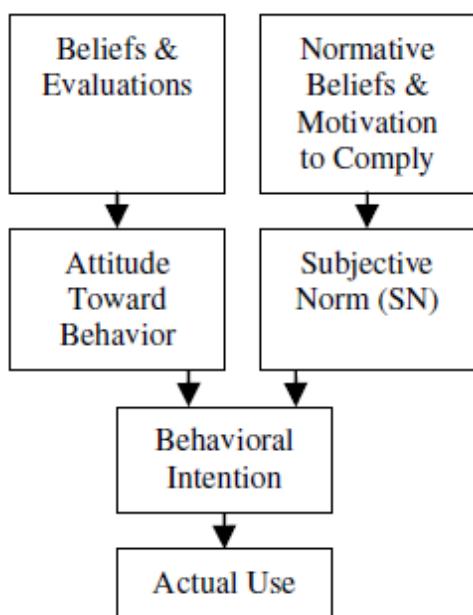


Figure 3.2: Theory of Reasoned Action (Fishbein & Ajzen 1975)

TRA has been used in ICT adoption-and-use research as a fundamental theoretical framework, and it also has been combined with other theories and models. Both attitude and subjective norm were found to be important determinants of peoples' intentions to adopt and use ICTs (Brown *et al.* 2002; Karahanna, Straub & Chervany 1999).

Overall attitude can be assessed as the totality of the individual consequence and desirability assessments for all expected consequences of the behaviour (Bagchi, Kanungo & Dasgupta 2003), and continued use of ICT (Anol Bhattacherjee & Premkumar 2004; Po-An Hsieh, Rai & Keil 2008). Looking at the subjective norm, previous studies found that the subjective norm influences not only the behavioural intention (Hu, Lin & Chen 2005; Venkatesh & Davis 2000), but also other constructs including satisfaction (Hsu & Chiu 2004), image (Chan & Lu 2004), and perceived usefulness (Venkatesh & Davis 2000). There is practically no explanation regarding why or how an individual or organization that approaches technology

adoption with sobriety and no prior beliefs but is eventually challenged by the one who presents the technology to them or the features of the technology(Venkatesh & Davis 2000).

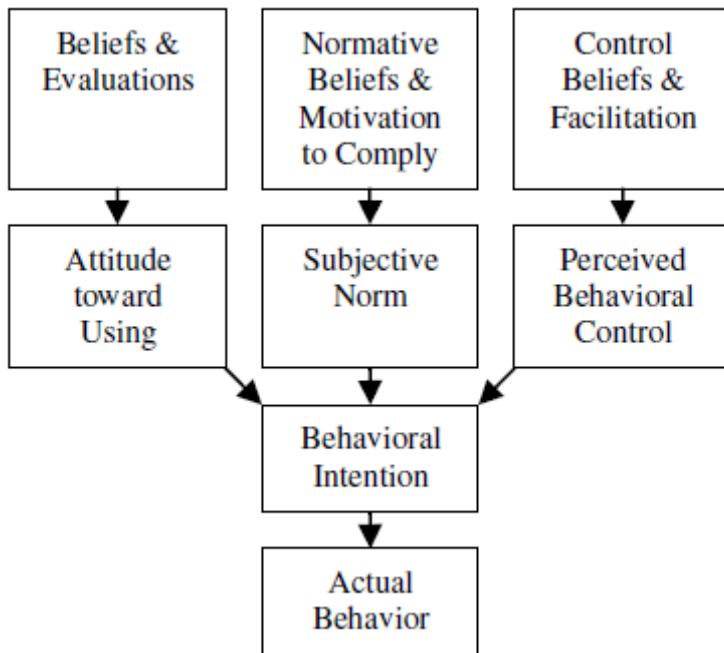
Critics such as Sheppard et al. (1988) in Ajzen, Albarracín and Hornik (2007: 225), argue that a behavioural intention measure will predict the performance of any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioural criterion in terms of action, target, context, time-frame and/or specificity. This has limiting conditions of the use of attitudes and subjective norms to predict intentions and the use of intentions to predict the performance of behaviour. Other critics such as Armitage, Connor and Norman (1999) and Pligt and de Vries (1998) also posit that theories like reasoned action and planned behaviour are too rational, failing to take into account emotions, compulsions, and other non-cognitive or irrational determinants of human behaviour.

### **3.5 THEORY OF PLANNED BEHAVIOUR**

Just like TRA, Theory of Planned Behaviour (TPB) is a social psychology theory which states that specific salient beliefs influence behavioural intentions and subsequent behaviour (Ajzen 1991). Compared to TRA, TPB added another construct, Perceived Behavioural Control (PBC), which can be defined as individuals' perception of their ability to act out a given behaviour easily. The major difference between TPB and TRA is that TPB introduces the third determinant factor that is perceived behavioural control which is refers to the "... perceived ease or difficulty of performing the behaviour" (Ajzen 1991).

According to Ajzen (1991), Fishbein *et al.* (2001), and Conner *et al.* (2003), perceived behavioural control is divided into two factors: control beliefs (the availability of skills, resources and opportunities) and perceived facilitation (an individual's assessment of the importance of those resources to the achievement of outcomes) (Ajzen (1991), Fishbein *et al.* (2001), and Conner *et al.* (2003)). Specifically, control beliefs are defined as the presence or absence of requisite resources and opportunities necessary to perform a behaviour. Theory of Planned Behaviour defines relationships between beliefs, attitudes, norms, perceived behavioural control, intentions, and behaviour. Attitude toward a behaviour, subjective norm, and perceived behavioural control influence an individual's intention to perform a given behaviour (*Ibid*).

Earlier studies that used TPB model looked at the factors that influence the adoption of internet banking (Tan & Teo 2000) while some scholars have proposed that TPB would better help to predict health-related behavioural intention and improve the predictability of intention in various health-related fields, leisure, exercise and diet (Fishbein *et al.* 2001; Sheeran & Taylor, 1999; Ajzen & Driver 1992; Nguyen *et al.* 1997; Conner *et al.* 2003).



*Figure 3.3: Theory of Planned Behaviour (Ajzen 1985)*

A lot of studies in ICT adoption have used TPB as their theoretical framework (Hsu & Chiu 2004; Liao, Chen & Yen 2007). Even with the addition of Perceived Behavioural Control (PBC), which can be defined as individuals' perception of their ability to act out a given behaviour with ease, it is still tenable that formally, the overall attitude can be assessed as the sum of the individual consequence and desirability assessments for all expected consequences of the behaviour in line with Bagchi, Kanungo and Dasgupta (2003). Similar to studies using TRA, these studies using TPB also found significant relationships between attitude, subjective norm, perceived behavioural control and behavioural intention(Wu & Chen 2005; Liao *et al.* 2007). PBC as an additional construct in TPB sheds light on the importance of the perceived difficulty of the behaviour and the person's perceived ability to act out the behaviour. A good number of studies found that PBC directly influences the technology adoption intention and continued usage intention (Wu & Chen 2005; Liao *et al.* 2007).

### **3.6 DECOMPOSED THEORY OF PLANNED BEHAVIOUR (DTBP)**

To overcome some of the limitations of the Theory of Planned Behaviour (TPB), Taylor and Todd (1995) proposed The Decomposed Theory of Planned Behaviour (DTBP). Taylor and Todd (1995) extended TPB by decomposing the attitudinal belief, normative belief, and control belief into several dimensional constructs to provide higher descriptive power and a more accurate understanding of the antecedents of behaviour. These scholars posited that DTBP provides several advantages. The first advantage according to Taylor and Todd (1995) is that by the decomposition of belief, the relationship between belief and the antecedents of intention should become clearer and more readily understood. The Second advantage, they argue, is that decomposition can give a stable set of beliefs, which can be applied across a variety of settings, and third, by focusing on specific beliefs, DTPB is more managerially relevant. Because of the larger number of factors that may influence adoption and usage, DTPB should provide a more complete understanding of IT usage (Suryaningrum 2012: 111).

According to Suryaningrum (2012: 113), several researchers have examined the validity of DTPB in understanding behavioural intentions. Hsu and Chiu (2004) studied electronic service continuance using DTPB. They indicated that even though DTPB provides better diagnostic value than the original TPB model, it is still more complex because it introduced a number of additional factors that may influence usage. Koeder et al. (2011) developed their model to identify the factors that encourage consumers to purchase e-book readers in Japan, with the focus on normative factors. They found that attitude towards connected e-book readers was the most important factor contributing to purchase behaviour. The Koeder et al. (2011) study differed from other scholars because they developed new constructs in decomposing attitude by exploring relevance advantage and decomposing subjective norm with normative influences.

The contribution of these scholars was worthwhile but they could have made some effort at least to add some missing components in the model or reformulate some perspectives. Although they should be judged according to their time, the mere decomposition to simplify a model without due contextualization may not really constitute a theory, a position that is supported by Koeder et al. (2011).

### **3.7 TASK-TECHNOLOGY FIT THEORY (TTF)**

In a bid to explain the linkage between information technology utilization and individual performance, Goodhue and Thompson (1995) developed a conceptual model of technology-to-performance chain, the Task Technology Fit theory (TTF) is seen as an important development in information system theory. According to Goodhue and Thompson (1995), TTF theory assumes that information technology is more likely to have a positive effect on individual performance and to be used if the capabilities of information technology match the task that the user must perform. This conceptual framework was based on two separate research streams: first, the utilization of information technology with its antecedent of attitude and behaviour, and second, the ‘fit focus’ evident in research investigating the performance of individual information technology user.

Venkatraman in Suryaningrum (2012: 113) discussed the concept of ‘fit’ assessment in strategy research comprehensively using six alternative perspectives and approach of fit; 1) Fit as moderation perspective; effect of fit as a moderating variable of an independent variable (predictor variable) on dependent variable (criterion variable); 2) Fit as mediation perspective; an existence of intervening (indirect) effects between an antecedent variable and its consequent (criterion) variable; 3) Fit as matching perspective; fit as a theoretically defined match between two related variable; 4) Fit as gestalts; gestalts could be defined as the degree of internal coherence among a set of theoretical attributes (fit as on the identification of different groups); 5) Fit as profile deviation; the degree of adherence to a specified profile; and 6) Fit as co-variation; a pattern of co-variation or internal consistency among a set of theoretically related variables (McGill & Hobbs 2006; Teo and Men 2008).

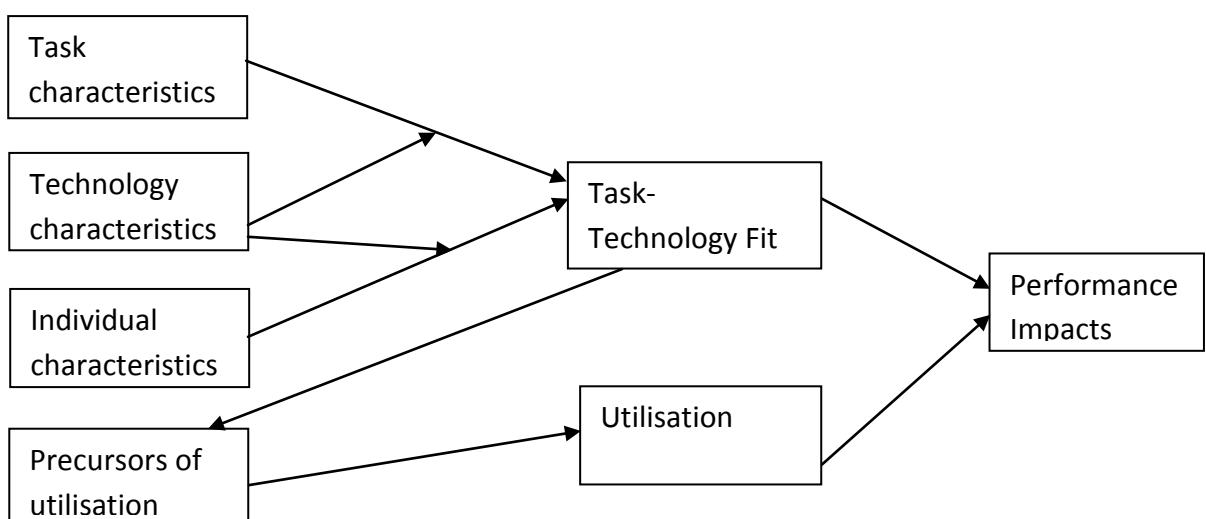
Arguably, Goodhue and Thompson (1995) use the concept of fit as moderating variable, as they proposed: ‘information system (systems, policies, staff of IS, among others) have a positive impact on performance only when there is a correspondence between their functionality and the task requirements of users.’ The study by Goodhue and Thompson (1995) found supportive evidence that TTF is a function of system characteristics and task characteristic, and also a strong evidence of performance where TTF and utilization must be included.

Even if TTF has some supporting evidence, some researchers have extended TTF with TAM in varying areas; conceptualization perspective (Dishaw et al. 2002), consumer of e-commerce (Klopping and McKinney 2004), education (Strong et al. 2006), e-Tourism (Usoro

et al. 2010), hotel industry (Schrier et al. 2010). They did that to obtain a more comprehensive explanation of human behaviour associated with the use of information systems. This new model of individual performance is trying to integrate TTF with DTPB, because even though TAM has proved a robust model, it is also a simple model, while DTPB assumed to provide a complete and more understanding of IT usage, but is complex as a result.

According to McGill and Hobbs (2006: 2), task-technology fit relates to the match between a user's task requirements, their abilities, and the functionality of the technology to support the task, and has been identified as an important contributor to the success of an information systems as postulated by Goodhue and Thompson (1995) in McGill and Hobbs (2006: 2). Goodhue and Thompson (1995) proposed the technology-to performance chain model to help end users and organizations understand and make more effective use of information technology.

The technology-to-performance chain model combines insights from research on user attitudes as predictors of utilization and insights from research on task-technology fit as a predictor of performance thereby providing some insight into this study about the adoption of technology for learning and teaching in Online and Distance Learning programs in Africa Nazarene University. Figure 2 below illustrates the Task-Technology Fit Theory (TTF)with the components of the model. The model states that task characteristics, technology characteristics and individual characteristics determine task-technology fit. Task-technology fit in turn both directly influences performance, and indirectly influences utilization via precursors of utilization such as expected consequences of use, affect toward use, social norms, habit and facilitating conditions. It also proposes that utilization directly influences performance.



*Figure 3.4: Adapted from The technology-to-performance chain (Goodhue & Thompson, 1995)*

McGill and Hobbs (2006: 3) posit that there is some evidence that supports aspects of the technology-to-performance chain in various domains such as studies by Dishaw and Strong on the task-technology fit of computer-aided software engineering (CASE), Dishaw and Strong (2003) on tools and several groups like Lim and Benbasat (2000), Pendharkar, Rodger and Khosrow-Pour (2001) have also researched on technology to performance in the health care domain.

However, there has been little research on its application in the e-learning domain and no comparison of different types of users within the e-learning domain. It is possible, given the different roles of students and instructors in interacting with VLEs, that the level of task-technology fit and other precursors of task success may differ between the two types of users. Satisfaction with an information system is commonly measured as an indicator of information systems success (Hwang & Thorn 1999) and has been identified as a precursor of performance impacts in DeLone and McLean's (1992) model of IS success. Despite not being included in the technology-to-performance chain it is relevant to research on e-learning and is probably the most often considered outcome variable in e-learning research.

Other precursors of IS success of interest in this study include expected consequences of use, attitude toward use, social norms, facilitating conditions and levels of use. Triandis (1971) introduced the role of expected consequences in influencing behaviour. Goodhue and Thompson (1995) argued that expected consequences of use should be influenced by the task-technology fit (that is, the better the task-technology fit the more positive anticipated consequences of use of a system) and that increased anticipated consequences of use should then lead to increased utilization of systems. Seddon (1997: 246) also included expectations about the consequences of future IS use in his test of DeLone and McLean's model of information systems success defining it as 'a valence-weighted sum of the decision-maker's expectations about the costs and benefit of future IS use'.

Attitude is defined as the amount of effect one feels for or against some object or behaviour (Fishbein & Ajzen 1975). Fishbein and Ajzen (1975) argue that attitudes towards objects do not strongly predict specific behaviour towards the objects, rather it is the attitude towards the specific behaviour that determines whether the behaviour is performed. In the technology-to-performance chain attitude towards use of the system it is proposed as a predictor of

utilization (Goodhue & Thompson 1995). Hence attitude of the users towards use of online and distance learning or VLEs is also of interest in this study. Social norm (also known as subjective norm) refers to the user's beliefs as to whether other individuals want them to perform the behaviour. The role of social norm in IS success has been investigated with mixed results.

Staples and Seddon (2004) in McGill and Hobbs (2006: 4) found that social norms influenced utilization when use was mandatory, and Venkatesh and Davis (2000) found that social norms influenced user acceptance. However, Dishaw and Strong (1999) found that social norms did not influence intention to use. This confusion might be explained by Karahanna, Straub, and Chervany's (1999) finding that social norm is important in determining initial adoption, but not in intention to continue. McGill and Hobbs (2006: 4) from another perspective argue that various capabilities or features of the technology used such as ease of access to the system, relationship of the user with support staff among others could also influence the use and performance. This is reflected in DeLone and McLean's addition of service quality to their updated model of IS success (DeLone & McLean 2003).

Utilization has been defined as 'the behaviour of employing the technology in completing tasks' (Goodhue & Thompson 1995: 218). Utilization of information systems has been measured in various ways including measures of frequency of current and anticipated use and diversity of application use. The technology-to-performance chain predicts that task-technology fit will lead to increased utilization, but evidence has been mixed. For example, although Goodhue and Thompson (1995) found weak support for the relationship, Staples and Seddon (2004) found no relationship between utilization and performance.

Performance impact refers to the effect of the system on the behaviour of the user or the outcomes for the user. The impacts most commonly considered in information systems success research relate to management performance and decision-making (DeLone & McLean, 1992 in McGill and Hobbs 2006: 4), but in the e-learning domain, performance impact can relate to impacts on academic results or student perceptions of learning success, among others (Piccoli et al. 2001). To enhance the coherence of the two models, some studies have used the sociology theory of symbolic interactionism. The addition of the various factors that may also affect technology adoption such as system characteristics, provision of support to users brings an enriching dimension with reasonable contribution from these proponents of Task Technology Fit theory (TTF).

### **3.8 HUMAN-TASK-TECHNOLOGY INTERACTIONS AND PERFORMANCE MODEL**

Suryaningrum (2012: 116), who is the proponent of the Human-Task-Technology Interaction and Performance model posits that the model is an integration of DTPB and TTF which provides a fuller understanding of the determinant of behavioural intentions as attested to by Taylor and Todd (1995) and Lin (2007). The justification for this is that both researchers compared three theories and models of usage behaviour, that is, Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), and Decomposed Theory of Planned Behaviour (DTPB) to come up with a trade-off. In examining the trade-off between parsimony and understanding associated with decomposition, the researchers showed that even if DTPB is more complex than the pure TPB because of its additional construct, by decomposing the belief structure of TPB, DTPB increases the explanatory power and offers a better, more precise understanding of the model for behavioural intentions. Particularly they emphasized that the uni-dimensional belief constructs of DTPB provide better understanding of behavioural antecedents.

According to Suryaningrum (2012: 117), DTPB has the capability of understanding human behaviour and can be a good predictor for system usage. TTF on the other hand provides a good theoretical assumption that information technology is more likely to have a positive effect on individual performance and be used if the capabilities of information technology match the task that the user must perform (Goodhue and Thompson 1995). Symbolic interaction occurs not only among subjects, but could also occur between subject and object. This could be illustrated by the interaction between people and objects in the form of information and technology. The rapid developments in information and communication technology have driven the development study of the interaction between people and technology.

Eason (1991) developed a model that divides human interaction with computers (technology) at three levels. Level one related to human-computer interaction; expanded by a factor of two levels of users, tasks, and environments that may affect job performance, and level three, IT and human-computer interaction impact on social life in the changed of nature of work, the way the organization operates, and how humans interact with one another more generally (Suryaningrum 2012: 116). In the HTTIP model, the main components are human. Although there are many ways to understand human beings and their interactions with technology, for example, in terms of demographics, physical skills and ergonomics, cognitive and

effective factors, this model focused on human behaviour intentions (cognitive aspects) (Suryaningrum 2012: 116). This is why the DTPB model is used owing to its comprehensiveness in predicting human behaviour (Suryaningrum 2012: 116).

With such integration in the Human-Task-Technology Interaction and Performance Model, this theory makes a significant contribution towards the understanding of the various dimensions borrowed from the other theories but still falls short of including other key factors such as facilitating conditions and is more inclined towards explaining the behavioural factors.

### **3.9 TECHNOLOGY ACCEPTANCE MODEL**

The Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) have influenced the Theory of Technology Acceptance Model (TAM) and its extended models, which mainly focus on the adoption and use of ICT. While TRA states that people are, more often than not, rational beings who make systematic use of available information, considering the repercussions of their actions before deciding whether or not to engage in a given behaviour, TAM assigns considerable weight to two key determinants - perceived usefulness and perceived ease of use (Davis 1989). The presence of behavioural intention (BI) in the TAM is one of the major differences with TRA. BI is considered to be an immediate antecedent of usage behaviour and gives an indication about an individual's readiness to perform a specific behaviour. In TAM, both PU and PEOU influence an individual's intention to use the technology, which in turn influences the usage behaviour. There were many confirmations in the literature for the relationship between BI and usage behaviour in general, and this has recently been extended to the e-learning context.

The Technology Acceptance Model (TAM) was developed by Davis (1989) to study diffusion and adoption of new technology at individual levels, and to clarify computer usage behaviour. Davis in Suryaningrum (2012) presented the TAM to explain the determinants of user acceptance of a wide range of end-user computing technologies. The basic factors in TAM are Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Davis defines PU as the degree to which individual beliefs regarding using the Information System will enhance the performance while PEOU relates to how 'Individual believes the given Information System will reduce the intensity of their work'. Out of the two factors (PU & PEOU), Davis concluded that PU was the most important, the reason is that after a period of time in actually

using the innovation (post adoption) the beliefs of Perceived Ease of Use (PEOU) have declining effect on intention, while Perceived Usefulness has cohesiveness and a strong positive effect on intention.

In this model, Davis (1989) identified two theoretical constructs of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that affect the intention to use a system. PE - is the extent an individual believes the system will help them do their jobs better. (PU), EE relates to how easy an individual believes the system is to use. (PEOU), IS - relates to whether or not important others "influence an individual's" intention to use the system. FC denotes whether individuals have the personal knowledge and institutional resources available to use the system.

### **3.9.1 Studies on Technology Acceptance Model (TAM)**

The design, adoption and development of a framework for the adoption and implementation of using ICT technologies to enhance and support distance learning must be looked at based on the existing models and theories as a way of addressing the existing gaps. Such design must also be informed by a thorough literature review alongside the environmental and infrastructural context as this forms the basis for financial, human resource, technological and physical resources-related challenges in most countries.

Roca et al. (2006) applied the technology acceptance model (TAM) and found that the users' intention is determined by student satisfaction, which is determined by the perceived usefulness, information quality, confirmation, service quality, system quality, perceived ease of use, and ability to support cognitive development. Germann and Sasse (1997) found that lecturers who participated in a two-year technology integration program improved their technology self-efficacy and their interest in learning more about how technology could impact the curriculum improved. Ross, Hogaboam-Gray, and Hannay (1999: 87) reported that access to technologies increased Lecturers' "opportunities for successful teaching experiences, thereby contributing to greater confidence in their instructional ability" (p. 87).

Additionally, they also noted, "Lecturers who interpret their interactions with computers as indicative of high ability grow in self-confidence, regardless of their experiences" (p. 93). Research reveals also that before lecturers use technology for instruction they must be personally convinced of its benefits and must see the utility of using a particular technology (Lam 2000). Before technology is used in the classroom, lecturers focus attention on their

students. They want to know what impact it will have on students' learning outcomes (Higgins & Moseley 2001).

Lecturers use technology because it motivates students and offers a different mode of presentation. Instead of using computers for drill and practice, more confident lecturers use technology as an instructional tool to enhance students' learning (Lam 2000). Successful technology adoption in lecturers' classrooms is dependent upon school administrators providing an individualized, differentiated process of training and implementation (Gray 2001). Glenn (1997: 126) commented, "often institutions rely upon a 'one size fits all' approach that meets the needs of only a few participants". Lecturers must see how technology fits within their localized classroom setting (Stein, Smith & Silver 1999). Lecturers' technology beliefs are influenced by their teaching philosophy. Resistance to adopting new technologies stem from lecturers' existing teaching beliefs (Norton, McRobbie & Cooper 2000).

For technology adoption to be successful, lecturers must be willing to change their role in the classroom (Hardy 1998). When technology is used as a tool, the lecturer becomes a facilitator and students take on a proactive role in learning. Niederhauser and Stoddart (2001) noted a "consistent relationship between lecturers' perspectives about the instructional uses of computers and the types of software they used with their students" (p. 27). Often, this change of teaching philosophy and methods focuses on learner-centred teaching and constructivist teaching practices (Rakes, Flowers, Casey & Santana 1999). Ertmer, Gopalakrishnan, and Ross (2001) found that exemplary technology-using lecturers exhibit more constructivist teaching practices. Successful integration of technology into teaching depends on transforming lecturers' beliefs and philosophy concurrently (Windschitl & Sahl 2002).

Some scholars such as Dillon and Morris (2006: 15) assert that although technology has been used over the years, the adoption of technology for learning and teaching has always experienced challenges. This calls for designing of simple yet comprehensive technology adoption models in tandem with the local settings. A study by Venktesh (2008), stated that IT adoption is becoming increasingly complex and implementation costs are very high. Scholars like Zemel and Groves (2000) assert that the challenges faced by higher education students for this technological impact is daunting and that higher education faculty need to prepare competent professionals in the design and use of current and emerging technologies. A study by Al-alak and Alnawas (2009: 201) using Tam also showed that perceived usefulness and perceived ease of use highly affected the adoption in their study on measuring the acceptance

and adoption of E-Learning by academic staff and students. In another study by Holzweiss, Joyner, Fuller, Henderson and Young (2014: 311-323) it was found that the use of TAM however good has limitations of leaving some dimensions such as used behaviour, behavioural intentions and attitudes. In yet other studies by Kripanont (2006: 13-28 and 2007) using TAM, he found that although TAM may be missing out on some factors affecting technology adoption, it was still key in understanding not only technology adoption but also the other models of technology adoption.

Many researchers have used the TAM to measure students' acceptance of Web-based learning tools. For example, Amoako-Gyampah (2004) found that the perceived ease of use (PEOU) has a direct and positive influence and effect on the intention to use the system, and his results were also supported by other researchers. In contrast, Chesney concluded that PEOU did not have a direct and significant influence on the intention to use the system.

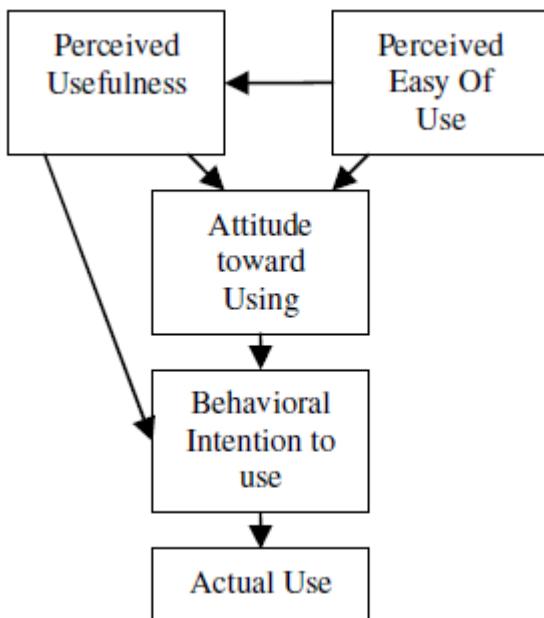
Social norm was adopted and included in the TAM model, in order to overcome the limitation of TAM in measuring the influence of social environments. SN is defined as the person's perception that most people who are important to him or her think he or she should or should not perform the behaviour in question. SN was studied in some research as an antecedent of BI and in other studies as an antecedent PU. However, as mentioned by Venkatesh et al (2008), the influence of SN is very complex.

It has been noted that there are a number of studies that have involved TAM as their theoretical background for explaining ICT adoption and use (Suryaningrum 2012) and in which scholars have already confirmed that Perceived Usefulness has a positive relationship with both adoption intention and continuance intention (Venkatesh 2000). In some post adoption studies, PU has been found to influence satisfaction (Anol Bhattacherjee 2001; Moez Limayem, Hirt & Cheung 2007) and attitude toward the technology (Anol Bhattacherjee & Hikmet 2008). PEOU has been found to influence both PU and adoption intention (Davis 1989). Even though TAM was found to be a valid theoretical framework in studying ICT adoption and use, it has been criticized for its several limitations including the original model's intended generality and parsimony (Dishaw & Strong 1999), not considering non-organizational setting (Venkatesh & Davis 2000), and overlooking the moderating effects of ICT adoption and use in different situations (Sun & Zhang 2006; Suryaningrum 2012).

Researchers, on the other hand, can use external variables in the extended TAM to measure the acceptance of new innovation technology in their study (Venkatesh & Davis 1996, 2000). The external variables in TAM include: System design characteristics, User characteristics (Cognitive style and other personality variables), Task characteristics (Nature of the development or implementation, Political influences and organization structure) (Venkatesh & Davis 1996 2000). Other researchers have used the Technology Acceptance Model in their studies including the study of Adams *et al.* (1992), Suryaningrum (2012), Hendrickson *et al.* (1993), Segars and Grover (1993), Subramanian (1994), and Szajna (1994) to provide empirical evidence on the relationships that exist between usefulness, ease of use and system use.

According to Suryaningrum (2012), TAM assigns considerable weight to two key determinants perceived usefulness and perceived ease of use. In addition, the Technology Acceptance Model (TAM) will be used to determine the extent at which people adopt or use technologies. This is confirmed by Eben & Achampong (2010). Suryaningrum (2012) notes that according to Davis *et al.* (1989), perceived usefulness will directly influence the behavioural intention. Whenever the technology is free of effort, people will realize its usefulness.

Adams *et al.* (1992) replicated the work of Davis (1989) to demonstrate the validity and reliability of his instrument and his measurement scales. This model has also been used to examine the acceptance of email systems (Straub *et al.* 1997), personal digital assistants (Yi *et al.* 2006), World Wide Web (Moon & Kim 2001), Enterprise Resource Planning Systems (Hwang 2005), and internet (Shih 2004).



*Figure 3.5: Technology Acceptance Model (Davis 1989).*

This theory due to its provision of a room for external variables seems to have key factors that could be inclusive of other factors that can to a greater extent explain the reasons as to why both individuals and organizations act differently in their adoption of new technologies. This seems to be why it has been used by many studies to shed light on adoption of technology.

### **3.10 ENHANCED TECHNOLOGY ACCEPTANCE MODEL (TAM 2)**

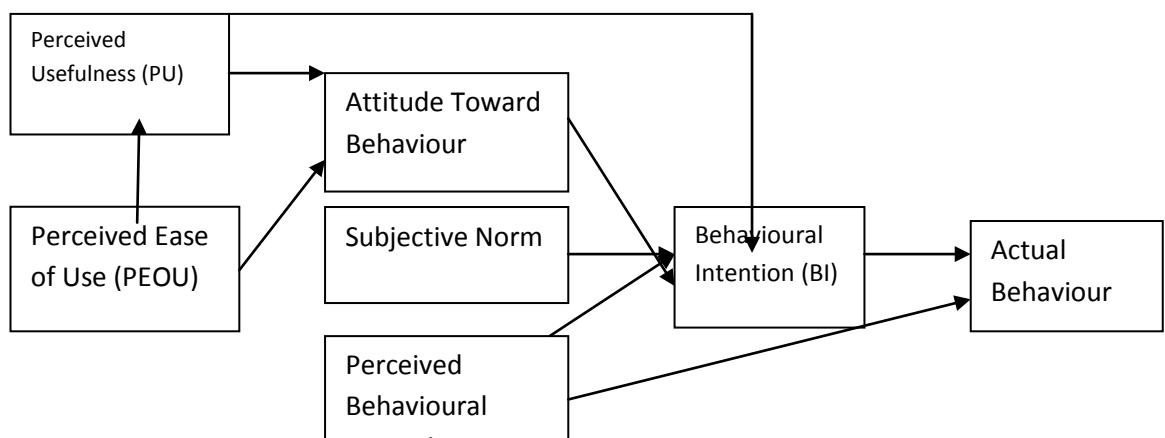
In order to address the limitations such as such as limited ability, time, environmental or organizational limits, and unconscious habits which will limit the freedom to act of TAM, Venkatesh and Davis (2000) enhanced the TAM to create the Extended Technology Acceptance Model (TAM2), which provides a detailed explanation of the key forces underlying judgments of perceived usefulness (Venkatesh & Davis 2000). Using TAM as the starting point, TAM2 incorporated additional theoretical constructs including social influence processes (subjective norm, voluntaries, image, and experience) and cognitive instrumental processes (job relevance, output quality, and result demonstrability), which the original TAM lacked (Venkatesh & Davis 2000). In TAM2, the social influences such as image and subjective norm were studied in order to overcome the limitations of the original TAM. In practice, constraints such as limited ability, time, environmental or organizational limits, and unconscious habits will limit the freedom to act. TAM2 actually incorporated social

influences into an individual's perceptions of usefulness (Venkatesh & Davis 2000). Subjective norm is the same construct that has been studied in TRA and TPB.

Compared to subjective norm, image can be defined as the way that people want to be seen. Image was found to have a significant influence on perceived usefulness (Chan & Lu 2004; Venkatesh & Davis 2000) and attitude (Karahanna *et al.* 1999). TAM2 also included diverse variables in order to enhance the explanatory power, but many times TAM2 explained low percentages of a system's use (Lu, Yao & Yu 2005).

### **3.11 AUGMENTED TAM OR COMBINED TAM AND TPB (C-TAMTPB)**

One of the limitations of both TAM and TAM2 is that it excludes the influence of social and control factors on behaviour but those factors have been found to have a significant influence on IT usage behaviour according to studies by scholars such as Mathieson (1991), Moore and Benbasat (1991), Taylor and Todd (1995), and Thompson, Higgins and Howell (1991). Deductively, it can also be noted that these factors are also key determinants of behaviour in the Theory of Planned Behaviour as proposed by Ajzen (1991). It was due to the identified limitations in TAM that the study by Taylor and Todd (1995) added the two factors of subjective norm and perceived behavioural control to TAM. This was to sire a more complete test of the important determinants of IT usage, because of their predictive utility in IT usage research and their wide use in social psychology (Taylor & Todd 1995).



### **Fig 3.6 Augmented TAM C-TAM-TPB adopted from Taylor and Todd (1995)**

According to Taylor and Todd (1995), the augmented TAM provides an adequate model of IT usage for both experienced and inexperienced users because it accounts for a reasonable proportion of the variance in intention and behaviour. For both groups of both experienced and inexperienced users, all direct determinants of intention, except attitude, were significant.

Thus, the augmented TAM can be used to predict subsequent usage behaviour prior to users having any experience with a technology system. This implies that this model has the capacity to predict usage for people who have never used the technology before as well as for individuals who have used the technology or for individuals who are familiar with the technology. Consequently, IT usage models may be employed diagnostically pre and post implementation both with inexperienced and experienced users and valid conclusions made.

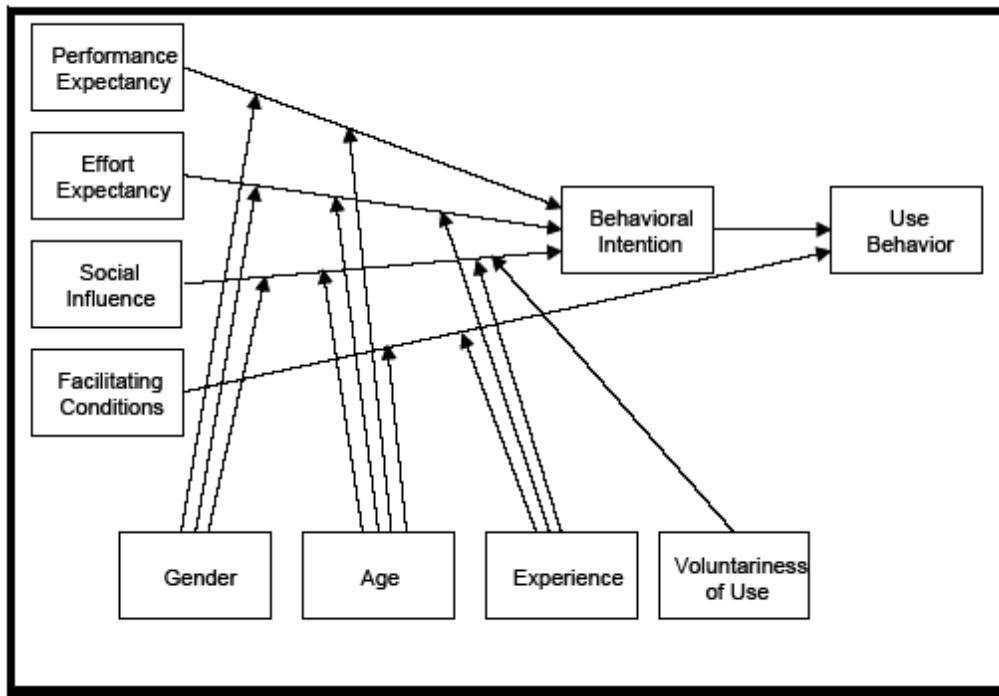
## **3.12 UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY**

The Unified Theory of Acceptance and Use of Technology model (UTAUT) was developed to address the same limitation such as limited ability, time, environmental or organizational limits, and unconscious habits will limit the freedom to act in TAM2 (Venkatesh, Morris, Davis & Davis 2003). UTAUT provides a refined view of how the determinants of intention and behaviour evolve over time. It assumes that there are three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behaviour (intention and facilitating conditions). These relationships are moderated by gender, age, experience, and voluntariness of use. Empirical testing of UTAUT shows that performance expectancy, effort expectancy, and social influence have significant relationships with the intention to use technologies (Venkatesh *et al.* 2003). Later studies found that social influence affects perceived usefulness and perceived ease of use (Hong & Tam 2006; Lu *et al.* 2005).

In post-adoption research, social influence on the continuance intention was inconsistent as some studies reported significant relationships (Hong, Thong, Moon& Tam 2008) while others reported non-significant relationships (Chiu & Wang 2008). UTAUT is one theory that covers extensive individual difference constructs including gender, age, experience, and voluntariness of use as moderating variables. Even though there are some inconsistencies in previous studies on individual differences, scholars reported significant moderating effects by

individual differences such as gender (Morris, Venkatesh & Ackerman 2005), age (Morris & Venkatesh 2000), experience (Venkatesh & Davis 1996), and voluntariness of use (Venkatesh *et al.* 2003).

The Unified Theory of Acceptance and Use of Technology (UTAUT) condenses the 32 variables found in the existing eight models into four main constructs and four moderating factors. The combinations of the constructs and moderating factors increase the predictive efficiency to 70%, a major improvement over previous TAM model rates (Oye *et al.*(2013).



**Figure 3.7: UTAUT Model adapted from (Venkatesh *et al.* 2003: 21)**

UTAUT- Unified Theory of Acceptance and Use of Technology (Oye *et al.* 2013) also addresses how individual differences determine the acceptance and use of technology. More precisely, the connection between PU, PEOU, and intention to use can be moderated by age, gender, and experience. For instance, the strength between PU and intention to use varies with age and gender such that it is more significant for male and young workers. (Oye *et al.* (2013) adds that the effect of PEOU on intention is also moderated by gender and age such that it is more significant for female and older workers, and the effect decrease with experiences. The UTAUT model accounted for 70% more of the variance in usage intention than any of TAM studies alone (Oye *et al.* 2013).

### **3.13 THE THEORY OF TRANSACTIONAL DISTANCE**

Since the adoption of the use of technology is going to be examined within a distance education context, it is worth looking at distance education theories that best support the concept of technology use and adoption. Many of the distance education theories do not address the adoption of technology, however, most of the theories investigate ways in which technology can be used to enhance learning and teaching at a distance. One such theorist investigated the components of the Theory of Transactional Distance from the learner centred approach and industrial approach.

According to Moore (1990), distance is determined by the amount of dialog which occurs between the learner and the instructor and the amount of structure which exists in the design of the course, and this is true for all educational relationships regardless of mode. Greater transactional distance occurs when an educational program has more structure and less student-teacher dialogue as might be found in some traditional distance education courses. Moore acknowledges that even face-to-face teaching environments have high transactional distance such as a class of 100 students offered in a large, auditorium-style classroom where there is little or no opportunity for the individual student to interact directly with the instructor. Education offers a continuum of transactions from less distant with greater interaction and less structure, to more distant with less interaction and more structure (Moore & Kearsley 1996).

It can be argued that Moore's theory of transactional distance factors learner autonomy which is a personal characteristic, in varying degrees. The learners' capacity and desire to determine the course of their own learning, or learner autonomy implies a corresponding decrease in the degree of instructor control over the process. Moore categorises programs according to the degree of autonomy they offer the learner in the three areas of planning, implementation and evaluation of instruction (Moore & Kearsley 1996). The highest degree of autonomy is found in programs that allow the learner to participate in all three aspects of instruction and the lowest degree of autonomy is offered by those programs in which instruction is planned, implemented, and evaluated entirely according to the dictates of the course designer(s) and/or instructor(s).

The theory of transactional distance blurs the distinctions between conventional and distance programs because of the variety of transactions which occur between teachers and learners in both settings (Moore & Kearsley 1996). Thus distance is not determined by geography but by

the relationship between dialog and structure with learner autonomy taken into account in varying degrees. It is also worthwhile to explore other types of distance that exist in an educational transaction that contributes to the distance of understandings and perceptions. These distances can be described as intellectual distance (that is, the level of knowledge, prerequisite learning) social distance (affinity, closeness, support), and cultural distance (language, class, ethnicity, age, gender and religion).

Saba and Shearer (1994) in their own study carried the concept of transactional distance a step further by proposing a system dynamics model to examine the relationship between dialog and structure in transactional distance. In their study using a system modelling program, to model the relationship between dialogue and structure using distance students' exchanges with instructors. Saba and Shearer (1994) conclude that as learner control and dialog increase, transactional distance decreases in such a way that the more control the teacher has, the higher the level of structure and the greater the transactional distance in the learning experience. Saba and Shearer claim that their results support the validity of Moore's theory of transactional distance. This concept has implications for traditional classrooms as well as distance ones. The use of integrated telecommunication systems may permit a greater variety of transactions to occur, thus improving dialogue to minimize transactional distance (Moore & Kearsley 1996).

As noted previously, this study uses the Technology Acceptance Model (TAM) as its basis while integrating various models from the other models presented in this study. This is because TAM provides a strong foundation for adoption of technology in distance learning but has some limitations as identified by various theories such as adoptions of innovation model, innovation diffusion theory, theory of reasoned action, TAM 2, augmented tam human-task-technology interaction and performance model task-technology fit theory (TTF), Decomposed Theory of Planned Behaviour (DTBP) and Theory of Planned Behaviour, thus the need for filling up those gaps using other relevant theories.

### **3.14 SUMMARIZED COMPARATIVE ANALYSIS OF THE MODELS**

A critical analysis reveals three key groups of models: 1) The innovations Diffusion Theory (IDT) which suggests that the user's perception of the characteristics of an innovation affect adoption (Moore & Benbasat 1991; Plouffe, Hulland & Vandenbosch 2001; Rogers 1995); 2) The intention-based theories of IT adoption such as TAM (Davis 1989; Davis, Bagozzi

& Warshaw 1989; Venkatesh & Davis 1996, 2000) and TPB (Mathieson 1991; Taylor & Todd 1995b; Venkatesh & Brown 2001) which show that user adoption and usage of an IT innovation is ultimately determined by personal beliefs and attitudes toward the information systems; 3) Sociology Theory (Compeau & Higgins 1995; Compeau, Higgins & Huff 1999) and Triandis' model (Cheung, Chang & Lai 2000) that have been applied to user adoption of IS studies.

**Table 3.1 Summary of Theories used in this study and their respective contributions**

Theory	Contribution to this Study
TAM	Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)
Theory of Planned Behaviour (TPB)	Perceived Behavioural Control (PBC)
Decomposed Theory of Planned Behaviour (DTBP)	Decomposition of belief, the relationship between belief and the antecedents of intention
Enhanced/extended Technology Acceptance Model (TAM2)	Social influence processes (subjective norm, voluntaries, image, and experience) and cognitive instrumental processes (job relevance, output quality, and result demonstrability)
Augmented TAM	Influence of social and control factors on behaviour (subjective norm and perceived behavioural control)
Theory of Reasoned Action (TRA)	Behavioural intentions
Innovation Diffusion Theory (IDT)	Relative advantage, compatibility, complexity, trial ability, and observation ability of the innovation, as well as social
Adoptions of Innovation Model	Steps of knowledge, persuasion, decision, implementation, confirmation

Human-Task-Technology Interaction and Performance Model	Determinants of behavioural intentions
Task-Technology Fit Theory (TTF)	Matching of technology to task
Unified Theory of Acceptance and Use of Technology model (UTAUT)	Limited ability, time, environmental or organizational limits, and unconscious habits that limit the freedom
Theory of Transactional Distance	Transactional distance (the amount of dialog between the learner and the instructor, and the amount of structure in the design of the course)

### 3.15 LIMITATIONS OF PREVIOUS THEORIES AND RESEARCH FINDINGS

Focusing on the adoption and use of distance learning technologies, which is our current research interest, we inventoried the main deficiencies of previous ICT adoption and use research. First, much of previous ICT adoption-and-use research mainly focused on adoption as a one-time event rather than investigating the evolving dynamics of ICT use after adoption Limayem *et al.* (2003) Scholars usually studied the adoption decision or intention to use a certain ICT at the initial adoption stage Limayem *et al.* (2003). These studies did not measure the actual usage behaviour at the initial adoption stage as well as the continued or discontinued usage of the technology. The studies on the post-adoption behaviour such as continuance and discontinuance of ICT usage would provide some alternative approaches in understanding why people continue or discontinue using a certain ICT. Similarly, many cyber-infrastructure adoption-and-use studies did not actually investigate the post-adoption behaviour of the technologies. In addition to initial adoption, continued use also needs to be researched by scientists.

Second, in regards to post-adoption research, the previous theoretical frameworks have some limitations in terms of original theories employed and the constructs used. Previous ICT adoption-and-use research streams emphasized the cognitive basis for an individuals' decision about technology adoption and use (Limayem *et al.* 2003).

Early post-adoption research used the same theories used in adoption research. Also, the post-adoption theories and models employed similar theoretical frameworks as adoption focused

theories (Limayem *et al.* 2003). In addition, many of post-adoption studies used constructs similar to the ones used in adoption studies to investigate the continued usage of a certain technology. The results from post-adoption studies using the same constructs studied in adoption research show inconsistency. For instance, subjective norm is significant in the pre-adoption stage but not significant in the post adoption stage (Hsieh *et al.* 2008; Morris *et al.* 2005; Roca, Chiu & Martínez 2006). The third limitation of previous ICT adoption and use research is that it does not address context. Existing literature on ICT adoption and use introduces a number of different variables; however, these variables are often context-independent. ICT adoption-and-use research was mainly studied under organizational contexts.

What does this mean in the context of this study? Although, researchers can get access to a constantly increasing number of technologies for their research, previous IS research often did not address the differences in contexts.

### **3.16 CHAPTER SUMMARY**

The purpose of this chapter was to look at different models and theories that focus on the adoption of technology use. The chapter included adoption theories and models such as Technology Acceptance Model (TAM), Extended Technology Acceptance Model (TAM2), Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB), Innovation Diffusion Theory (IDT), Unified Theory of Acceptance and Use of Technology model (UTAUT) and Theory of Transactional Distance. The chapter also covered Limitations of Previous Theories and Research Findings and chapter summary.

## **CHAPTER FOUR**

### **QUALITATIVE STUDY – DATA COLLECTION AND ANALYSIS**

#### **4.1 INTRODUCTION**

This chapter presents the qualitative research methods that were employed in this study in order to accomplish one of the research objectives. As explained in the introduction this study adopted a mixed research design using cross-sectional survey research in which factors impacting on students' technology integration were investigated through survey instrument. However, the researcher used both quantitative and qualitative data approaches (Creswell 2009). This chapter will focus on the qualitative part of the study, addressing the objective of exploring student experiences in using technologies to support learning and teaching in a distance learning program at Africa Nazarene University. It gives the plan, structure and strategies that were employed to respond to the research questions. Qualitative data provides a rich, detailed picture to be built up about why people act in certain ways, and their feelings about these actions. This chapter covers the qualitative research design, research population and sampling procedure, ethical clearance, research instruments and data gathering procedure, and data analysis related to the qualitative part of the study.

From qualitative studies, the researcher can gain deep knowledge; however, this is often not generalizable. Qualitative research explores phenomena in specific contexts, articulates participants' understandings and perceptions and generates tentative concepts and theories that pertain to particular environments (Creswell 2009). Qualitative research is a form of empirical study that aims at showing how individuals view their environment in which they live work and operate. The main aim of using qualitative methods is to give insight into the social reality of individuals' classes and cultures. In most researches, qualitative approaches are used to explore the behaviour, perspectives and experiences of the population under the study (Holloway 1997). The researcher employed use of qualitative data to bring out the insights of the students' perceptions and attitudes on the subject matter. Using qualitative methodology calls for inclusion of a variety of strategies for systematic collection, organization and interpretation of textual material gathered while talking with people or by observation (Malterud 2001). In qualitative approaches, the matter under study are studied in their natural set ups trying to make sense of phenomena in terms of the meanings individuals bring to them.

A qualitative method was included for this study because of the belief that it would bring original information on the issue under study, it would give in-depth information about the subject under study and that it would reveal the feelings, attitudes and opinions of the respondents in their natural environmental setting. It is hoped that the qualitative study will assist the Researcher to explore scenarios in particular contexts, articulate participants' understandings and perceptions and generate apparent concepts and theories that pertain to the research's particular environment. The major research question of this study was based on the assessment of the level of technology adoption in learning and teaching, identification of the learners' perceptions and attitudes towards e-learning, and determination of factors affecting implementation of e-learning at Africa Nazarene University. The researcher felt that she could probe the respondents' more deeply using qualitative methods to get the answers needed. With qualitative methods, everybody language can be observed and noted therefore revealing qualitative information that is nonverbal and not written.

Denzin (1970) and Lincoln and Guba (1985) point out that in qualitative research, samples are usually small because the focus is not on the numbers but on how deep and rich the data collected from individual cases is. The aim is not to generalise but to understand an issue in detail. Unlike in quantitative studies where scholars concur over criteria for sample size, qualitative scholars have not generally agreed on adequate sample arguing that an appropriate sample size for a qualitative study is one that sufficiently answers the research questions (Denzin & Lincoln 2000; Marshall 1996: 523). This has been attributed to different factors by various scholars. Such factors include heterogeneity of the population, selection criteria, multiple samples within one study, data collection methods used, budget and resources available (Ritchie et al. 2003: 5 as cited in Mason 2010); scope of the study, nature of the topic, quality of the data collected, design of the study and expertise in the chosen topic.

## **4.2 FOCUS GROUPS**

To explore the students' attitudes and perceptions about using technology in learning and teaching, data was collected through Focus Group Discussions. These were used to probe and explore issues that are central to students' understanding of technology usage for learning and teaching, results from the quantitative research were used to help identify patterns and extent of students' actual technology usage in learning and teaching. The specific strength of qualitative data is its ability to relate the phenomena under study to other social and cultural

phenomena. They are able to lift the veil by digging deep into the underlying issues while quantitative data reveals what the phenomena is all about on an aggregate level and can thereby allow the description of socio-cultural factors and behavioural intentions to use technology for learning (Kelle 2001). The idea is to better understand the detailed views of students in their understanding of learning and this will be achieved through qualitative data.

#### **4.2.1 Purposive Sampling**

Judgmental and stratified sampling was used to select respondents who have various levels of understanding of the e-Naz from different department and schools. For Qualitative data analysis; an in-depth focus group discussion questionnaires was analysed manually to help in exploring the students' attitudes and perceptions about using technology in learning and teaching. Transcriptions and summaries of emerging issues in the discussion were documented in line with Guba and Lincoln cited in Poggenpoel (1998: 238). The responses from students were grouped into themes. The recurring statements and narratives were then summarized and analysed, that is, categorizing and comparing units, integrating categories and their units, delimiting the construction and using external coder.

A key part of any research project is getting workable data from the general population. Without this, your research is shallow, one-sided and lacking in any real proof. It is for this reason that some form of sampling is generally carried out, and one of the most popular sampling methods is a process known as purposive sampling. When carrying out purposive sampling, the researcher chooses specific people within the population to use for a particular study or research project. Unlike random studies, which deliberately include a diverse cross section of ages, backgrounds and cultures, the idea behind purposive sampling is to concentrate on people with particular characteristics who will better be able to assist with the relevant research. In this study, the researcher opted to choose targeted individuals to participate in the focused group discussions. Distance learners from the academic departments and schools were chosen to participate in this research initiative. Traditional conventional students were excluded. The focus group comprised of twelve distance learning students of six men and six women.

Three focus group with four members each were selected and put in different rooms where the moderator used the focus group discussion guide to lead the discussion. The discussion guide was derived from the objectives of the study to probe more deeply into the students' attitudes and perceptions about using technology in learning and teaching. Accessing the participant's

perspectives and attitudes through interviews was important to the study in revealing how the participants interpret the concept of technology integration and how their understandings influences their behaviour.

Focus groups were interviewed to obtain the relevant qualitative information. A focus group in this case refers to a group of six to ten individuals led through an open discussion by a skilled moderator or facilitator. The group needs to be large enough to ensure rich discussion but not so large that some participants do not contribute to the discussion. A Focus Group interview refers to a type of interview where respondents sit in a group with the researcher to discuss a topic of interest. Focus group interviews can yield rich detailed information and deep understanding on the subject under study. If properly applied, a Focus group may create an all-inclusive accommodative environment that helps the respondents feel free, enabling them to thoughtfully respond to questions in their own words, therefore making their answers more meaningful. There are many benefits that come along with the use of a Focus Group. Focus Group interviews offer an in-depth revelation of issues at hand based on different contributions of the respondents. They give better quality data in its natural format as compared to other forms of interviews. Focus group interviews also promote active participation and objectivity as the contributors are assured of anonymity.

The Focus Group Guide (Appendix B) consists of recommended questions based upon the general topic areas and structure of the survey. With intention to ensure that the focus group members addressed particular topics, the interview was guided by a schedule. The focus group guide for this study was designed specifically to obtain in-depth information that concerned the ‘how’ and ‘why’ of technology adoption by students of ANU.

Eight questions in total were included on the guide, in line with the objectives of the study. Sample questions from the instrument were “Briefly describe your rating and experience on the level of usage of e-Nazplatform, the Virtual learning environment at Africa Nazarene University; Kindly explain how students use technology in learning and teaching processes in ANU and compare the online discussions as opposed to Face-to-Face instructions that you have had in your courses at ANU; Discuss how Africa Nazarene students’ attitudes and perceptions have influenced your usage of eLearning technological tools available in ANU; From your online education experience, discuss the relationship that exists between technology users attitude/ perception and adoption of technology for learning and teaching;

and From your experience and challenges, explain factors influencing implementation of technology to support learning and teaching through e-Naz and other online platforms you have used before at Africa Nazarene University". The development of this instrument was inseparably tied to the survey to ensure accurate triangulation of data.

Three focus groups were also used to help generate responses in relation to students' experience on the use of technology for learning and teaching. Twelve students participated in three focus groups. The three focus groups were conducted with a mixture of students of different demographic characteristics such as age, department of study, school, gender, possession of computers among others. The interviews lasted from one and a half to two hours. When the researcher conducted these focus groups in ANU, she was under the impression that the younger students that she would be talking to would find technology issues easier than those who were older in age and therefore more comfortable with the discussion. Although they were comfortable and contributed during the discussion, the mature students seemed more focused and serious, possibly with the hope that the challenges they raised could be handled for effective online learning.

They were also asked to explain how distance students were using technology, the extent to which they were using technology for learning and teaching, the students' attitudes and perceptions in using technology for learning, and factors influencing the implementation of technology to support learning and teaching. Discussion followed.

Data was collected from 12 respondents through Focus Group Discussions from three focus groups (three groups with four students each – two males and two females in each group).Twelve students participated in three focus groups. Each group consisted of a mixture of students from the two schools (Business and Law) and four faculties (Computer Science, Religion, Education and Environment) sampled for the study. These respondents were selected using stratified and purposive strategy. At Africa Nazarene there are 12 Academic departments and so each of the 12 respondents represented each academic department. Out of the 12 respondents 6 were male and 6 were female. Out of the twelve respondents three groups were constituted as follows: -

| Group one was made up of, –Respondents 1, 2,~~3~~ and 34). Group two was made up of - Respondents 5, 6, 7 and 8). Group three was made up of G- Respondents 9, 10, 11 and 12. All students were studying at African Nazarene University's Institute for Open and Distance

Learning at the time of data collection. Focus groups took place in a face-to-face session in a class. Chairs were arranged in a circular position in order to eliminate any feeling of authority or superiority. Research assistants collected data and they were trained to ensure that they understood what the study was really about and what each of the questions meant. The research assistants were picked from Africa Nazarene University who could be reached easily and had worked as researchers in other similar assignments before. The researcher worked with the assistants in the distribution of the consent forms amongst the respondents and students were requested to read and sign it as it outlined the goal of the research and showed the voluntary nature of their participation in this study. Students were also assured that the discussion was confidential and they needed not to worry that it could reach the administration and cause them any harm. It was explained that the presence of the facilitator was just to listen and record. It was stressed that the presence of the Facilitator was also to enable the respondents to ask any questions that they may have and to offer clarification for any concern that the respondents may have.

Focus group members were selected and put in groups of four where the research assistant used the focus group discussion guide to lead the discussion.

Immediately after that, one student with a concern said, “but assuming I have a point to raise or contribute which has the exact names of those who were involved in my development of negative attitude towards online and distance and I mention the name of let me say one of my lecturers, as an administrator wouldn’t you use it to castigate the lecturer?” The student was assured that for the sake of avoiding such circumstances, they all needed to refer to the Lecturers as Mr. X, Ms. Y or Mrs. Z instead because pseudo names are safer.

All questions that the entire discussion was based on were read to the students. This is because it was good for them to know the questions on which our discussion would be based in advance of the discussion. The students were assured that they did not need to remember the questions as the same questions would be asked one at a time and the discussion would move on to the next question only after the group had exhaustively discussed the previous question. Emphasis was put on the fact that the question that was to be keenly dealt with was “How Africa Nazarene students’ attitudes and perceptions have influenced their usage of eLearning technological tools available in Africa Nazarene University (ANU)”.

Even though most students were challenged over responding to the question on their perception and attitude on the use of technology in learning and teaching, they were still able to give relevant and in-depth information that facilitated coding and thematic analysis.

It could be argued that a good number of the students took time to respond to the question on their perception and attitude on the use of technology in learning and teaching because either they felt some information regarding their attitudes and perceptions were too personal or possibly due to discomfort with the moderator of the focus group discussions who also served as the Director of Online and Distance Learning. This might have been based on fear of possible victimisation or just the desire to say what was pleasing to the Director of IODL. After assurance and re-assurance they opened up although some only opened up as the discussion fared along.

Despite small samples of students from various departments, there were enough similarities in the sample make-up and topic exploration: notably a consistent emphasis on the adoption of technology to support learning and teaching in a distance learning program at Africa Nazarene University.

A sample of 12 IODL students was selected justified by the assertions of various scholars who posit that samples for qualitative studies are usually much smaller compared to those used in quantitative studies. Such scholars base their argument of varying sample size on factors such as requirement of only a code, concern with meaning, the use of maximum saturation, and labour intensive nature of qualitative research which makes data analysis of large samples challenging (Ritchie et al. 2003: 5 in Mason 2010).

#### **4.4 DATA ANALYSIS**

Data was analysed using Thematic Analysis which entails the procedure of identifying patterns or themes within qualitative data (Braun & Clarke 2006). Thematic analysis is actually a method rather than a methodology. Therefore it means that, unlike many qualitative methodologies, it is not tied to a particular epistemological or theoretical perspective so it is very flexible. It also means that thematic analysis can be carried out in many different ways and so it can be challenging to find clear guidelines (Braun & Clarke 2006). According to Daly and Gliksman (1997), thematic analysis is a qualitative analysis method emphasizing the examination of themes identified from the raw qualitative data by organization and wealthy description of the data set. Braun and Clarke (2006: 82) define a theme as a word or phrase

that captures something important about the data related to the research question and represents some level of patterned response or meaning within the data set. Guest and MacQueen (2012) contend that the method goes beyond mere enumeration phrases or even words in a text for the identification of implicit and explicit concepts inside the data after coding. In this type of analysis, coding is understood as the basic process for the developing themes within the primary data by distinguishing the key moments and trends in the data and encoding them before interpretation. Such an interpretation of the codes may include comparing of theme frequencies, ascertaining theme co-occurrence, tabularization and graphical illustration of the relationships between different identified themes (Boyatzis 1998).

Although most scholars cogitate thematic analysis as a critical method in capturing the intricacies of meaning inside a data set, there are diverging views on the size of a data set as some texts can be one word in length while others can be several pages in length (Guest 2012; Saldana 2009). According to Charmaz (2006), thematic analysis is founded on the rationale of supporting all scholarly assertions with data as evidence from the grounded theory as a way of constructing theories that are grounded in the data itself. Guest and MacQueen (2012) add that this process of thematic analysis entails reading transcripts, identifying possible themes, comparing and contrasting themes, and building theoretical models based on the themes.

Thematic analysis is somehow phenomenological in its subjective focus on human experience and emphasizing the participants' perceptions, feelings and experiences as the prevalent object of study (Guest & MacQueen 2012). It is a way of giving voice to the voiceless 'other' that has roots in humanistic psychology during the research process, thus allowing participants to discuss the topic in their own words, free of constraints found in the fixed-response in questions in quantitative studies.

This study employed both deductive and inductive thematic analyses. Scholars such as Boyatzis (1998), Braun and Clarke (2006), contend that thematic analysis can either take the inductive or deductive approach. While in an inductive approach the themes identified are strongly linked to the data because all assumptions are data-driven, this is not the case in the deductive approach which is theory-driven rather than data-driven. The inductive approach implies that the coding process occurs without attempts to fit the data into already existing models or theories. Crabtree (1999) noted that one issue that has been raised on the inductive approach is that the researchers cannot possibly free themselves from their theoretical epistemological responsibilities during the entire process. Comparatively, the deductive

approach due to its being theory-driven, is less descriptive because the analysis is limited to the preconceived theoretical frames and models. This similarly shapes the results of such findings from a deductive approach.

The thematic analysis conducted in this study utilised Braun and Clarke's 'guide' of the six phases of conducting thematic analysis, that is, (1) Getting familiar with the data; (2) Generating initial codes; (3) Looking for themes; (4) Reviewing themes; (5) Defining and naming themes; and (6) Producing the report. The highlighted steps are explained below:-

#### **4.4.1 Steps in thematic analysis**

In **step one** of Braun's and Clarke's thematic analysis format, the Researcher is expected to read and counter read the transcripts to get sufficiently familiar with the entire body of data. At this stage it is useful to make notes and jot down early impressions.

In **step two** the Researcher is expected to start to organise the data in a meaningful and systematic manner. Coding reduces a large body of data into smaller chunks of meaning. There are different manners to code and the method opted for is determined by the researcher's perspective and research questions.

The **third step** involves searching for themes. Themes are the patterns in the data that are important or interesting in terms of the research question. They are bigger clusters and more meaningful than codes and say something about the topic or the research question

In **step four** the Researcher is expected to review, modify and develop the preliminary themes that were identified in step three to find out if they make sense. At this step all the data that is relevant to each and every theme are gathered,

**Step five** is about finally fine tuning of the themes and the goal of this step is to identify the essence of what each theme concerns. It is also at this step that the Researcher attempts to find out the relationship between the themes

**Step six** is the final step in thematic analysis according to Braun and Clarke and it involves a write up. It is the end point of qualitative thematic analysis and requires a write up of some kind of a report. It may be a journal article or discussion of findings of the research.

All questions asked and responses were transcribed verbatim. The responses were read and re-read to understand their meaning. Memoing, whereby the researcher read the transcriptions while noting down any ideas about the data that had similar meaning, were noted in a notebook. The Researcher immersed her thoughts fully into the data until certain meaning units began to develop and seemed to fit into distinct categories. These eventually became obvious and started clustering together in the form of statements made by the respondents during the interviews.

The researcher read and re-read the transcribed focus group discussions and notes taken during the focus groups in order to familiarise herself with the data. She read and counter read the responses of the different participants on each question under discussion and noted both diverse and concurring views on the students' attitudes and perception in technology use for learning and teaching in IODL. She read about the technology appliances most participants were using, how they were using them, the frequency of their use of such appliances, their attitude and perception and factors influencing the use of technology for learning and teaching.

In reading and re-reading, it was revealed that some participants highly criticised the lecturers and the system, some conceded that students' attitude was a challenge as some were not appropriately and regularly engaging with the online system to understand it better and were doing the bare minimum by choosing the easiest appliances to receive learning materials and to send their assignments. This trend seemed to run throughout the responses. Reading the various responses of the participants also helped in noting the positive and negative attitudes and their Basis. Reading through the views of the participants unveiled that lecturers were often also the cause of the students' perceptions and attitudes with intention to use technology in learning and teaching in IODL, due to factors such as shallow notes, poor communication, untimely sending of notes, and incompetence in understanding technology among others.

In using the thematic analysis for this qualitative data, the researcher approached the data with absence of trepidation with the aim of fully capturing the students' attitudes and perceptions in using technology for learning. This entailed constant watch and control of my assumptions,

biases and prejudices about the use of technology in learning and teaching at African Nazarene University from infiltrating the analysis. The study consequently employed horizontalization (McLeod & Shanahan 1993).

#### 4.4.1 THEMATIC ANALYSIS

**Step1 - Becoming familiar with the data:** This entailed treating all the statements made by the participants as of equal importance and listening to each of the phone-recorded interviews over and over again as advised by McLeod and Shanahan (1993). This was followed by what Breakwell, Harmond and Fife-Schaw (2003) calls memoing whereby the researcher repeatedly read the transcriptions while noting down any ideas about the data that came to her mind on her notebook. She immersed my thoughts fully into the data until certain meaning units began to develop and seemed to fit into distinct categories. These eventually became obvious and started clustering together in form of statements made by the respondents during the interviews.

#### **GROUP 1 AND 3 (Respondents 1, 2, 3, 4, 9, 10, 11 and 12)**

Before looking critically at the data, respondents were asked to rate their experiences on the use of thee-Naz platform, the Virtual learning environment at Africa Nazarene University. To this they gave various responses in the discussion and then they were requested to move to the next question. The facilitator's statement and the responses of the participants were as follows:-

Rating of individual respondents in the group

**Table 4.1: Respondent Comments**

<b>Respondent Rating</b>	<b>Comments</b>
Very High: Respondent 3;10; 5	<i>On my side I rate it as very high because whenever the lecturers cannot assist us the administration usually helps I rate it as very high because of the online discussions I rate it as very high because the platform was easy to learn and user-friendly</i>
High: Respondent 11; 9; 4	<i>I can rate it as high because of the technology infrastructure in ANU, stability, security of the system, accessibility and other good values</i> <i>I would rate it as high because of the system itself and some lecturers who are doing their best.</i> <i>I will equally rate it as high because of availability of assistance whenever there is need.</i>

Average: Respondent 2	<i>I would rate it as average due to power disruptions and initial difficulty in using the system</i>
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Following the rating exercise, participants were asked to explain how students use technology in learning and teaching processes in ANU and compare the online discussions as opposed to Face-to-Face Instructions that they had had in their courses at Africa Nazarene University. Some of them said:

Respondent 2: *I mostly use emails to access and send reading materials and assignments and e-Naz.*

Respondent 1: *I use online/electronic libraries, Google search, and emails*

Respondent 3: *I enjoy face to face video interactions through You Tube, webinars, audiotape, and e-Naz.*

Respondent 4: *I use e-Naz for online discussion forum, IR and chat, and email.*

Respondent 10: *Some use email, e-Naz platform, You Tube, webinars, audiotape, and chat*

Respondent 12: *I think email is the easiest and the most used by students.*

This shows that respondents use emails and e-Naz much more than the other interactive platforms such as online discussion forum, IR and chat, e-Naz platform, You Tube, webinars, and audiotape. This could mean that the respondents find it easier to use emails and thee-Naz platform which is well-structured and interactive.

The respondents were then asked to discuss how Africa Nazarene students' attitudes and perceptions have influenced their usage of eLearning technological tools available in ANU. This is the question the respondents took the longest time to answer as it was quite wide in scope. Their suggestions were noted in an index card which formed categories which were later used with the third group to group categories into themes. The responses predominantly show that most respondents were not engaging with more technical ways of communication such as You Tube, Webinars and Video Conferencing. This indicates they may require more training to gain competence.

Various respondents registered their responses as noted below:

Respondent 1: *I would say we have both negative and positive attitude and perception towards adoption of technology for learning and teaching. At times I feel very good about it but at times especially when I have difficulty in doing the assignment I feel bad.*

Respondent 12: *I had a very positive attitude because I knew I came to learn, but the challenges I have been facing have made me to develop negative attitude even fearing to use it.*

Although some of the students identified the benefits of using e-Naz, others feel they were coerced to use technology due to the environmental circumstances within the labour industry, globalization among other compelling factors.

Respondent 11: *...because technology is the way of the future, users have no choice but to pick it.*

Respondent 3: *We are not only forced to know it but we want to be in demand, you know most companies in the market want students who are computer literate!*

Despite benefits there were challenges that the respondents experienced in using technology in learning and teaching.

Respondent 2: *The challenges have overwhelmed us!*

Respondent 2: *Some of lecturers have miserably failed in expressing passion or readiness to learn technology tools I think that is why we ask those questions and they fail to answer. As students we have also contributed because some of us are afraid and do not want to tell the administration thinking the lecturers will victimize us.*

Respondent 9: *I wish ANU had done a need analysis first before introducing the system. This is possibly why we lack timely feedback to the students and the content is sometimes too little*

Respondent 11: *Some lecturers say, 'As for me I don't care.' Some of these lecturers need to come down to students' level and know that students are human beings."*

Respondent 10: *It is all about passion and wanting to learn something new. Students need to voice their concern to the IODL. Lecturers don't express passion."*

Respondent 1: *"Some are good and some are terrible. They delay with materials. They don't send feedback on time. They don't appear for face to face meetings. There are some who go out of their way to help the student. Some lecturers guide you through your learning processes and some don't."*

Respondent 1: *the experience is awesome experience. I access and connect with colleagues whenever I want and I can also leave a message for lecturers.*

Respondent 2: *Convenience when it comes to time. Lecturers keep you on toes. I can submit my assignments at my own time.*

Respondent 9: ... *the system is user friendly because it gives us directions on what to do. The feedback from facilitators is in a timely manner and the discussion fora are enjoyable.*

Respondent 10: Yes. *Online discussion has the challenge of connectivity and other technological gadgets which if provided then this is the best way to discuss.*

Respondent 12: *Hosting issues need to be checked. It could be better to have e-Naz hosted elsewhere because of the power interruptions in Africa Nazarene University.*

From the responses, it was noted that the challenges included high internet cost, connectivity problems, and cost of other technological gadgets, power fluctuation, and power availability among others.

*When they were asked about their views and feelings, they said:*

Respondent 10: ... *the system plays a key role in time management, it keeps users on their toes; you don't submit your assignment in time, the portal closes! E-Naz system is interactive and quite good.*

Respondent 11: *I support her. There is nothing without its good and bad side.*

Respondent 9: *For the analogs, online is time consuming and cumbersome. Online forces us to have internet. So if I lack internet at home I am left out. Both are good but they favour different people. There are those who live in areas where there is no electricity pole.*

Respondent 10: *This is true and very bad if you cannot afford the connection.*

Respondent 9: *Although the e-Naz system was initially very hard but the more I interacted with it, the better it became. It saves time and keeps the users on their toes just as earlier mentioned.*

Respondent 12: *The increased demand for education has forced many people who desire to further their education to go online. Online discussions and education is cheaper and convenient.*

Respondent 9: *the attitude of our lecturers is very negative and they are very arrogant and they stress students because of their weaknesses*

The respondents argued during the online discussion with some saying that the relationship is not clear and others saying it is clear because good technology, supportive staff, good content and timely content among others make students to have a positive attitude and anything less makes them to have negative attitude.

Shy participants were re-assured of the unthreatening role of the facilitator and they were advised only to see the facilitator as a student who is simply conducting research.

Students were asked to discuss the relationship that exists or can exist between technology users' attitude/ perception and adoption of technology for learning and teaching, they had diverse responses:

*Respondent 2: There is a very high relationship between attitude and perception of students on the adoption of technology for learning and teaching in ANU. I am highly satisfied with the training using e-Naz as training for e-Naz through 40 computers has been excellent.*

But another one said:

*Respondent 1: It is difficult to say what relationship exists between technology users' attitude/ perception and adoption of technology for learning and teaching in ANU. Positive attitude and perception of users makes adoption of technology easier while negative attitude and perception makes the adoption, difficult, slow or even impossible. The university has supported us with a big computer lab with personnel to train but more lecturers visit the lab than students.*

*Respondent 12: The experience is direct. I few enjoy our online learning, then we have positive experience, if we don't, we have negative experience.*

*Respondent 10: The situation can be challenging and prevent some from having positive experience but if one is determined, they he or she can continue with the positive attitude that was there to use technology for learning.*

The findings noted both positive and negative attitude and perception of users towards the use of technology in learning and teaching. While some students pointed out their negative attitude as stemming from the failures and weaknesses of the lecturers whom they viewed as incompetent and not ready to embrace the use of technology, others were categorical that some students just had negative attitudes. They cited the example of other lecturers who were visiting the computer laboratory more often than the students, yet they students still complained that the lecturers were not making any effort to interact with the technology.

The last question posed to the group was “From your experience and challenges, explain factors influencing implementation of technology to support learning and teaching through e-Naz and other online platforms you have used before at Africa Nazarene University”. This question received very many answers with many respondents actively participating. After exhaustively covering the topic, the students were requested to stop. The Students were then asked to “*explain factors influencing implementation of technology to support learning and teaching through e-Naz and other online platforms you have used before at Africa Nazarene University*”.

Respondent 10: *The platform was good and interactive...I liked the discussion forum*

However some students raised issues of connectivity which requires electricity, airtime or bundles

Respondent 3: *Purchase of bundles to access the internet is very costly for us especially for webinars, You Tube and video conferencing.*

Respondent 11: *Even if we could afford the cost of the internet, some places do not have power while others have very poor network reception.*

Respondent 2: *Even in school, power can go off at any time consequently disrupting our learning through the internet*

Respondent 9: *Sometimes you have travelled upcountry for some event and in that part of the country there is no electricity connection, it makes the use of technology in learning and teaching very challenging.*

After collecting data from these groups, step 2 and 3 of thematic analysis were used to derive codes from the data.

Facilitator: Our question now is, *from your experience, kindly explain how students use technology in learning and teaching processes in ANU and compare the online discussions as opposed to Face-to-Face Instructions that you have had in your courses at Africa Nazarene University*

Respondent 7: *I mostly use emails to access and send reading materials and assignments and e-Naz*

Respondent 8: *I enjoy face to face video interactions through You Tube, webinars, audiotape, and e-Naz*

Facilitator: *I think now we have properly adequately jogged our minds for the main question for this discussion, haven't we? I think it is time we tackle the central question of the focus group discussion.*

Respondent 5: *We are eagerly waiting too!*

They were then requested to specify the extent to which they were using technology for learning and teaching. In answering this some were using technology to a high extent while others were using technology to a low extent. They gave several answers after which they were asked to continue with the next question. The Statement of the Facilitator and the responses of the students were as noted below:-

Facilitator: *Here it is, from your experience, kindly explain how students use technology in learning and teaching processes in ANU and compare the online discussions as opposed to Face-to-Face Instructions that you have had in your courses at Africa Nazarene University*

Respondent 7: *I mostly use emails to access and send reading materials and assignments and e-Naz*

Respondent 8: *I enjoy face to face video interactions through You Tube, webinars, audiotape, and e-Naz*

Facilitator: *I think now we have properly adequately jogged our minds for the main question for this discussion, haven't we? I think it is time we tackle the central question of the focus group discussion.*

Respondent 5: *We are eagerly waiting too!*

On the next question which was the students' attitudes and perceptions in using technology for learning, a serious discussion followed. This was where they had the freedom to express their feeling, opinions and thoughts in the best possible way.

Respondent 6: *I highly praise ANU on its process of introducing e-Naz, the institution scored an A<sup>+</sup> on networking.*

Respondent 7: *I almost dropped my training. Introduction of e-Naz should have been gradual, Deadlines varied from one lecturer to the other. Some lecturers are not willing to be consulted via the phone for extra assistance.*

Respondent 5: *I admit that both online and face to face are equally good because they both have their advantages and disadvantages. Online discussions allow users to multitask and*

*they can do the task what they intend to do at one's own convenience. You learn from one another. You are able to take care of your personal obligations while discussing subject of interest. It is easier to check on plagiarism when things are done online.*

*Respondent 6: Face to face is good because users can ask for clarifications from the lecturers and get responses instantly.*

*Respondent 7: I agree with Respondent # 5 that online discussion is better because in the world people are busy and online gives users a chance to do more.*

*Respondent 8: ....online discussions are better because the users can choose when to interact with their colleagues which enable such users to prepare well by collecting valued information. You are able to compare information from other people.*

*Respondent 7: Sorry to repeat but I still feel bad that some lecturers are not differentiating between young regular students and older distance learning students. Attitude is an issue.*

*Respondent 8: I pray for our lecturers to become good Christians. Technology is not easy but our lecturers must show interest. Some don't give feedback and they never respond to students.*

*Respondent 6: Feedback is not given on time and then some lecturers just say that we will meet during 'face to face'. Lecturers' behaviour and attitude matters a lot.*

It was clear in this discussion that students needed more support from their lecturers. Despite this problems student also raised issues about:

*Respondent 5: ... electricity blackouts and the problematic internet connectivity*

*Respondent 6: There are challenges in time management for both the students and the teachers through timely content for lecturers and timely submission of assignments for students.*

*Respondent 7: I almost dropped my training. Introduction of e-Naz should have been gradual, Deadlines varied from one lecturer to the other. Some lecturers are not willing to be consulted via the phone for extra assistance.*

**Step 2 Generating initial codes:** After listening, immersion and memoing, the researcher noted the categories down as they emerged. She thought through them carefully and meditatively considering their implicit and explicit meanings and interpretations. The data formed clustering meaning units (Breakwell, Harmond & Fife-Schaw 2003). The researcher

categorised the data into two (2) categories, that is, negative and positive consisting of 44 codes. Out of the forty four codes, eighteen codes were positive and twenty six were negative. The positive codes included the positive responses on the attitude and perception of students regarding the role of lecturers in the development of their positive or negative attitudes such as encouragements and discouragements towards the use of technology in learning and teaching as shown in Table 4.1 below.

This decision is supported by the Technology Acceptance Model, Davis (1989) which identified two theoretical constructs of Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that affect the intention to use a system. PE - is the extent an individual believes the system will help them do their jobs better. It has been noted that there are a number of studies that have used TAM as their theoretical background for explaining ICT adoption and use (Suryaningrum 2012) and in which scholars already confirmed that Perceived Usefulness has a positive relationship with both adoption intention and continuance intention (Venkatesh 2000).

**Table 4.1 Categories of Responses from Participants**

Positive	Negative
Technology is the way to go	Discouragements sow negative attitude
Company/market demand for computer literate students	Lecturer's failure to learn and understand technology tools
Student passion and desire to learn something new	Fear of victimization
Guidance by some lecturers through the system	Lack of guidance by some lecturers
Good access and connectivity among students and lecturers	Absence of need analysis
System convenience and flexibility	Untimely feedback
System efficiency in time management	Lack of communication from lecturers
User-friendly system	Challenges in identifying unique learners

Highly interactive platform	Students' failure to voice their concerns
Good networking	Lecturers' lack of passion/interest in technology
Low cost learning	Technicality of some things to be done without physical presence or meetings
Enhance research	Lecturers' delay with learning materials
Non-judgmental/non-biased	Inadequacy of connectivity gadgets
No intimidation	Some lecturers confuse students
Allow multitasking	Unstable hosting
Knowledge sharing	
Controlled plagiarism	Power interruptions
Some lecturers give good content and further reading	Speedy introduction of e-Naz
Understanding e-Naz eased with time	Arrogant and stressful lecturers
	Students with negative attitude to technology
	Excludes those outside the National electricity power grid

**Step 3 Searching for themes:** The noting down of the categories was followed by thematic analysis, that is, the writing down of the meaning units in form of statements. This was followed by attaching participants' statements and grouping repeated statements together in clusters until all the categories were exhausted after which the researcher discarded redundant information in line with McLeod and Shanahan (1993). These processes led to the categories and codes outlined in Table 4.2.

**Table 4.2Codes**

<b>1.</b>	<b>Basic Themes</b>
2.	Benefits of technology
3.	Essential nature of Technology
4.	Challenges in using technology
5.	Technology-challenged lecturers
6.	Unresponsive lecturers
7.	Passionate students
8.	Passionate lecturers
9.	Fearful students
10.	Supportive lecturers
11.	Communication
12.	Need analysis
13.	Efficient system
14.	User-friendly system
15.	Highly interactive platform
16.	Cost of online and distance learning
17.	Lecturers' absence during face to face meetings
18.	Timely deliveries of learning materials
19.	Non-judgmental/non-biased learning
20.	Adequacy of connectivity gadgets
21.	Reduction in workload

22.	Knowledge sharing
23.	Hosting
24.	Controlled plagiarism
25.	Power interruptions
26.	Mode of introduction of e-Naz
27.	Inconsiderate distribution of assignment submission deadlines
28.	Countrywide electricity distribution
29.	Sensitivity to types of learners
30.	Poor quality content
31.	Lecturers attitude
32.	Students attitude

Being a qualitative study, the judgment of the researcher was paramount in retaining what was of worth and retaining the participants' experiences as valid as possible through the process of data reduction. This was based on the understanding of McLeod and Shanahan (1993) and Kothari (2010) that data reduction is the process of looking deeply into the data and sharpening, sorting, focusing, discarding and organizing data so as to enable drawing and verifying final conclusion. Out of the forty four (44) codes, the researcher derived the following 31 basic codes as shown in the Table 4.2 in line with Attride-Stirling (2001).

These codes were extracted from the textual data. They were like backings because they were statements of belief anchored around central notions and contributed toward the formation of the organising themes and eventually the super-ordinate themes (Attride-Stirling 2001). Even though on their own the codes were basic properties of the data offering very little clue on the text or group of texts that were analysed all together, they gave the immediate meaning of the data. This is essentially why the analysis was taken further into organising themes.

#### **Step 4 Reviewing themes:**

In regard to the fact that the 31 basic themes were many, the researcher again conducted reduction on the codes to come up with 17 organising themes through further reduction as summarised in the following Table 4.3. These organizing themes were further reduced in step 5 to come up with global themes.

**Table 4.3 Organising Themes**

<b>Organizing Themes</b>	
1	Benefits of technology
2	Hosting
3	Communication
4	Passion for technology
5	Efficiency and effectiveness
6	Ease of use
7	System interactivity
8	Study content
9	Communication
10	Electricity
11	Cost of technology application equipment and gadgets
12	Staff competence, availability of staff and their readiness to help students whenever there is need
13	Influence
14	System design
15	Individual intention/disposition of the users
16	Resource availability

17	Internet connectivity
----	-----------------------

The above organising themes according to Attride-Stirling (2001) were mid-order themes that classified the basic themes into clusters of similar meanings or concerns. They were clusters of denotations that summarised the chief assumptions of a group of basic themes in a way more illuminating of the originating data. Organising themes were the foundations that helped in the development and explanation of the high level global themes on Technology Acceptance which consists of many organising sub-themes. In this perspective, it can be said that the organising themes brought together all the main ideas suggested by the basic themes, and cut across the main assumptions underlying the substantial broader theme in the texts as a whole. The researcher then performed further reduction in order to obtain global themes and came up with 12 global themes. The final themes included Attitude Toward Use (ATU), Behavioural Intention to Use (BIU), Fear, Reasons for using technology/ Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Facilitating Conditions (FC), Time, Technology/System Design Characteristics (SDC), User Characteristics (UC), Task Characteristics (TC), Social Influence Processes (SIP), and Training/Cognitive Instrumental Processes (CIP) as indicated in column 1 of table 4.4 below.

#### **Step 5: Defining and naming themes**

Data Reduction was then followed by displaying the basic themes, organising themes and global themes which emerged from the data in order to help another person other than the researcher to quickly identify and make sense of bulky data. The various initial codes, basic themes, and organising themes were defined and named in this level with the necessary explanations for each provided.

**Table 4.4 Global Themes**

1	Attitude Toward Use (ATU)	Affect/feeling
2	Behavioral Intention to Use (BIU)	Social norms
3		Fear Complaints Victimisation
4	Perceived Usefulness (PU)	Usefulness

		Diverse uses (emails, chat, discussion fora, google search, LMS, webinar and video conferencing)
5	Perceived Ease of Use (PEOU)	Ease of use
6	Facilitating Conditions (FC)	Interaction
7		Resources Staff availability Saving time for travel to school
8	Technology/System Design Characteristics (SDC)	Interactivity Usability
9	User Characteristics (UC)	Age Background in using computers Access to laptop
10	Task Characteristics (TC)	Nature of the development or implementation Political influences Organization structure
11	Social Influence Processes (SIP)	Subjective norm Voluntaries Image Experience
12	Training/Cognitive Instrumental Processes (CIP)	Job relevance Output quality Result demonstrability

### Step 6: Producing the report

The sixth step involved explaining the meanings emerging from the thematic analysis, to give an overview of participants' expressions in the data. Qualitative researchers contend that detached and true objectivity is impossible to achieve and that the essence of any

phenomenon is not fully knowable although truth can be constructed. To this extent, qualitative research permitted the researcher to give this rich exposure on the shared meanings and subjective experiences that the researcher and core researchers constructed together.

It involved the description of attitudes and perceptions of students in using technology for learning from the point of view and frame of reference of the focus group discussants. It is on these global themes on technology acceptance that interpretations and interpretations were given based on each theme to shed light on the main question of the study which was “What are the students’ attitudes and perceptions in using technology for learning?” This study revealed that students and attitudes and perceptions on the use of technology in learning and teaching were diverse and were both positive and negative. While positive attitudes and perceptions of users on adoption of Technology in learning and teaching can simplify their understanding and use of the technology in learning and teaching, a negative attitude would instead complicate this making adoption difficult. However this also depends on the characteristics of the individual users and their levels of commitment to using technology in learning and teaching.

Interaction was also key in the development of a positive attitude and perception in line with Ajzen and Fishbein (2005) in Venkatesh, Thong and Xu (2012:166) who asserted that feedback from previous experiences can play an important role in influencing various beliefs and, consequently, future behavioural performance. The anecdote that time heals also played a key role as the participants’ understanding of the use of the technology in place became easier with time. This confirmed the findings of Vankatehh Thong and Xu (2012: 166) that with increasing experience, learners have more opportunities to reinforce their habit because they have more time to encounter the cues and perform the associated behaviour. It could be logically deduced that with increasing experience routine behaviour becomes automatic and is guided more by the associated cues. The experience seemed to have an inversely proportional relationship to the effect of negative behavioural intention on technology use. Another key determinant of attitude and perception was noted as the technology itself in terms of the system design that plays a key role in system interactivity, security, ease of use of technology among other factors. Suh and Han (2002) investigated the effect of trust on acceptance of Technology in Korea by incorporating trust into the TAM model. The results of statistical analysis using Structural Equation Modeling indicated that trust is an important determinant of intention to use technology. Trust, perceived usefulness and perceived ease of

use were significant determinants of attitude. Attitude and perceived usefulness had significant effect on the intention. Finally, intention had significant effect on the actual usage.

#### **4.5 Conclusion**

The Thematic analysis presented above followed the Braun and Clarke format with several variations and modifications introduced from the researcher's experiences and learning. The Researcher started by reading and re-reading the qualitative data to become familiar with it. This was followed by coding of the data in table forms to help in searching for possible themes, steps 4 and 5 that is, reviewing themes and defining and naming themes. After the searched themes were reviewed to come up with more clear and comprehensive explanations of the data, the study moved to the final level of report writing. The contribution of qualitative data was in coming up with the 12 global themes. The final themes included Attitude Toward Use (ATU), Behavioural Intention to Use (BIU), Fear, Reasons for using technology/ Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Facilitating Conditions (FC), Time, Technology/System Design Characteristics (SDC), User Characteristics (UC), Task Characteristics (TC), Social Influence Processes (SIP), and Training/Cognitive Instrumental Processes (CIP) which explained the various aspects of the perception and attitude of the participants towards the use of technology in learning and teaching in Africa Nazarene University

## **CHAPTER FIVE**

### **QUANTITATIVE STUDY**

#### **5.1 INTRODUCTION**

The quantitative approach was used in the study for several reasons: First, data can be gathered from a large sample of students; second, it provides data that are precise and can be analysed statistically and are broadly comparable; and third, results can be generalised beyond the confines of the research location. The aim was to explain variations in Kenyan distance learners' conceptions of learning and the quantitative findings were used in identifying the patterns students use in describing and defining their conceptions of learning. Quantitative research has also been used successfully in other studies that examined objective descriptive data and statistical explanations of patterns of behaviour in terms of some predefined factors (Corbetta 2003).

In quantitative research, it is necessary to make sure that the research process of both developing and testing the instrument is not only valid, but also reliable. Reliability is concerned with the consistency of the responses to the questions while validity refers to whether a study measures what it claims to measure. However, “reliability is not a measure of validity” warns Hosker (2002). According to Hosker (2002: 71), “It is possible to design a questionnaire that is reliable because the responses are consistent, but it may be invalid because it fails to measure the concept you think it is measuring”.

This chapter presents the quantitative study, the objectives of the quantitative study, target population, sample and sampling design, data collection instrument (development of survey questionnaire), pilot study, data collection procedure and data analysis.

The quantitative part of this thesis seeks to:

- To establish the level of adoption of technology amongst lecturers and students in an ODL environment.
- To examine how students are using technology in learning and teaching processes.
- To establish factors influencing implementation of technology to support learning and teaching in an ODL environment

## **5.2 Quantitative Study**

To establish the extent to which the IODL uses technology for learning and teaching and to establish the extent of technological training/skills adoption at the IODL, data was collected using questionnaires. As Kombo and Tromp (2006) point out, an effective sample population should be diverse, representative, accessible and knowledgeable on the topic being investigated. Respondents were assured of confidentiality and anonymity when reporting the findings of the study. To spell out clearly the purpose of this study and full assurance of the confidentiality of the data collected, the questionnaire was accompanied with a covering letter.

Data was collected from 234 (39%) of 600 IODL students. After the administration of the questionnaires, the data collected was organized, collated, summarized, statistically treated and drafted in tables with the help of Statistical Package for Social Sciences (SPSS). Data was analysed descriptively and inferentially with the help of Statistical Package for Social Sciences (SPSS) computer software version 22.0. This was analysed using means, frequencies and percentages and data was also analysed using the t- test, chi square, factor analysis and multiple regression analysis.

Statistical Package for Social Sciences is widely accepted and used by researchers in different disciplines, for data screening, coding and reliability tests. In addition, SPSS is widely applied in generation of descriptive statistics such as frequencies, percentages, mean values, and standard deviations. These analyses were performed for each variable separately and appropriately to get a summary of the demographic profile of the respondents to obtain preliminary information and the feel of the data. Important summary statistics were then obtained and associations examined using factor analysis and the chi-square test. Significance level of 0.05 (that is,  $P < 0.05$ ) was used to determine the significance of associations being examined.

## **5.3 DATA COLLECTION INSTRUMENT**

### **5.3.1 Development of Survey Questionnaire**

There are wide varieties of instruments designed to measure students' experience of technology use. Two research instruments were developed and employed by the using

original entries and adaptations from existing instrument items. The development of the questionnaire and focus group guide was based on upon the research questions for this work, the focus topic areas of technology adoption to support learning and teaching, relevant literature, and existing instruments.

The survey method used is titled Technology Adoption to Support Learning and teaching (TASTL). This questionnaire adapted from and contextualised from TAM was self-designed by the researcher after in-depth study of related research literature and it consisted of closed ended structural questions. The questionnaire selected various elements that were deemed essential, primarily from TAM while also incorporating other information from all the other theories and models that were perceived to have the possibility of filling the identified gaps in the study. Its design involved selection of major elements from TAM while also including some elements identified by other models and theories for comprehensive coverage of the problem under study. The researcher used this instrument because of its ability to solicit information from respondents within a short time as supported by Gupta (1999: 35).

The survey questionnaire was developed based on the study questions as well as the guidelines recommended for better response outcomes. The questionnaire was divided into 2 parts:

Part 1 containing biographic data related to user background and usage of the system in general.

Part 2 of the instrument consisted of 52 questions which were subdivided into three sections namely; Adoption Level where questions related to establishing the level of technology adoption amongst lecturers and students in an ODL environment will be stated. The second section contained questions related to the actual usage of technology and they were aimed at examining how lecturers and students are using technology in learning and teaching processes. The last section was about attitudes and perceptions about using technology by lecturers and students. In this section, using 5-point Likert scales and closed-ended response, the survey questions formulated and then subjected to critical item-by-item scrutiny. The Likert response scale is: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. A survey instrument entitled Technology Adoption to Support Learning and teaching (TASTL) Appendix (A) contains 60 questions that were aimed at getting information as needed to address this study's research questions was finally designed.

The variables on quantitative research instrument, TASTL were broadly categorised into the independent variables and the dependent variables. The **Independent variable (IV)** is a variable that the researcher manipulates (i.e. changes) and is assumed to have a direct effect on the dependent variable while the **Dependent variable (DV)** is the variable the researcher measures, after making changes to the IV that are assumed to affect the DV. For this study, the learners' attitudes and perceptions towards using technology in teaching and learning, access to computer were the independent variables while technology usage and technology adoption levels were the dependent variables.

### 5.3.2 Pre-testing the instrument

Prior to sending the questionnaire to a bigger sample, the questionnaire was tested in advance with a small group of people. Pre-testing refers to the preliminary assessment of a questionnaire with a group of respondents for the purpose of detecting problems in the questionnaire contents, wording, or layout, whether the respondents have any difficulty in understanding questions or whether there are any ambiguous or biased questions (Sekaran, 2003). According to Baines and Chansarkar (2002), pre-testing is vital since it affects all aspects of the questionnaire design. Pre-test is essential for parts of questionnaire survey design. According to Sekaran (2009: 35), pre-tests must be conducted prior to the initial data collection phase or main survey in order to validate the instrument and to ensure that the survey questionnaire is free of errors and ambiguities. Therefore, one pre-test was conducted prior to using the survey questionnaire in the main study. The purpose of pre-testing is to avoid participants' confusion and misinterpretations as well as to identify and detect any errors and ambiguities (Ogula & Onsongo 2009; Kombo & Tromp 2006).

In this research study, the pre-test was done by giving out questionnaires to students from the IODL who were not included in the actual study. Fifteen out of twenty questionnaire returns generated a very good response rate of (about 83%). The reason behind using these subjects was because all of them were from IODL and therefore were exactly like their colleagues who were sampled during the actual study. In addition to that, respondents were required to identify problems they thought would arise with the questionnaire design in order to obtain feedback for improving the survey questionnaire. Questionnaire pre-testing made it possible to obtain interesting comments from the respondents. The questionnaire was also reviewed by experts in ICT. This was to ensure that the questions asked concentrated on essential issues,

the right questions with proper ingredients were be asked, and increased the reliability of answers and their consistency.

Other respondents highlighted some possible problems with wording and improper sequencing of the questionnaire design and identified some ambiguities. During this process, the wording was changed as required and ambiguous questions were either clarified or deleted. Consequently, the questionnaire was substantially revised according to suggestions of the respondents in the pre-test. The initial version of the questionnaire was developed from the previous literature (Ballester and Alemán, 2001; Cronin *et al.*, 2000; Hoare and Butcher, 2008, Harris and Ezeh, 2008; Imrie *et al.*, 2002) and refined through consultation with academics with experience in questionnaire design and scale development. Scale response categories were altered as comfortably felt by the respondents with five-point responses as opposed to the original seven-point responses. The final version of the questionnaire was evaluated in terms of instructions, ease of use, reading level, clarity, item wording.

#### **5.4 VALIDITY AND RELIABILITY IN QUANTITATIVE RESEARCH**

Quantitative research has various objectives including generalisation of the findings, and validity is used to examine the degree to which the outcomes of the study are generalizable or transferable (Bryman & Cramer 1990; Corbetta 2003). Validity is best examined through face validity which is usually achieved through examining the wording or structure of the constituent items or through examining the content of the instrument. Content validity concentrates on the test's ability to include or represent all of the content of a particular construct that it is supposed to be measuring (Adcock & Collier 2001; Corbetta 2003). It tests whether the items on the data represent the entire range of possible items the data should cover. Construct validity puts more focus on the degree to which a test measures the construct at which it is aimed (Bryman & Cramer 1990). It is done using factor analysis to examine whether the scale scores in the instrument define more global dimensions (Richardson 2004).

While reliability looks at the accuracy of the measuring instrument or the procedure used, validity is the degree to which it accurately reflects what the study set out to measure. Validity is vital for the test because it does not focus only on the statistic; it looks at the relationship between the test and the behaviour it intends to measure (Adcock & Collier 2001).

Convergent validity measures the same factors that are measured by other instruments, while discriminative validity describes the degree to which the measured observation differs from observations. This refers to the extent to which an instrument yields different scores on groups of participants who would be expected to differ in the underlying traits (Richardson 2004). Validity can be examined through using criterion validity which uses the correlation between the scores on an instrument and the scores obtained on some independent criterion. The criterion measures may be obtained at the very time the instrument is administered. This process is referred to as concurrent validity where the test scores accurately estimate an individual's current state regarding the criterion. In criterion-related validity, the test has to demonstrate that it is effective in predicting indicators of a construct. Predictive validity has to do with criterion measures that are obtained at a time after the test (Richardson 2004).

Face and content validity of the instrument was ascertained by giving copies of the questionnaire to the supervisor and other experts from the College of Higher Degrees to examine the questionnaires to ensure face validity and the content to meet the VV specifications of Presser (2004). Their comments and suggestions were used to revise the questionnaires before making the final one. The content validity refers to the representativeness of the item content domain: the manner in which the questionnaire and its items are built to ensure the reasonableness of the claims of content validity (Presser 2004; Sing 2007). Rigorous procedures were used to select the questionnaire constructs to form the initial items, personal interviews with experts, and the iterative procedures of scale purification imply that the instrument has strong content validity.

The construct validity can be demonstrated by validating the theory behind the instrument. Researchers have used various validation strategies to establish it, including item-to-total correlations, factor analysis, and assessment of convergent and discriminant validity, which demonstrates construct validity by showing that an instrument not only correlates with variables with which it should correlate, but also does not correlate with variables from which it should differ (Kombo & Tromp 2006).

#### **5.4.1 Reliability**

In order to understand whether the questions in the Technology Adoption to Support Learning and teaching (TASTL) questionnaire all reliably measure the same latent variables (adoption level, Technology Use and Perception about using technology) a Likert scale was constructed, and a Cronbach's alpha was run on a sample size of 20 respondents. Cronbach's alpha

reliability coefficients were used to measure the internal consistency of each measure (Creswell 2009). So as to generate the general reliability of each of the latent constructs used in the model, Construct reliabilities were calculated by determining Cronbach's Coefficient Alpha using the following Kuder- Richardson (K-R) 20 formulae;

Where:

- = Reliability coefficient of internal consistency
- = Number of items used to measure the concept
- = Variance of all scores
- = Variance of individual items

A high coefficient implies that items correlate highly among themselves. This is sometimes referred to as homogeneity of data. A Cronbach's alpha estimate value above 0.70 is generally considered as acceptable. According to Sekaran (2010: 56), if the value of Cronbach's alpha reliabilities is less than 0.6, they are considered as poor, if the value is in 0.7 they are acceptable, and the reliabilities value above 0.8 are considered good. Therefore, the closer the Cronbach's alpha gets to 1.0 the better is the reliability.

**Table 5.1 Reliability Statistics**

Cronbach's Alpha	N of Items
General .819	60
Group A .613	8
Group B .951	21
Group C .706	31

All of the measures used in the testing stage showed an adequate average reliability with Cronbach's alpha value of 0.819. Group Cronbach alpha ranged between 0.951 and 0.706 that are considered to be good and acceptable except for two items, that is, one item from Technology Adoption (TAL14), and one from Attitude and Perception on the technology (APT3) constructs, which were later dropped in the final survey instrument. They were coded as Strongly Agree =5, Agree = 4, Undecided = 3, Disagree = 2 and Strongly Disagree = 1. Questions under Technology adoption level among users were coded as "TAL"; hence they ranged from TAL1 to TAL13.

Items under the section on Use of Technology were coded as “UOF” and the ranged from UOT1 to UOT15. Finally, items under Attitude and Perception of students on technology were coded as “APT” and ranged between APT1 to APT26. The function of reliability is to examine whether the instrument measures a trait in the same way each time it is used under the same condition with the same subjects (Richardson 1990). A test is considered reliable if the same results are achieved repeatedly. Reliability of instruments could be estimated by examining the internal consistency; and grouping the items in a questionnaire that measure the same concept (Adcock & Collier 2001, Richardson 2004). The reliability of the instrument is estimated by looking at how well the items that reflect the same construct yield similar results. Internal consistency reliability can be measured when a single measurement instrument is administered to a group of people on one occasion to estimate reliability (Bryman & Cramer 1990). This is measured by using Cronbach coefficient alpha which aims to estimate the internal consistency of an instrument by comparing the variance of the total scores with the variances of the scores of the constituent items (Richardson 1990; 2004).

Cronbach alpha tends to be higher when there is homogeneity of variances among items than when there are not. The higher the value the greater the indication that the item responses are collectively and empirically consistent with what it is measuring (Field 2000). Gliem & Gliem (2003) point out the following rules of thumb in estimating consistency:  $\alpha > 0.9$  should be considered excellent;  $\alpha > 0.8$  is good;  $\alpha > 0.7$  is acceptable;  $\alpha > 0.6$  is questionable;  $\alpha > 0.5$  is poor and anything below 5 is unacceptable. When an alpha is 0.70, the standard error for measurement will be over half (0.55) standard deviation.

Although the high value for Cronbach's alpha indicates good internal consistency, it does not mean that the scale is un dimensional (Gliem & Gliem 2003). Reliability can also be measured by using split-half reliability where all items that purport to measure the same construct are randomly divided into two sets. The entire instrument is administered and a correlation coefficient is calculated between the scores obtained on the two halves (Richardson 1990). The purpose is to check the extent to which the scores obtained on its individual items correlate with one another (Bryman & Cramer 1990; Adcock & Collier 2001).

Richardson (1990) and Adcock and Collier (2001), posit that the test-retest reliability is used to examine the replicability of the instrument. It involves calculating the correlation coefficients between scores obtained by the same individuals on successive administrations. It

is assumed that there is no change in the underlying condition between the scores of the two tests. The amount of time awarded between the administrations depend in part, by how much time elapses between the two measurement occasions. To avoid the problem of changes that may occur in the longer time gap, the administration should take place within a relatively short interval for the instrument to be reliable (Adcock and Collier 2001). “The correlation coefficient between scores obtained at the two administrations is more a measure of its stability than its reliability, and variability in the scores obtained on different occasions need not cast doubt on the adequacy (Adcock and Collier 2001).

## **5.5 DATA COLLECTION PROCEDURE**

The questionnaire in this thesis was administered to 234 students of the Institute for Open and Distance Learning. It consisted of items deduced from the various specific objectives of the study in line with the literature review and the theories employed in the study. The survey questionnaire was accompanied with a covering letter which explained the purpose of the research study and ensured confidentiality of the data gathered. The participants were told that the research is being conducted to explore their perception of and/or adoption of technology in learning and teaching, and that the participation in the survey was voluntary. They were further informed that they had the right to withdraw from the survey study at any time without penalties and that they had to be at least 18 years old to participate in the survey in accordance with the assertions of Garner, Wagner and Kawulich (2009). In addition, the respondents were provided with the contact information of the researcher (telephone number and e-mail address) so that they could do relevant inquiries or could obtain the results of the study, if they so wished.

The researcher distributed the questionnaires randomly among the purposefully intended participants in the morning, upon which they were allowed enough time to answer the questions in the questionnaires. Then the researcher tried retrieving the questionnaires within the same day of distribution for the face to face respondents. All questionnaires retrieved were checked if completely filled out. After the administration of the questionnaires, the data collected was organized, collated, summarized, statistically treated and drafted in tables with help of Statistical Package for Social Sciences (SPSS).

## **5.6 DATA ANALYSIS**

Descriptive and inferential statistics analysis was carried out on the quantitative data obtained from the survey (Mugenda & Mugenda 2003). Group level analysis and reporting was done at each stage providing for the generation of tables and graphs illustrating response frequencies, means, and standard deviations of key questions on the survey. The quantitative research was important in determining the extent of technology adoption and usage and examining the learners' perceptions and attitudes towards use of technology in e-learning. It was used to investigate the factors influencing the implementation of technology in learning and teaching at African Nazarene University.

Data processing and data analysis was guided by the research objectives and theoretical framework for the study. It involved the establishment of categories, the application of the categories to the raw data through coding, and tabulation which leads to drawing statistical inferences. Completed questionnaires were coded and inputted into a statistical package (SPSS). The statistical analysis helped capture variables that decisively affect technology adoption and describe the problems and experiences that would have been encountered by the IODL students in regard to online and distance education. Data was analysed by using descriptive statistics and inferential statistics with the help of Statistical Package for Social Sciences (SPSS) computer software version 22.0. This was analysed using means, frequencies and percentages and data was also analysed using the t test, chi square, factor analysis and multiple regression analysis.

Statistical Package for Social Sciences is widely accepted and used by researchers in different disciplines, thus, this tool was used to screen the data of this research study in terms of data coding and reliability analysis. In addition, SPSS was also applied to generate descriptive statistics such as frequencies, percentages, mean values, and standard deviations.

These analyses were performed for each variable separately and appropriately in order to summarize the demographic profile of the respondents to obtain preliminary information and the feel of the data. Important summary statistics was then obtained and associations examined using factor analysis and chi-square test. Significance level of 0.05 (that is,  $P < 0.05$ ) was used to determine the significance of associations being examined.

Factor analysis was used to bring inter-correlated variables together under more general, underlying variables. In so doing, factor analysis reduces the dimensionality of the original

space and gives an interpretation to the new space, spanned by a reduced number of new dimensions which are supposed to underlie the old ones or explaining the variance in the observed variables in terms of underlying latent factors (Habing 2003: 2). Field (2000: 424) posits that factor analysis offers not only the possibility of gaining a clear view of the data, but also the possibility of using the output in subsequent analyses. The interpretation of the mean range scale was as follows;

**Table 5.2: Interpretation of the mean range scale**

Mean Range	Response Mode	Description	Interpretation
Above 3.75	Strongly agree	You agree without doubt	Very High Level
3.74-3.00	Agree	You agree with some doubt	High Level
2.99-2.60	Undecided	You have doubt/ not sure	Moderate
2.59-2.00	Disagree	You Disagree with some doubt	Low Level
Below 2.00	Strongly disagree	You disagree with no doubt at all	Very Low Level

The biographic data of the respondents were analysed to determine the gender composition, age, computer usage, accessibility to laptop, frequency of use of Google search, means of accessing reading materials on the computer, preferred mode of receiving learning materials and preferred mode of presenting assignments as summarised in table 5.3 below.

**Table 5.3 Biographical data of the Respondents**

Variable	Frequency	Percentage
<b>Gender:</b>		
Male	124	51.2
Female	118	48.8
<b>Age:</b>		
Less than 20		
20- 29	7	2.9
30- 39	74	30.6
40- 49	116	47.9
50 and above	35	14.5
	6	2.5
<b>Computer Usage:</b>		
Less than 1 year		
1 - 3 years	47	19.4
4 - 6 years	68	28.1
7 - 9 years	46	19.0
More than 10 years	35	14.5
No response	42	17.4
	4	1.7
<b>Access to Laptop:</b>		
Yes	202	83.5
No	40	16.5
<b>Frequency of use of Google search for information:</b>		
Every day		
Two or three times a week	128	52.9
A few times a month	76	31.4
No response	33	13.6
	5	2.1
<b>Means of accessing reading materials on the computer</b>		
Read it on my computer		63.2
Print it to read it	153	32.6
Read it on my computer or print and read it	79	3.3
No response	8	0.8
	2	
<b>Preferred mode of receiving your learning material</b>		
Hardcopy (printed book)		
Electronic book	95	39.3
Doesn't matter	79	32.6
	63	26.0
<b>Preferred mode of presenting assignments</b>		
Face to face Video (via YouTube)		
Audiotape	17	7.0
Online (via a discussion forum, IR or chat) E-Naz	3	1.2
Email	82	33.9
E-Naz and Email	133	55.0
	7	2.9

Regarding age, the respondents were grouped as shown on the table above. The majority of the respondents were in the age group 30-39 (47.9%), followed by 20-29 years (30.6%), 40-49 years (14.5%), less than 20 years (2.9%) and lastly above 50 years old (2.5%).

The younger respondents aged 20-29 could be understood as pro-technology in terms of its being widespread during their age while the upper ages could be understood as coping with the challenges of technology as it emerges. This influences their choices and possibly attitudes. A small percentage of 2.5% of the respondents did not respond to this item.

On computer usage, the study found that the highest percentage of respondents (28.1%) had used computers for 1-3 years followed by 19.4%, 19%, 17.4%, and 14.5% who had used computers less than 1 year, 4-6 years, more than 10 years and 7-9 years respectively. Those who had used computers for 3 years and below constituted 47.5% of the sample while those who had used computers for more than 3 years were 50.9%. This means that those who had computers for more years had a higher potential of understanding how to perform various activities using computers. On respondents' having access to laptops, empirical evidence showed that 83.5% had access to laptops while 16.5% did not have access to laptops.

Regarding frequency of use of Google search, 52.9% of the respondents were found to be daily users, 31.4% as using it twice or thrice a week, and 13.6% as using it only a few times a month. The more one uses a technology or platform, the more conversant they become with it and consequently perceived ease of use. Five respondents constituting 2.1% did not respond to this item of the questionnaire. When respondents were asked the means they were using to access reading materials on the computer, it was noted that a majority constituting 63.2% had picked ICT trend by reading from the computer while 32.6% were printing first in order to read and 3.3% were using either of the above. On the preferred mode of receiving reading materials, the respondents were sharply divided with 39.3% preferring hard copy (printed Book), 32.6% preferring electronic book and 26% preferring either or minding less about the form of the document (whether hard copy or electronic). Regarding the respondents' preferred mode of presenting their assignments, the findings showed that email was the most preferred at 55% followed by online presentation (via discussion forum, IR or chat) E-Naz at 33.9%, a combination of E-Naz and email at 2.9% and face to face video (via You Tube) at 7% and audiotape at 1.2%.

### **5.5.2 Level of Adoption of Technology among Students in an ODL Environment**

When the respondents were asked about various items on their level of adoption of technology, they gave responses that are summarised in table 5.4 below.

**Table 5.4 Level of Adoption of Technology among Students in an ODL Environment**

Item	Frequency	Percentage
<b>I currently use e learning technology in learning and teaching</b> Strongly disagree	41	16.9
Disagree	27	11.2
Undecided	13	5.4
Agree	90	37.2
Strongly agree	59	24.4
<b>I intend to use e learning technology in future</b> Strongly disagree	14	5.8
Disagree	9	3.7
Undecided	9	3.7
Agree	7	29.3
Strongly agree	125	51.7
<b>I find using e learning tools very interesting</b> Strongly disagree	9	3.7
Disagree	13	5.4
Undecided	29	12.0
Agree	52	21.5
Strongly agree	131	54.1
<b>I find e-Naz very interactive</b> Strongly disagree	18	7.4
Disagree	24	9.9
Undecided	43	17.8
Agree	71	29.3
Strongly agree	80	33.1
<b>I am experienced in using technology in learning and teaching</b> Strongly disagree	18	7.4

Disagree	36	14.9
Undecided	28	11.6
Agree	93	38.4
Strongly agree	58	24.0
<b>Whenever possible, I intend to use computers for learning and teaching</b> Strongly disagree	6	2.5
Disagree	13	5.4
Undecided	30	12.4
Agree	102	42.1
Strongly agree	83	34.3
<b>I plan to use computers during my teaching practicum or internship</b> Strongly disagree	17	7.0
Disagree	20	8.3
Undecided	44	18.2
Agree	70	28.9
Strongly agree	89	36.8
<b>I will use computers in future</b>	9	3.7
Strongly disagree	15	6.2
	6	2.5
Disagree	45	18.6
Undecided	156	64.5
Agree		
Strongly agree		
<b>Whenever possible, I intend to use computers for learning and teaching</b> Strongly disagree	10	4.1
Disagree	13	5.4
	5	2.1
Undecided	80	33.1
Agree	121	50.0
Strongly agree		
<b>I will return to E-learning often for future training</b> Strongly disagree	11	4.5
	3	1.2

Disagree		22	9.1
Undecided		92	38.0
Agree		106	43.8
Strongly agree			
<b>I intend to visit E-learning frequently for my course work</b>		11	4.5
Strongly disagree		17	7.0
Disagree		10	4.1
Undecided		71	29.3
Agree		127	52.5
Strongly agree			
<b>It is easy for me to do works that I want to do using computers</b>		9	3.7
Strongly disagree		4	1.7
Disagree		10	4.1
Undecided		91	37.6
Agree		125	51.7
Strongly agree			
<b>I find computers easy to use</b>	Strongly	8	3.3
disagree		9	3.7
Disagree		7	2.9
Undecided		85	35.1
Agree		132	54.5
Strongly agree			

From Table 5.4 above, it was noted that the level of adoption of technology in Africa Nazarene University is high. The table shows summarised results of the findings on different variables of the study from the questionnaire that sought the respondents' answers through rating of the extent at which they agreed with the listed statements. Strongly agree was combined with agree and the mean of the resulting percentage calculated and presented as discussed here. This was based on the respondents' score on various items such as: I currently use e learning technology in learning and teaching (61.6%); I intend to use e learning technology in future (81%); I find using e learning tools very interesting (75.6%); I find e-

Nazvery interactive (62.4%); I am experienced in using technology in learning and teaching (62.4%); Whenever possible, I intend to use computers for learning and teaching (76.4%); I plan to use computers during my teaching practicum or internship (65.7%); I will use computers in future (83.1%); Whenever possible, I intend to use computers for learning and teaching (83.1%); I will return to E-learning often for future training (81.8%); I intend to visit E-learning frequently for my course work (81.8%); It is easy for me to do work that I want to do by using computers (89.3%); I find computers easy to use (89.6%). This gives an average of 76.45%.

### **5.5.3 How students are using technology in learning and teaching processes**

Findings related to this objective were answered by the items on the demographic information especially from item 5 to 8 of the questionnaire. The findings showed that students were using technology in learning and teaching through Google search (97.9%); accessing reading materials on the computer (63.2%); receiving/sending learning materials (58.6%) and sending/presenting assignments (100%).

These included diverse ways such as use of electronic books (32.6%); face to face video via You Tube (7%); audiotape (1.2%); online (via discussion forum, IR or chat);E-Naz (33.9%); emails (55%) and a combination of E-Naz and email (2.9%).

### **5.5.4 Students' attitudes and perceptions about using technology in learning and teaching**

Regarding this objective of the study, 38 items were used to obtain the attitudes and perceptions of students on adoption of technology to support learning and teaching in a distance learning programme the findings were summarised in table 5.5 below.

**Table 5.5 Students attitudes and perceptions about using technology in learning and teaching**

Item	Frequency	Percentage
<b>Using e learning would enhance my effectiveness in learning</b>	10	4.1
Strongly disagree	4	1.7
	12	5.0
Disagree	77	31.8
	135	55.8
Undecided		
Agree		
Strongly agree		
<b>Using e learning would improve my course performance</b>	13	5.4
Strongly disagree	7	2.9
	11	4.5
Disagree	83	34.3
	126	52.1
Undecided		
Agree		
Strongly agree		
<b>Using e learning would increase productivity in my course work</b>	8	3.3
Strongly disagree	4	1.7
	14	5.8
Disagree	97	40.1
	101	41.7
Undecided		
Agree		
Strongly agree		
<b>I find e learning useful</b>	8	3.3
Disagree	17	7.0
	14	5.8
Undecided	75	31.0
	123	50.8
Agree		
Strongly agree		
<b>I could improve my performance by using computers</b>	6	2.5
Strongly disagree	4	1.7
	14	5.8
Disagree	67	27.7
	127	52.5
Undecided		
Agree		

Strongly agree		
<b>I could improve my productivity by using computers</b>	8	3.3
Strongly disagree	21	8.7
Disagree	27	11.2
Undecided	60	24.8
Agree	119	49.2
Strongly agree		
<b>I could enhance my effectiveness by using computers</b>	6	2.5
Strongly disagree	6	2.5
Disagree	24	9.9
Undecided	64	26.4
Agree	134	55.8
Strongly agree		
<b>Using e learning would enhance my effectiveness in learning</b>	5	2.1
Strongly disagree	7	2.9
Disagree	16	6.6
Undecided	64	26.4
Agree	134	55.4
Strongly agree		
<b>I have participated in Video Conferencing</b>	90	37.2
Strongly disagree	48	19.8
Disagree	30	12.4
Undecided	38	15.7
Agree	32	13.2
Strongly agree		
<b>I enjoy communicating using Electronic Mail (Email)</b>	14	5.8
Strongly disagree	27	11.2
Disagree	18	7.4
Undecided	75	31.0
Agree	105	43.4

<b>Strongly agree</b>		
<b>I always use internet in learning and teaching</b>	Strongly disagree	
Disagree	43	17.8
Undecided	25	10.3
Agree	39	16.1
	55	22.7
	72	29.8
<b>Strongly agree</b>		
<b>I do use audio/video tapes in learning and teaching</b>	Strongly disagree	
Disagree	62	25.6
Undecided	44	18.2
Agree	30	12.4
	58	24.0
	35	14.5
<b>Strongly agree</b>		
<b>I have attended a course in Virtual Classroom</b>	Strongly disagree	
Disagree	85	35.1
Undecided	35	14.5
Agree	35	14.5
	54	22.3
	25	10.3
<b>Strongly agree</b>		
<b>I like teaching &amp; learning materials through CD-ROM &amp; WebCT</b>	Strongly disagree	
Disagree	92	38.0
Undecided	37	15.3
Agree	37	15.3
	49	20.2
	21	8.7
<b>Strongly agree</b>		
<b>I have high level of self-confidence in using e-Naz</b>	Strongly disagree	
Disagree	24	9.9
Undecided	25	10.3
Agree	59	24.4
	67	27.7
	63	26.0
<b>Strongly agree</b>		

<b>I am able to skilfully use e-Naz system</b>	Power interruptions 27 53 51 85	9.5 11.2 21.9 21.1 35.1
Strongly disagree		
Disagree		
Undecided		
Agree		
Strongly agree		
<b>Using e-Naz is entirely within my control</b>	18 50 64 38 63	4.1 12.4 27.7 18.2 36.0
Strongly disagree		
Disagree		
Undecided		
Agree		
Strongly agree		
<b>The e-Naz system allows easy access to information</b>	10 30 67 44 87	4.1 12.4 27.7 18.2 36.0
Strongly disagree		
Disagree		
Undecided		
Agree		
Strongly agree		
<b>I am willing to participate in e-learning activities</b>	6 14 14 86 118	2.5 5.8 5.8 35.5 48.8
Strongly disagree		
Disagree		
Undecided		
Agree		
Strongly agree		
<b>I am rarely disconnected during online tutorials</b>	25 38 49 71 53	10.3 15.7 20.2 29.3 21.9
Strongly disagree		
Disagree		
Undecided		
Agree		
Strongly agree		
<b>I have resources, knowledge and ability to use e-Naz</b>	Strongly disagree Disagree	7.0 16.9 16.9 26.0
Strongly disagree		
Disagree		

Undecided	73	30.2
Agree		
Strongly agree		
<b>I learn more in online courses offered at e-Naz than in face to face courses</b>		
Strongly disagree	27	
Disagree	25	11.2
Undecided	64	10.3
Agree	75	26.4
Strongly agree	44	31.0
		18.2
<b>e-Naz courses require more study time than face to face courses</b>		
Strongly disagree	14	5.8
Disagree	54	22.3
Undecided	48	19.8
Agree	72	29.8
Strongly agree	53	21.9
<b>I find the site easy to learn</b>		
Strongly disagree	14	5.8
Disagree	54	22.3
Undecided	48	19.8
Agree	72	29.8
Strongly agree	53	21.9
<b>My interaction with e-Naz is clear and understandable</b>		
Strongly disagree	14	5.8
Disagree	16	6.6
Undecided	62	25.6
Agree	51	21.1
Strongly agree	92	38.0
<b>I think taking courses on e-Naz is convenient</b>		
Strongly disagree	9	3.7
Disagree	15	6.2
	53	21.9
	65	26.9

Undecided	96	39.7
Agree		
Strongly agree		
<b>I think learning through e-Naz is fun</b>	16	6.6
Strongly disagree	29	12.0
Disagree	50	20.7
Undecided	67	27.7
Agree	76	31.4
Strongly agree		
<b>I am generally satisfied with the quality of online services offered at e-Naz</b>	15	
Strongly disagree	34	6.2
Disagree	54	14.0
Undecided	67	22.3
Agree	69	27.7
Strongly agree		
<b>I believe it will be a good idea to use e-Naz tools</b>	9	3.7
Strongly disagree	8	3.3
Disagree	23	9.5
Undecided	60	24.8
Agree	137	56.6
Strongly agree		
<b>Online discussions enable students to exchange ideas and comments</b>	9	3.7
Strongly disagree	11	4.5
Disagree	32	13.2
Undecided	76	31.4
Agree	106	43.8
Strongly agree		
<b>I benefit from using interactive applications</b>	12	5.0
Strongly disagree	26	10.7
Disagree	24	9.9
	102	42.1

Undecided	72	29.8
Agree		
Strongly agree		
<b>I am able to ask questions and receive answers</b>	16	6.6
Strongly disagree	19	7.9
Disagree	47	19.4
Undecided	80	33.1
Agree	73	30.2
Strongly agree		
<b>Browsing classmates work help reflect own shortcoming</b>	34	14.0
Strongly disagree	16	6.6
Disagree	37	15.3
Undecided	93	38.4
Agree	56	23.1
Strongly agree		
<b>I think sharing knowledge through online discussion is time consuming</b>	51	21.1
Strongly disagree	43	17.8
Disagree	37	15.3
Undecided	58	24.0
Agree	48	19.8
Strongly agree		
<b>I am likely to take an online course again through e-Naz</b>	14	5.8
disagree	9	3.7
Disagree	36	14.9
Undecided	59	24.4
Agree	116	47.9
Strongly agree		
<b>If available, I intend to use e-learning tools during the semester</b>	13	5.4
Strongly disagree	5	2.1
Disagree	23	9.5
	72	29.8

Undecided		117	48.3
Agree			
Strongly agree			
<b>If available, I intend to use e-learning tools as frequently as possible</b>	Strongly disagree	11 11 30	4.5 4.5 12.4
Disagree		66	27.4
Undecided		120	27.3
Agree			
Strongly agree			
<b>I intend to use e-learning tools whenever possible for my coursework</b>	Strongly disagree	11 3 19	4.5 1.2 7.9
Disagree		57	23.6
Undecided		148	61.2
Agree			
Strongly agree			

This shows that the level of adoption of technology in Africa Nazarene University was rated as high in most items except an item on attending a course on Virtual Classrooms. The most worrying trend were numbers of students who chose the Undecided option. Although students agreed and strongly agreed with most items, they did not necessarily display the users' attitudes and perceptions on use of technology in learning and teaching in Africa Nazarene University (ANU). This is because there is a difference between the university's adoption policies which compel both the students and lecturers to cope with the requirements with no due regard to whether they have a positive attitude for it or not. Students' attitudes and perceptions about using technology in learning and teaching in ANU was measured based on the respondents' score on various items such as using E-learning would enhance my effectiveness in learning (87.6%); using E-learning would improve my course performance (86.4%); using E-learning would increase my productivity in my course work (81.8%); I find E-learning useful (81.8%); I could improve my performance by using computers (80.2%); I could increase my productivity by using computers (74%); I could enhance my effectiveness by using computers (82.2%); using E-learning would enhance my effectiveness in teaching

(81.8%); I have participated in Video Conferencing (28.9%); I enjoy communicating using Electronic Mail( E-mail) (74.4%); I always use Internet in learning and teaching (52.5%); and I do use Audio/Video tapes in learning and teaching (38.5%). This table and its findings show the respondents rating of the perceived use of technology in increasing their performance through efficiency and effectiveness.

Others' responses to students' perception on technology adoption included: I have attended a course in a Virtual Classroom (32.6%); I like delivering my study and teaching materials through CD-ROM and WebCT (28.9%); I have high level of self-confidence in using the e-Naz system (53.7%); and I am able to skilfully use e-Naz system (56.2%); using e-Naz is entirely within my control (54.2%); the e-Naz system allows easy access to information (54.2%); I am willing to participate in e-learning activities (84.3%); I am rarely disconnected during online tutorial (51.2%); I have the resources, knowledge, and ability to use e-Naz (56.2); I think I learn more in online courses offered at e-Nazto face to face courses (49.2%);e-Naz courses require more study time than face to face courses (51.7%); I find the site easy to learn (59.1%); my interaction with the e-Naz is clear and understandable (66.6%); I think taking courses on e-Naz is convenient (66.6%); I think learning through e-Naz is fun (59.1%); I am generally satisfied with the quality of online courses offered through e-Naz (56.2%); I believe it will be a good idea to use eLearning tools(81.4%); online discussion enables students to exchange ideas and comments (75.2%); I benefit from using interactive applications (71.9%). These responses could be summarised as usability of the system, interactivity of the platform, and user attitude.

Regarding the same attitudes and perceptions of students, responses were also summarised and presented as: I am able to ask questions and receive answers (63.3%); browsing classmates' works helps reflect own shortcoming (61.5%); I think sharing knowledge through online discussions is time consuming (43.8%); I am likely to take an online course again through e-Naz (72.3%); if available, I intend to use e-learning tools during the semester (78.1%); if available, I intend to use e-learning tools as frequently as possible (54.7%); and if available, I intend to use e-learning tools whenever possible for my coursework (84.8%). This gives an average of 31.61%.

#### **5.5.5. Association between technology users' attitude/ perception and adoption of technology for learning and teaching**

The association between technology users' attitude/ perception and adoption of technology for learning and teaching was tested using factor analysis and correlation.

#### *5.5.5.1 Factor Analysis*

Factor analysis played a key role in identification of critical factors contributing to technology adoption especially in showing the link between technology users' attitude/ perception and adoption of technology. This study utilized Principal Component Analysis for maximum extraction of variance from the variables under study by employing the SPSS. As a prelude to understanding the interpretations of factor analysis some few terms were taken into consideration.

**Eigenvalues** is the measure of the level of variation in the total sample accounted for by each factor loaded. Factors with low eigenvalues have little contribution to the explanation of the variations in the variables under study and are thus dropped in line with Kaiser's rule which states that any factor with eigenvalue below 1 should be dropped.

**Factor loadings** are correlation coefficients of the variables being studied. Factor loadings that are less than 0.4 are perceived and interpreted as low while those above 0.6 are treated as high.

**Rotation** is the process that makes the outputs easier to understand for better interpretation of the factors.

**Communality** is reliability of the indicator when measured by the degree of variance in a given variable as jointly explained by all the factors.

Table 5.6 below includes all the factors that were entered into the Statistical Package for Social Sciences for analysis and their consequent reduction in line with the Confirmatory factor Analysis using the principal component analysis.

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.690	35.942	35.942	8.317	15.994	15.994
2	5.536	10.646	46.589	7.144	13.738	29.732
3	4.483	8.622	55.211	7.107	13.668	43.400
4	2.808	5.399	60.610	4.375	8.414	51.814
5	1.993	3.832	64.442	3.094	5.950	57.764
6	1.734	3.335	67.777	2.768	5.323	63.086
7	1.329	2.557	70.334	2.757	5.302	68.388
8	1.183	2.275	72.608	1.666	3.205	71.593
9	1.088	2.092	74.700	1.381	2.656	74.249
10	1.012	1.947	76.647	1.247	2.398	76.647

11	.952	1.830	78.477			
12	.879	1.691	80.168			
13	.748	1.438	81.606			
14	.680	1.307	82.913			
15	.637	1.225	84.139			
16	.568	1.093	85.231			
17	.529	1.017	86.248			
18	.507	.975	87.223			
19	.488	.938	88.161			
20	.457	.879	89.040			
21	.426	.820	89.860			
22	.422	.811	90.672			
23	.393	.757	91.428			
24	.361	.695	92.123			
25	.335	.644	92.767			
26	.314	.603	93.370			
27	.291	.560	93.930			
28	.274	.526	94.456			
29	.245	.471	94.927			
30	.240	.462	95.389			
31	.224	.430	95.820			
32	.218	.419	96.238			
33	.199	.383	96.622			
34	.195	.374	96.996			
35	.185	.357	97.353			
36	.160	.307	97.660			
37	.144	.277	97.937			
38	.139	.267	98.203			
39	.130	.251	98.454			
40	.118	.227	98.681			
41	.101	.194	98.875			
42	.094	.181	99.056			
43	.087	.167	99.223			
44	.078	.150	99.374			
45	.063	.121	99.495			
46	.059	.113	99.609			
47	.047	.091	99.700			
48	.042	.082	99.782			
49	.032	.062	99.843			
50	.031	.060	99.903			
51	.028	.054	99.957			
52	.022	.043	100.000			

Extraction Method: Principal Component Analysis.

Table 5.6 shows that although there were fifty two (52) items on the relationship between technology users' attitude/ perception and adoption of technology for learning and teaching, the use of factor analysis reduced the items to ten (10) based on the fact that only factors with eigenvalues ranging from 1 and above had substantive importance. This was a high level summary of the technology users' attitude/ perception and adoption of technology for learning and teaching which was further taken through principal component analysis and varimax rotation, and the interpretation made. Table 5.6 displayed shows that only the reduced factors had a significant role in determining the relationship between technology users' attitude/ perception and adoption of technology for learning and teaching though with diverse interrelationships among the items. This is shown by their different loadings upon rotation of the component matrices as illustrated in Table 5.6. In the result for the rotated component

matrix, loadings that were less than 0.5 were deleted in line with Kaiser's rule. It shows linear components (factors) before extraction and after extraction and their partial correlations as analysed through factor analysis rotation matrix through varimax method.

Table 5.6 indicates that the ten significant variables with highest eigenvalues were: I currently use technology in learning and teaching; I intend to use e-learning in future; I find e-learning tools interesting; I find e-Naz very interactive; I am experienced in using technology in learning and teaching; I plan to use computers during my teaching practicum and internship; I will return to e-learning often for future training; I find computers easy to use;e-Naz allows easy access of information; taking courses on e-Naz is convenient thus impacting on technology adoption. This meant that only the reduced variables afore-mentioned highly affected technology adoption in Africa Nazarene University.

**Table 5.7: Rotated Component Matrix<sup>a</sup>**

	Component									
	1	2	3	4	5	6	7	8	9	10
I currently use e learning technology in learning and teaching			.778							
I find using e learning tools interesting		.583								
I find e-Naz very interactive										.501
I am experienced in using technology in learning and teaching				.676						
Whenever possible, I intend to use computers for learning and teaching									.514	
I plan to use computers in my practicum or internship									.706	
I will use computers in future			.616							
Whenever possible, I intend to use computers for learning and teaching					.526					
I will return to e learning often for future training			.508							
I intend to visit e learning frequently for my course work			.617							
It is easy for me to do my classwork using computers	.566	.565								
I find computers easy to use	.558									
Using e learning would enhance my effectiveness in learning	.759									
Using e learning would improve my course performance	.809									
Using e learning increases productivity in my course work	.819									
I find e learning useful	.777									
I could improve my performance by using computers	.834									
I could improve my productivity by using computers	.688									
I could enhance my effectiveness by using computers	.833									
Using e learning would enhance my learning effectiveness	.742									
I have participated in Video Conferencing					.680					
I enjoy communicating using Electronic Mail (Email)										.545
I always use internet in learning and teaching										.534
I do use audio/video tapes in learning and teaching						.779				
I have attended a course in Virtual Classroom							.782			
I like delivering my learning and teaching materials through CD-ROM and WebCT								.714		
I have high level of confidence in using e-Naz system			.876							
I am able to skillfully use e-Naz system			.885							
Using e-Naz is entirely within my control			.802							
The e-Naz system allows easy access to information				.770						
I am rarely disconnected during e learning tutorial				.510						
Using e-Naz is entirely within my control				.565	.569					
I have the resources, knowledge and ability to use e-Naz			.785							
I think I learn more in courses offered at e-Naz than in face to face courses				.508						
e-Naz courses require more time than face to face courses								.629		
My interaction with e-Naz is clear and understandable				.744						
I think taking courses on e-Naz is convenient				.511						
I think learning through e-Naz is fun					.640					
I am generally satisfied with the quality of online courses offered through e-Naz						.653				
I believe it is good idea to use e learning tools		.650								
Online discussions enable students to exchange ideas and comments							.565			
I benefit from using interactive applications							.663	.540		
I am able to ask questions and receive answers								.714		
Browsing classmates' works helps reflect on my shortcomings								.811		
I am likely to take an online course again through e-Naz		.723								
If available, I intend to use e learning tools during the semester		.792								
If available, I intend to use e learning tools as frequently as possible		.805								
If available, I intend to use e learning tools whenever possible for my coursework		.759								

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 12 iterations.

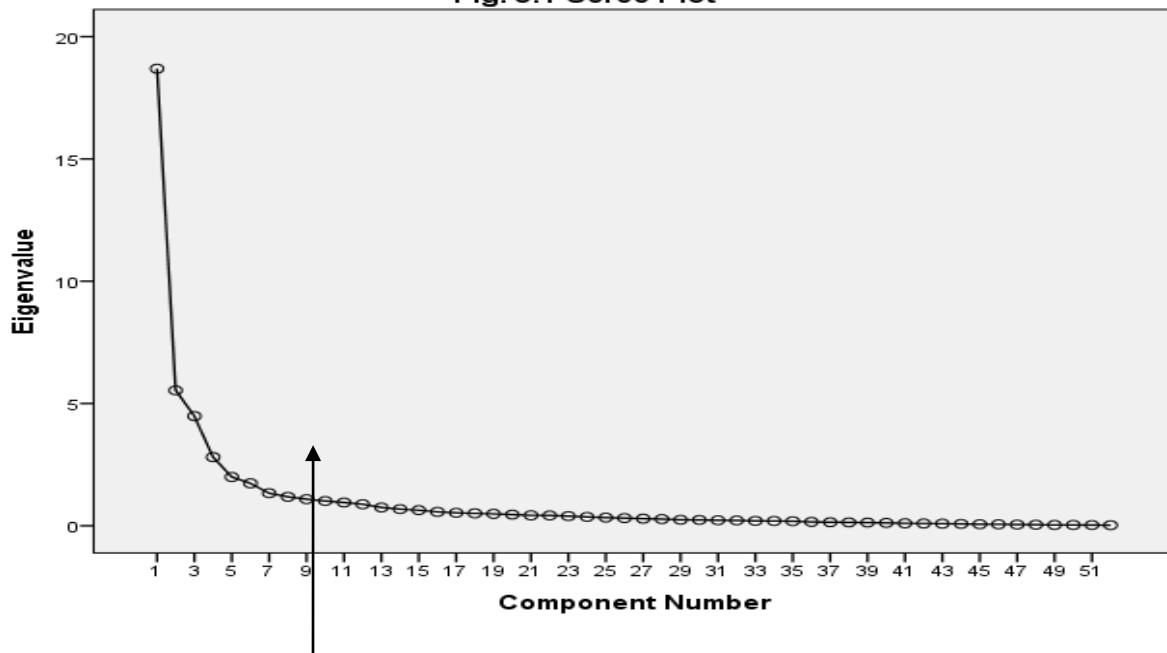
From Table 5.7, it was noted that from the 10 factors that were registered as significantly affecting the relationship between technology users' attitude/ perception and adoption of technology for learning and teaching, the degree of their correlation differed as attested to by the factor loadings. From Table 5.7, most of the questions (10) loaded highly in factors 1, 2 and 3, five questions loaded highly in factor 4, four question loaded highly in factor 5, three questions loaded highly in factor 6, four questions loaded highly in factor 7, two questions

loaded highly in factor 8, two questions loaded highly in factor 9 and one question loaded highly in factor 10. This means that each number in the factors represents the partial correlation between the item and the rotated factor consequently forming a ten-factor model attested to by the table above. The partial correlations as deduced from Table 5.7 were .778, .583, .501, .676, .514, .706, .616, .526, .508, .617, .566, .565, .558, .759, .809, .819, .777, .834, .688, .833, .742, .680, .545, .534, .779, .782, .714, .876, .885, .802, .770, .510, .565, .569, .785, .508, .629, .744, .511, .640, .653, .650, .565, .663, .540, .714, .811, .723, .792, .805, .759 which gives an average of correlation of 0.676039. This attests to the relationships between the individual variables/factors as well as the relationship between the independent and dependent variables in this study.

The findings from Tables 5.6 and Table 5.7 above are in line with the assertions, specifications and explanations of Rietveld and Van Hout (1993: 292), that factor scores are the scores of a subject on a given factor while factor loadings are the correlation of the original variable with a factor. It is from this understanding that Field (2000: 425), adds that the factor scores can be utilized as new scores in multiple regression analysis, while the factor loadings are stated as significant in determining the substantive importance of a particular variable to a factor. This summarises the initial presentation of the findings from factor analysis and builds the basis for scree plot and Table 5.8 for factor summary and interpretation.

The component scree plot for the factors and components was also generated and presented as illustrated in Figure 5.1 below.

**Fig. 5.1 Scree Plot**



Elbow point

The scree test is a graphical method first proposed by Cattell that plots the eigenvalues in a simple line plot (Bartholomew *et al.*, 2008). Although it is based on the eigenvalues, it uses the relative rather than absolute values as a criterion to plot the eigenvalues associated with successive factors.

In this perspective, because each factor after the first factor is extracted from a matrix that is a residual of the previous factor's extraction, the amount of information in each successive factor is less than its predecessors as shown in Figure 5.1 above. The vertical proportion of the plot on the left side is where the substantial factors are located while the right horizontal plot on the right side is where the rubble or less substantial factors are located. Figure 5.1 shows that ten factors were substantial leaving the other 42 factors as less substantial. The elbow is half way down the scree plot at eigenvalue of 3 showing the strength of technology users' attitude/ perception and adoption of technology for learning and teaching in Africa Nazarene University.

**Table 5.8 Factor Summary and Interpretation**

Factor	Variables	Summary
1.	I currently use e learning technology in learning and teaching I intend to visit E-learning frequently for my course work	PEOU
2.	I intend to use e learning technology in future Whenever possible, I intend to use computers for learning and teaching I will use computers in future Whenever possible, I intend to use computers for learning and teaching	BIU
3.	I find using e learning tools very interesting	
4.	I find e-Naz very interactive I benefit from using interactive applications I am able to ask questions and receive answers	ATU
5.	I am experienced in using technology in learning and teaching It is easy for me to do works that I want to do by using computers	PEOU
6.	I plan to use computers during my teaching practicum or internship Using E-learning would enhance my effectiveness in learning Using E-learning would improve my course performance Using E-learning would increase my productivity in my course work I find E-learning useful I could improve my performance by using computers I could increase my productivity by using computers I could enhance my effectiveness by using computers Using E-learning would enhance my effectiveness in teaching e-Naz courses require more study time than face to face courses I think I learn more in online courses offered at e-Naz to face to face courses	BIU
7.	I will return to E-learning often for future training I am likely to take an online course again through e-Naz If available, I intend to use e-learning tools during the semester If available, I intend to use e-learning tools as frequently as possible. If available, I intend to use e-learning tools whenever possible for my coursework. I am likely to take an online course again through e-Naz	BIU
8.	I find computers easy to use I have participated in Video Conferencing I enjoy communicating using Electronic Mail (E-mail) I always use Internet in learning and teaching I do use Audio/Video tapes in learning and teaching I have attended a course in a Virtual Classroom I like delivering my study and teaching materials through CD-ROM and WebCT I have high level of self-confidence in using the e-Naz system I am able to skilfully use e-Naz system Using e-Naz is entirely within my control I find the site easy to learn	PEOU
9	The e-Naz system allows easy access to information I am willing to participate in e-learning activities I am rarely disconnected during online tutorial Using e-Naz is entirely within my control I have the resources, knowledge, and ability to use e-Naz	ATU
10	I think taking courses on e-Naz is convenient I think learning through e-Naz is fun I am generally satisfied with the quality of online courses offered through e-Naz I believe it will be a good idea to use eLearning tools Online discussion enables students to exchange ideas and comments My interaction with the e-Naz is clear and understandable Browsing classmates' works helps reflect own shortcoming I think sharing knowledge through online discussions is time consuming	PU

### **5.5.6 Factors influencing implementation of technology to support learning and teaching in an ODL environment**

From the factor analysis, the 10 key factors influencing implementation of technology in learning and teaching were management skills; relative usage and experience from continued use; appropriate design; interactive platform; IT service competence; perceived usefulness; individual intention/disposition; perceived ease of use; engagement, system stability and resource availability; and satisfaction, relative advantage, attitude, convenience, knowledge sharing and quality of technology. A proper design must therefore consider and creatively integrate all these factors among other factors cited by various scholars in such a way that makes online and distance learning easiest, most interactive, attractive, stable, flexible/adaptable, least power consuming, effective and efficient to its users. These were both inclusive of the technology system characteristics/features and individual attributes of the users/adopters.

Critical analysis showed that some of these factors found to be affecting the adoption of technology for learning and teaching in Africa Nazarene University concurred with the findings of a study by Babu, Ferguson, Parsai, Almoguera (2013) on Open Distance Learning for Development: Lessons from Strengthening Research Capacity on Gender, Crisis Prevention, and Recovery that participant profiling prior to the course, user friendliness of technology, meeting various learning styles, encouraging and rewarding online exchanges, commitment of course moderators, a variety of learning materials, and mixed approaches to learning are some of the factors that can enhance the success of e-learning programs.

In interpreting the results of the independent samples t-test, it is essential to look at the information to ascertain whether there is a significant difference between the two variables under scrutiny, for example, respondents' possession of laptops and their frequency of use of Google Search for Information, how they access reading materials on the computer, how they prefer to receive learning materials, and how they prefer to present their assignments respectively as shown in Table 5.9 below. Before examining the t-test information, you must decide whether you can assume equal variances or not.

We look at the p-value (sig.) for the Levene's test (where only one, 0.010 for how the Respondents prefer to present their assignments is below .05, hence you cannot assume equal variances, read the bottom row of the table. Below the section of t-test for equality of means,

one needs to focus on the sig (2-tailed) column – this is the p-value. It is .000 or is reported as  $p < .001$ . This is below our cut-off point. This p-value is related to independent samples t-test and shows that there is a significant difference between the two groups with and without laptops in terms of their preferred mode of presenting their assignments as explained after the table.

## Tests for Differences

The Laverne's test of .878 indicates that we should assume equal variances. The t-test significance is .326, so there does not appear to be a difference in means. The null hypothesis is supported. An independent samples t-test was conducted to examine whether there was a significant difference between the students possession of laptops in relation to how they prefer to receive learning materials. The test revealed a statistically significant difference between males and females ( $t = -4.94$ ,  $df = 33$ ,  $p < .001$ ). Students possessing laptops ( $M = 1.89$ ,  $SD = .82$ ) reported significantly higher preference for receiving learning materials in soft copy than

**Table 5.9: Independent Samples Test 1**

		Levene's Test for Equality of Variances		t-test for Equality of Means							95% Confidence Interval of the Difference			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference						
Whether the respondents have a Laptop	Equal variances assumed	.121	.728	.174	240	.862	.00834	.04796	-.08615	.10282				
	Equal variances not assumed			.174	239.788	.862	.00834	.04794	-.08610	.10278				
Respondents' Frequency of use of Google Search for Information	Equal variances assumed	.377	.540	.234	235	.815	.02204	.09401	-.16318	.20726				
	Equal variances not assumed			.234	231.804	.815	.02204	.09416	-.16349	.20756				
How the respondents access reading materials on the computer	Equal variances assumed	.002	.967	.073	238	.942	.00521	.07171	-.13606	.14649				
	Equal variances not assumed			.073	237.305	.942	.00521	.07172	-.13608	.14650				
How the Respondents prefer to receive learning materials	Equal variances assumed	.024	.878	.064	237	.949	.00687	.10724	-.20440	.21814				
	Equal variances not assumed			.064	235.657	.949	.00687	.10729	-.20451	.21824				
How the Respondents prefer to present their assignments	Equal variances assumed	6.820	.010	-2.910	240	.004	-.32026	.11007	-.53708	-.10344				
	Equal variances not assumed			-2.930	228.388	.004	-.32026	.10932	-.53566	-.10485				

the students who did not have laptops ( $M = 1.88$ ,  $SD = .84$ ).

Regarding how the students prefer to present their assignments a similar test was conducted. The Laverne's test of .010 indicates that we should not assume equal variances. The t-test significance is .004, so there appears to be a difference in means. The null hypothesis is not supported. An independent samples t-test was conducted to examine whether there was a significant difference between the students possession of laptops in relation to how they prefer to present their assignments. The test revealed a statistically significant difference between

males and females ( $t = -2.93$ ,  $df = 228.39$ ,  $p < .001$ ). Students possessing laptops showed significantly higher preference for receiving learning materials in soft copy than the students

		Table 5.10: Independent Samples Test 2							
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Whether the respondents have a Laptop	Equal variances assumed	1.054	.312	-.494	33	.624	-.03571	.07224	-.18268 .11125
	Equal variances not assumed			-1.000	27.000	.326	-.03571	.03571	-.10899 .03757
Respondents' Frequency of use of Google Search for Information	Equal variances assumed	13.549	.001	-1.440	31	.160	-.34615	.24045	-.83655 .14424
	Equal variances not assumed			-2.807	25.000	.010	-.34615	.12332	-.60013 -.09218
How the respondents access reading materials on the computer	Equal variances assumed	39.283	.000	-1.958	33	.059	-.42857	.21893	-.87398 .01684
	Equal variances not assumed			-3.959	27.000	.000	-.42857	.10824	-.65066 -.20648
How the Respondents prefer to receive learning materials	Equal variances assumed	1.051	.313	1.615	33	.116	.57143	.35388	-.14855 1.29141
	Equal variances not assumed			1.741	10.214	.112	.57143	.32819	-.15776 1.30061
How the Respondents prefer to present their assignments	Equal variances assumed	.561	.459	.190	33	.851	.07143	.37612	-.69379 .83665
	Equal variances not assumed			.157	7.668	.880	.07143	.45612	-.98837 1.13123

who did not have laptops ( $M = 3.61$ ,  $SD = .73$ ).

The Laverne's test of .001 indicates that we should not assume equal variances. The t-test significance is .010, so there appears to be a difference in means. The null hypothesis is not supported. An independent samples t-test was conducted to examine whether there was a significant difference between the students possession of laptops in relation to the frequency of their google search. The test revealed a statistically significant difference between males and females ( $t = -2.81$ ,  $df = 25$ ,  $p < .001$ ). Students possessing laptops ( $M = 1.35$ ,  $SD = .63$ ) reported significantly higher frequency of google search than the students who did not have laptops ( $M = 1.00$ ,  $SD = .00$ ).

Regarding how the students prefer to present their assignments a similar test was conducted and the Laverne's test of .000 indicates that we should not assume equal variances. The t-test significance is .000, so there appears to be a difference in means. The null hypothesis is not supported. An independent samples t-test was conducted to examine whether there was a significant difference between the students possession of laptops in relation to how they access reading materials from the computer. The test revealed a statistically significant difference between males and females ( $t = -3.96$ ,  $df = 27$ ,  $p < .001$ ). Students possessing

laptops ( $M = 1.43$ ,  $SD = .57$  reported significantly higher preference for softcopy of learning materials in than the students who did not have laptops ( $M = 1.00$ ,  $SD = .00$ ).

		Table 5.11: Independent Samples Test 3							
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Respondents' Frequency of use of Google Search for Information	Equal variances assumed	4.192	.042	-5.576	235	.000	-.66395	.11907	-.89853    -.42937
	Equal variances not assumed			-4.809	48.072	.000	-.66395	.13806	-.94153    -.38637
How the respondents access reading materials on the computer	Equal variances assumed	.298	.585	-3.240	238	.001	-.30500	.09413	-.49044    -.11956
	Equal variances not assumed			-3.553	61.433	.001	-.30500	.08585	-.47665    -.13335
How the Respondents prefer to receive learning materials	Equal variances assumed	.499	.481	2.831	237	.005	.39975	.14121	.12156    .67794
	Equal variances not assumed			3.136	62.337	.003	.39975	.12746	.14499    .65451
How the Respondents prefer to present their assignments	Equal variances assumed	4.359	.038	.235	240	.814	.03540	.15069	-.26145    .33224
	Equal variances not assumed			.196	48.303	.846	.03540	.18082	-.32811    .39891

The Laverne's test of .585 indicates that we should assume equal variances. The t-test significance is .001, so there appears to be a difference in means. The null hypothesis is not supported. An independent samples t-test was conducted to examine whether there was a significant difference between the respondents frequency of google search in relation to their how they accessed their reading materials. The test revealed a statistically significant difference between males and females ( $t = -3.24$ ,  $df = 238$ ,  $p < .001$ ). Frequent use of google search ( $M = 1.65$ ,  $SD = .48$  reported significantly higher access via soft copy than those who did not frequently use google search ( $M = 1.35$ ,  $SD = .55$ ). "1.65 .48

**Table 5.12 Gender ANOVA 1**

		Sum of Squares	df	Mean Square	F	Sig.
Respondents' Frequency of use of Google Search for Information	Between Groups	.029	1	.029	.055	.815
	Within Groups	122.891	235	.523		
	Total	122.920	236			
How the respondents access reading materials on the computer	Between Groups	.002	1	.002	.005	.942
	Within Groups	73.394	238	.308		
	Total	73.396	239			
How the Respondents prefer to receive learning materials	Between Groups	.003	1	.003	.004	.949
	Within Groups	162.717	237	.687		
	Total	162.720	238			
How the Respondents prefer to present their assignments	Between Groups	6.201	1	6.201	8.466	.004
	Within Groups	175.799	240	.732		
	Total	182.000	241			
I intend to use e learning technology in future	Between Groups	.019	1	.019	.015	.902
	Within Groups	282.227	226	1.249		
	Total	282.246	227			
I find using e learning tools interesting	Between Groups	.047	1	.047	.039	.844
	Within Groups	282.692	232	1.219		
	Total	282.739	233			
I find e-Naz very interactive	Between Groups	1.276	1	1.276	.825	.365
	Within Groups	361.821	234	1.546		
	Total	363.097	235			
It is easy for me to do my classworks using computers	Between Groups	.783	1	.783	.907	.342
	Within Groups	204.439	237	.863		
	Total	205.222	238			
Using e learning would enhance my effectiveness in learning	Between Groups	.964	1	.964	1.026	.312
	Within Groups	221.679	236	.939		
	Total	222.643	237			
I find e learning useful	Between Groups	.203	1	.203	.180	.672
	Within Groups	265.822	235	1.131		
	Total	266.025	236			
I have participated in Video Conferencing	Between Groups	.118	1	.118	.055	.815
	Within Groups	507.176	236	2.149		
	Total	507.294	237			
I enjoy communicating using Electronic Mail (Email)	Between Groups	3.113	1	3.113	2.087	.150
	Within Groups	353.548	237	1.492		
	Total	356.661	238			
I always use internet in learning and teaching	Between Groups	3.915	1	3.915	1.806	.180
	Within Groups	502.991	232	2.168		
	Total	506.906	233			
I do use audio/video tapes in learning and teaching	Between Groups	.013	1	.013	.006	.938
	Within Groups	483.000	227	2.128		
	Total	483.013	228			
I have attended a course in Virtual Classroom	Between Groups	14.951	1	14.951	7.373	.007
	Within Groups	470.455	232	2.028		
	Total	485.406	233			
I like delivering my learning and teaching materials through CD-ROM and WebCT	Between Groups	.239	1	.239	.120	.729
	Within Groups	466.151	234	1.992		
	Total	466.390	235			
The e-Naz system allows easy access to information	Between Groups	.642	1	.642	.442	.507
	Within Groups	342.770	236	1.452		
	Total	343.412	237			
I am rarely disconnected during e learning tutorial	Between Groups	.095	1	.095	.057	.811
	Within Groups	387.341	234	1.655		
	Total	387.436	235			
I think I learn more in courses offered at e-Naz than in face to face courses	Between Groups	.696	1	.696	.459	.499
	Within Groups	353.278	233	1.516		
	Total	353.974	234			
I think taking courses on e-Naz is convenient	Between Groups	1.742	1	1.742	1.430	.233
	Within Groups	287.435	236	1.218		
	Total	289.176	237			
I am generally satisfied with the quality of online courses offered through e-Naz	Between Groups	1.491	1	1.491	1.003	.318
	Within Groups	352.325	237	1.487		
	Total	353.816	238			

Table 5.12 (Levene's test) aims at testing the assumption of equal variances for the ANOVA. Looking at the sig. or p-value for the various items, we note that the p values for Respondents' Frequency of use of Google Search for Information, how the respondents access reading materials on the computer, how the Respondents prefer to receive learning materials, how the

Respondents prefer to present their assignments, I intend to use e learning technology in future, I find using e learning tools interesting, I find e-Naz very interactive, It is easy for me to do my classworks using computers, Using online learning would enhance my effectiveness in learning, I find e learning useful, I have participated in Video Conferencing, I enjoy communicating using Electronic Mail (Email), I always use internet in learning and teaching, I do use audio/video tapes in learning and teaching, I have attended a course in Virtual Classroom, I like delivering my learning and teaching materials through CD-ROM and WebCT, The e-Naz system allows easy access to information, I am rarely disconnected during e learning tutorial, I think I learn more in courses offered at e-Naz than in face to face courses, I think taking courses on e-Naz is convenient, and I am generally satisfied with the quality of online courses offered through e-Naz are .815, .942, .949, .004, .902, .844, .365, .342, .312, .672, .815, .150, .180, .938, .007, .729, .507, .811, .499, .233, .318 which are checked against .05. The results above .05 indicate that equal variances assumption is met while results that are below .05 indicate that the equal variances assumption is not met. Variances are not met when the assumptions that form the foundation for Levene's test are not sustained. Only How the Respondents prefer to present their assignments (.004) and having attended a virtual class (.007) are below .05 therefore equal variances assumption is not met for them

A one-way ANOVA was conducted to examine whether there were statistically significant differences among students of different gender preference to various features of the e-Naz, technology features such as ease of use, interaction among others and satisfaction with online and distance learning. The results revealed statistically significant differences among the gender but only for two items,  $F(8.466, 1) = 0.004, p = .001$  and  $F(14.951, 1) = 0.007, p = .001$ . Post-hoc Scheffe tests revealed statistically significant differences between male students ( $M = 3.11, SD = 1.05$ ), and female students ( $M = 3.84, SD = .95$ ). Female students reported significantly higher satisfaction with the online and distance learning compared to their male colleagues years. There were no other significant differences between the other groups.

**Table 5.13: Age ANOVA**

		Sum of Squares	df	Mean Square	F	Sig.
Respondents' Frequency of use of Google Search for Information	Between Groups	5.848	5	1.170	2.358	.041
	Within Groups	112.599	227	.496		
	Total	118.446	232			
How the respondents access reading materials on the computer	Between Groups	1.493	5	.299	.968	.438
	Within Groups	71.224	231	.308		
	Total	72.717	236			
How the Respondents prefer to receive learning materials	Between Groups	9.838	5	1.968	2.978	.013
	Within Groups	151.286	229	.661		
	Total	161.123	234			
How the Respondents prefer to present their assignments	Between Groups	2.433	5	.487	.633	.675
	Within Groups	178.357	232	.769		
	Total	180.790	237			
I intend to use e learning technology in future	Between Groups	3.029	5	.606	.476	.794
	Within Groups	277.431	218	1.273		
	Total	280.460	223			
I find using e learning tools interesting	Between Groups	2.499	5	.500	.412	.840
	Within Groups	271.744	224	1.213		
	Total	274.243	229			
I find e-Naz very interactive	Between Groups	8.954	5	1.791	1.201	.310
	Within Groups	337.042	226	1.491		
	Total	345.996	231			
It is easy for me to do my class works using computers	Between Groups	2.186	5	.437	.503	.774
	Within Groups	198.895	229	.869		
	Total	201.081	234			
Using e learning would enhance my effectiveness in learning	Between Groups	5.182	5	1.036	1.092	.366
	Within Groups	216.378	228	.949		
	Total	221.560	233			
I find e learning useful	Between Groups	.837	5	.167	.145	.981
	Within Groups	262.434	227	1.156		
	Total	263.270	232			
I have participated in Video Conferencing	Between Groups	14.705	5	2.941	1.375	.235
	Within Groups	487.641	228	2.139		
	Total	502.346	233			
I enjoy communicating using Electronic Mail (Email)	Between Groups	5.958	5	1.192	.792	.557
	Within Groups	344.697	229	1.505		
	Total	350.655	234			
I always use internet in learning and teaching	Between Groups	6.829	5	1.366	.637	.672
	Within Groups	480.371	224	2.145		
	Total	487.200	229			
I do use audio/video tapes in learning and teaching	Between Groups	16.089	5	3.218	1.547	.176
	Within Groups	455.466	219	2.080		
	Total	471.556	224			
I have attended a course in Virtual Classroom	Between Groups	7.235	5	1.447	.692	.630
	Within Groups	468.696	224	2.092		
	Total	475.930	229			
I like delivering my learning and teaching materials through CD-ROM and WebCT	Between Groups	3.491	5	.698	.346	.884
	Within Groups	455.987	226	2.018		
	Total	459.478	231			
The e-Naz system allows easy access to information	Between Groups	1.645	5	.329	.225	.952
	Within Groups	333.739	228	1.464		
	Total	335.385	233			
I am rarely disconnected during e learning tutorial	Between Groups	7.149	5	1.430	.874	.499
	Within Groups	369.709	226	1.636		
	Total	376.858	231			
I think I learn more in courses offered at e-Naz than in face to face courses	Between Groups	3.774	5	.755	.492	.782
	Within Groups	345.118	225	1.534		
	Total	348.892	230			
I think taking courses on e-Naz is convenient	Between Groups	1.871	5	.374	.309	.907
	Within Groups	275.702	228	1.209		
	Total	277.573	233			
I am generally satisfied with the quality of online courses offered through e-Naz	Between Groups	4.371	5	.874	.578	.717
	Within Groups	346.590	229	1.513		
	Total	350.962	234			

This table (Levene's test) tests the assumption of equal variances for the ANOVA. Looking at the sig. or p-value for the various items, we note that the p values for Respondents' Frequency of use of Google Search for Information, how the respondents access reading materials on the

computer, how the Respondents prefer to receive learning materials, how the Respondents prefer to present their assignments, I intend to use e learning technology in future, I find using e learning tools interesting, I find e-Naz very interactive, It is easy for me to do my classworks using computers, Using e learning would enhance my effectiveness in learning, I find e learning useful, I have participated in Video Conferencing, I enjoy communicating using Electronic Mail (Email), I always use internet in learning and teaching, I do use audio/video tapes in learning and teaching, I have attended a course in Virtual Classroom, I like delivering my learning and teaching materials through CD-ROM and WebCT, The e-Naz system allows easy access to information, I am rarely disconnected during e learning tutorial, I think I learn more in courses offered at e-Naz than in face to face courses, I think taking courses on e-Naz is convenient, and I am generally satisfied with the quality of online courses offered through e-Naz are .041, .438, .013, .675, .794, .840, .310, .774, .366, .981, .235, .557, .672, .176, .630, .884, .952, .499, .782, .907, .717 which are checked against .05. The results above .05 indicate that equal variances assumption is met while results that are below .05 indicate that the equal variances assumption is not met. Only Respondents' Frequency of use of Google Search for Information (.041) and How the Respondents prefer to receive learning materials (.013) are below .05 therefore equal variances assumption is not met for them

A one-way ANOVA was conducted to examine whether there were statistically significant differences among students of different age and their preference to various feature of the e-Naz, technology features such as ease of use, interaction among others and satisfaction with online and distance learning. The results revealed statistically significant differences among the ages but only for two items,  $F(2.358, 5) = 0.041, p = .001$  and  $F(2.978, 5) = 0.013, p = .001$ . Post-hoc Scheffe tests revealed statistically significant differences between ages 20-29 ( $M = 3.04, SD = 1.01$ ), and ages 30-39 ( $M = 3.73, SD = .91$ ). Students of ages 30-39 reported significantly higher satisfaction with the features of online and distance learning compared to those aged 20-29. There were no other significant differences between the other groups.

Table 5.14: Possession of laptop ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Respondents' Frequency of use of Google Search for Information	Between Groups	14.363	1	14.363	31.093	.000
	Within Groups	108.557	235	.462		
	Total	122.920	236			
How the respondents access reading materials on the computer	Between Groups	3.101	1	3.101	10.499	.001
	Within Groups	70.295	238	.295		
	Total	73.396	239			
How the Respondents prefer to receive learning materials	Between Groups	5.322	1	5.322	8.014	.005
	Within Groups	157.397	237	.664		
	Total	162.720	238			
How the Respondents prefer to present their assignments	Between Groups	.042	1	.042	.055	.814
	Within Groups	181.958	240	.758		
	Total	182.000	241			
I intend to use e learning technology in future	Between Groups	.172	1	.172	.138	.711
	Within Groups	282.074	226	1.248		
	Total	282.246	227			
I find using e learning tools interesting	Between Groups	.534	1	.534	.439	.508
	Within Groups	282.205	232	1.216		
	Total	282.739	233			
I find e-Naz very interactive	Between Groups	.157	1	.157	.101	.751
	Within Groups	362.941	234	1.551		
	Total	363.097	235			
It is easy for me to do my class works using computers	Between Groups	1.639	1	1.639	1.908	.168
	Within Groups	203.582	237	.859		
	Total	205.222	238			
Using e learning would enhance my effectiveness in learning	Between Groups	.745	1	.745	.792	.374
	Within Groups	221.898	236	.940		
	Total	222.643	237			
I find e learning useful	Between Groups	.176	1	.176	.155	.694
	Within Groups	265.850	235	1.131		
	Total	266.025	236			
I have participated in Video Conferencing	Between Groups	2.530	1	2.530	1.183	.278
	Within Groups	504.764	236	2.139		
	Total	507.294	237			
I enjoy communicating using Electronic Mail (Email)	Between Groups	7.391	1	7.391	5.015	.026
	Within Groups	349.270	237	1.474		
	Total	356.661	238			
I always use internet in learning and teaching	Between Groups	7.346	1	7.346	3.411	.066
	Within Groups	499.560	232	2.153		
	Total	506.906	233			
I do use audio/video tapes in learning and teaching	Between Groups	.832	1	.832	.392	.532
	Within Groups	482.181	227	2.124		
	Total	483.013	228			
I have attended a course in Virtual Classroom	Between Groups	1.170	1	1.170	.561	.455
	Within Groups	484.236	232	2.087		
	Total	485.406	233			
I like delivering my learning and teaching materials through CD-ROM and WebCT	Between Groups	.806	1	.806	.405	.525
	Within Groups	465.584	234	1.990		
	Total	466.390	235			
The e-Naz system allows easy access to information	Between Groups	.196	1	.196	.135	.714
	Within Groups	343.216	236	1.454		
	Total	343.412	237			
I am rarely disconnected during e learning tutorial	Between Groups	.422	1	.422	.255	.614
	Within Groups	387.014	234	1.654		
	Total	387.436	235			
I think I learn more in courses offered at e-Naz than in face to face courses	Between Groups	2.074	1	2.074	1.374	.242
	Within Groups	351.900	233	1.510		
	Total	353.974	234			
I think taking courses on e-Naz is convenient	Between Groups	.211	1	.211	.172	.679
	Within Groups	288.966	236	1.224		
	Total	289.176	237			
I am generally satisfied with the quality of online courses offered through e-Naz	Between Groups	2.654	1	2.654	1.791	.182
	Within Groups	351.162	237	1.482		
	Total	353.816	238			

The table on Levene's test checks the assumption of equal variances for the ANOVA.

Looking at the sig. or p-value for the various items, we note that the p values for Respondents'

Frequency of use of Google Search for Information, how the respondents access reading materials on the computer, how the Respondents prefer to receive learning materials, how the Respondents prefer to present their assignments, I intend to use e learning technology in future, I find using e learning tools interesting, I find e-Naz very interactive, It is easy for me to do my classworks using computers, Using e learning would enhance my effectiveness in learning, I find e learning useful, I have participated in Video Conferencing, I enjoy communicating using Electronic Mail (Email), I always use internet in learning and teaching, I do use audio/video tapes in learning and teaching, I have attended a course in Virtual Classroom, I like delivering my learning and teaching materials through CD-ROM and WebCT, The e-Naz system allows easy access to information, I am rarely disconnected during e learning tutorial, I think I learn more in courses offered at e-Naz than in face to face courses, I think taking courses on e-Naz is convenient, and I am generally satisfied with the quality of online courses offered through e-Naz are .000, .001, .005, .814, .711, .508, .751, .168, .374, .694, .278, .026, .066, .532, .455, .525, .714, .614, .242, .679, .182 which are checked against .05. The results above .05 indicate that equal variances assumption is met while results that are below .05 indicate that the equal variances assumption is not met. Only Respondents' Frequency of use of Google Search for Information (.000), How the respondents access reading materials on the computer (0.001), How the Respondents prefer to receive learning materials (0.005), and I enjoy communicating using Electronic Mail (Email) (.026) are below .05 therefore equal variances assumption is not met for them

A one-way ANOVA was conducted to examine whether there were statistically significant differences among students who possess laptops and preference to various feature of the e-Naz, technology features such as ease of use, interaction among others and satisfaction with online and distance learning. The results revealed statistically significant differences among possession of laptops but only for four items,  $F(31.093, 1) = 0.000, p = .001$ ,  $F(10.499, 1) = 0.001, p = .001$ ,  $F(8.014, 1) = 0.005, p = .001$ , and  $F(5.015, 1) = 0.026, p = .001$ .

**Table 5.15 Paired Samples Test**

		Paired Differences					T	df	Sig. (2-tailed)			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference							
					Lower	Upper						
Pair 1	Age of the Respondents - I intend to use e learning technology in future	-.54464	1.54970	.10354	-.74869	-.34059	-5.260	223	.000			
Pair 2	Age of the Respondents - I find e-Naz very interactive	-.05603	1.55459	.10206	-.25713	.14506	-.549	231	.584			
Pair 3	Age of the Respondents - It is easy for me to do my class works using computers	-.66383	1.45067	.09463	-.85027	-.47739	-7.015	234	.000			
Pair 4	Age of the Respondents - I do use audio/video tapes in learning and teaching	.86222	1.72006	.11467	.63625	1.08819	7.519	224	.000			
Pair 5	Age of the Respondents - I have participated in Video Conferencing	1.20940	1.74653	.11417	.98446	1.43435	10.593	233	.000			
Pair 6	Age of the Respondents - I have attended a course in Virtual Classroom	1.10870	1.73115	.11415	.88378	1.33361	9.713	229	.000			
Pair 7	Age of the Respondents - I am rarely disconnected during e learning tutorial	.30172	1.63681	.10746	.08999	.51345	2.808	231	.005			
Pair 8	Age of the Respondents - e-Naz courses require more time than face to face courses	.28692	1.69307	.10998	.07026	.50358	2.609	236	.010			
Pair 9	Age of the Respondents - I am generally satisfied with the quality of online courses offered through e-Naz	.09787	1.57538	.10277	-.10459	.30034	.952	234	.342			
Pair 10	Age of the Respondents - I think taking courses on e-Naz is convenient	-.27778	1.46628	.09585	-.46663	-.08893	-2.898	233	.004			

In the paired sample t test, various items such as I intend to use e learning technology in future, I find e-Naz very interactive, It is easy for me to do my class works using computers, I do use audio/video tapes in learning and teaching, I have participated in Video Conferencing, I have attended a course in Virtual Classroom, I am rarely disconnected during e learning tutorial, e-Naz courses require more time than face to face courses, I am generally satisfied with the quality of online courses offered through e-Naz, and I think taking courses on e-Naz is convenient were paired using age as the base. Significances were found for all the variables to be .000, .584, .000, .000, .000, .005, .010, .342, .004 respectively. This indicates that all the variables except Age of the Respondents - I find e-Naz very interactive (.584) and I am generally satisfied with the quality of online courses offered through e-Naz (.342). this implies that Africa Nazarene University has to work hard on the two areas, that is, the interactiveness of the e-Naz platform and the general satisfaction of the students with online and distance learning in ANU. This could be inclusive of the various elements raised by the various models in the study and also pointed out by various findings from this study.

## 5.7 CHAPTER SUMMARY

This chapter aimed at examining the quantitative methods that were used in investigating adoption of technology to facilitate studying process in a distance learning program at Africa Nazarene University. It commenced with an overview of key underpinnings and assumptions of the quantitative methods used in this study, then proceeded to provide a rationale behind the choice of the quantitative study method, validity in quantitative research, survey

questionnaire, and limitations of instruments, pilot study, data analysis, quantitative findings, and chapter summary. The quantitative methods and analysis assisted in the examination of adoption of technology to support learning and teaching in a distance learning program at Africa Nazarene University in line with the quantitative objectives of the study. The study also assisted in the identification of the target population from which the sample was collected. The focus of this study was on understanding the statistical variation of the use of technology in the learning process, varying extent of usage, attitudes of students towards the use of technology in learning and teaching, and the factors influencing the use of technology for learning and teaching. The quantitative studies reviewed has provided grounds to suggest that it is possible or imperative to understand student views of adoption of technology to support learning process in a distance learning program at Africa Nazarene University as users and clients.

## **CHAPTER SIX**

### **DISCUSSION OF QUANTITATIVE AND QUALITATIVE FINDINGS**

#### **6.1 INTRODUCTION**

This chapter reveals, presents and discusses the results of the quantitative and qualitative findings presented in line with the objectives of the study followed by an analytical discussion of the findings in the immediate section. The objectives that guided the study included establishing the level of adoption of technology amongst students in an ODL environment, examining how students are using technology in learning and teaching processes, exploring the students attitudes and perceptions about using technology in learning and teaching, determining the association between technology users attitude/ perception and adoption of technology for learning and teaching, and designing, adopting and developing a framework for the adoption and implementation of using ICT technologies to enhance and support distance learning.

#### **6.2 DISCUSSION OF QUANTITATIVE FINDINGS**

This section discusses the quantitative findings in line with the objectives that that seeks to examine the extent in which technology is adopted by the distance learners at ANU.

##### **6.2.1 Students Profile**

###### ***Gender***

From the findings it was noted that regarding gender, males were 51.2% and female were 48.8% of the sample. The finding showed gender balance among technology adopters in Africa Nazarene University's open and distance learning. The total population of students in the distance learning program at ANU is 600. Three hundred and fifty three of them are male while 247 are female. In relation to the total population in the area of study, the sample size of the study reflected the actual population, therefore, enhancing the reliability of the study. The result from gender analysis is a close reflection of the total population in the area of study, again, enhancing the reliability of the study. Although it is commonly perceived that IT is male dominated, this was not the case in practice as the trend was changing giving way to gender parity in adoption and use of technology (Gillborn, D. & Mirza, H.S. 2000). This may have a direct relationship with perceived usefulness by respondents of either gender. This could be demonstrated from the study on the factors identified under factor analysis under

perceived usefulness. In the case of perceived usefulness; the questions “I think sharing knowledge through online discussions is time consuming” and “Browsing classmates' works helps reflect on my shortcomings” were identified to be major factors playing a significant role in the implementation of technology adoption within ANU. General log-linear modeling was used to study if the gender of the respondent influenced his/her view on perceived usefulness of the technology (in this case the question “I think sharing knowledge through online discussions is time consuming”) using IBM SPSS version 20. The General Log linear Analysis procedure is used to study the relationship between categorical variables. This is accomplished through analysis of the cell counts of the cross tabulation table formed by the cross-classification of the variables of interest (Agresti 2002).

The table 6.1 below shows the results on goodness of statistics of the model.

<b>Table 6.1 Goodness-of-Fit Tests<sup>a,b</sup></b>			
	Value	Df	Sig.
Likelihood Ratio	2.101	4	.717
Pearson Chi-Square	2.095	4	.718
a. Model: Poisson			
b. Design: Constant + GENDER + QN56			

The goodness-of-fit table shows that two tests for null hypothesis that the model adequately fits the data. (IBM corporation 1989, 2011). For this model, it also tests the independence of *gender of the respondent* and the question “*I think sharing knowledge through online discussions is time consuming.*” If the null is true, the Pearson and likelihood ratio statistics have chi-square distributions with the displayed degrees of freedom. If the significance value is small (less than 0.05), then the model does not adequately fit the data. In this case, its value is above 0.05, thus there is no relationship between *gender of the respondent* and the question “*I think sharing knowledge through online discussions is time consuming.*” The goodness-of-fit statistics are based on the cells of the cell count and residuals table. Cells in the table represent the cross-classification of the factors. See the table 6.2 below

**Table 6.2 Cell Counts and Residuals<sup>a,b</sup>**

Gender of the Respondents	I think sharing knowledge through online discussions is time consuming	Observed		Expected		Residual	Standardized Residual	Adjusted Residual	Deviance
		Count	%	Count	%				
Male	Strongly disagree	27	11.2%	26.132	10.8%	.868	.170	.274	.169
	Disagree	25	10.3%	22.033	9.1%	2.967	.632	.998	.619
	Undecided	18	7.4%	21.521	8.9%	-3.521	-.759	-1.195	-.781
	Agree	30	12.4%	29.719	12.3%	.281	.052	.085	.051
	Strongly agree	24	9.9%	24.595	10.2%	-.595	-.120	-.192	-.120
Female	Strongly disagree	24	9.9%	24.868	10.3%	-.868	-.174	-.274	-.175
	Disagree	18	7.4%	20.967	8.7%	-2.967	-.648	-.998	-.664
	Undecided	24	9.9%	20.479	8.5%	3.521	.778	1.195	.757
	Agree	28	11.6%	28.281	11.7%	-.281	-.053	-.085	-.053
	Strongly agree	24	9.9%	23.405	9.7%	.595	.123	.192	.122
a. Model: Poisson									
b. Design: Constant + GENDER + QN56									

The first row of the table pertains to male respondents who strongly disagreed that knowledge sharing through online discussions and forums consumes too much time (Fienburg 1994). The observed column reports the number and percentage of cases observed in the data file that are in the cross-classification. The expected column reports the number of cases you would expect to see in the cell if the model is correct. The residuals are measures of the difference between the observed and predicted values (Agresti, 1996). Large residuals can indicate cells that are not well fit by the model. In this case, most residuals were small only below 1, indicating how best this model fitted the data. From table 6.2 above, however, it reveals that the number of male respondents who disagreed that sharing knowledge through online discussions and forums consume time were many; 52 (42% of male respondents), compared to female counterparts who were only 42 (36% of the female respondents). A study by

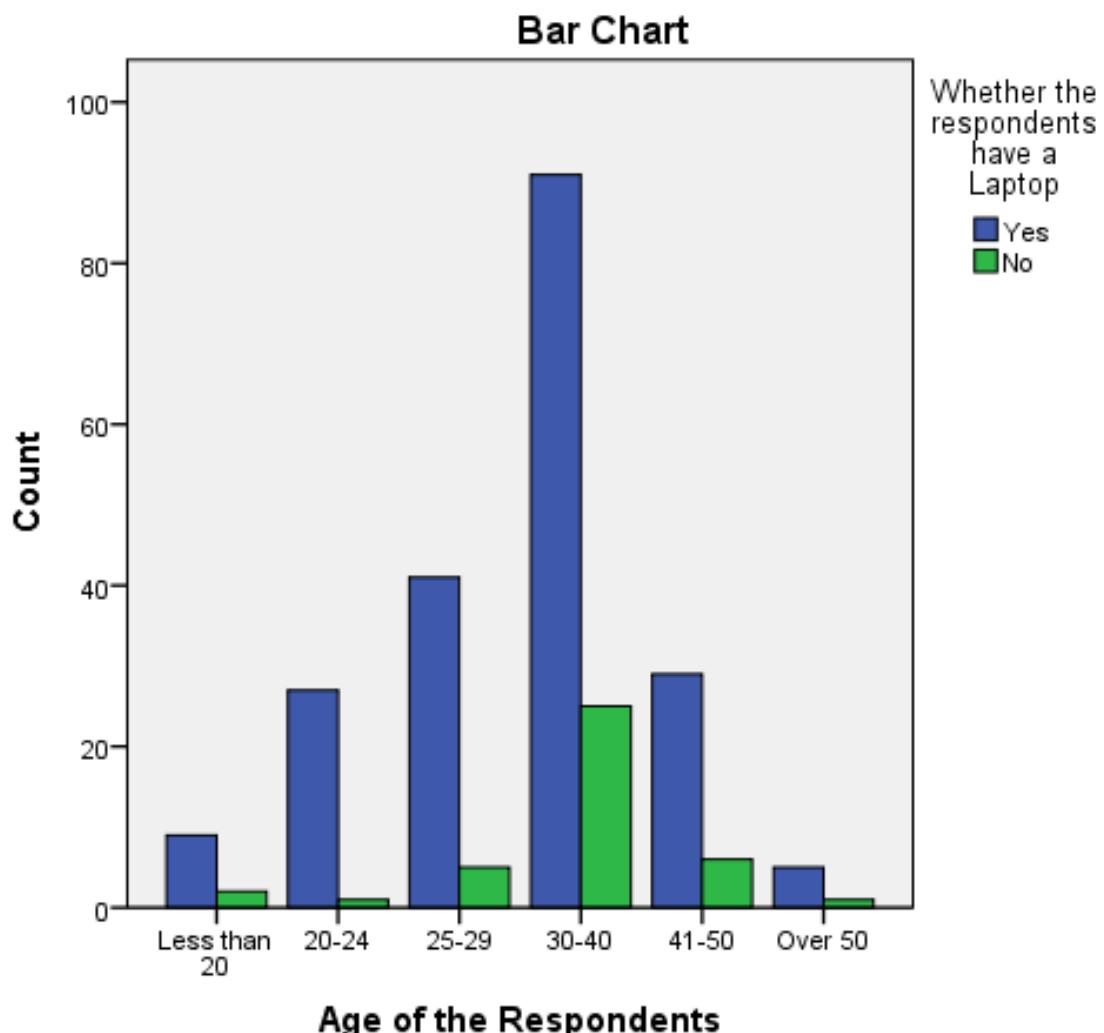
Deborah Fallows found that more men than Women perform online activities, although both share a rapidly growing enthusiasm for online functions as a tool of learning and teaching (Fallows, 2005). This is an indication that to some extent, gender of the respondents played a role in the respondents' perceived usefulness of technology. This is as a result of gender disparity but the close gender parity is a strong sign that, most females have taken up education to compete with the male counterparts in adopting technology in learning and teaching. Therefore, in accordance to General log-linear model, the relationship between gender and perceived usefulness of the respondent would be relatively constant, not depending on the gender of the respondent.

### ***Age of the respondents***

Regarding age, the respondents ranged from ages of 20 to 49 years with those aged 30-39 as the majority. This is because most students enrolling to study in the distance learning program at ANU are adults who are employed and find the distance learning mode of study flexible enough to enable them to attend to their personal and professional obligations. The majority of non-distance learners at ANU are high school leavers aged between 20 and 29. It was therefore the researcher's expectation that the distance learners would be of the same age group but that was not the case as revealed in this study. The highest from the findings (30-39) could have been due to some reasonable percentage of economic independence and possible engagement on some paid job or self-employment. This study, however, focused on the relationship between age and computer adoption, in this case relating it to possession of a laptop as an indicator of technology adoption. A cross-tabulation with chi-square test was done using IBM SPSS 20.0 to study the kind of association that can exist between the two variables. The crosstabulation table is a basic statistical technique that examines categorical relationship between two (nominal or ordinal) variables, with a possibility of controlling the additional layering variables (IBM corporation 1989, 2011).

The Crosstabs procedure tests for independence of the two variables. It also measures the level of association and agreement for ordinal and nominal data. The crosstabs procedure can also provide the estimates of the relative risk of an event given the presence or absence of a particular characteristic, showing the significant differences in the columns of the cross tabulation table. Figure, fig 6.1 shows a combined bar graph of age of respondents against possession of laptop.

**Figure 6.1: Bar chart on age of the respondent against possession of laptop**



It is noted that, across all the ages, possession of laptop is high. The number of those respondents possessing laptops increases significantly as the age of the respondents increase up to the age bracket of 30-40 years. This then drops as the age bracket reaches 40-50 years and then lastly over 50 years old. The drop is as a result of fewer respondents in the upper age brackets. Thus, the researcher argued that there is a linear association that could be associated among the two variables, that is, as the age of the respondents increases, so does the ability to possess a laptop, and so is the adoption of technology made easier. Thus, at the higher level of ages, we expect nearly every respondent to possess a laptop. However, this association was found to be unreliable as revealed by chi-square tests shown on table 6.3

below. The p-values are all above 0.05, implying that the researcher could not entirely rely on such association.

**Table 6.3 Chi-Square Tests**

	Value	Df	Asymp. (2-sided)	Sig.
Pearson Chi-Square	6.628 <sup>a</sup>	5	.250	
Likelihood Ratio	7.919	5	.161	
Linear-by-Linear Association	2.316	1	.128	
N of Valid Cases	242			
a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is .99.				

The unreliability of the association can be as a result of the policies within the area of study, African Nazarene University in this case, that would have compelled open distance learning students to adopt technology in learning and teaching despite the age of the participant. Therefore, in a simple conclusion the age of the respondent is not likely to influence the respondents' wish to adopt technology.

### ***Length of time using a computer***

With regard to the computer usage, the study found that the highest percentage of respondents had used computers for 1-3 years followed by those who had used computers for less than 1 year, followed by those who had used computers for 4-6 years, followed by those who had used computers for more than 10 years and followed by those who had used computers for between 7 and 9 years. It is a fact that those who have used computers for a long period of time such as 3 years may feel comfortable and competent to handle e-tools in open and distance learning unlike those who are amateurs in computer usage or have less experience. A study on computer usage in relation to perceived ease of usefulness was carried out using cross-tabulation with chi-square tests. Experience in use of technology in learning and teaching was picked as an indicator of perceived ease of usefulness and then studied in

relation to length of time in computer usage. Table 6.4 below is a result of cross-tabulation of the above variables.

<b>Table 6.4: Computer Usage of the Respondents * I am experienced in using technology in learning and teaching Cross tabulation</b>							
Count		I am experienced in using technology in learning and teaching					Total
Computer Usage of the Respondents		Strongly disagree	Disagree	Undecided	Agree	Strongly agree	
	Less than 1 year	7	10	7	16	8	48
	1-3 years	3	11	11	30	16	71
	3-7 years	2	6	4	21	13	46
	7-10 years	2	5	9	11	8	35
	More than 10 years	4	4	6	15	13	42
Total		18	36	37	93	58	242

It is evident from the table above that, there is a higher probability that a respondent who has used a computer for more than three years is likely to be an experienced user of technology in learning and teaching. In comparison to lower age levels of computer usage, where the probability of getting an inexperienced user compared to higher age levels of usage the numbers of experienced users were still relatively higher compared to inexperienced users. Therefore, it could be argued that, in general, most users were experienced. But this association was found to be insignificant (all the p-value>0.05) as revealed in the chi-square test table 6.5 below.

**Table 6.5: Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.282 <sup>a</sup>	16	.504
Likelihood Ratio	14.688	16	.548
Linear-by-Linear Association	2.642	1	.104
N of Valid Cases	242		

a. 4 cells (16.0%) have expected count less than 5. The minimum expected count is 2.60.

It was not just necessary to be a long time user to gain relevant experience in use of technology in learning and teaching, but individual skills, ability and capability to learn and adopt technology, time spent in a week in using the computer, and other external factors could favour a respondent to gain relevant experience.

However, it has to be understood that the number of years alone may not really suffice as one may have a short duration of use of computers but intensively such as through a computer course thereby making them feel equipped to embrace technology in learning and teaching.

On the item regarding respondents' having access to laptops, the study found that a large majority had access to laptops leaving a small minority as lacking in access to laptops. At admission stage all potential distance learners are expected to prove readiness for online learning by purchasing a laptop. This is a mandatory requirement before admission into the distance learning program. Open and distance learning may entail lecturers' preparation of lessons using computers and students submission of assignments through computers and possibly internet connection depending on the mode of submission such as email, you tube, e-Naz among others. This makes it compelling for e-learners to have laptops for convenience hence the finding that almost every user had a laptop.

### ***Google Search usage***

Regarding frequency of use of Google search, most respondents were daily users followed by bi-weekly or tri-weekly users, and occasional visitors. This has a direct link with the research question on the level of technology use. Within the setting of online and distance learning, the need to do assignments, research, and reviews explain the role of Google search in facilitating

this. However, as can be inferred from the item on the respondents' preferred means of accessing reading materials discussed here below, the respondent who preferred hard copy only used Google search occasionally.

The researcher suspected that there could exist a relation regarding frequency of Google search with laptop possession and the length of time of computer usage. Linear regression analysis was employed to investigate this kind of relationship. Linear regression is a modelling procedure that tries to estimate the value of a dependent scale variable based on its linear relationship to one or more predictors (the independent variables) (Neter 2004). The model assumes that the dependent variable is linearly related, or has a "straight line," relationship with its independent variables/predictors. This relationship can be described by the indicated formula shown below.

$$y_i = b_0 + b_1 x_{i1} + \dots + b_p x_{ip} + e_i$$

where

$y_i$  is the value of the  $i^{\text{th}}$  case of the dependent scale variable

$P$  is the number of predictors

$b_j$  is the value of the  $j^{\text{th}}$  coefficient,  $j=0,\dots,p$

$x_{ij}$  is the value of the  $i^{\text{th}}$  case of the  $j^{\text{th}}$  predictor

$e_i$  is the error in the observed value for the  $i^{\text{th}}$  case

The model can be described to be linear because an increase in value of the  $j^{\text{th}}$  predictor by a unit would increase the value of the dependent variable by  $b_j$  units. It should be noted that  $b_0$  is the constant intercept, the model-predicted value of the dependent variable when the value of every predictor is equal to 0. For the purpose of testing hypotheses about the values of model parameters, the linear regression model also assumes the following in order to purposefully test hypotheses about the values of model parameters:

- There normal distribution with a mean of 0 in the error term.
- The error term has a constant covariance across cases and independent of the variables in the model. In this case, the error term is referred to as **heteroscedastic**.

- The values of the error term for a given case, values of the variables in the model and values of the error term for other cases are totally not related and independent from each other.

The data was subjected to transformations, to ensure that the data achieves normality so that the data can be ready for regression modelling. The ANOVA table (see table 6.6 below) reports significance in F-statistic, showing that this model is better predicts the model than a guess in the model; p-value=0.000

<b>Table 6.6 ANOVA<sup>a</sup></b>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	15.076	2	7.538	16.438	.000 <sup>b</sup>
	Residual	109.601	239	.459		
	Total	124.678	241			

a. Dependent Variable: Respondents' Frequency of use of Google Search for Information

b. Predictors: (Constant), Whether the respondents have a Laptop, Computer Usage of the Respondents

In general, the regression model does relatively better in modelling the data. More than a sixth of the variation in data is explained by the model.

<b>Table 6.7 Model Summary</b>					
Model	R	R Square	Adjusted R Square	R	Std. Error of the Estimate
1	.348 <sup>a</sup>	.121	.114		.67719

a. Predictors: (Constant), Whether the respondents have a Laptop, Computer Usage of the Respondents

The model fit looks positive, however, the first section of the coefficients table indicates that there are some predictors in the model that do not contribute significantly to the model. Computer usage time was found insignificant to the model, (p-value>0.05). Please see table

6.8 below on coefficients. The second section of the table indicates that this model might have suffered multi-collinearity (high levels of correlation)

**Table 6.8:Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
		B	Std. Error				Tolerance	VIF
1	(Constant)	1.034	.189		5.473	.000		
	Computer Usage of the Respondents	-.053	.033	-.101	-1.614	.108	.948	1.054
	Whether the respondents have a Laptop	.601	.120	.311	4.991	.000	.948	1.054

a. Dependent Variable: Respondents' Frequency of use of Google Search for Information

The coefficients indicates that possession of laptop is a positive predictor for frequency for Google search while length of computer usage is a negative predictor, that is, more possession of laptops will increase using Google search while increase in the length of time of computer usage will decrease Google search. However, the length of computer usage was found to be insignificant, therefore, this might not present the true picture of the association between the two variables (Draper 1998).

On the means the respondents were using to access reading materials, it was noted that a majority were accessing reading materials via computer (soft copy) while a third were printing first in order to read and a paltry 3.3% alternating using computer and printing hard copy. Accessing reading materials through computer is a positive step in the adoption of technology in learning and teaching. The fact that one third of the users were still printing documents in order to access them might have been due to lack of laptops to access soft copies outside the university or low adoption of technology. It seemed that respondents who preferred hard copy and those who preferred both hard and soft copies might have joined or crossed sides to preference for hard copy as the preferred mode of receiving reading materials as found in the next demographic characteristic. This could be explained in line with access to technology where it was found that 83.5% of the sample had access to laptops. For that reason they preferred to access their learning material in soft copy.

Regarding the preferred mode of receiving reading materials, the highest number of respondents preferred hard copy (printed Book) followed by electronic book and either hard or soft (electronic copy). This was a negative trend which was also confirmed by the item on the lecturers' and students' attitudes and perceptions on the use of technology in learning and teaching in Africa Nazarene University which was only 0.32, that is, 32%. This calls for a concerted effort by the university to change or improve the attitude and perception of students on the usage of technology in learning and teaching by use of various ways, some of which have been outlined in the recommendations section of this study.

On the respondents' preferred mode of presenting their assignments, the findings showed that email was the most preferred followed by online presentation (via discussion forum, IR or chat) E-Naz, a combination of E-Naz and email and face to face video (via You Tube) and audiotape. Although the preferred means of accessing reading materials and receiving assignment was averagely picking the technology adoption trend, the mode of presenting assignments was much better and higher. The findings on the high preference for emails was in line with scholars who found that emails have wider acceptance due to ease of use, accessibility, simplicity and low cost (Straub *et al.* 1997) alongside personal digital assistants (Yi *et al.* 2006), World Wide Web (Moon & Kim 2001), Enterprise Resource Planning systems (Hwang 2005), and internet (Shih 2004).

The use of online presentation and E-Naz showed that the qualities of the e-Naz system such as perceived usefulness, ease of use, interactive platform among other many qualities have enticed e-Naz users. The use of a combination of E-Naz and email, points towards some users who may have some challenges or possibly slow adopters who still had challenges in picking the e-Naz system. On the other hand, this may also be due to directions from the lecturers on the prefer mode of submission of the assignments. The use of face to face video (via You Tube) which was minimal at only 7% could be the epitome of technology adoption in e-Naz that needs to be nurtured. However, audiotape which proved to be the least is seemingly becoming obsolete though still essential mode.

As pointed above, online presentation through e-Naz and discussion forum or a combination of E-Naz and email and face to face video via You Tube could be a good way of establishing online communities, but due to the percentage of the users of these electronic tools, this is only the starting point. It is true that online communities take time to develop and this depends on the level of discussions which can only be built by regular use of such platforms

and e tools. This is why Yoder (2003) described the evolutionary quality of online communities as involving first friendship evolution, then member development through discussion threads and finally fellowship that comes from long-term discussion engagement.

It was a challenge that in a world where online communities and technology adoption is on the rise as online communities are now perceived as central to online learning, such interactions need to be directed by lecturers. This means that lecturers should be equally technology savvy to the extent of imparting such online community interactions to engage students. Student engagement through creation of active online communities seemed to be one area of e learning that had not been adequately utilized by Africa Nazarene University. The finding from this study somehow concurs with that of LaRose and Whitten (2000) who found that students' involvement in online discussions is statistically linked to their satisfaction in their online or distance learning course.

From the above it could be deduced that the low participation in online discussions and web discussions could be due to low satisfaction that the students and teachers were getting from the online platform at ANU. While it is acknowledged that online discussions arouse users' interest, Yuen (2003) added that online discussions help create learning communities which surpass individual learning and promote the sharing of ideas among the members thereby building newer perspectives and helping the users to think outside the box. This can be achieved through stipulation of clear expectations and guidelines by the Lecturer. The lecturer is also expected to play multiple roles of being a guide, a mentor, a catalyst, a coach, an assessment giver and a resource provider. The lecturer must structure the online discussion to enable students to take on more responsibility and achieve a greater level of critical thinking in structured online conversations. The lecturer is expected to create effective ways for keeping online discussions on topic through designing clear focused questions, providing guidelines to help students create relevant responses and regularly providing discussion summaries (Café, 2009).

The perception and attitude of online users, that is, students in this case, could be redirected by improving their satisfaction with the system or platform to make both students get actively involved in online community. However, it should be noted that the involvement in online communities is also tied to the users' perception of what constitutes an effective community and the role that each stakeholder has to play in developing and maintaining the online community.

In as much as Slagter van Tryon and Bishop (2009) suggested that students use analysis and negotiation to establish a social context, they noted that instructors use evaluation to determine the effectiveness of the social context as there are different methods of addressing online communities as well as the factors that help in building a strong online community. Development of such a perception and attitude may require the use of motivation to increase the satisfaction levels of the users through the various motivation strategies noted by Maslow, Herzberg, and McGregor in Noe, Hollenbeck, Gerhart and Wright (2006) as presented in the recommendations section of this study.

### **6.2.2 The level of adoption of technology amongst students in an ODL environment**

The finding regarding this objective was as high as 0.76 or 76.45% as illustrated in Table 6.8 reported admiration for Africa Nazarene University. It is possible that learners are highly satisfied with the various measures put in place to enhance adoption of technology for learning and teaching in the university. This entails the technology infrastructure, platform, stability, security, accessibility, ease of use and possibly the teaching staff among other key factors that might have contributed to the students rating of level of adoption of technology in ANU.

### **6.2.3 How students are using technology in learning and teachingprocesses**

Students were found to be using technology in learning and teaching processes in various ways. The findings showed that students were using technology in learning and teaching through Google search, accessing reading materials on the computer, receiving/sending learning materials, and sending/presenting assignments. Other than the afore-mentioned, the respondents also used technology through electronic books, face to face video via You Tube, audiotape, online discussion, E-Naz, emails and a combination of E-Naz and email. How students use technology was however limited as there were many other ways they could have taken advantage of technology for competitive advantage.

How students of ANU were using technology was noted to be determined by their attitude towards the technology, complexity of the technology, perceived usefulness, and perceived ease of use among other factors. The findings were in line with Beadnell and Baker (2008), Hale *et al.* (2003), Hoffman (1999) Fishbein and Ajzen (1975) who demonstrated that one can build new beliefs by performing some behaviour as beliefs provide the basis for the construction of the attitude toward the objects, attitude in turn determine the individual's intention to perform the behaviour in future and this intention lead to performance or non-

performance of the behaviour. Theory of reasoned action (TRA) posits that individual behaviour can be driven by behavioural intentions where behavioural intentions are a function of an individual's attitude toward the behaviour and subjective norms surrounding the performance of the behaviour.

Attitude toward the behaviour can be defined as the individual's feelings, either positive or negative towards performing a certain behaviour. This is what has been interpreted as perceived usefulness that arises from specific behavioural aspects and the evaluation of the technology adoption as argued by Bagchi, Kanungo and Dasgupta (2003).

The findings also confirmed some factors from the Perceived Usefulness (PU) can be summarised as the extent that individuals believe using the technology will enhance and ease the performance and Perceived Ease of Use (PEOU). Just as Venkatesh (2000) and Davis (1989) found that PU was the most important because after some time of technology usage (post adoption) the beliefs of Perceived Ease of Use (PEOU) loses effect on intention, while Perceived Usefulness remains a relatively intact and strong positive effect on intention. This study found through factor analysis that more factors were loading under PU than PEOU. This confirms to an extent that Perceived Usefulness will continuously affect adoption intention, continued intention to use technology, satisfaction, positively even after a long time since its adoption in line with Venkatesh (2000), Anol Bhattacherjee (2001), and Moez Limayem, Hirt and Cheung (2007). Other factors included users' attitudes towards the technology (Anol Bhattacherjee & Hikmet 2008), and intention. The perceived usefulness has ripple effects such as influencing the behavioural intention, attitude and perceptions that eventually leads the users to adopt and continue using technology or rejection and stoppage of use of the same.

This study, however, indicates that, technology was intensively used in ANU by students in ways such as video conferencing, emails and intentions to use computer in the future projects and trainings. Perceived ease of use played a key role to determine the kind of usage of the technology within African Nazarene University.

### **6.2.3 Students' attitudes and perceptions about using technology in learning and teaching**

Students' perceptions and attitudes on the use of technology in learning and teaching were diverse based on the items that were meant to measure this objective. The finding that the perception of students on technology adoption scored only 0.32, that is 32% was quite low.

Sometimes, this low attitude and perceptions of students about using technology in learning and teaching could be attributed to technology anxiety in students. According to Johnson, Wisniewski, Kuhlemeyer, Isaacs, Krzykowski (2012) such challenges that lower users' attitudes and perceptions on technology adoption in Higher Education could be overcome through 'Bootcamps', a student development program developed by Carroll University in Waukesha. The 'Bootcamps' program that were designed specifically and intentionally in consistency with the principles of andragogy and learning transfer to assist student in adoption of technology for learning and teaching in an online environment, the model can be adapted easily for implementation at other higher education institutions. The adoption of technology is one of the key areas where higher learning institutions can borrow a leaf from each other and even compare notes on the best ways of mitigating the challenges faced during implementation.

With respect to attitude, the overall conclusion was assessed through the summation of the individual consequences and desirability assessments for all expected consequences of the behaviour (Bagchi, Kanungo & Dasgupta 2003), determining the interest and intention to continue using ICT (Anol Bhattacherjee & Premkumar 2004; Po-An Hsieh, Rai & Keil 2008). The attitude of the students influences the behavioural intention (Hu, Lin & Chen 2005), user satisfaction (Hsu & Chiu 2004), image (Chan & Lu 2004), and perceived usefulness (Venkatesh & Davis 2000). These factors seemed to have merged in lowering the attitude and perceptions of students to 31.61%. In cases of perceived ease of use, the various predictors such as confidence in e-Naz, skilful use of e-Naz system, control over e-Naz, site's ease to learn and interaction and understanding of e-Naz scored relatively higher above the average as in the table 6.8 below. This is as a result of developing confidence in e-Naz since it has not been in existence for a long period of time. As indicated above, the learners have already adopted e-Naz as the best way for learning in IODL. But reliability and stability of the system would influence positively the learners' perceptions and attitudes towards e-Naz. The trend that has seen the perceived ease of use of e-Naz as above the average is of great significance since, it is highly probable that this would improve with time. The management, too, must ensure that not only should e-Naz remain stable and reliable, necessary resources should be invested in e-Naz to ensure its suitability and adaptability to the ever-changing trends in open and distance learning. This challenges could be seen in the qualitative responses when, from their discussions, the learners identified some of the problems such as high internet cost,

connectivity problems, and cost of other technological gadgets, power fluctuation, and power availability among others.

**Table 6.9: Adoption Level Frequencies**

<b>I have high level of confidence in using e-Naz system</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	24	9.9	9.9	9.9
	Disagree	25	10.3	10.3	20.2
	Undecided	63	26.0	26.0	46.3
	Agree	67	27.7	27.7	74.0
	Strongly agree	63	26.0	26.0	100.0
	Total	242	100.0	100.0	
<b>I am able to skilfully use e-Naz system</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	23	9.5	9.5	9.5
	Disagree	27	11.2	11.2	20.7
	Undecided	56	23.1	23.1	43.8
	Agree	51	21.1	21.1	64.9
	Strongly agree	85	35.1	35.1	100.0
	Total	242	100.0	100.0	
<b>Using e-Naz is entirely within my control</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	18	7.4	7.4	7.4
	Disagree	50	20.7	20.7	28.1

	Undecided	73	30.2	30.2	58.3
	Agree	38	15.7	15.7	74.0
	Strongly agree	63	26.0	26.0	100.0
	Total	242	100.0	100.0	
<b>I find the site easy to learn</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	12	5.0	5.0	5.0
	Disagree	31	12.8	12.8	17.8
	Undecided	64	26.4	26.4	44.2
	Agree	78	32.2	32.2	76.4
	Strongly agree	57	23.6	23.6	100.0
	Total	242	100.0	100.0	
<b>My interaction with e-Naz is clear and understandable</b>					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	14	5.8	5.8	5.8
	Disagree	16	6.6	6.6	12.4
	Undecided	69	28.5	28.5	40.9
	Agree	51	21.1	21.1	62.0
	Strongly agree	92	38.0	38.0	100.0
	Total	242	100.0	100.0	

In case of perceived usefulness, learners were optimistic finding it convenient to take courses on e-Naz, enjoying the fun using e-Naz because they could exchange ideas online and become more interactive using e-Naz. However, in cases where personal weaknesses of the learners could be revealed through e-Naz, such as browsing other peoples' work through e-Naz, the perception of the learners became so negative as most felt that, such cases lowers self-confidence.

### **6.3 DISCUSSION OF QUALITATIVE FINDINGS**

Qualitative analysis further showed that the Perceived ease of usefulness as indicated by the respondents played a big role in adoption of technology in learning. Indicators of perceived ease of use such as current use of e-learning technology in learning, experience in e-learning, intentions to make frequent use of e-learning, ease to work on computers in learning and the ease to use computers were all highly rated, an implication that most of the students, having had influence and contact with e-learning tools, they were more willing to adopt the technology as they perceived it to simplify the learning process. The e-learning tools being so interesting to use, made e-Naz, an example of e-learning tool in the area of study which was interactive and influenced most students' perceptions to adopt technology in learning. The perceived usefulness could also be as a result of the composition of respondents in the area of study. Most students in the IODL are employed, have stable income, and are expected not only to utilise technology in the e-learning process, but also experience that technology is also very important even in their working environments. This could be seen even in their future intentions to adopt technology in internships and work stations. In accordance to Rodgers (2003), the students in ANU can be generally be described as "*early adopters*". Early adopters of technology usually comprise 13.5% of the total population of the study, younger in age, more e-lucid and always wanting to know more about technology than their counterparts in the older age-groups (Rodgers 2003).

The qualitative data revealed that, learners were interested in using e-Naz, not to reveal their weaknesses but as an opportunity to learn, interact, share ideas and improve their skills. This is in line with the quantitative findings that placed more emphasis on convenience and interaction. The students urged the management to come up with better measures that will ensure that lecturers who spent most of their time on computers but could not offer notable contents to the learners are able to change the practice. Such lecturers made the learners feel negative towards e-Naz since they could not make it useful to the learners.

Interaction was found to be the key in the development of positive attitude and perception in line with Ajzen and Fishbein (2005) in Venkatesh, Thong and Xu (2012:166) who had insisted in their studies that feedback from previous experiences can play an important role in influencing various beliefs and, consequently, future behavioural performance. The belief that "time heals" also played a key role as the participants' understanding of the use of the technology in place became easier with time. This confirmed the findings of Vankatehh

Thong and Xu (2012: 166) that with consistence increase in the learners' experience, they have more opportunities to add value to their habitual activities as they have more time to encounter the problems associated with e-Naz and sought for better solutions to such problems. The experience seemed to have an inversely proportional relationship affecting negatively behavioural intention on technology use. Another key determinant of attitude and perception was noted as the technology itself in terms of the system design that played an important role in system interactivity, security, and ease of use of technology among other factors

### **6.3.1 Association between technology users' attitude/ perception and adoption of technology for learning and teaching**

With regard to the findings on association between technology users' attitude and perception and adoption of technology that there was a direct positive relationship as was deduced from the factor analysis and correlation, it can be further deduced that users' attitude is key in technology adoption. The findings from the factor analysis that the average partial correlation of the factors denoting the association between technology users' attitude/ perception and adoption of technology for learning and teaching was 0.676039 and hence showed a strong positive correlation. The attitude and perception of users can be critical because the system is specifically meant for them and if they opt not to use the system or totally reject the system then, all the financial resources, human resources, physical resources and even the technological resources themselves become a total waste. A similar argument would befit under-utilisation of the above resources, for example, the cases where the learners felt more resources were allocated to lecturers that could not effectively use them to make the learners appreciate e-learning, but rather impact negative attitudes. Such undertakings proved costly but not beneficial, therefore, they could be done away with and more resources added that could be helpful in learners' perspectives. Optimisation of internet connectivity, allocating more funds in computer laboratories, training the staff to acquire the relevant skills in ICT and e-learning, ensuring reliable source of power and improving the current systems would all require more resources.

### **6.3.2 Factors influencing implementation of technology to support learning and teaching in an ODL environment**

The finding that factors such as management skills; relative usage and experience from continued use; appropriate design; interactive platform; IT service competence; perceived usefulness; individual intentions/disposition; perceived ease of use; engagement, system

stability, resource availability; and satisfaction, relative advantage, attitude, convenience, knowledge sharing and quality of technology influenced implementation of technology to support learning and teaching in an ODL environment concurred with the findings of Fishbein and Ajzen (1975). They claim that perceptions, attitudes or beliefs, repeated performance of behaviour, intention to use technology future, perceived usefulness (Bagchi, Kanungo & Dasgupta 2003; Venkatesh & Davis 2000), perceived ease of use (Anol Bhattacherjee & Premkumar 2004), experience from continued use of technology (Po-An Hsieh, Rai & Keil 2008), and user satisfaction (Hsu & Chiu 2004) influenced implementation of technology to support learning and teaching. Learners would get discouraged in e-learning if the lecturers failed to deliver the right contents. The management was also challenged to live to the expectations of the learners through ensuring full support of e-learning to those in IODL in order to avoid inconveniences, instability, incompetence and unsuitability of the system.

According to Costello and Welch (2014) the effect of these factors can be leveraged by adopting Herzberg's motivation factors as shown in Table 6.10 below:

**Table 6.10: Herzberg's Motivation/Hygiene Factors Adapted to Online Instruction**

Learning Enhancement (Motivators)	Sustaining (Hygiene)
Achievement	Administration
Grades, evaluation	Adequacy or inadequacy of the environment
Recognition of achievement by instructor	Reward or carrot
Course content	Supervision
Variety of assignments	Acceptable interaction with instructor
Responsibility	Interpersonal relations
Independent responsibility of student	Reports of specific interactions with others in class
Advancement	Working conditions
An actual change in a person's status or position	Physical qualities of environment (discussion formats, technology equipment among others).
Learning new skill or the opening of a previously closed door	

Adapted from Costello and Welch (2014).

The suggestion of Costello and Welch (2014) as illustrated in the table above could be true but it can also be logically deduced that Herzberg's theory cannot fully explain the challenges of factors that affect online and distance learning. This could be true in one cultural setting and even in other different cultural settings but in employment of the diverse mix of technology platforms and technology equipment which have equally differing features and capacities additional factors may need to be considered. This also brings intrinsic motivation into the focus as couched in this study in relation to individual characteristics. The level of each individual's intrinsic motivation varies and with this, are also the specific motivating factors. For example, as supervision may motivate one user to use or adopt technology faster in learning and teaching, it may at the same time demoralise or demotivate other users who may not prefer supervision in line with McGregor's Theory XY (Noe, Hollenbeck, Gerhart & Wright, 2006).

### **6.3.3 How Africa Nazarene students' attitudes and perceptions have influenced usage of eLearning technological tools available at ANU in learning and teaching.**

This study revealed that students' attitudes and perceptions on the use of technology in learning and teaching were diverse and were both positive and negative but differed in intensity as explained by various respondents.

Respondent # 1 cited both positive and negative attitude and perceptions of students but was more inclined towards the attitudes and perceptions of the lecturers. The respondent stated:

*“Some are good and some are terrible. They delay with materials. They don’t send feedback on time. They don’t appear for face to face meetings. There are some who go out of their way to help the student. Some lecturers guide you through your learning processes and some don’t.”*

The statement clearly shows some negative attitude and perception from the lecturers. It could be understood as the reason for their carelessness or lack of concern as inferred from the delay with learning materials, failure to send feedbacks on time, failure to turn up for face to face meetings, and not guiding students through the learning processes.

Nevertheless, it was encouraging that this was not the case with all lecturers. There were some with positive attitude and perception who could do whatever it took to help the students.

Following a similar pattern, respondent # 5 also affirmed that while some lecturers encouraged the learners, others gave them a black out of presence (failure to turn up) and

others confused them more. It is possible that confusion could come out of little understanding of the platform by both parties as it is the role of the lecturers to enhance clarity of the learners' perspectives on content and usage of the technology platform (e-Naz).

The issue of content was again raised by Respondent # 9 who lamented:

*“Some give you shallow notes. They do not give you content but expect you to learn. So you read anything that’s comes your way. Most students have a challenge because the lecturers only come a day before exams for face to face. Some try and give some content and recommend further reading.”*

The issue of content as raised by the two respondents seems a serious issue that needs to be addressed by the management/administration. From the complaints raised, it seems that most e-learners are suffering to get notes by themselves and this is a disadvantage to them as their counterparts in the physical classes get all the explanations they seek directly from the lecturers, and/or get notes and adequate time to consult the library. With tight schedules that compel some users to engage in online education, the time to make notes as well as do class assignments could be a challenge. It could be preferred that in online and distance learning, the notes not only be availed, but also be as comprehensive as possible because this is the greatest asset that the online learners have. This was supported by the fourth respondent, Respondent #4 who pointed out that lecturers play a critical role and their attitudes and behaviour is key in technology adoption by the students. The role of the online learning platform in ANU is basically educational.

Very constructive comments came from Respondent # 2. These included the necessity of need analysis and the reality of technophobia. According to this respondent, technophobia (fear of new and emerging technologies) is rampant among lecturers. Such an assertion could be proved true based on the previous findings which showed delays in sending learning materials to the students, confusion of the students, and shallow notes just to mention a few.

The respondent's proposal that need analysis is essential and needs to be done with the students before a technology supported class is valuable. However, this should not be limited to the students only as various key stakeholders could also play a key role in the improvement of the online learning process. It is from such a needs analysis that the administration/management could find the best way of meeting the identified needs in such a way that all stakeholders are satisfied.

The sensitivity of lecturers' attitude and perceptions made Respondent # 6 to also re-state that lecturers have a critical role to play in the successful adoption of technology for learning and teaching in Africa Nazarene University. The respondent noted: "*Feedback is not given on time and then some lecturers just say that we will meet during 'face to face'. Lecturers' behaviour and attitude matters a lot.*" Once again, the issue of untimely feedback re-appears. This is aggravated by the fact that some lecturers instead of responding to the challenges faced by students or giving clarity on certain issues as sought by the students simply whisk the students' requests away saying that such challenges will be solved during the face to face meetings. It is baseless to have an online and distance education programme in which the online challenges can only be solved by face to face meetings or discussions. There has to be at least an attempt to solve them online as waiting for the face to face meeting which is merely a day to the examinations could be too late to help some learners who might have had major challenges with the system.

The attitude and perception of lecturers re-surfaced with Respondent # 10 who said, "*Some lecturers are not differentiating between young regular students and older distance learning students. Attitude is an issue.*" It should be normal that a lecturer is capable of differentiating their students based on their uniqueness. Such uniqueness could be in terms of understanding, age, gender, weight, height, just to mention but a few. Although some unique characteristics such as weight or height among others can only be easy to identify in physical classes, gender and age ought to be documented as part of the students' records at Africa Nazarene University, from the online database, or e-learning platform. These should play a key role in determining the best approach to use for each learner to prevent petty issues like handling adults as young people or vice versa.

Regarding the attitude of teachers and lecturers in the adoption of technology for learning and teaching, an additional spiritual dimension was identified by Respondent # 3 who said, "*I pray for our lecturers to become good Christians. Technology is not easy but our lecturers must show interest. Some don't give feedback and they never respond to students.*" The requirement that lecturers become good Christians and show interest in technology is not easy to unpack and has two connotations; one connotation is that technology use is not easy even to the lecturers but the lecturers need to persevere in their learning to engage technology in teaching at Africa Nazarene University nonetheless.

To the respondent, this has now gone beyond professional duty and the respondent opts to exhort the lecturers to practice the faith they and the institution they work for, that is, Africa Nazarene University profess and practice.

In ordinary situations, surrendering issues to God always occurs as the last resort when most of the other options have been explored or when one is almost giving up. This view of the respondent might have also pointed at the same direction which calls for following up on how the complaints of the students as clients regarding the use of technology in learning and teaching in the institution have been factored in by the management and solved. The presence of clear channels for solving grievances and the clients feeling that their complaints are being attended to gives an assurance, hope, and courage to march ahead and motivation to adopt the new technology in learning and teaching. Without such assurance, students might easily give up and possibly even fail to cooperate with their lecturers as a way of communicating their dissatisfaction with the e-Naz platform or the system as such.

The dangers posed by the attitudes and perceptions of lecturers received another emphasis by Respondent # 9 who clearly stated that the “*attitude of our lecturers is very negative and they are very arrogant and they stress students because of their weaknesses.*” A ‘very negative attitude and perception’ of lecturers as stated by this respondent sends a danger signal to the online and distance learning community at Africa Nazarene University, consequently calling for an urgent situation analysis and immediate action upon proving such allegations.

This could be through an open forum, seminar, workshop or any other avenue that the institution might find appropriate in collecting the views of the various stakeholders especially the clients (students) and responding to them effectively.

Some respondents such as respondent # 7 took the approach of encouraging and advising the lecturers on how to deal with the challenge of technology adoption. The respondent said; “*It is all about passion and wanting to learn something new. Students need to voice their concern to the IODL. Lecturers don't express passion.*” From the assertions of this respondent, the respondent casts the blame on two categories of people; both students and lecturers.

The respondent asserts that lecturers have miserably failed in expressing passion or readiness to learn something new (technology tools) while the students have equally failed by not voicing their concern to the Institute of Open and Distance Learning. This now gives some light towards the issue that has been running through this analysis namely whether

the administration knows about these challenges of the students in IODL. From this statement, it is highly likely that the administration of IODL are totally ignorant of the challenges facing their clients such as negative attitude and perception of the lecturers, lecturers' lack of timely feedback to the students, minimal content, refusal to receive students' calls among other challenges pointed out by students in these study findings.

Respondent # 11 even quoted what the lecturers say, "*Lecturers say, 'As for me I don't care.'* *Some of these lecturers need to come down to students' level and know that students are human beings.*" A carefree attitude or as put by the respondent, 'I don't care attitude' of the lecturers must have some basis or foundation. It cannot be said that all the students assertions regarding the attitude and perceptions of lecturers is true but it cannot also be not be rejected as wholly wrong. Some steps have to be certainly and urgently taken by the administration to evaluate Online and Distance learning in Africa Nazarene University. Such an evaluation will play a key role in bringing to light some hidden issues that have not been raised by either the lecturers or students. It could also equally identify whatever the students have raised which has not been dealt with comprehensively or has not been totally dealt with. The fact that a student could notice that some of their lecturers were incapable of coming down to the students' level and know that students are human beings is illustrative of a counter-educational trend and practice.

Education essentially calls for coming down to understand the learners' level and picking them up from that level to a newer level in an effort to fulfil institutional and the educators' objectives. Such educators could be seriously challenged in education and call for further remedies as stipulated in the recommendations of this study.

## **6.4 THEMES GENERATED FROM THE FINDINGS**

### **6.4.1 Inadequate infrastructure**

System design can be gauged as the most critical factor affecting online and distance learning as it is the key component that constitutes almost all the other components. This is because design of a system includes high information and design quality of the online learning system, good accessibility and usability of content and tools in the online learning system, display of contact details of the instructor or the physical entity behind the online learning system just as argued by Wang (2014: 239). Hosting within the country has been always associated with

challenges such as system stability, cost and system backup. Stability of a system can be gauged from its ability to retain its features and characteristics even against various changes within its environment of operation. This could also include power fluctuations, users tampering with the platform, or system administrators making some mistakes while using the system. An unstable system in this perspective may make users critical of its services in certain occasions as aforementioned.

Power failure has become a common phenomenon in the developing world and any technology platform that does not take this into consideration or factor it in its development is bound to have many power related challenges. This is because most technology equipment is linked with power in such a way that power surges, disruptions or total failure can tamper with not only the equipment but also the attitude and perception of the users owing to their being annoyed or disappointed with the disruption. It is this annoyance or disappointment that discourages the users and reduces their morale and yearning to use technology in learning and teaching. Hence comments such as “.....*Electricity was an issue. We need back up for electricity;* There are certain areas that had no power connection as initiating distance learning in such areas was almost impossible unless the e-learning system and platform was designed to use solar or wind power. “*Some areas do not have electricity connection.* Due to lack of adequate infrastructure, hosting of a platform outside the country has been viewed as more stable than within the country. This has also been the case with technicians and users perspective on the cost of hosting both within and outside the country. It is perceived that systems that are outside their base of operation can be better backed up than those within the same location. This is because certain factors that affect the electronic systems within one location such as power interruptions or power overloads within one area can tamper or destroy almost all electronics that were in operation including the back-up.

The issue of cost is inherent to more effective online and distance learning. This is because in as much as it purports to charge lower rates than the physical classes, the various hidden costs such as visiting online rather than physical libraries, using the university's free internet resources, the cost of the technology equipment, gadgets, connectivity challenges among others need to carefully analysed and monitored. It is also true that although there are legal requirements for equal access to online education in many countries, there is no financial provision for this so the cost and problems of accommodating the needs of the disabled

students such as the blind or deaf must be taken into account by the providers of online and distance education.

While it is easier for each learner or lecturer to take care of their own security within the face to face learning environment, this may not be necessarily the case in online and distance learning. Security within the technological world has been known to be closely tied to privacy of the details of the users. This could be due to the high level of knowledge or technological resources required to keep users of online and distance learning systems safe from the reach of ill-minded hackers. Privacy and security may also entail disclosure of understandable and adequate privacy and security policy statement; use of security mechanisms such as the secure HTTP protocol, encryption, secured logging system; compliance with third-party privacy assurance or standards; reliable and timely access to the online learning system just to mention a few. These are the same key issues that other scholars such as Wang (2014: 238), Akhter, Buzzi, Buzzi and Leporini (2009), and Bansal *et al.* (2008: 1529) pointed out. Failure of an online and distance education system to assure its users of such key elements may make them lose trust in the system and consequently withdraw from adopting the use of technology in learning and teaching in Africa Nazarene University.

#### **6.4.2 Communication and Networking**

Communication is very dear to human beings as can be deduced from their very definition as rational social beings. This was obtained from codes such as “*....access and connection with colleagues was assured. I could also leave a message for lecturers*”. The need to be on par with each other and the need for assurance that one is on the right track or is not alone in his/her challenge or difficulty in using a technology system or platform can be very comforting and encouraging in the promotion of a technology adoption culture, especially among adult users. This could be facilitated through various communication channels and media such as a university magazine, online publications, display on noticeboards, workshops, and any other forum within the university setting. Such communications could take the dimension of vertical communication (from management to staff and students), horizontal (from staff to fellow staff or students to fellow students), or zig zag traversing all categories of people.

However, care should be taken that issues should be aired and communicated clearly to avoid rumours which are quite damaging in business process re-engineering or change management during the implementation of projects such as technology adoption for learning and teaching.

It has to be noted that the key role of communication in this study is justified as found in a study by Wang (2014: 239) that instructor's socio-communicative style, assertiveness of the instructor, responsiveness of the instructor, a sense of care and community created by the instructor were critical in shaping the attitudes and perceptions of learners based on trust.

According to Robley, Farnsworth, Flynn, and Horne (2004) in Holzweiss *et al.* (2014: 312), online students build various skills such as communication and critical thinking when the constructivist theory which proposes that humans build knowledge and meaning through interactions with each other and their environment by bringing "unique knowledge, skills, attitudes, and beliefs to the learning experience of instruction" was used in their courses. The dimension of communication was brought in by the argument that while individual constructivism occurs when a student creates knowledge from his or her direct experiences, social constructivism involves creating knowledge through collaboration with others, therefore the necessity of communication.

Networking as a factor in technology adoption for learning and teaching plays a key role in opening up the minds of users to the presence of shared joys and challenges by various users over the globe. This was in tandem with studies that have revealed that courteous interactions with peers and students' ability to organise their own course materials and assignments ((Rieck & Crouch 2007; Ingram 2005) have an impact on the level of engagement students had in online courses. Fewer positive interactions with peers and inability to organise resulted in decreased engagement in the learning process. Networking can help the students explore their own potential as they strive to portray the best picture of themselves to their peers and lecturers through e-learning. The theme of networking was founded on codes such as "*Networking was an A+;*

It can be argued that in line with Likoebe and Massimo (2015: 2) that networking can play a key role in promoting collaboration technology which is important because collaboration technologies are deployed to support teamwork and a majority of organizations now use teams to manage their operations. Such paradigms can be used to facilitate group or team work among students during online and distance learning for greater interactivity based on networking.

The use of this approach in such settings, entails that individual members' tasks tend to be intertwined such that the ability of one team member to accomplish his/her task assignment is

dependent on the actions of other team members. Collaboration technologies just like networking, are social in nature and the effect of their use extends beyond the individual implying that exploring the incorporation of collaboration technology features into task accomplishment can benefit the team as a whole (Zhang, Venkatesh & Brown 2011: 557) and individual decisions about exploration of collaboration technology need to be considered within the boundaries of the team.

An interactive platform is key for providing forums for discussions such that the more interactive the platform is, the more the discursive ability of the platform. This gladdens and enlightens the users at the same time leading to higher use of discussion forums in learning and teaching as indicated in the quotes such as “*...I liked the discussion forums; it is a pleasure to hear other peoples' point of view.*”

#### **6.4.3 Flexibility**

One of the main characteristics of distance education is that it offers flexibility. It is an indubitable truth that most learners opt for online and distance learning due to its convenience. However, if such a type of learning were found to be lacking convenience either by the type of platform for user engagement or the requirements in terms of demands, then most users would feel disappointed and let down with eventual withdrawals. This could be a setback for both the users/learners and the institution offering such a service. This was deduced from codes such as “*Convenience when it comes to time. Lecturers keep you on toes. I can submit my assignments at my own time;*

Flexibility is a critical element when it comes to rapidly changing environments and appliances. This could be due to the availability of options for the users to engage in both teaching and e-learning in such a way that when one option proved difficult for a user, the lecturer or instructor had another easier option to start with until the student had developed a reasonable level of understanding and comfort with the other method of instruction.

This theme had codes such as “*Access at your own convenience....Flexible...;* It is this flexibility for learners as anticipating and responding to their ever-changing needs and expectations, therefore expanding their choice in what, when, where, and how they learn (Backroad Connections Pty Ltd 2005: 3) that attracts learners to online and distance learning. Such flexible learning has also been described as enabling learners to learn when they want (frequency, timing, duration), how they want (modes of learning), and what they want, that is,

learners can define what constitutes learning to them (Willems 2005: 429). However, the aim of this flexibility should be student satisfaction in learning and as such it should highly consider the expectations and needs of existing students, as “some learners may become marginalised in such processes by their inability to adapt to the changes or in their prior learning preferences in such processes by their inability to adapt to the changes or in their prior learning preferences” (Todhunter 2013: 233).

#### **6.4.4 Effectiveness of instructional technology**

Effectiveness of instructional technology came out strongly as one of the themes from the analysis. This was in line with Holsweiss *et al.* (2014: 316) who saw that online courses should contain a blend of peer interactions and individual assignments to help balance the independent and collaborative creation of knowledge as was supported by study participants through comments. Owing to the fact that few users in ANU were using online discussion forums, this was almost the exact opposite the findings of Holsweiss *et al.* (2014) that regarding effectiveness of instructional technology, the most cited technological tool was online discussion forums which promoted the exchange of ideas with classmates and instructors. However, it has to be understood that users’ preference of one instructional technology against another could be due to frequency of use, number of years of exposure to computing technology, age, gender as pointed by the analysis in this study on Africa Nazarene University. This may mean that students who have more experience with online courses or are further along in their educational programmes may benefit more from participating in discussion forums than students who are new to distance education or to the academic discipline.

From the argument of some respondents that in online discussions they have plenty of time to think before they respond or contribute to a discussion, it can be logically deduced that online discussion forums are more thoughtful and self-governing than discussions occurring in face-to-face environments, and can also be longer and more academically focused (Oztok, Zingaro, Brett, & Hewitt, 2013; Holsweiss *et al.* 2014). Arguably, online discussions could have additional benefits for both lecturers and students of ANU because they give them an opportunity to interact with peers who are becoming their professional colleagues, mentors and consultants. This goes beyond what is experienced in any physical class environment where a diverse set of fields may be represented in a specific course and discussions can take many forms. For example, students who exchange career-focused information with their peers

increase their acculturation into the professional field and increase their ability to acquire knowledge. The use of other useful instructional technologies such as watching videos through You Tube or podcasts created by instructors and peers, interactions with other learners through videoconferencing, using the e-Naz platform and online research tools from the campus library can also support the development of different knowledge and skills of the users, and make learning and teaching interactive and even interesting.

The fact that ANU was using various technology instruction tools such as google search, e-Naz platform, audio-tapes, video conferencing, You Tube among others in instruction to help engage learners addresses the concern raised by Dixson (2010) that in some higher learning institutions technology is not used as frequently as it could be. This was similar to Ke and Xie (2009) who reported that most of the activities students reported for online courses comprised reading assignments, library research and offline interactions with peers. This was possibly why Harris and Martin (2012) added papers, multiple-choice exams, and discussion forums to the list of possible resources. Other forms of technology were infrequently used, which could be a factor for graduate students who are at an educational stage where they are expected to create knowledge rather than just absorb it passively.

Feedback to users, whether from lecturers, administrators or students is quite critical in helping them select appropriate technology right from the beginning or in re-orienting them towards appropriate technology adoption if at all they had deviated form that path. Regular giving of feedback, even if the feedback is negative but with an assurance of maximum support to remedy the situation or take the most appropriate measures to see that the strategy picked in the adoption of technology in learning and teaching works, can give heart to the users and make them adopt a positive attitude and perception towards the technology. This can be ensured through the various means articulated and explained under communication. Some respondents gave codes such as "*Feedback from facilitators in a timely manner*".

System interactivity can engage the users actively without losing interest. This is greatly determined by the Information System platform on which e-Naz is built. As gauged from the findings from the respondents, the interactivity of e-Naz was averagely rated. This means that from the perspective of the students, more still needs to be done to improve the level of interactivity of the system. "...*Interaction amongst students and teachers*" was greatly enhanced.

Effectiveness of instructional technology often leads to ease of use. Although ease of use is essential in the users' quick embracing of the technology in use, the requirements of the system sometimes makes it difficult if not impossible to simplify it to the level of everyone, including those who are using computers for the first time. Codes for this theme included "*Challenging at the beginning*".

#### **6.4.5 Competency**

Competent management plays a key role in the maintenance of the system, daily administrative routines and teaching of the students. Incompetent staff members are incapable of offering support in case a user is stuck and therefore any e-learning platform requires competent support management. However, management competence also requires other issues such as supervision and evaluation which were found to be wanting as students had many complaints which could have been easily solved by the management such as poor communication with lecturers, untimely submission of learning materials among others. On the other hand the existence of some competence of the management in e-learning was illustrated by codes such as "*...I got a lot of help from colleagues and IODL office:*

Clearly some students and lecturers need additional support, due to differences in computing background, ability to understand based on the types of learners and their respective speed of learning new technologies. This was the basis for the complaint by a number of the students on the speed at which e-learning was introduced at Africa Nazarene University as justified by the codes such as "*I almost dropped my training. Introduction of e-Naz should have been gradual...;*

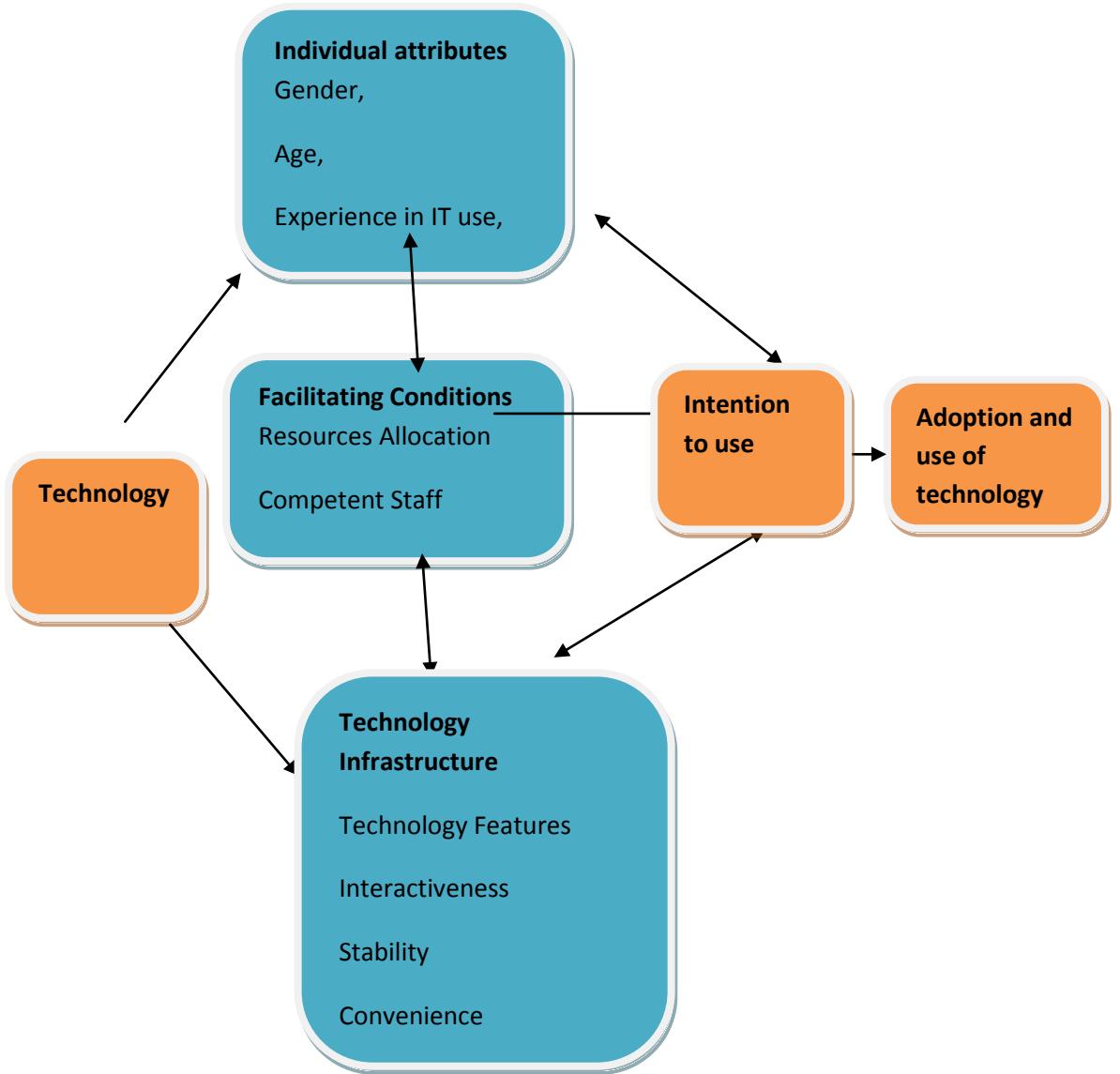
The quick introduction of e-learning accompanied by tight deadlines which varied from one lecturer to the other when students had still not fully understood the system was too much for some students. This reached its apex when some lecturers were not willing to be consulted via the phone for extra assistance even with the knowledge that some students were having difficulties in understanding the system

## **6.5 PROPOSED SIMPLIFIED MODEL FOR TECHNOLOGY ADOPTION FOR LEARNING AND TEACHING IN AFRICA NAZARENE UNIVERSITY**

The findings were then brought together to propose a simplified model that can be used in developing countries. Many scholars have proposed various models such as the Human – Task-Technology interaction and performance model by Suryaningrum (2012); Enhanced Technology Acceptance Model by Vankatesh and Davies (2000); The Unified Theory of Acceptance and use of Technology by Vankatesh, Morris, et al (2003)

This study proposes a model that it deems may play a critical role in mitigating the aforementioned challenges and gaps identified. The study highlighted various constructs that played a role in the learners' level of technology adoption in learning and teaching. As discussed in the previous chapters of this study, TAM focuses on perceived usefulness and perceived ease of use as the main constructs of technology adoption. However, this study further revealed that other factors such as individual attributes, facilitating conditions and technology infrastructure could also influence the learners' willingness to adopt technology.

A simplified model to guide future decision-making is presented in Figure 6.2 below for further scrutiny and adoption.



**Figure 6.2: Integrated Technology Adoption Model For Africa Nazarene University (Ooko, 2015)**

From Figure 6.2 above, it should be noted that technology as such earns no competitive advantage that merits its adoption by users unless it has features and characteristics that appeal to its users. These users of technology are diverse in tastes, age, gender, experience of using IT, attitudes, perceptions, effort, intention perceived usefulness of IT to them, and consequently require IT infrastructure, platforms, security, designs, stability, convenience, ease of use and interactivity that suits them because they have different satisfaction levels.

However, their efforts and goodwill should be controlled through facilitating conditions, resource allocation, and carrot and stick formulas to promote their adoption and use of technology.

### **6.5.1 Technology**

Technology in this model refers to appliance, gadget, software or platform that can be used to facilitate use of online and distance learning. It is a combination of these appliances that constitute the online and distance learning platform and instructional methods such as electronic mail, You Tube, e-Naz, chat, audio and many others that highly facilitate learning and teaching in online and distance mode of learning as compared to face to face learning. Proper selection of each and every component of technology is critical in enhancing user satisfaction and promoting increased and faster adoption of technology in learning and teaching in Africa Nazarene University.

### **6.5.2 Individual attributes**

Individual attributes in this model included gender, age, experience in IT use, attitudes, perceptions, effort, intention just to mention a few. The importance of individual attributes in the adoption of technology in learning and teaching in Africa Nazarene University is based on the uniqueness of the human person; each is equal in terms of human dignity and rights yet very different in character, personality and capability.

#### **6.5.2.1 Gender**

In line with studies such as Venkatesh and Morris (2000) that more men than women are willing to spend more effort to overcome different constraints and difficulties to pursue their goals, with women tending to focus more on the magnitude of effort involved and the process to achieve their objectives, it could be possible that there could be more men than women involved in the adoption of technology for learning and teaching through online and distance learning. Thus, men tend to rely less on facilitating conditions when considering use of a new technology whereas women tend to place greater emphasis on external supporting factors. This can also be explained partly by the cognitions related to gender roles in society where men tend to be more task-oriented as argued by Lynott and McCandless (2000) in Venkatesh, Thong and Xu (2012: 162).

#### **6.5.2.2 Age**

Age can affect the individual users' attitudes and perception towards adoption of technology due to its impact of inquisitiveness and ambitiousness that promotes the desire to explore and learn newer things. Older learners may face more difficulties in processing new or complex information, thus affecting their learning of new technologies Morris *et al.* (2005 in

Venkatesh, Thong and Xu (2012: 162) comparison with their younger counterparts. This difficulty may be attributed to the decline in cognitive and memory capabilities associated with the aging process. This necessarily means that the older users of online and distance learning technologies will tend to place greater importance on the availability of adequate support during the entire period of their learning than the younger users. This means that with regard to older learners, Africa Nazarene University should offer regular and timely support unlike the current situation where the users were complaining of lack of timely assistance in most of the occasions when they had challenges.

#### ***6.5.2.3 Experience in IT use***

It could be postulated that those with higher experience in IT use may find it easier to engage and consequently use online and distance learning platforms than those who are totally new to computer use. This similarly applies to those users who regularly or frequently utilise the use of technology in learning and teaching. Kim and Malhotra (2005) in Venkatesh, Thong and Xu (2012: 162) explain that experience, as conceptualized in prior research echoes an opportunity to use a target technology and is usually actualized as the passage of time from the initial use of a technology by an individual. Comparing this study with the study by Venkatesh *et al.* (2003) who operationalized experience as three levels based on passage of time post-training when the system was initially available for use, one month later; and three months later, there were a number of respondents in Africa Nazarene University who said that although they had challenges with the system, these challenges were gradually overcome with time due to some support that was offered by their lecturers and colleagues. Habit as the extent to which people tend to perform behaviours automatically because of learning can also be used to explain that users who make frequent use of the technology develop habits and routines that help them to be better and faster adopters (Venkatesh, Thong & Xu 2012: 166).

Venkatesh, Thong and Xu (2012: 166) add that with increasing experience, learners have more opportunities to reinforce their habit because they have more time to encounter the cues and perform the associated behaviour. It could be insinuated that with increasing experience, routine behaviour becomes automatic and is guided more by the associated cues. As a result, the effect of behavioural intention on technology use will decrease as experience increases. Studies in psychology have found that experience can moderate the effect of behavioural intention on behaviour. Greater usage experience implies more opportunities to strengthen the link between cues and behaviour which then facilitates habitualisation and weakens the link

between behavioural intention and use (Kim *et al.* 2005). Experience is a necessary but not sufficient condition for the formation of habit and experience as the passage of chronological time can result in the formation of differing levels of habit depending on the extent of interaction and familiarity that is developed with a target technology. An example could be that within a specific period of time, say 6 months, different individuals can form different levels of habit depending on their use of a target technology.

Experience can also moderate the relationship between facilitating conditions and behavioural intention. Greater experience can lead to greater familiarity with the technology and better knowledge structures to facilitate user learning, thus reducing user dependence on external support such that users with less experience or familiarity will depend more on facilitating conditions.

#### ***6.5.2.4 Attitudes and perceptions***

Attitudes and perceptions of users on adoption of technology in learning and teaching can simplify or complicate their understanding of the technology in use. This calls for a very positive first or initial impact when users interact with the technology for the first time. This first impression on the use, characteristics or features and the provision of support can help in the construction of a positive attitude and perception. According to Ajzen and Fishbein (2005) in Venkatesh, Thong and Xu (2012: 166), feedback from previous experiences can play an important role in influencing various beliefs and, consequently, future behavioural performance.

Effort of the individual users in terms of the time they dedicate towards learning how the online and distance learning system operates, duration of use (for example 30 minutes or 1 hour), the frequency of use (that is, the number of attempts per day or week), seeking for help from colleagues, lecturers or IODL staff among others all affect take up. It could be a fact that even with a complex system that is not user friendly, has specific levels of interaction, and appropriate e-tools among others, users with similar capability such as all moderate learners could differ in their understanding of how the system operates based on their individual efforts. Even students with similar intention who make different efforts would end up with different levels of competence in handling e-tools which has direct impact on their effectiveness, satisfaction and possibly performance in exams. From this perspective, it would be justified that effort consequently affects the level of technology adoption as well as the attitude and perception towards the use of technology in learning and teaching in Africa

Nazarene University. Knowledge of such a factor can play a key role in encouraging users to put in more effort by increasing the number of times they use the e-Naz platform or to lengthen the duration they take to interact with the e-Naz system alongside other e-tools such as You Tube, webinars, web conferencing just to mention but a few.

### **6.5.3 Technology Infrastructure**

In this model, technology features and characteristics refer to all that constitutes the technology such as interactivity, system stability, perceived usefulness, perceived ease of use, system security, user satisfaction, convenience, IT infrastructure, interactive platform, and appropriateness of the design which among others can also play a key role. This is because these technology features and characteristics can be pivotal in drawing users towards the technology for faster adoption or repel them away from the technology and make adoption of technology more difficult or impossible for learning and teaching.

### **6.7.4 Facilitating Conditions**

Facilitating conditions such as resource allocation, training and support to the users can play a great role in influencing their attitude and perception on adopting technology in learning and teaching. It is the resources that play a key role in facilitating adoption of technology. This is because it is the financial resources that help in the purchase and acquisition of the required technological equipment and e-tools; it is the intellectual resources that form the content of the online and distance learning; and it is the human resource that provides the necessary support, assurance and environment of trust that is essential for adoption of technology in learning and teaching.

In UTAUT which is one of the models that informed this study as noted in the theoretical review, facilitating conditions are hypothesized to influence technology use directly based on the idea that in an organizational environment, facilitating conditions can serve as the substitute for actual behavioural control and influence behaviour directly. This is because many aspects of facilitating conditions, such as training and support provided, will be freely available within an organization and fairly invariant across users. In contrast, the facilitation in the environment that is available to each user can vary significantly across the lecturers, IODL administrators and management and even fellow students. In this context, facilitating conditions will act more like perceived behavioural control in the theory of planned behaviour (TPB) and influence both intention and behaviour.

This means that a user who has access to a favourable set of facilitating conditions is more likely to have a higher intention to use a technology while a consumer with a lower level of facilitating conditions will have lower intention to use technology.

In the use of carrot and stick, the institution opts to give rewards and punishments. While the rewards are given to those who have done well or in this case have embraced the use of technology in learning and teaching to encourage them and entice those who did not do the same, punishments are given to those who failed to do the right thing, in this perspective the use of technology generally or to a certain required frequency or extent.

#### **6.5.5 Intention to use**

The intention of users to engage in use of specific technology tools may vary with each user and consequently determine their adoption of such a technology. According to Venkatesh *et al.* (2006) in Likoebe and Massimo (2015: 4), intention and expectation represent two distinct cognitions that drive behaviour. Such an intention can foster sustained post-adoption behaviour, and entice the users to continue the adoption and use. The users' motivation to engage in sustained exploration of a system to find additional potential uses over time may decline: while the expectation to continue exploring refers to the users' subjective probability of sustaining the exploration of the system and finding potential use based on their appraisal of the volitional and non-volitional behavioural determinants (Likoebe & Massimo 2015: 4).

#### **6.5.6 Adoption and use of technology**

Adoption and use of technology is the final result, that is, the dependent variable from the entire process. From the findings of the study, Africa Nazarene University needs not to be contented with the level of adoption of technology in the institution in learning and teaching but should constantly evaluate the programme as a way of improving it. The evaluation should involve all the key players such as students, teachers, and IODL administrators/managers and the evaluation could span the e-learning platform, adequacy of resources, pedagogical approach used, system design, cost and effectiveness of the system, the phases of the lifecycle of the courses, usefulness of use so that appropriate adjustments could be made for the betterment of the system.

This would be in line with a study in which the Technology Acceptance Model (TAM) was adapted for use in the evaluation of methodological and technological innovations determined by the introduction of a new e learning system in an Italian online university. The study found

that the adapted TAM model could be used to go beyond the assessment of acceptance and adoption of new technology to all the phases of use of the system (course design, running and evaluation), all the users of the system (students, teachers and online and distance administrators), and all the system's components (the e-learning platform, resources for learning and the fundamental pedagogical approach).

## **6.6 CHAPTER SUMMARY**

This chapter presented emerging findings resulting from both the quantitative and qualitative data gathered from the respondents using both survey and FocusGroup Discussions (FGDs). It empirically showed the actual situation regarding adoption of technology to support learning and teaching in a distance learning programme at Africa Nazarene University. The findings from the interviews which validated those of the survey were also presented, discussed and interpreted. These findings formed the basis for the following chapter on conclusions, recommendations and summary.

## **CHAPTER SEVEN**

### **CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS**

#### **7.1 INTRODUCTION**

This chapter presents conclusions that came from the review of literature together with the empirical investigation. It has also looks at limitations to the study and makes recommendations on how best technology can be adopted to support learning and teaching.

The topic of this study is the adoption of technology to support learning and teaching in a distance learning programme at Africa Nazarene University. The following objectives were studied in relation to adoption of technology in learning and teaching:

- To establish the level of adoption of technology amongst students in an ODL environment.
- To examine how students are using technology in learning and teaching processes.
- To explore the students' attitudes and perceptions about using technology in learning and teaching.
- To establish factors influencing implementation of technology to support learning and teaching in an ODL environment

For it to be successful, the following research questions needed to be answer

- What is the level of adoption of technology among students in a specific ODL environment?
- What are the students' attitudes and perceptions in using technology for Learning?
- What factors influence the implementation of technology to support learning and teaching in an ODL environment?
- What is the association between technology users' attitude/perception and adoption of technology in studying process?

## **7.2 KEY FINDINGS FROM THE STUDY**

### **7.2.1 Conclusions from the literature Study**

From previous studies, it was found that the level of adoption of e-learning was still very low in various parts of the world (Nyirongo 2009). Most universities were yet to introduce e-Learning courses and the few that have adopted it only offer a handful of courses and hence they risk being left behind in the pursuit of this strategic and cost effective tool of education globally (Cherry 2014).

Other studies also revealed that the level of adoption by students is highly challenged by inadequacy of instructing experience with ICT, inadequate but necessary assistance for teachers using technology, lack of help supervising children when using computers, lack of enough ICT specialist teachers to teach students computer skills, lack of computer availability, lack of time required to successfully integrate technology into the curriculum, and lack of financial support (Cherry 2014).

It has also been argued that universities can only maximize the potential of eLearning by being fully informed of the essential success factors concerned with the introduction of online models of education. When this happens, the adoption level of technology among students will improve.

In Sub-Saharan Africa, paper-based distance learning was found to be much more reliable than online and web-based methods. This is because the region is still technologically underdeveloped. This goes to the extent of some regions which are completely lacking even the most basic technology educational tools. This was further supported by the fact that the literary materials based in this region concerning e-learning is limited. Still, more information has remained uncovered, therefore, the concerned parties such as governments, researchers among other parties, can work round the table to unveil this source of knowledge.

Students use technology in learning and teaching in ways such as audio graphic conference environment, audio graphic task-based environment on the web, digital discussion environment, webinars, tutorial simulation programs, and interactive programs. Some students also use combined radio, print, audio, and video recordings for distance learning. Additionally, the coming of mobile phones in developing countries has promoted the development of mobile learning (m-learning), to educate the masses.

The study also revealed that even though most students had a positive attitude, challenges such as infrastructural failure and electricity failures could possibly swing their attitudes and perceptions about using technology in learning to be negative. It was noted that since online learning is mainly based on the use of technology to provide access to content via the internet, it still remains very radical and challenging for many students in higher education. Therefore it is necessary that there is stable and adequate infrastructure to support the use of technology. This is common problem associated with developing countries such as Kenya, which are still struggling to improve the existing technological systems. An improvement on technological infrastructure will in turn enhance accessibility, and thus, adoption in teaching and learning.

To address the objectives of the study of examining factors that lead to the adoption of using technology, data was collected both qualitatively and quantitatively. In this study, interviews were used to explore the students' experiences in using technology while the questionnaire was used to establish the extent to which technology is used in learning and teaching. Questionnaires were used to enhance the quantitative aspect of the research while interviews were used to enhance the qualitative nature of the research. Data was collected through questionnaires for students and interview schedules followed by document analysis. The research findings were obtained using triangulation methods, encompassing questionnaires and interviews. Triangulation in this instance was used as a means to produce a more complete picture of the investigated phenomena. Triangulation made it possible to validate the different results from different methods. The validity of one method was checked against the validity of the other method in order to get results through a planned and systematic collection, analysis and interpretation of data. The multi-method approach did not only narrow the gap between quantitative and qualitative methods, but also offered a better understanding of the processes taken in investigating the students' experiences of using technology.

A majority of learners also reported the use of technology is associated with quite a number of hurdles such as electricity failures, computer vision syndrome, finger joint pain, backaches, headaches, and dizziness due to occasional long periods of computer use to compensate for limited access. This meant that even though they had a positive attitude, such challenges as infrastructural failure and electricity failures could possibly swing their attitudes and perceptions about using technology in learning to be negative.

It was also found that students have positive attitudes towards technology and this is seen from their acceptance towards technology. However, some also exhibited some negative attitudes. Given that online learning is mainly based on the use of technology to provide access to content via the internet, it still remains very radical and challenging.

## **7.2.2 Conclusions from the empirical investigation**

### *7.2.2.1 Research question 1*

*What is the level of adoption of technology amongst students in a specific ODL environment?*

The outcome of this study noted that the level of adoption of technology in Africa Nazarene University is high since more than half of the students and lecturers were using e-learning technology. A good number also intended to use e-learning in future, and found e-tools very interesting and interactive. Some also said that they were experienced in the use of technology in the learning process such as during practicum. Others planned to make greater use of technology in future since they find the use of computers very easy.

### *7.2.2.2 Research question 2*

*To what extent are distance learning students using technology for learning and teaching?*

Almost all students and lecturers reported to have been making use of Google search more often. Slightly more than half of all the lecturers and students involved in the study were using technology in learning and teaching as well as accessing reading materials on the computer. They were able to receive and send assignments, communicate face-to-face through applications such as skype, access video via You Tube, and access audiotape, online (via discussion forum, IR or chat) e-Naz and email.

### *7.2.2.3 Research question 3*

*What are the students' perceptions and attitudes on using technology for learning?*

The perceptions of the students involved in the study indicate that the use of e-learning enhances their effectiveness in learning, improves their course performance, and increases their productivity in their course work. They also said that E-learning enhanced their effectiveness in learning and teaching while others had participated in Video Conferencing, used email, internet and Audio/Video tapes in learning and teaching.

Almost a third of the sample population were using CD-ROM and since they were very skilful in the use of the e-Naz system, they were confident in its use. Other strategies included their

ability to answer and ask questions, reflect on their shortcomings by browsing through classmates' work and share knowledge online through discussions.

#### *7.2.2.4 Research question 4*

*What is the association between technology users' attitude/perception and adoption of technology in the studying process?*

Following tests by factor and correlation, there was a positive association between technology users' attitude/ perception and adoption of technology in the learning process. Experience in the use of technology also propagated faster rates of technology adoption. Most of the learners who indicated positive attitudes for technology in teaching in learning, showed to use the same methods afterwards.

#### *7.2.2.5 Research question 5*

*What factors influence the implementation of technology to support the studying process in an ODL environment?*

The following 10 key factors were found to influence implementation of technology in the studying process: management skills, determination/focus, appropriate design, interactive platform, IT service competence, perceived benefits, attractiveness, individual disposition and interest, IT infrastructure usability/simplicity, system stability, convenience and knowledge sharing.

#### ***Demographic findings***

The study covered a variety of demographic factors on the respondents such as gender, age, length of computer usage, access to laptop, use of google search, access of reading materials on computers, preferred mode of receiving learning materials and assignment presentation. Age and gender played a critical role in terms of usage of technology. The use of technology in teaching and learning was even in both cases of gender, but, however, was rampant among the youths than the elderly. Most of the respondents aged 35 years and below readily adopted technology, had a varied use of technology in teaching and learning and more positive towards technology those of higher age groups.

### ***Level of technology adoption in ANU***

The outcomes of this study noted that the level of adoption of technology in Africa Nazarene University is high since more than half of the students were using e-learning technology. A good number also intended to use e-learning in future, found e-tools very interesting and interactive. Most of the students demonstrated experience in the use of technology in the studying process such as during practicum. This means that there was relatively a greater level of adoption of technology amongst students in the ODL environment than anticipated. Most of the learners believed that use of e-learning platforms such as e-Naz were convenient, offered a variety of information and increased interaction. It was easy to share information and discuss through online facilities made available through e-Naz.

### ***Technology usage***

Almost all students reported to have been making use of Google search more often. Slightly more than half of all the students involved in the study were using technology in learning and teaching as well as accessing reading materials through the computer. They were able to receive and send assignments through face-to-face video, via You Tube, audiotape, online (via discussion forum, IR or chat) e-Naz and email. This therefore indicates that the students use diverse kinds of technology in the ODL environment.

### ***Students' perceptions and attitudes on using technology for learning***

A majority of the students involved in the study believed that the use of e-learning enhanced their effectiveness in learning, improved their course performance, and increased their productivity in their course work. They also said that e-learning enhanced their effectiveness in learning and teaching while others had participated in Video Conferencing, used email, internet and Audio/Video tapes in learning and teaching.

Almost a third of the sample population were using CD-ROMs and since they were very skilful in the use of the e-Naz system, they were confident in its use. This therefore indicated a positive attitude towards use of technology amongst students in learning and teaching. Many of the students reported that their lecturers were not supportive and lacked in

motivating the students to adopt technology, however. A study by Michelle Everson stated that to keep students motivated and willing to continue striving on in their learning processes students need to be cheered on and informed that they are on the right track; Lecturers need to question students about their understanding or ask them to clarify remarks they have made or expand on certain ideas; lecturers also need to correct misconceptions as they arise; likewise the Lecturers need to provide direct instruction if students appear to be struggling to understand new information ( Everson 2009).

### ***Association between technology users' attitude/perception and adoption of technology for learning and teaching***

Following tests by factor and correlation, it was found that there was a linear association between technology users' attitude/ perception and adoption of technology for learning and teaching. This therefore indicates that students' attitude towards technology affected technology adoption in the learning and teaching environment, in that a positive attitude enhances a higher level of adoption of technology.

Factors such as management skills, determination/focus, appropriate design, interactive platform, IT service competence, perceived benefits, attractiveness, individual disposition and interest, IT infrastructure, usability/simplicity, system stability, convenience and knowledge sharing tends to influence the implementation of technology to support learning and teaching in an ODL environment.

In conclusion, user attitude and perception, infrastructure, usefulness of technology, behavioural intention to use and reasons for using technology are the major factors that affect the adoption of technology in an ODL environment such as ANU IODL. This was deduced in accordance to findings in thematic analysis and also analysis on research objectives.

## **7.3 RECOMMENDATIONS**

Based on the findings, this study makes the following recommendations on adoption of technology for learning and teaching in Africa Nazarene University.

### **7.3.1 Recommendations on the Adoption of Technology for Learning and teaching**

The following were the recommendations regarding adoption of technology in learning and teaching that can inform policy formulation regarding technology adoption:

### ***7.3.1.1 Institutional readiness to adopt technology***

Institutional readiness to adopt technology is critical and as such stakeholders involved in adoption of technology in learning and teaching must ensure they have the required financial, human, physical and technological resources to facilitate technology adoption. It includes the goodwill of the management which is necessary in the provision of constant support required in the inculcation and nurturing of a pro-technology adoption culture within the organization. Institutional readiness can spark and promote use of technology in various spheres of the organization. In regard to IT infrastructure to support students in technology adoption, the institution needs to pay attention to appropriate resource allocation. Training and support to the users can play a significant role in influencing the attitude and perception on adopting technology in learning and teaching. It is the resources that play a key role in facilitating adoption of technology. This is because it is the financial resources that help in the purchase and acquisition of the required technological equipment and e-tools, it is the intellectual resources that create the content of the online and distance learning and it is the human resources that provide the necessary support, assurance and environment of trust that is essential for adoption of technology in learning and teaching. The technical infrastructure needed to efficiently operate the virtual learning environment must be put in place and monitored to ensure free flow of information to and from the students virtually.

In line with Wasike (2014) on the appropriateness of software, this study recommends that necessary application software must be available to establish effective and efficient Information Systems Infrastructure. The appropriateness of the software could also include scalability by extending or increasing the number of users of the software without reducing the effectiveness and efficiency of the software. The application platforms that make most students prefer to submit their assignments via email should be simplified and modified to attract students in submitting their assignments and receiving their learning materials through e-Naz. e-Naz should be constantly upgraded to incorporate recent developments in the computing world including cloud computing, more interactive social media, voice and teleconferencing, as well as video conferencing.

To enhance use of e-learning tools, the institution should include a minimum utilization of each tool as part of the syllabus/curriculum requirement for students. The institution should be concerned with improving individual, team and organizational performance. According to Armstrong (2007), a performance management system is a strategic and integrated approach to delivering sustained success to organizations by improving the performance of the people

who work in them and by developing the capabilities of teams and individual contributors. Setting performance management system targets is essential because the concerns of performance management touch on all areas including the use of technology in learning and teaching such as performance improvement, employee development, satisfying the expectations of stakeholders just to mention a few. This could be achieved in relatively simple ways such as establishing a compulsory minimal required level of use of each e-tool or application.

Other than back-up generators for the entire university, the study recommends that due to the need for system stability in fluctuating and frequent power interruptions, a specific generator should be set aside for the Institute for Open and Distance Learning students.

### **7.3.2 Training and Development and students**

Effectiveness and efficiency requires knowledgeable personnel thus institutions can use the carrot and stick formula in rewarding and sanctioning (Armstrong 2007: 113) both students who adopt technology most and fastest and those who do not. It is essential that an institution of higher learning such as Africa Nazarene University engages adequate and competent personnel to meet its increasing IT needs. Training and development needs to be a planned, continuous effort by management to improve employee competency levels and organizational performance by providing employees or learners with the knowledge and skills needed for their present jobs, while development is learning that looks beyond the knowledge and skill needed for a present job (Armstrong 2007: 87). ANU needs to equip its employees with the necessary knowledge and skills they need for both the present and even go beyond that to those of future needs through technology workshops, seminars and even coaching. Training and development will be essential as contemporary skill requirements continue to increase in response to rapid technological change, the workforce continues to become significantly educated and more diverse, corporate restructuring continues to reshape businesses, as outsourcing of training increases, training departments continue to shrink, the role of training departments is significantly changing to almost being brokers, integrated high-performance work systems proliferate the market and more firms are striving to become learning organizations. This shows the importance of emphasising on human performance management especially with regard to technology adoption.

Training and development alone is not enough as some employees may not actually implement the knowledge gained or may be slow in doing so. Effectiveness and efficiency

requires knowledgeable personnel thus institutions can use the carrot and stick formula in rewarding and sanctioning (Armstrong 2007: 113) both lecturers and students who engage most and fastest or not at all. It is essential that an institution of higher learning such as Africa

The institution also has to factor in the elements of motivation as propagated by Maslow, Herzberg, and McGregor (Noe, Hollenbeck, Gerhart, & Wright, 2006). While it could be true that the lecturers and learners could be having different needs owing to their being in different stages such as the physiological, safety/security, social, self-esteem and self-actualization stage, this implies there could be differences in motivating factors for these individuals. A similar trend would apply if the lecturers and students were to be viewed from Herzberg's two factor theory of motivators such as recognition, responsibility and challenging work which give employees/learners satisfaction and hygiene factors such as status, good salaries, job security and fringe benefits which do may not motivate if present but could demotivate if absent. This could be relevant in mitigating the challenges noted in the study as laxity or low concern for students by some lecturers could be due to hygiene factors such as company policy, supervision, working conditions, interpersonal relations, salary, status, job security, and personal life.

The use of carrot and stick befits Douglas McGregor who in his X-Y theory (Noe, Hollenbeck, Gerhart, & Wright, 2006), explained that theory X (dictatorial management) perceives people as having tendencies to dislike work and believes they would avoid it if they could, such people have to be forced with the threat of punishment to work towards organisational objectives and prefer to be directed, avoid responsibility, are relatively unambitious, and want security above all else. This brings in the stick dimension.

To the contrary, theory Y (participatory management) perceives that effort in work is as natural as work and play; people will apply self-control and self-direction in the pursuit of organisational objectives, without external control or the threat of punishment; commitment to objectives is a function of rewards associated with their achievement; people usually accept and often seek responsibility; the capacity to use a high degree of imagination, ingenuity and creativity in solving organisational problems is widely, not narrowly, distributed in the population; and the intellectual potential of the average person is only partly utilised. This points towards the direction of rewarding of the good work done by such people be they lecturers, administrators or students in the adoption of technology in learning and teaching in ANU.

Owing to the fact that Information System knowledge and practice is a constantly changing field, employees and students of Africa Nazarene University require regular updates/training to boost their IT skills and basic maintenance skills of their computers and consequently improve their competence and system stability. Of significance is the conducting of eLearning readiness assessment and training. The training should equip the potential e learners with basic computer knowledge; appropriate interpersonal communication skills; necessary skills for navigating the virtual learning environment; time management skills and effective writing skills (Ragan, L.C 1998)

The study recommends the promotion of development of active IT platforms and service competence, by promotion of online teamwork though rewarding employees and students who engage in knowledge sharing in the institution's online repositories. In setting the pace by leading from the front, ANU should increase its engagement with technology in all departments in service provision and in engagement of external stakeholders on a real time basis.

### **7.3.3 Standardisation of eLearning in Kenya**

Kenyan online and distance learning requires strong and consistent national quality assurance measures that institutions can use as a standard. This is due to the fact that even in developed countries such as the United States, it has been noted that the lack of strong and consistent national quality assurance measures for online educational institutions have become obstacles towards students' trust in the online and distance learning. This has on some occasions led to more e-learner dropouts than in face-to-face courses. This lack of standardization can lead to low retention rate as students who perceive the system as sub-standard may opt out of e-learning for the face to face courses consequently making lower retention rates for online courses to become another barrier to the widespread adoption of technology in online learning. In an effort to standardize eLearning in Kenya the following areas need to be highly considered as adapted from The National Association of Distance Education and Open Learning in South Africa (NADEOSA) quality criteria document that emphasised on policy and planning, learners, program development, course design, course materials, assessment, learner support, human resource strategy, management and administration, collaborative relationships, quality assurance, information dissemination and results

## **7.4 LIMITATIONS OF THE STUDY**

One limitation was that the study covered only one private university, that is, Africa Nazarene University and in regard to this, the study was conducted only on its main campus leaving other campuses like Nairobi Central Business District, Meru among others. This study focus on the main campus, however, was justifiable as all the students in the ODL were attended to from the main campus.

Another major limitation of the study is that it focused on students who are distance learners and who are at the same time expected to use online services for learning. The study did not consider that there are conventional, traditional, face-to-face students within the university who also use online services in their learning and teaching.

There were some extraneous variables that were beyond the researcher's control such as respondents' honesty, personal biases and uncontrolled setting of the study as the respondents were only requested to be as objective as possible in answering the questionnaires. However, through validity and reliability tests, the effects of such responses were reduced, and misleading information discarded.

Some degree of bias is nearly always present in a research study. This may influence a study's conclusions. In this case there could have been a possible focusgroup discussion bias catalysed by the presence of the researcher who is also a lecturer of the respondents. Respondents could have had different intentions for giving the responses that they gave; either to please the researcher or to express honest opinion. The researcher attempted to overcome this bias by briefing the respondents that she was herself an e-learner, therefore, she resonated with the respondents' views. It is also important to note that the questionnaires used in the quantitative study underwent validity tests to prove its reliability.

The study echoed the sentiments of distance learning students only while excluding the sentiments of the distance teaching lecturers who are also faced with the challenges of technology adoption but did not participate in the study. This is a limitation of the present study. A recent study conducted at Illinois State University identified several factors that affected adoption of institutional technology by lecturers. The majority of the lecturers agreed on three factors that imposed barriers to adoption, that is, lack of institutional support,

lack of financial support and lack of time to test and learn new technologies. To successfully implement new technologies amongst lecturers, institutions must address these barriers in regards to technology adoption by lecturers to support learning and teaching (Butler 2002). Barriers to technology adoption by lecturers and students need to be addressed so that the two groups involved in learning and teaching can be accorded relevant support to enable them to function at their optimum level.

## **7.5 RECOMMENDATIONS FOR FURTHER STUDY**

In relation to the area of focus of this study and the limitations of this study, there are many provisions for further research using the Technology Adoption Model and the questionnaire in a wider scope. The wider scope of further research may include all Africa Nazarene students, public institutions of higher learning in Kenya and technology adoption by Africa Nazarene lecturers.

A study could be conducted to investigate the relationship between system security and effectiveness of Open and Distance Learning in ANU to combat some security-related issues.

Another study could be conducted on further revelation of the kind of relationship between system interactivity and user preference for Open and Distance Learning in African Universities. This can explore the exact level of interactivity and user preference resulting in accurate policy formulations on system interactivity.

Another study could also be conducted on the factors affecting technology adoption in higher learning institutions in Kenya as the factors that affect Africa Nazarene University may not necessarily affect other private and public institutions of higher learning.

Other studies could be conducted on the role of user motivation on technology adoption as a way of ascertaining the extent to which user motivation can enhance technology uptake/adoption in universities.

Since this study focussed only on students, a similar study could be done with a focus on the lecturers and the same instruments used to determine the level of adoption that can be adapted for the study.

These are a few areas that can be further developed as a way of harnessing greater benefits from technology adoption and its related benefits.

## **7.6 CONTRIBUTIONS OF THE STUDY**

From a theoretical perspective the Technology Acceptance Model focused on perceived usefulness and perceived ease of use as the main construct of technology adoption. However, this study further revealed that other factors such as individual attributes, facilitating conditions and technology infrastructure could influence the learners' willingness to adopt technology. The study also revealed that where lecturers had low skills and knowledge in eLearning tools, the learners were negatively impacted lowering the adoption of technology in learning and teaching. This means that before eLearning is introduced, possible facilitators need to be trained and the training must continue throughout the entire eLearning provision period. However from the qualitative data analysis on section 6.3 of the study, it is further revealed that some lecturers do not possess the skills to deliver through online platforms and have persistently showed lack of commitment for their students. This revelation could be invested upon by the managements of various universities in Kenya to ensure proper and continuous training and motivation to the lecturers to ensure understanding of concepts and delivery through online platforms.

The study further revealed a direct positive relationship between technology users' attitude/perception and adoption of technology. This means that if students have a positive attitude towards technology, then they are more likely to adopt technology with ease. Other contributions made by the study are the revelation that prolonged use of technology would propagate the learners wish to use technology in learning and teaching. Early exposure to technology should be encourage in Kenyan schools to ensure familiarity and development of positive attitudes and perceptions towards technology, therefore, enabling learners to easily adopt and use technology during the higher learning processes.

This study has further indicated that the use of mixed methods research design in an educational set up was an appropriate approach. Mixed method approach has exhaustively addressed the concerns, attitudes, perceptions and experience in e-learning. Triangulation method merged the analysis of data from qualitative and quantitative sources to speak out the same results.

## **7.7 CONCLUSION**

The study revealed that prolonged use of technology would propagate the learner's wish to use technology in learning and teaching. Most learners who possessed laptops were found to prefer accessing their learning materials through soft copy rather than hard copies. Facilitating conditions such as management ability, allocation of resources and institutional support emerged to be affecting the learners' wish to adopt technology. In cases where the lecturers had low skills and knowledge in e-learning tools, the learners were impacted negatively lowering the adoption of technology in learning and teaching. Technology infrastructure such as technology features, interactivity stability, convenience and design were found also to be a major determinant in technology adoption by distance learning students.

The study further revealed a high level of technology adoption among the students at ODL at Africa Nazarene University with varied uses of technology during the learning process. The application of technology in teaching and learning varied from Google Search, assignment submission, emailing, video conferencing among others. It is however noted that, students preferred use of technology due its convenience, timeliness, interactivity and its ease of use. A positive attitude towards the use of technology in teaching and learning propelled more of the users to adopt and prefer to use it in further learning process and even in their working environment. The study further confirmed that eLearning students are feeling confident about the future. This is more good news for the Kenya as country, or even the entire Sub-Saharan Africa because the combination of education and technology is clearly a powerful driver for growth. It further emphasized that the prospects for Kenyan education will depend increasingly on good communications and connectivity

There was high level of technology adoption among the IODL students than what the researcher had initially anticipated. The availability of effective resources impacted positively on the learners to adopt the use of technology in teaching and learning. Commitment from the lecturers and supporting staff to help in solving out the problems accelerated the adoption process, as learners were able to conveniently acquire and use e-learning resources without difficulties. The study, however, showed similar results as that on African e-Learning Journal Report (2012) that observed that teachers, lecturers, entrepreneurs and policymakers all have

high expectations about the ability of new technologies to scaffold progressive change at both institutional and system-wide levels. The most significant constraint to eLearning at a national level cited by respondents is limited bandwidth. A lack of funds, limited electricity supply and insufficient human resource capacity were additional significant constraints. The government was identified as the most important change agent for accelerating ICT-enhanced learning.

The model adopted by the study, Technology Acceptance Model, showed that the Ease of Use and Perceived Ease of Use of technology are shown as the major aspects considered by users, especially in learning environment while adopting technology. The use mixed method approach methodology has further extensively covered the diverse aspects of the participants in e-learning. The qualitative data gave a deeper insight on the students' feelings, attitudes, perceptions and experiences while using technology in teaching and learning. The quantitative data further revealed the existing links among the variables indicating that could be exploited by the relevant organisations for a improvement on the existing systems

## **KEY WORDS**

Adoption, Effective teaching, Effective technology integration, Internet, Learning processes, Learning, Teaching, Technology Users, Technology.

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## APPENDICES

### Appendix A: Confirmation of Registration at UNISA for 2015

duate letter - OOKO M https://outlook.office365.com/owa/projection.aspx

#### Postgraduate letter

mandd@unisa.ac.za  
Tue 09/12/2014 09:17  
Inbox  
To:OOKO M <53452569@mylearn.unisa.ac.za>;

0817 MIRST.  
OOKO M A MRS  
P O BOX 67821-00200  
CITY SQUARE  
NAIROBI  
KENYA  
STUDENT NUMBER : 5345-256-9  
ENQUIRIES NAME : POSTGRADUATE QUALIFICATIONS  
ENQUIRIES TEL : (012) 441-5702  
DATE : 2014-12-09

Dear Student  
I wish to inform you that your registration has been accepted for the academic year indicated below. Kindly activate your Unisa mylife (<https://myunisa.ac.za/portal>) account for future communication purposes and access to research resources. Please check the information below and kindly inform the Master's and doctoral section on mandd@unisa.ac.za on any omissions or errors.

DEGREE : DED (DIDACTICS) (98435)  
TITLE : The adoption of Technology to support Teaching and Learning in a distance Learning programme at Africa Nazarene University

SUPERVISOR : Dr ME MAKOE

ACADEMIC YEAR : 2015

TYPE: THESIS

SUBJECTS REGISTERED: TFDID05 D ED - DIDACTICS

A statement of account will be sent to you shortly.

If you intend submitting your dissertation/thesis for examination, complete form DSAR20 (Notice of Intention to Submit) before 30 September. If this deadline is not met, you need to re-register and submit your intention for submission by 15 April and submit your dissertation by 15 June.

Your supervisor's written consent for submission must accompany your notice of intention to submit.

Yours faithfully,

Prof M Mosimege  
Registrar

of 1

2/12/2015 5:48 PM

## **Appendix B: Research Permit**

### **Appendix C: Letter from the National Council for Science in Kenya granting the Researcher permission to conduct research in the Kajiado County of Kenya at Africa Nazarene University**



#### **NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,  
2241349, 310571, 2219420  
Fax: +254-20-318245, 318249  
Email: [secretary@nacosti.go.ke](mailto:secretary@nacosti.go.ke)  
Website: [www.nacosti.go.ke](http://www.nacosti.go.ke)  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No.

Date:

**11<sup>th</sup> December, 2014**

**NACOSTI/P/14/9697/4315**

Ooko Mary Atieno Agumba  
University of South Africa  
**SOUTH AFRICA.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on "*An investigation of the adoption of technology to support teaching and learning in a distance learning programme at Africa Nazarene University,*" I am pleased to inform you that you have been authorized to undertake research in **Kajiado County** for a period ending **1<sup>st</sup> December, 2015**.

You are advised to report to the **Vice Chancellor, Africa Nazarene University, the County Commissioner and the County Director of Education, Kajiado County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

*SAID HUSSEIN*  
FOR: SECRETARY/CEO

Copy to:

The Vice Chancellor  
Africa Nazarene University.

The County Commissioner  
Kajiado County.

*National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified*

## **Appendix D: License provided by the Kenya National Council of Science and Technology permitting the Researcher to conduct research in Kenya**

<p><b>THIS IS TO CERTIFY THAT:</b>  <b>MISS. OOKO MARY ATIENO AGUMBA</b>  <b>of UNIVERSITY OF SOUTH AFRICA, 0-200</b>  <b>NAIROBI, has been permitted to conduct</b>  <b>research in Kajiado County</b></p> <p><b>on the topic: AN INVESTIGATION OF</b>  <b>THE ADOPTION OF TECHNOLOGY TO</b>  <b>SUPPORT TEACHING AND LEARNING IN A</b>  <b>DISTANCE LEARNING PROGRAMME AT</b>  <b>AFRICA NAZARENE UNIVERSITY</b></p> <p><b>for the period ending:</b>  <b>1st December, 2015</b></p> <p><b>Applicant's</b>  <b>Signature</b></p>	<p><b>Permit No : NACOSTI/P/14/9697/4315</b>  <b>Date Of Issue : 11th December, 2014</b>  <b>Fee Received : Ksh 2,000</b></p>  <p><b>Full Secretary</b>  <b>National Commission for Science,</b>  <b>Technology &amp; Innovation</b></p>
--	--

## **Appendix E: Focus Group Interview Research Schedule**

This Interview will help research on technology adoption at Africa Nazarene University.

Please orally respond to these questions as accurately as you can. Your oral response will be recorded using a flip video. Your response will not be used for any other purpose other than research and will be kept confidential. Thank you very much!

1. Briefly describe your rating and experience on the level of usage of e-Naz platform, the Virtual learning environment at Africa Nazarene University
2. Kindly explain how students use technology in learning and teaching processes in ANU and compare the online discussions as opposed to Face-to-Face Instructions that you have had in your courses at Africa Nazarene University
3. Discuss how Africa Nazarene students' attitudes and perceptions have influenced your usage of eLearning technological tools available in ANU.
4. From your online education experience, discuss the relationship that exists or can exist between technology users' attitude/ perception and adoption of technology for learning and teaching.
5. From your experience and challenges, explain factors influencing implementation of technology to support learning and teaching through e-Naz and other online platforms you have used before at Africa Nazarene University.

**THANK YOU!**

## **Appendix F: Questionnaire for Quantitative Part of the Research**

### **Questionnaire about Technology Adoption to Support Learning and teaching (TASTL)**

This questionnaire is part of a study of technology adoption at Africa Nazarene University. Your participation in this study is voluntary, and your answers will form part of a statistical study that will not identify you as an individual. These questions will only be used in the research and not on any other project. Please first answer these background questions, then complete the rest of the survey. Thank You! Mrs Mary Ooko.

#### **PART 1: BIOGRAPHICAL DATA**

**Direction 1:** Please, appropriately mark one response with a tick in the space provided below.

*Note that all responses are handled anonymously!*

##### **1. Gender**

Male  Female

##### **2. Age**

Less than 20  20- 29  30- 39   
40- 49  50 and above

##### **3. Computer Usage**

Less than 1 year  1 - 3 years  4 - 6 years   
7 - 9 years  More than 10 years

##### **4. Do you have access to a laptop?**

Yes  No

##### **5. How often do you use Google to search for information?**

Every day  Two or three times a week  A few times a month   
[ ]

##### **6. How do you access reading materials on the computer**

Read it on my computer  Print it to read it

##### **7. How would you prefer to receive as your learning material?**

Hardcopy (printed book)  Electronic book  doesn't matter

##### **8. How would you like to present your assignment?**

Face to face Video (via YouTube)  Audiotape   
[ ]

Online (via a discussion forum, IR or chat) E-Naz  Email  
[ ]

#### **PART 2: Levels of Adoption of Technology in Open and Distance Learning Environment**

For the following questions, indicate the extent of your agreement or disagreement you give to each factor by marking it with an X according to the scale.

<b>Rating</b>	<b>Response Mode</b>	<b>Description</b>
5	Strongly Agree	You agree with no doubt at all
4	Agree	You agree with some doubt
3	Undecided	You have no idea
2	Disagree	You disagree with some doubt
1	Strongly Disagree	You disagree with no doubt at all

<b>No.</b>	<b>Adoption level</b>	<b>Rating</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
9.	I currently use e learning technology in learning and teaching					
10.	I intend to use e learning technology in future					
11.	I find using e learning tools very interesting					
12.	I find e-Naz very interactive					
13.	I am experienced in using technology in learning and teaching					
14.	Whenever possible, I intend to use computers for learning and teaching					
15.	I plan to use computers during my teaching practicum or internship					
16.	I will use computers in future					
17.	Whenever possible, I intend to use computers for learning and teaching					
18.	I will return to E-learning often for future training					
19.	I intend to visit E-learning frequently for my course work					
20.	It is easy for me to do works that I want to do by using computers					
21.	I find computers easy to use					
<b>No.</b>	<b>Usage of Technology</b>	<b>Rating</b>				
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

22.	Using E-learning would enhance my effectiveness in learning				
23.	Using E-learning would improve my course performance				
24.	Using E-learning would increase my productivity in my course work				
25.	I find E-learning useful				
26.	I could improve my performance by using computers				
27.	I could increase my productivity by using computers				
28.	I could enhance my effectiveness by using computers				
29.	Using E-learning would enhance my effectiveness in teaching				
30.	I have participated in Video Conferencing				
31.	I enjoy communicating using Electronic Mail( E-mail)				
32.	I always use Internet in learning and teaching				
33.	I do use Audio/Video tapes in learning and teaching				
34.	I have attended a course in a Virtual Classroom				
35.	I like delivering my study and teaching materials through CD-ROM and WebCT				
<b>No.</b>	<b>Attitudes and Perceptions about using Technology</b>	<b>Rating</b>			
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
36.	I have high level of self-confidence in using the e-Naz system				
37.	I am able to skilfully use e-Naz system				
38.	Using e-Naz is entirely within my control				
39.	The e-Naz system allows easy access to information				
40.	I am willing to participate in e-learning activities				
41.	I am rarely disconnected during online tutorial				
42.	Using e-Naz is entirely within my control				
43.	I have the resources, knowledge, and ability to use e-Naz				
44.	I think I learn more in online courses offered at e-Naz to face to face courses				
45.	e-Naz courses require more study time than face to face courses				
46.	I find the site easy to learn				
47.	My interaction with the e-Naz is clear and understandable				
48.	I think taking courses on e-Naz is convenient				
49.	I think learning through e-Naz is fun				
50.	I am generally satisfied with the quality of online courses				

	offered through e-Naz				
51.	I believe it will be a good idea to use eLearning tools				
52.	Online discussion enables students to exchange ideas and comments				
53.	I benefit from using interactive applications				
54.	I am able to ask questions and receive answers				
55.	Browsing classmates' works helps reflect own shortcoming				
56.	I think sharing knowledge through online discussions is time consuming				
57.	I am likely to take an online course again through e-Naz				
58.	If available, I intend to use e-learning tools during the semester				
59.	If available, I intend to use e-learning tools as frequently as possible.				
60.	If available, I intend to use e-learning tools whenever possible for my coursework.				

Thank you.

END

## **Appendix G: TRANSMITTAL LETTER FOR THE QUESTIONNAIRE RESPONDENTS**

Dear Sir/ Madam,

This letter is an invitation to consider participating in a study I, Mrs. Mary Atieno Agumba Ooko, am conducting as part of my research as a doctoral student entitled “*Investigation of the Adoption of Technology to Support Learning and teaching in a Distance Learning Programme at the Africa Nazarene University*” at the University of South Africa. Permission for the study has been given by Kenya National council of Science and Technology, Department of Education and the Ethics Committee of the College of Education, UNISA. I have purposefully identified you as a possible participant because of your valuable experience and expertise related to my research topic.

I would like to provide you with more information about this project and what your involvement would entail if you should agree to take part. The importance of technology in learning and teaching is substantial and well documented. Such benefits include convenience, cost-effectiveness, interactivity with other learners through online tools and platform, and flexibility among others. In this interview I would like to have your views and opinions on this topic. This information can be used to improve the Institute for Open Distance Learning (IODL) in the Africa Nazarene University and to develop strategies for implementation of technology enhanced learning.

Your participation in this study is voluntary. It will involve a questionnaire with 60 questions for you to fill in a mutually agreed upon location at a time convenient to you. You may decline to answer any

of the questions if you so wish. Furthermore, you may decide to withdraw from this study at any time without any negative consequences.

Shortly after the data from the questionnaire has been cleaned, coded and entered into Statistical Package for Social Sciences for quantitative analysis, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of the entered data and to add or to clarify any point. All information you provide is considered completely confidential. Your name will not appear in any publication resulting from this study and any identifying information will be omitted from the report. However, with your permission, anonymous quotations may be used. Data collected during this study will be retained on a password protected computer for 5 years in my locked office safe. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please contact me at +254 722 523 103 or by e-mail at mooko@anu.ac.ke.

I look forward to speaking with you very much and thank you in advance for your assistance in this project. If you accept my invitation to participate, I will request you to sign the consent form which follows on page 2 hereafter.

Yours sincerely

A handwritten signature in black ink, appearing to read "Mooko".

## **Appendix H: CONSENT FORM FOR QUESTIONNAIRE RESPONDENTS**

I have read the information presented in the information letter about the study investigating the adoption of technology to support learning and teaching in a distance learning programme at Africa Nazarene University in education. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and add any additional details I wanted in relation to my answering of the questionnaire. I am also aware that excerpts from the questionnaire may be included in publications to come from this research, with the understanding that the quotations will be anonymous. I was informed that I may withdraw my consent at any time without penalty by advising the researcher. With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant's Name (Please print):

Participant Signature:

Researcher Name : MRS. MARY ATIENO AGUMBA OOKO



Researcher Signature:

Date :

## **Appendix I: TRANSMITTAL LETTER FOR THE FOCUS GROUP DISCUSSANTS**

Dear Sir/ Madam,

This letter is an invitation to consider participating in a study I, Mrs. Mary Atieno Agumba Ooko, am conducting as part of my research as a doctoral student entitled "*Investigation of the Adoption of Technology to Support Learning and teaching in a Distance Learning Programme at the Africa Nazarene University*" at the University of South Africa. Permission for the study has been given by Kenya National council of Science and Technology, Department of Education and the Ethics Committee of the College of Education, UNISA. I have purposefully identified you as a possible participant because of your valuable experience and expertise related to my research topic.

I would like to provide you with more information about this project and what your involvement would entail if you should agree to take part. The importance of technology in learning and teaching is substantial and well documented. Such benefits include convenience, cost-effectiveness, interactivity with other learners through online tools and platform, flexibility among others. In this interview I would like to have your views and opinions on this topic. This information can be used to improve the Institute for Open Distance Learning (IODL) in the Africa Nazarene University and to develop strategies for implementation of technology enhanced learning.

Your participation in this study is voluntary. It will involve an interview of approximately 45minutes in length to take place in a mutually agreed upon location at a time convenient to you. You may decline to answer any of the interview questions if you so wish. Furthermore, you may decide to withdraw from this study at any time without any negative consequences.

With your kind permission, the interview will be audio-recorded to facilitate collection of accurate information and later transcribed for analysis. Shortly after the transcription has been completed, I will send you a copy of the transcript to give you an opportunity to confirm the accuracy of our conversation and to add or to clarify any points. All information you provide is considered completely confidential. Your name will not appear in any publication resulting from this study and any identifying information will be omitted from the report. However, with your permission, anonymous quotations may be used. Data collected during this study will be retained on a password protected computer for 5 years in my locked office safe. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please contact me at +254 722 523 103 or by e-mail at mooko@anu.ac.ke.

I look forward to speaking with you very much and thank you in advance for your assistance in this project. If you accept my invitation to participate, I will request you to sign the consent form which follows on page 2 hereafter.

Yours sincerely



## **Appendix J: CONSENT FORM FOR FOCUS GROUP DISCUSSION PARTICIPANTS**

I have read the information presented in the information letter about the study investigating the adoption of technology to support learning and teaching in a distance learning programme at Africa Nazarene University in education. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and add any additional details I wanted. I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses. I am also aware that excerpts from the interview may be included in publications to come from this research, with the understanding that the quotations will be anonymous. I was informed that I may withdraw my consent at any time without penalty by advising the researcher. With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant's Name (Please print):

Participant Signature:

Researcher Name : MRS. MARY ATIENO AGUMBA OOKO



Researcher Signature:

Date :

## **Appendix K: STUDENT ASSISTANT CONFIDENTIALITY FORM**

Dear Sir/ Madam,

I, Charles Odhiambo Okore grant consent/assent that the information I share during the data collection through questionnaires and group discussions (focus group interviews) on behalf or together with the researcher, Mrs. Mary Atieno Agumba Ooko will be strictly for research purposes. I have been made to understand that the respondents' participation in this study is voluntary, the study will involve an interview of approximately 45minutes in length to take place in a mutually agreed upon location at a time convenient to the respondents, the respondents may decline to answer any of the interview questions if you so wish, and that they may decide to withdraw from this study at any time without any negative consequences.

I have also understood that all information provided by the respondents is considered completely confidential, their names will not appear in any publication resulting from this study and any identifying information will be omitted. I am aware that the group discussions will be digitally recorded and grant consent/assent for these recordings, provided that my privacy will be protected. I undertake not to divulge any information that is shared in the questionnaires or group discussions to any person outside the group in order to maintain confidentiality.

Student Assistant's Name : GEORGE MAK OWINO

Student Assistant's Signature: 

Researcher's Name : MRS. MARY ATIENO AGUMBA OOKO

Researcher's Signature : 

Date : 24/03/2015

## **Appendix L: DECLARATION**

## **STATEMENT AGREING TO COMPLY WITH ETHICAL PRINCIPLES SET OUT IN UNISA POLICY ON RESEARCH ETHICS**

I, Mary Atieno Agumba Ooko . (full name of main researcher), declare that I have read the Policy on Research Ethics of UNISA and the contents of this document are a true and accurate reflection of the methodological and ethical implications of my proposed study. I shall carry out the study in strict accordance with the approved proposal and the Policy on Research Ethics of UNISA. I further undertake to inform the relevant research ethics review committee of the College of Education in writing of any adverse events that occur arising from the injury or harm experienced by the participants in the study. I shall also notify the research ethics review committee if any changes to the study are proposed. I shall maintain the confidentiality of all data collected from or about the research participants, and impose strict controls in the maintenance of privacy. I shall record all data captured during interviews in accordance with ethical guidelines outlined in my proposal. The Policy on Research Ethics places huge emphasis on the integrity of the research and I shall ensure that I conduct the research with the highest integrity taking into account UNISA's Policy for Copyright Infringement and Plagiarism. No data that wasgathered retrospectively will be used. I acknowledge that as main researcher it is my responsibility to ensure that the co-researchers, if any, to this research project adhere to the ethical principles set out in the UNISA Policy on Research Ethics.

1  
.....  
.....  
.....

(Signature)

(Date)

Approved by supervisor (if applicable)

I.....(name of supervisor) declare that I have checked that this form is correctly and honestly completed. I subsequently approve the submission of the proposal for ethical clearance. If applicable, I will ensure that the student reports unanticipated problems or serious adverse events to the Research Ethics Committee of the College of Education.

.....  
.....

(Signature)

(Date)

Approved by co-supervisor (if applicable)

I.....(name of supervisor) declare that I have checked that this form is correctly and honestly completed. I subsequently approve the submission of the proposal for ethical clearance. If applicable, I will ensure that the student reports unanticipated problems or serious adverse events to the Research Ethics Committee of the College of Education.

.....  
.....

(Signature)  
(Date)

#### **Appendix M: RESEARCH BUDGET**

<b>Item</b>	<b>Cost in Ksh</b>
Stationery	4,000
Printing	5,000
Photocopy and binding	1,000
Computer services	5,000
Traveling for Resource Materials	6,000
Internet consultation	3,000
Books and Resource materials	16,000
Research Assistants for Data Collection	30,000
Consultancy for data Analysis	30,000
<b>TOTAL</b>	<b>100,000</b>

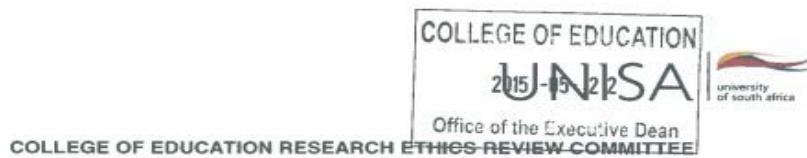
## **Appendix N: WORK PLAN**

Activity	Time																								
Month	Jan-March 2013		April-Dec 2013		Jan-Feb 2014		March-2014		April 2015		May 2015		June 2015												
Week		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Approval of topic																									
Draft Proposal Writing																									
Working on corrections from Supervisors																									
Presentation of corrected copy to supervisor																									
Data Collection																									
Data Analysis and Report Writing																									
Final Draft and Submission																									

## Appendix O: KREJCIE AND MORGAN TABLE

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	373
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	225	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

## Appendix P: APPROVAL FOR ETHICAL CLEARANCE



COLLEGE OF EDUCATION RESEARCH ETHICS REVIEW COMMITTEE

13 May 2015

Ref #: 2015/05/13/53452569/02/MC

Student #: Mrs MAA Ooko

Student Number #: 53452569

Dear Mrs MAA Ooko

**Decision: Ethics Approval**

**Researcher**

Mrs MAA Ooko  
Tel: +254 722 523 103  
[mooke@anu.ac.ke](mailto:mooke@anu.ac.ke)

**Supervisor**

Prof N Makoe  
Institute for Open Distance Learning  
Unisa  
Tel: +2712 429 6603  
[gakisme@unisa.ac.za](mailto:gakisme@unisa.ac.za)

**Proposal:** The adoption of technology to support teaching and learning in a Distance Learning Program at Africa Nazarene University

**Qualification:** D Ed in Didactics

Thank you for the application for research ethics clearance by the College of Education Research Ethics Review Committee for the above mentioned research. Final approval is granted for 2 years.

**For full approval:** The application/ resubmitted documentation was reviewed in compliance with the Unisa Policy on Research Ethics by the College of Education Research Ethics Review Committee on 13 May 2015.

The proposed research may now commence with the proviso that:

- 1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
- 2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the College of Education Ethics Review Committee.



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Pretoria Street, Muckleneuk Ridge, City of Tshwane  
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Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150  
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