THE INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGY INFRASTRUCTURE AND COMPETENCE OF LECTURERS ON THEIR PREPAREDNESS FOR ELECTRONIC LEARNING: THE CASE OF THE UNIVERSITY OF NAIROBI, KENYA

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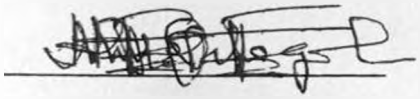
DECLARATION

This Thesis is my original work and has not been submitted for any award in any university for examination.



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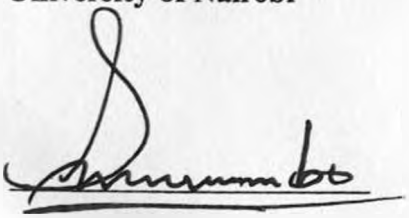

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To my family for their encouragement and support during my Doctorate programme at the University of Nairobi

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ABSTRACT

This study was conducted to identity infrastructural and skill gaps, as well as training and support needs among lecturers at the University of Nairobi, which should be addressed to improve their preparedness to function in an electronic learning (eLearning) environment. More specifically, the study sought answers to the following questions: what is the effect of access to computers at work, quality of computers and internet reliability on lecturers' preparedness for eLearning? How do the ICT training programme and timeliness of technical support affect lecturers' preparedness for eLearning? What is the effect of technical staff and annual budget on lecturers' preparedness for eLearning? How does lecturers' competence in word processing, spreadsheet, database management, presentation, statistical analysis and internet tools affect their preparedness for eLearning? To address these questions, a cross-sectional survey design was applied to source data from 213 academic staff and 108 administrative staff at the University of Nairobi. Both quantitative and qualitative techniques were applied to process, analyse and interpret the data. Quantitative analysis was done at the univariate, bivariate and multivariate levels. Hypotheses were tested using cross tabulations with Chi square (χ^2) statistic, while Binary Logistic Regression was used to determine factors influencing lecturers' preparedness for eLearning. The study found that the timeliness of technical support was the most important factor influencing lecturers' preparedness for eLearning by accounting for 10.1% of variance; this is followed by access to computers at the workplace (8.2%), competence in word processing tools (7.0%), internet reliability (6.7%), competence in presentation tools (6.4%), the adequacy of budgetary allocations (5.4%) and competence in spreadsheets (3.2%). Consequently, ensuring adequate and timely access to technical support is likely to discourage apprehensiveness to use ICT facilities, while enhancing access to computers at the workplace is likely to help lecturers improve skills and overcome fears and anxiety associated with computer use. Whereas reliable internet connectivity remains a key requirement for eLearning, harmonising the ICT training programme with academic semesters at the University should enable academic staff acquire necessary ICT skills. Given the importance of eLearning in equipping lecturers and learners with necessary competencies, the University of Nairobi has no option but to integrate technology to cope with the increasing demand for modernisation of higher education. In view of this, the study recommends the need to: strengthen the ICT training programme, enhance access to relevant resource materials on eLearning, strengthen technical support as well as improve infrastructural facilities by acquiring modern computers and fast-tracking the universal computerisation initiative. The study further advocates for an eLearning strategy as well as strong linkages with public and private sector organisations to create avenue for sharing information and resources. For further research, the study recommends the need for similar studies in other public universities, focusing on the preparedness of both lecturers and learners for eLearning.

TABLE OF CONTENT

LIST OF TABLES

Page

LIST OF FIGURES

Page

ABBREVIATIONS AND ACRONYMS

ALNs	Asynchronous Learning Networks
ANOVA	Analysis of Variance
ANSTI	African Network of Scientific and Technology Institutions
APEC	Asia-Pacific Economic Cooperation
ASA	American Statistical Association
B.Ed	Bachelor of Education
CAD	Center for Academic Development
CAE	College of Architecture and Engineering
CAVS	College of Agricultural and Veterinary Sciences
CBPS	College of Biological and Physical Sciences
CBT	Computer-based Teaching
CD	Compact Disc
CEES	College of Education and External Studies
CHS	College of Health Sciences
CHSS	College of Humanities and Social Sciences
DIM	Diffusion of Innovation Model
DL	Distance Learning
DVD	Digital Versatile Disc
EFL	English as a Foreign Language
ELearning	Electronic Learning
ICT	Information and Communication Technology
ISP	Internet Service Provider
LAN	Local Area Network
LCD	Liquid Crystal Display
LCMS	Learning Content Management System
LMS	Learning Management Systems
MLE	Maximum Likelihood Estimation
NCES	National Center for Educational Statistics (US)
ODL	Open and Distance Learning

OECD	Organisation for Economic Cooperation and Development
PhD	Doctor of Philosophy
ROM	Random Only Memory
SCDE	School of Continuing and Distance Education
SMART	Specific, Measurable, Achievable, Realistic & Time-bound
SPSS	Statistical Package for Social Sciences
SQL Server	Structured Query Language Server
TAM	Technology Acceptance Model
TLU	Teaching and Learning Unit
TRA	Theory of Reasoned Action
UB	University of Botswana
UBeL	University of Botswana eLearning Initiative
UK	United Kingdom
UNESCO	United Nations Educational, Scientific & Cultural Organisation
UoN	University of Nairobi
US	United States
VLE	Virtual Learning Environment
WebCT	Web-based Communication Technology
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The exponential growth of Information and Communication Technology (ICT) and the Internet has significantly influenced the delivery of university education, both in developing and developed countries (Naidu, 2006; Datuk & Ali, 2008). Over the past two decades, many institutions of higher learning have increasingly integrated ICT to support course delivery. The interest in ICT has been necessitated by the need to expand access to university education, particularly for corporate sector workers by creating a flexible mode that results to minimal or no inconveniences to their work schedule (Naidu, 2006). The application of ICT and the Internet to support course delivery is collectively referred to as Electronic Learning (eLearning) (Farahani, 2003; Omwenga, 2004). This chapter provides a brief description of the eLearning concept, terminologies, merits and trends, as well as institutional infrastructure and lecturers' competence in the application of ICT tools.

1.1.1 The concept of eLearning

ELearning is a mode of instruction that involves the intentional application of electronic media, including the Internet, Intranet, satellite broadcast, audio or video tapes, interactive television or CD-ROMs (Trombley & Lee, 2002; Tavangarian et al., 2004). ELearning improves teaching and learning processes by encouraging the use of modern instructional methods supported by ICT tools

(Selim, 2007). As part of preparedness for eLearning, institutions of higher learning must put in place appropriate ICT infrastructure and develop human resource on how to work with such facilities (Oblinger & Oblinger, 2005). This makes its necessary for all academic staff to develop their computing skills in order to function effectively in an eLearning environment.

As indicated by Naidu (2006), various terminologies are often used in place of eLearning; for instance, *online learning*, *virtual learning*, *distributed learning*, *network* or *web-based learning*. In this regard, Carabaneanu et al. (2007) note that in the recent years, the terminologies for eLearning have metamorphosed from terms such as *technology-supported learning*, *distance learning* and *distance education* to *online learning* and *web-based training* to *eLearning*. Whatever the terminology used, their primary connotation is the application of ICT tools and the Internet to mediate asynchronous as well as synchronous learning and teaching activities (Naidu, 2006).

According to Abbad et al. (2009), "eLearning in its broadest sense refers to any education that is electronically enabled. In a slightly narrower sense, eLearning is a kind of learning that is enabled by the application of digital technologies. Narrowed down further, eLearning is any form of education that is web-based or internet-enabled" (p. 2). Instruction over the internet is perceived by many education scholars to be a significant breakthrough in teaching and learning, particularly at the institutions of higher learning (Keller & Cernerud, 2002; Abbad et al., 2009). Being a mode that is internet-driven, the stability and reliability of

internet connectivity is a crucial part of infrastructural requirement for the adoption of eLearning.

Studies conducted by Romiszowski (2004) and Naidu (2006) reveal that eLearning has four distinct modalities; namely, individualised self-paced online, individualised self-paced offline, group-based synchronously and group-based asynchronously. Under the individualised self-paced online modality, an individual learner accesses learning resources through the internet or intranet. As noted by (Farahani, 2003), this modality is appropriate for learners in contexts where internet infrastructure is reliable. A typical example of the modality is a learner studying alone or conducting some research on the Internet or a local network (Naidu, 2006). Contrastingly, the individualised self-paced offline modality refers to situations where an individual learner accesses learning resources without connection to the internet or intranet. The modality is more suited for learners in contexts where internet infrastructure is unreliable or non-existent. An example of this modality is a learner working alone off a hard drive, a CD or DVD (Naidu, 2006).

More still, the group-based synchronously modality reflects a situation where groups of learners work together in real time via the internet or intranet; for instance, through videoconferencing. The synchronous mode is appropriate within contexts where internet is stable. It may include text-based conferencing, and one or two-way audio and videoconferencing. Examples of this include learners engaged in a real-time chat or an audio-videoconference (Naidu, 2006). The

group-based asynchronously modality refers to a situation where groups of learners work over the internet or intranet but where feedback occurs later; for instance, communication through electronic mail (Romiszowski, 2004; Naidu, 2006). The asynchronous mode is commonly applied in countries, where the internet infrastructure is too weak or unreliable (Farahani, 2003). Typical examples of this kind of activity include on-line discussions via electronic mailing lists and text-based conferencing within learning managements systems (Naidu, 2006).

1.1.2 ELearning trends

ELearning has been gaining momentum in developed and developing countries alike over the past two decades, especially in response to the rapid advancement of ICTs. The ability of new ICT facilities to support multimedia resource-based teaching and learning is fundamental to the growing interest in eLearning, world over (Farahani, 2003; Omwenga, 2004). According to Naidu (2006), the revolution in ICT continues to stimulate the design of eLearning courses, which in turn, influences the substance of university education. Statistical projections indicate that enrolment for university education through eLearning was expected to grow consistently from about 900,000 in 2003 to about 15.2 million learners by the end of 2012 (Farahani, 2003; MENON Network, 2007).

Naidu (2006) also points out that the growing interest in eLearning seems to be coming from several directions. First, institutions of higher learning that have traditionally offered distance education perceive eLearning as a logical

extension of their distance education activities. Such institutions also consider eLearning as an avenue for improving access to and expanding the market base for their academic programmes. In this regard, Rosenberg (2001) notes that institutions of higher learning are increasingly experiencing the pressure to integrate ICT in the teaching process; thus, impart skills relevant for job market requirements. The corporate sector also views eLearning as a cost-effective way for staff training and development (Oblinger & Oblinger, 2005; Naidu, 2006).

ELearning is fast becoming the ideal mode of university education in this aged of knowledge-based economies and globalisation. To remain relevant, Kihara (2005) notes that, universities all over the world will have to redefine their mission and review their curriculum to integrate the use of technology. As noted by Dunn (2000), the integration of eLearning is inevitable for institutions of higher learning that wish to remain relevant in the era of technology. The anticipated changes make it necessary for lecturers to learn new roles and skills to facilitate their operation within eLearning environments. Similarly, Volery (2000) emphasises the importance of eLearning to the future of universities across the globe. In this regard, failure to embrace eLearning technology is likely to jeopardize the relevance and survival of such institutions in the decades of information technology.

Despite a high level of interest in eLearning, it is not without constraints and limitations. The fundamental obstacle to the growth of eLearning is lack of

access to necessary technological infrastructure and inadequacy of ICT competence, particularly among academic staff. Limited access to appropriate ICT infrastructure, including software tools and hardware equipment, ties with the prohibitive cost of such products in the market. Consequently, transition from the traditional mode of delivery to eLearning is a gradual process that requires heavy investments, not only on the necessary infrastructure but also in the training and development of human resource (Naidu, 2003).

1.1.3 Merits of eLearning in university education

ELearning is applauded for various reasons: first, it provides an alternative for learners who want to improve their skills but are unable to attend training centres that are situated away from their usual residence (Garrison & Anderson, 2003; Shephard, 2008). The method provides access to resource materials round the clock; implying that learners can access and use such materials at a time, place and at the most convenient pace (Naidu, 2006). As Rosenberg (2001) puts it, "eLearning can reach an unlimited number of people virtually simultaneously. Everyone gets the same content, presented the same way. Yet the programmes can also be customised for different learning needs or different groups of people" (p. 30).

Due to its flexibility, institutions of higher learning are often able to meet the learning needs of their students and staff at a time, place and pace that are most convenient (Becta, 2003). They have been able to do this with the help of

ICTs, which afford learners access to up-to-date information as and when they need them. ICTs and the Internet also provide learners with opportunity to discuss information with their peers and lecturers at their convenience (Oblinger & Oblinger, 2005; Naidu, 2005).

The group-based synchronously eLearning modalities can be used to engage learners in active discussions, sharing ideas and passing information, with fast and accurate feedback (Koo, 2008). Besides, the advancement of ICTs has provided a wide range of software applications and computer conferencing technologies, which enable learners and lecturers to engage in synchronous as well as asynchronous interaction across space, time and pace for collaborative inquiry among students (Naidu, 2005). "eLearning provides access to instructional materials, videos and strategies 24 hours a day, 7 days a week; implying that learners can access their training materials anywhere they have access to the internet. With the use of online chat and e-mail, learners remain in contact with their instructors; they are also exposed to modern technology including multimedia machines, software packages and the internet" (Kerka, 2002, p. 708).

In addition, the application of multimedia machines, software packages and the internet motivates learners, resulting in better academic performance (Kerka, 2002; Ya-Ching, 2006). Lastly, ICTs facilitate the capture and storage of various types of information, including print, audio and video materials, which

may not be possible within the spatial and temporal constraints of conventional educational settings (Levin & Thurston, 1996; Dede, 2000).

1.1.4 Institutional infrastructure and preparedness for eLearning

The preparedness for eLearning at institutions of higher learning is a function of various infrastructural elements, including access to computers at the workplace, internet connectivity and reliability, availability of ICT training programmes, availability of technical support and adequacy of budgetary allocation, just to mention a few. According to Ngai at al. (2007), the fundamental obstacle to the growth of eLearning is lack of access to necessary technological infrastructure. Poor or insufficient infrastructure may restrict access to ICT facilities by lecturers, learners and administrators. On the other hand, limited access to ICT infrastructure is likely to impair practice, efficiency and effectiveness of eLearning initiatives. Also crucial is the cost of system support and maintenance, as well as the appropriate training of staff to enable them make the most of technology (Ngai et al., 2007).

Studies conducted by Hitt and Hartman (2002), Gulbahar (2005) and Albirini (2006) have found that preparedness for eLearning is significantly associated with access to functional computers at the workplace. Access to such facilities often influences the proportion of academic staff who eventually decides to use computers to support their teaching activities. Besides, the adequacy of appropriate computers is also critical in determining the decision and preparedness of lecturers to operate in an eLearning environment.

The linkage between internet access and preparedness for eLearning has been documented in various studies, such as Volery (2000), APEC (2009) and Mercado (2008), among others. Access to a stable Internet connectivity and a dependable computer is crucial for successful integration of eLearning at the institutions of higher learning. However, internet reliability is one of the critical challenges to the integration of eLearning in developing countries. Connectivity challenges may be associated with weak bandwidths (Ndume et al., 2008). Most developing countries are characterised by slow or unreliable internet connectivity, which remains a key concern for institutions of higher learning interested in eLearning.

The adoption and infusion of eLearning should be founded on a sound ICT policy and integration plan, articulating the position of technology within an institution. As noted by Anderson and Dexter (2000), the ICT policy should articulate clear goals, strategies of how such should be achieved, as well as vision and mission, formulated through a broad-based approach, involving administrators, lecturers, technical staff and learners (Bennett, 1996). Also necessary in the preparedness for eLearning is the ICT integration plan. Such plan should detail the process of ICT introduction and support at the departmental level (Strudler & Wetzel, 1999; Bangkok, 2004). Similarly, Gulbahar (2005) emphasises the need for institutions of higher learning to develop ICT master plans to expedite the infusion of technology in teaching and learning processes.

The integration of ICT in teaching and learning activities requires strong leadership to manage the process of change. Such leadership is particularly necessary in the formulation and implementation of appropriate policies on staffing, training and development, technical support, financial allocation and management, among other functions (Bosley & Moon, 2003). Gulbahar (2005) perceives the integration of eLearning as a change process, which requires appropriate policies on leadership and management to allay technology phobia among the academic staff (Miller 1995; Albirini, 2006).

In addition, a strong leadership should come up with appropriate policies to protect intellectual property rights, particularly regarding information that is posted online (Dibiase, 2000). Leadership is also required to influence institutional culture, which modifies attitudes and behaviour towards new technology. A mismatch between new technology and institutional culture is likely to frustrate the infusion of ICT in teaching and learning, which in turn, undermines institutional preparedness for eLearning (Devos, 2007).

The transition from traditional modes of delivery to eLearning comes with various changes, which require academic staff to make certain adjustments in terms of mindset, attitude and skills. Establishing a training programme to support lecturers, administrators and technical staff remains a key component of preparedness for eLearning (US Department of Education, 2000; Gulbahar, 2005).

The importance of such training programmes is also emphasised by (Inglis et al., 1999) and Neil (2004). In this regard, lecturers need to understand new pedagogy for eLearning, course development, moderation and evaluation. Furthermore, Agboola (2005) notes that all academic staff need to experience the power of technology to implement it; he further points out that training is the most critical factor for bonding lecturers with technology and subsequently, successful infusion of eLearning methodology.

Preparedness for eLearning is influenced by the availability and adequacy of technical support for lecturers. Without such support, those who may not be sure of where to turn for technical assistance may remain apprehensive in using ICT facilities (Preston, 2000; OECD, 2005). Lecturers operating in environments that are deficient of technical support often cite lack of such support as the most critical obstacle to the application of ICT tools in teaching activities (US Department of Education, 2000; Butler & Sellbom, 2002). A study conducted by Saekow and Samson (2011) also found that technical support was one of the key requirements for successful integration of eLearning initiatives. In this regard, inadequacy of technical support staff was noted as the key factor influencing academic staff from using ICT facilities in their teaching and was also the main factor delaying the launch of certain eLearning courses.

More still, financial resource is fundamental for successful integration of eLearning in academic institutions. In this regard, Albirini (2006) revealed that inadequacy of financial resource was one of the factors influencing the integration

and use of eLearning in academic institutions. Similarly, Gulbahar (2005) also reported that inadequate financial provisions played a crucial role in influencing institutional use of eLearning in Singaporean public universities.

Various studies such as Schifter (2000) and Pelgrum (2001) have indicated that eLearning is a costly affair and remains way above most institutions of higher learning to finance single-handedly. This explains why most universities in developing countries are yet to shift from the traditional mode of teaching to eLearning. Successful integration and operations of eLearning largely depends on the available budgetary allocation. Consequently, universities contemplating the adoption of eLearning should have appropriate funding strategies and financial management policies to expedite response to issues arising (Bates, 1997; Briggs, 1999).

1.1.5 Lecturers' ICT competence and the preparedness for eLearning

ELearning has the potential to transform the nature of university education, particularly regarding where and how learning takes place. In this regard, eLearning comes with a number of changes in the roles of lecturers (Bangkok, 2004; Omwenga, 2004). According to Farahani (2003), the transition to eLearning in universities prompts changes such as chart rooms replacing lecture halls and electronic discussions boards replacing black boards (Farahani, 2003). Such changes necessitate the mastery of new skills and competencies (Garrison & Anderson, 2003; Lu, Liu & Liao, 2005).

However, in most institutions of higher learning, transition from the traditional mode of course delivery to eLearning is constrained by inadequate computing competence among lecturers, which in turn undermines institutional preparedness for eLearning (Farahani, 2003; Ya'acob, 2005). This challenge is real for many institutions in developing countries, including Kenya (Omwenga, 2004; Kihara, 2005). Computing competence is the ability to use a wide range of computer applications with minimal effort and constraints, to achieve a particular purpose. A high level of computing excellence is necessary for effective use of computers by lecturers to support eLearning activities (van Braak, 2004). According to Albirini (2006), computing competence refers to user's beliefs about their computer skills and it forms a key component of institutional preparedness for eLearning.

The relationship of computing competence among lecturers/teachers and preparedness for eLearning has been a subject of empirical investigation in many countries. A review of empirical literature reveals two sets. The first set comprises of literature that details lecturers' competence in general while the second set focuses on lecturers' competence in specific software tools including word processing, spreadsheets, database, presentations, statistical analysis, Internet and e-mailing tools. Highlighted in the subsequent paragraphs are key findings of selected studies.

Luan, Aziz, Yunus, Sidek and Bakar (2005) conducted a descriptive study, which investigated the gender differences in ICT competencies among academicians at the Universiti Putra Malaysia. The study investigated difference between male and female lecturers in terms of eight software tools, including tools for word processing, spreadsheets, databases, presentations, electronic mail, World Wide Web, multimedia and virtual class applications. Among other findings, the study noted that female and male academicians were most skilful in the application of word processing and e-mailing tools. The high level of competence in the two applications was tied to the frequency utilisation in the development of teaching materials, preparation of manuscripts and communication. The study also found that female lecturers were more competent in the application of most tools than their male counterparts. For instance, in the application of word processing tools, up to 85% of the female lecturers against 64% of their male colleagues rated themselves as 'excellent' in the insertions and editing of texts in word processing. Again, a higher proportion of women than men (96% and 87%, respectively) rated their competence in the application of e-mailing tools as 'excellent'. Overall, 64% of the lecturers were above average in terms of computing competence (Luan et al., 2005).

Marcinkiewicz (1994) found that the level of computing competence was significantly associated with computer use among public university lecturers in the United States. The study noted that computing competence among lecturers was one of the key factors influencing institutional preparedness for eLearning.

Still in the United States, Berner (2003) found that self-perceived ICT competence was the key determinant of computer use by lecturers, especially to support teaching activities. Consequently, developing the ICT competence among lecturers remains crucial for enhancing institutional preparedness for eLearning.

In another study, Sime and Priestley (2005), found a positive correlation between computing competence and computer use frequency among Argentine middle-level college instructors. The study further found that computing competence accounted for up to 7.2% of variance in the preparedness for eLearning and was the third most important factor after access to computers at the workplace and internet reliability. In Ecuador, a study conducted by Harrison and Rainer (1992) indicated that lecturer's attitude was significantly correlated with the frequency of computer use. Based on this, lecturers with negative attitudes towards ICT were less skilled in computer use. The study identified negative attitudes towards ICT as one of the key constraints to institutional preparedness for eLearning among leading Ecuadorian universities.

In Malaysia, a study conducted by Koo (2008) noted that up to 85% of lecturers in public universities were limited in terms of computing skills, which in turn, affected their application of computers to support teaching activities. The functionality of such lecturers was significantly constrained by skill limitations in computing, which delayed the adoption of eLearning by more than half of public Malay universities. Still in Malaysia, a study conducted by Selim (2003) noted

that due to inadequacy of computing skills, more than 80% of Malay lecturers in public universities lacked confidence in computer use; thus, influencing their preparedness for eLearning. The study also found a significant relationship between the level of computing confidence and institutional preparedness for eLearning.

In their study, Al-Ammari and Hamad (2007) found that the perceived usefulness of computers and the perceived ease of use were significantly associated with lecturers' intention to integrate ICT in their teaching activities at the University of Bahrain. The study also found that computer self-efficacy positively influenced lecturers' intention to use computers in their work. The perceived usefulness, perceived ease of use and self-efficacy regarding computer use among lecturers are critical elements of institutional preparedness for eLearning. Lecturers holding a negative perception of computers are less likely to cooperate or accept to infuse such facilities in their work. However, negative psychosocial orientation can be shaped and influenced through training.

Still in Asia, Lu et al. (2005) found that the intention to use eLearning websites among university lecturers in Taiwan was significantly associated with lecturers' competence in using computers, alongside other covariates such as perceived relative advantage, compatibility with new technology and previous experience of using ICT facilities. The study further noted that competent lecturers were more regular in visiting eLearning websites than those lacking

computing skills. The study emphasised the role of universal training for academic staff to facilitate the infusion of technology-aided university education. Such training would be crucial for institutional preparedness for eLearning.

Nanayakkara and Whiddett (2008) noted that the decision of lecturer's to embrace eLearning was significantly correlated with the level of computing skills in online content design. In relation to this finding, the study revealed that about two-thirds of lecturers at the Bay of Plenty Polytechnic in New Zealand reported a low level of computing skills; thus, were less prepared to function in an eLearning environment. Yet again, ICT training was identified as the most crucial avenue through which institutions of higher learning can improve computing skills among their academic staff. Although investment in ICT infrastructure is crucial, staff development is equally as important for eLearning preparedness.

In the United Kingdom, a study conducted by Thomas and Stratton (2006) revealed a strong positive relationship between ICT training, the computing competence and computer use. In this regard, lecturers who had had some training in ICT applications were more competent than those lacking such training. Besides, up to 70% of trained lecturers were of the opinion that the manipulation of ICT tools was easy. In this regard, the frequency of computer use was higher among those who perceived that the manipulation of ICT tools to be easy. The study also found that trained lecturers were consistently using computers to support course delivery than those who were yet undergo such training. In relation

to institutional preparedness for eLearning, the study found a strong relationship between the proportion of ICT competent academic staff and the number of departments delivering their courses through the eLearning mode.

Still in Europe, Drent and Meelissen (2007) found a positive relationship between lecturers' ICT competence and attitude towards such facilities in selected Dutch universities. In this regard, lecturers with positive attitude towards ICT were more regular in computer use to support their work. Besides, computing competence was one of the determinants of eLearning adoption across the departments. Of all the covariates, attitude towards ICT tools accounted for up to 11.0% of variance in the eLearning adoption across the departments. In view of this, institutions intending to adopt eLearning modes should lay down appropriate strategies to re-orient lecturers' attitudes towards ICT facilities.

In Africa, studies relating computing competence and institutional preparedness for eLearning remain scarce. The few existing documentations are concentrated in the south and western parts of the continent. For instance, Thurab-Nkhosi et al. (2004) found that inadequate computing competence among lecturers was one of the key constraints to eLearning at the University of Botswana (UBeL initiative). In this regard, the study revealed that only 20% of the surveyed participants rated their computing proficiency as excellent, the majority expressed discomfort with computers. Thus, inadequacy of computing

skills among lecturers remains a challenge to the infusion of eLearning at the University.

In Namibia, a study conducted by Mpofu (2004) noted that more than two-thirds of lecturers were not using computers to facilitate course delivery, despite the motivational support provided by the universities, which include ICT training, universal access to computers at the workplace and higher allowances for trained lecturers. The study noted that low computing competence was significantly associated with negative attitudes towards ICT facilities, which affected the level of computer use. In Nigeria, Tella (2007) found that low level of computing skills was the key factor influencing the confidence to utilise ICT equipment and software tools to support course delivery. The study found a significant relationship between the level of computing skills and the intensity of fear regarding computer use. In this regard, teachers lacking computing skills expressed a low level of confidence in computer use. Teachers cited concern on how to handle faults occurring during teaching sessions, which enhanced apprehensiveness.

Kenya is one of the countries experiencing a dearth of academic literature on lecturers' computing competence and the infusion of eLearning at the institutions of higher learning. A study conducted by Gakuu (2006) revealed that the use of ICT-based instructional modes was limited at the University of Nairobi; however, lecturers expressed a positive attitude towards computer use and

eLearning. Moreover, lecturers' attitude towards computers and eLearning was not significantly different across University colleges. However, key deficiencies noted in Gakuu's study included inadequate linkage between infrastructural facilities, lecturers' computing competence and preparedness for eLearning. Besides, the study did not bring out the extent of ICT training needs among lecturers at the University.

The infusion of eLearning in institutions of higher learning necessitates preparedness, particularly by ensuring that all lecturers are properly equipped with relevant skills and supported to use such skills in their work. This is particularly essential for universities in developing countries, where ICT use in teaching and learning activities has not been fully embraced (Farahani, 2003). As noted by Koo (2008), besides baseline ICT infrastructure and funding, universities need to support lecturers to acquire ICT skills, which would enable them design and mount courses online, moderate discussions as well as evaluate learners within an eLearning environment. Gan (2001) notes that formal training in ICT skills is necessary for lecturers as institutions of higher learning pursue the agenda of eLearning. Nonetheless, most institutions of higher learning in developing countries have a long way to go before they will fully take advantage of the opportunities provided by technology (Morss, 1999; Naidu, 2005).

1.1.6 Preparedness for eLearning at the University of Nairobi

University of Nairobi (UoN), through the School of Continuing and Distance Education (SCDE) has been the leader in Open and Distance Learning

(ODL) in Kenya (Juma, 2002; UoN, 2007). Its activities date back to 1953 when the first Department of Extra Mural Studies was founded in Makerere with a resident tutor for Kenya. The SCDE was mandated to spearhead distance education activities. The School offers academic programmes using ODL methods, which is a convenient mode of teaching and learning that does not constrain students to be physically present in the same location as the lecturer (UoN, 2007; Rambo, 2008).

In 1986, the Bachelor of Education (Arts), by Distance Learning (DL) was initiated with about 400 learners. Under the programme, learners come to campus for tuitions, revisions and examinations during the months of April, August and December each year. The programme uses print materials, audio cassettes and face-to-face modes of instruction. Historically, ODL was meant be a correspondence study; however, in recent times, audio, video and computer technologies are the more common delivery modes, in addition to face-to-face instruction (UoN, 2007; Rambo, 2008). To remain relevant and competitive in the era of technology, the University is already making efforts to integrate eLearning in the teaching and learning processes. The main aspects of this initiative include establishing the physical infrastructure, installing ICT facilities and building the capacity of its lecturers (UoN, 2007). This initiative is particularly important for achieving its vision of becoming the leading center of academic excellence in the country.

In spite of these efforts, there is limited information about the institution's preparedness for eLearning in terms infrastructural facilities such as computers at the workplace; internet reliability, ICT training programmes for staff, budgetary allocation and the availability of technical support remains inadequate (Gunga, 2006; Kariuki, 2006). Besides, preparedness for eLearning in terms of lecturers' competence in using ICT tools to develop courses, upload learning materials, facilitate online discussions and evaluate learners remains unclear (Gunga, 2006; Kariuki, 2006). Consequently, this study was initiated to assess the influence of ICT infrastructure and lecturers' ICT competence on the preparedness for eLearning at the UoN.

1.2 Statement of the Problem

The introduction of eLearning in universities has been gaining momentum in the past two decades in response to technological revolution, including the advancement of internet as a medium of communication (Farahani, 2003; Omwenga, 2004; Selim, 2007). As such, eLearning has attracted the interest of academic institutions, lecturers, learners and the corporate sector. As noted by Pelgrum (2001), eLearning is a costly venture that requires adequate plans in terms of infrastructure and ICT competent human resource to infuse. Essential infrastructural plans for eLearning should include improved access to computers at the workplace for academic, technical and administrative staff; internet connectivity and reliability, as well as availability of ICT training programmes.

Infrastructural facilities would also include the availability of technical support, adequacy of budgetary allocation, ICT policies and plans, as well as institutional leadership. Various studies such as Anderson and Dexter (2000), Gulbahar (2005), Ngai et al. (2007) and Mercado (2008) among others, have established the existence of significant relationship between the adequacy of infrastructural facilities and institutional preparedness for eLearning. The key message conveyed by such studies is that poor or insufficient infrastructure may restrict access to ICT facilities by academic and technical staff, which in turn, is likely to impair the practice, efficiency and effectiveness of eLearning initiatives.

Furthermore, as universities infuse eLearning in their systems, the roles of lecturers are bound to change significantly, particularly in terms of course development, facilitation, moderation and evaluation of learners (Bangkok, 2004; Omwenga, 2004). This makes it necessary for lecturers to learn new skills to facilitate their operation within an eLearning setting (Farahani, 2003; Lu, et al., 2005). However, inadequate computing competence among lecturers remains a key factor undermining institutional preparedness for eLearning in most institutions of higher learning as noted by various studies, including Marcinkiewicz (1994), Farahani (2003), Omwenga (2004), Sime and Priestley (2005) and Koo (2008), among others. The key message contained in the findings of these studies is that the level of computing competence among lecturers significantly correlates with institutional preparedness for eLearning.

The relationship between infrastructural facilities, lecturers' computing competence and institutional preparedness for eLearning has been a subject of empirical investigation in many countries. However, very little documentation of the subject has been done in African countries, especially in Kenya; thus, leading to a dearth of academic literature to inform policy processes and programming. Although the University of Nairobi has been a leading icon in Open and Distance Learning (ODL) activities within the East African region, eLearning is still at the early stages of development. Transition from the traditional mode to eLearning is constrained by various issues such as weak and unreliable internet connectivity, limited access to computers by lecturers, inadequate technical support and lack of an eLearning strategy (Kariuki, 2006).

The eLearning idea has been nurtured for at least a decade; however, no academic initiative has fully investigated the institution progression towards eLearning, especially regarding infrastructural facilities and ICT competence among its academia. The most recent study whose focus was close to the subject of this study was conducted by Gakuu (2006), who noted that although the application of ICT-based instructional modes was limited at the University of Nairobi, lecturers were positive about the integration of eLearning. However, the study did not establish the linkage between infrastructural facilities, lecturers' ICT competence and preparedness for eLearning. Besides, Gakuu's study did not determine the extent of ICT training needs among lecturers at the institution. These are the information gaps that this study sought to address.

Furthermore, the conduct of this study was necessitated by the realisation that eLearning was fast becoming a necessity in university education, particularly in the era of globalisation and knowledge-based economies. To enhance their survival and relevance in competitive economies, universities across the world have to redefine their mission, especially in relation to technology adoption to expand their markets. By documenting information on infrastructural and skill gaps, as well as training and support needs, this study provides useful baseline information that should stimulate investment in ICT infrastructure and skill development among lecturers at the University of Nairobi.

1.3 Purpose of the Study

This study was designed to assess the influence of ICT infrastructure and lecturers' competence in ICT software tools on their preparedness to function in an eLearning setting. The key purpose of the study was to highlight infrastructural and skill gaps, as well as ICT training and support needs among lecturers at the University of Nairobi, which should be given due attention to enhance their preparedness for eLearning.

1.4 Objectives of Study

The study was guided by the following objectives: -

i. To determine the influence of access to computers at work and reliability of internet connection on lecturers' preparedness for eLearning.

ii. To assess the influence staff ICT training programme and timeliness of technical support on lecturers' preparedness for eLearning.

iii. To examine the influence of technical staff and annual budgetary allocation on lecturers' preparedness for eLearning.

iv. To determine the influence of lecturers' competence in word processing and spread sheet tools on their preparedness for eLearning.

v. To assess the influence of lecturers' competence in database management and presentation tools on their preparedness for eLearning.

vi. To examine the influence of lecturers' competence in statistical analysis and internet tools on their preparedness for eLearning.

vii. To assess how socio-demographic factors influence the preparedness of e-learning.

1.5 Research Questions

The study sought to address the following research questions:

i. What is the influence of access to computers at work, quality of computers and reliability of internet connection on lecturers' preparedness for eLearning?

ii. How does staff ICT training programme and timeliness of technical support affects lecturers' preparedness for eLearning?

iii. What is the influence of technical staff and annual budgetary allocation on lecturers' preparedness for eLearning?

iv. How does lecturers' competence in word processing and spread sheet tools influence their preparedness for eLearning?

v. How does lecturers' competence in database management and presentation tools affect their preparedness for eLearning?

vi. What is the influence of lecturers' competence in statistical analysis and internet tools on their preparedness for eLearning?

1.6 Hypotheses of the Study

The study determined the statistical significance of the following null hypotheses.

$H_0$1: There is no relationship between access to computers at work and lecturers' preparedness for eLearning

$H_0$2: There is no relationship between quality of computers and lecturers' preparedness for eLearning.

$H_0$3: There is no effect of staff ICT training programme on lecturers' preparedness for eLearning.

$H_0$4: There is no relationship between the timeliness of technical support and lecturers' preparedness for eLearning.

$H_0$5: There is no relationship between the adequacy of technical support staff and lecturers' preparedness for eLearning.

$H_0$6: There is no relationship between amount of annual budgetary allocation for ICT and lecturers' preparedness for eLearning.

$H_0$7: There is no relationship between Lecturers' competence in word processing with their preparedness for eLearning.

$H_0$8: There is no relationship between lecturers' competence in spread sheet tools and their preparedness for eLearning.

$H_0$9: There is no relationship between Lecturer's competence in using presentation tools and their preparedness for eLearning.

$H_0$10: There is no relationship between lecturers' competence using in statistical analysis tools and their preparedness to apply eLearning.

$H_0$11: There is no relationship between lecturers' competence in using internet tools and their preparedness to apply eLearning.

$H_0$12 : There is no relationship between the Lecturers socio-demographic factors and their competence to apply e-learning.

The hypotheses were tested at 0.05 error margin, which implies up to 95% confidence that the null hypotheses held true.

1.7 Justification of the Study

The integration of eLearning in institutions of higher learning such as colleges and universities depends on the level to which ICT infrastructure has been developed for easy access by all lecturers. However, Koo (2008) notes that developing infrastructural facilities may not be adequate, especially if lecturers are not trained and consistently supported to function within an eLearning environment. By assessing the influence of ICT infrastructure and lecturers' competence on the preparedness for eLearning, this Thesis highlights infrastructural and skill gaps, as well as training and support needs. This Thesis can be used to justify the need for appropriate interventions to improve lecturers'

preparedness for eLearning. It also improves the stock of existing literature on the integration of eLearning in developing countries, making it a valuable resource material for eLearning scholars.

1.8 Limitations of the Study

The primary limitation of the research design used in this study is that it depends on the co-operation and honesty of participants; which in turn, may affect the questionnaire return rate. To ensure optimum co-operation and honesty in the process, the investigator explained importance of the study, the need for honesty and the guarantee on confidentiality of the information sourced. Co-operation was also improved by involving key administrative offices in follow-up activities. Another limitation is that the study relied on self-assessment of lecturers' competence in using ICT software tools. Such data was likely to suffer from subjective bias. Nonetheless, participants were requested to provide the most sincere rating of their competence in using various ICT software tools. The analysis used the mean score for all reported scores per software tool.

1.9 Delimitations of the Study

The study focused on the University of Nairobi because of its relatively longer history in the provision of higher education through ODL mode. The study covered faculties, schools, institutes and centres within the six colleges of the University. Besides lecturers, senior administrators and administrative staff within

the colleges were targeted during data collection. However, scope of the study was delimited by reliance on personal resources to finance the study.

1.10 Basic Assumptions of the Study

The study assumes that most lecturers are concerned about their ability to function effectively within an eLearning environment. Based on this concern, it is further assumed that instructors were willing to provide accurate information as regards their ICT capabilities, as well as identify their training and support needs; thus, enable the University to strengthen ICT infrastructure and improve lecturers' ICT skills through training and retraining, as appropriate.

1.11 Definition of Significant Terms as Used in the Study

Asynchronous course - Refers to a course in which learners and instructors interact at different times and different places.

Information Communication Technology - Refers to hardware equipment such as internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV and CD-ROM, among others, as well as software programmes such as Learning Content Management System (LCMS), word processing and web browsing tools such as Google Chrome, among others.

ICT software tools - Include basic tools for word processing, spreadsheet, presentation, statistical analysis and the internet. ICT competence was gauged from lecturers' self-estimation of their ICT capability.

ICT competence - Lecturers' perceived capability to work well with various ICT software tools. On a scale of 0 to 100, lecturers rated their capability for each software tool.

Internet - A collection of linked computers and networks around the world.

ELearning - Any teaching or learning activity that is supported by ICT facilities such as computers, satellite TVs, video conferencing, audio or video materials; or the internet, among others.

Preparedness to use - Lecturers' perceived readiness to function in an eLearning environment, given their ICT skills

Synchronous course - Class interaction happening in real time, or at the same time, e.g. videoconferencing or telephone.

1.12 Organisation of the Thesis

This Thesis has been organised into five chapters. Chapter one provides background to the study, research problem, purpose of the study, objectives of the study, research questions, hypotheses of the study and justification of the study as well as limitations, delimitations and definitions of significant terms. Chapter two presents a review of empirical and theoretical literature on ICT infrastructure and lecturers' ICT competence and their preparedness to function in an eLearning environment. The third chapter covers the methodology applied to source, process and analyse data; it covers sub-sections on research design, target population, sample size and sampling procedures; research instruments, validity and reliability issues, as well as data collection and analysis procedures. Chapter four presents study findings, discussions and interpretations of the findings; followed by chapter five, which provides a summary of the findings, conclusions as well as recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explores empirical and policy-related literature focusing on ICT infrastructure and lecturers' competence and its influence on the preparedness for eLearning. The chapter also explores theoretical models on ICT acceptance and use in teaching and learning processes, with a view to identifying a framework within which findings of the study have been contextualised.

2.2 An overview of eLearning

Prior to the advent of the Internet, the higher education sector has largely remained conservative in terms of structures, policies and ideologies (Williams & Goldberg, 2005). Notwithstanding a few policy changes at the international and national levels, higher education systems have been resistant to change, particularly regarding the integration of technology to facilitate teaching and learning activities (Williams & Goldberg, 2005). The evolutionary path of higher education in both developed and developing economies reveals a major paradigm shift, which is tied to two key factors.

The first antecedent to the paradigm shift was a change in political and economic policies in the 1970s, which significantly reduced funding for institutions of higher learning; thereby, prompting such institutions to establish tie with stakeholders in the private sector to enhance their survival. The second

antecedent of the major paradigm shift was linked to ICT development, including the Internet (Hart & Christensen, 2002).

The first signs of political and economic changes emerged in the late 1970s with the demise of post-war Keynesian consensus regarding the role of state (Williams & Goldberg, 2005). Key attributes of this period included fiscal stringency, reduction of the size of national governments, reduction of funding for public universities and market orientation. In this regard, there was intense pressure on universities to become a lot more innovative regarding their funding sources. In other words, public universities were encouraged to initiate projects that would enable them raise supplementary resources to support their development and operational budgetary requirements. Under this arrangement, academic programmes were tailored to fit learner demands, tastes and preferences. Failure to embrace such changes threatened their very survival in competitive markets (Hart & Christensen, 2002; Anderson, 2003).

The growing pressure for market orientation brought sweeping changes in public universities across the world, including the expansion of university access to all segments of the population able to pay for university education (Williams & Goldenberg, 2005). These changes created vast opportunity for population segments and communities that were earlier unable to attain minimal qualifications for joining public universities (Carrier, 1990; Romiszowski, 2004). Consequently, the subsequent decade (1980s) saw an unprecedented increment in

the population of university students, particularly in developing countries - a phenomenon which Carrier (1990) refers to as *massification* of higher education.

In most countries, addressing the educational demand arising from massification became a key challenge, especially due to funding constraints. The challenge bred other challenges such as overstretching of teaching and learning facilities such as classrooms, accommodation, health, catering and entertainment, among others (Association of African Universities, 2009). This challenge bolstered the need for Open and Distance Learning (ODL) modes, which would enable learners to pursue university education without necessarily leaving their usual residences (Garrison & Anderson, 2003; Shephard, 2008). The ODL mode was promoted because it was considered relatively more economical in terms of operational costs, as well as its flexibility, which made it more appropriate for learners in employment (UNESCO, 2002; Krishnan, 2004). ODL enabled public universities to tap into growing national and regional markets for higher education (UNESCO, 2002).

The unprecedented growth in the population of learners pursuing university education through part-time studies and the ODL mode was also noted by UNESCO (2002) and Krishnan (2004), among other studies. Similarly, Williams and Goldberg (2005) notes the dramatic growth in the population of non-traditional learners, aged beyond the typical 18-24 years bracket, which led to a significant change in the demographic composition of learners in public

universities. Enrolment for higher education through the ODL mode is expected to clock 159 million people by 2025, up from a base of 48 million learners in 1999 (Hart & Christensen, 2002; Shephard, 2008).

Gradually, technological advancement yielded ICT facilities and programmes that could address shortcomings of the ODL mode. For instance, communication with loaners through the internet guaranteed faster feedback than communication through surface or airmail (Oblinger & Oblinger, 2005). Consequently, institutions of higher learning soon found ICTs useful in facilitating distance learning by reducing the feedback time, encouraging more interaction and enhancing flexibility (Becta, 2003; Oblinger & Oblinger, 2005). In the late 1980s, ICT supported distance education was called *computer-based teaching* (CBT).

The CBT mode soon generated interests among institutions of higher learning, employers and potential learners in the corporate sector. Of particular interest was the sophisticated pedagogy, which was more interactive, engaging and capable of producing better learning outcomes (Oblinger & Oblinger, 2005; Naidu, 2006). As noted by Hart and Christensen (2002), CBTs provided learning stimulus beyond the traditional learning methodology from textbooks, print materials or classroom-based instructions. For example, CBTs offered user-friendly solutions to satisfy continuing education requirements. Unlike the traditional system, which limited students to attending courses or reading print

materials, under the CBT-based system, learners were able to acquire knowledge and skills through methods that are much more conducive to individual learning preferences. Consequently, universities had no option but to embrace CBT to improve their competitiveness in the national and regional markets of higher education. Oblinger and Oblinger (2005) notes that the adoption of CBT by institutions of higher learning such as New York, Columbia and Cornell Universities and the US Open University came with significant investments.

According to Williams and Goldberg (2005), the development of eLearning is evolutionary rather than revolutionary. The evolution of eLearning has been analogised by experts to the evolution of the movie industry in the United States (Oblinger & Oblinger, 2005). In this regard, eLearning has moved from live stage performances (classroom training) to motion pictures (internet-supported mode). The integration of eLearning requires a gradual but focused transition from the traditional mode to the Internet-supported mode, particularly because it is an expensive venture (Schifter, 2000; Pelgrum, 2001). Institutions jumping into eLearning without adequate plans for infrastructural facilities and human resources are less likely to succeed in their quest (Williams & Goldberg, 2005).

ELearning has gone through several evolutionary phases some of which have been highly optimistic, while others have been characterised by considerable pessimism. The initial phase of CBT, which covered mid and late 1980s, was

characterised by heavy spending on the development of pioneer projects (Williams & Goldberg, 2005). The subsequent period between 1990 and 1994 was rather conservative, as educationists deeply considered the economics eLearning. During this period, funding was as lavish as in the pioneer phase, and project teams were obligated to account for resources placed in their hands to support the development of CBT infrastructure. Another remarkable feature of the second phase was the scalability and economic viability of such projects (Williams & Goldberg, 2005).

The preoccupation with eLearning economics instigated a paradigm shift from CBT to Learning Management Systems (LMS) in the mid-1990s. Operating almost exclusively within a Local Area Network (LAN) environment, early LMS were an attempt by educationists to pool ideas and resources. with a view to providing a more integrated learning experience for students (Williams & Goldberg, 2005; Naidu, 2006). LMS forms the backbone for designing online courses and managing the classes, assignments and tests. A robust LMS will go a long way in supporting both the instructors and students by ensuring effective interactions between instructors and students, uploading and downloading of lessons and course materials, submissions of assignments and reports, evaluation and grading of examinations. One of the main advantages of using a LMS is the convenient incorporation of free course material from the Internet. After a period of relative austerity, there was a renewed optimism about what could be achieved

through eLearning. Towards the end of 1990s, in came the *dotcom boom* and the unlimited promise of the *World Wide Web*.

This era opened the horizons for online LMS, as they were no longer strictly LAN-based for internal use. Instead, learning went fully online regardless of space or time, so long as one has internet connection and a credit card (Williams & Goldberg, 2005). Online LMS are a suite of software tools that enable the management and facilitation of a range of learning and teaching activities and services. In large-scale operations, online LMS can save costs and time. In conventional educational settings, online LMS can help to improve the speed and effectiveness of the educational processes, communication among learners, and staff and students. Use of LMS in non-traditional educational settings (such as in distance education contexts) allows organisations to maximise their value by enabling flexible access to its resources and services. A few of the widely known LMSs include *BlackboardTM, WebCTTM, FirstClassTM, MoodleTM* and *Lotus Learning SpaceTM* (Naidu, 2006).

In response to this development, eLearning providers quickly sprung up ubiquitously to take advantage of the Internet-supported learning, which was considered cheaper and more efficient than the traditional mode (Oblinger & Oblinger, 2005). Some of the pioneer institutions launched during the *World Wide Web* age included the UK e-University, the Digital University in the Netherlands, the Bavarian Virtual University, the Virtual University in Finland, the Net-

University in Sweden and the African Virtual University (Williams & Goldberg, 2005; Oblinger & Oblinger, 2005; Naidu, 2006).

Furthermore, eLearning was praised for providing students with greater autonomy over their learning, particularly in terms of when, where and how such learning takes place (Oblinger & Oblinger, 2005). As noted by Williams and Goldberg (2005) interaction with fellow students and instructors is literally, at their fingertips. Since content is developed in advance, instructors have more time to devote to individual students permitting shorter turnaround times on feedback. Importantly, as less time is spent in didactic content transmission, there is more time for reflection and critical analysis. Finally, eLearning provides students with an opportunity to be part of a strong learning community (Kassop, 2003).

However, the adoption of eLearning was not devoid of controversy. Early attempts at eLearning education were hampered by resistance from conservative institutions and educationists. Arguing from the point of philosophy of education, opponents of eLearning noted that lecturers were essential for university education and could not just be replaced by technological modes (Williams & Goldberg, 2005). Consequently, degrees acquired through the online mode were considered inferior to degrees earned through the traditional mode (Oblinger & Oblinger, 2005). However, improvements in eLearning technology and the ability to create virtual classrooms and a Virtual Learning Environment (VLE) gradually broke down the resistance (Oblinger & Oblinger, 2005).

Based on the evolutionary path, there is optimism that eLearning is here to stay and is rapidly becoming ubiquitous across the globe. The future of eLearning is one of sustainable growth as it continues to draw attention and interest of academic institutions at all levels, learners and employers. Being an expensive venture to set up, eLearning preparedness is critical and institutions need to put in place appropriate infrastructural facilities, including computers, internet connectivity of appropriate bandwidths and technical support systems, among other requirements (Anderson & Dexter, 2000; Gulbahar, 2005; Mercado, 2008). Also important in the preparation phase for eLearning infusion is the development of human resource capacity on computer operations, course development, uploading, moderation and student evaluation through the internet (Marcinkiewicz, 1994; Farahani, 2003; Omwenga, 2004).

2.3 Distance Education and ELearning

The terms "distance education" and "eLearning" are often used interchangeably to refer to learning activities, where instructors and learners are separated by time and space (Moore et al., 2011). Distance education is the oldest term used to describe such learning activities and considered by scholars such as Keegan (1996), as the umbrella term that has been evolving over time. It has also been referred to as correspondence education or correspondence study. Under distance education, both print and electronic media such as CD-ROMS, radio and

television, as well as audio and video tapes, are used to deliver instructional materials (Moore, 1990).

Due to technological advancements, the need for more efficient and convenient mode of instructional delivery within the framework of distance education spurred the evolution of eLearning, where learners and instructors strictly engage via the Internet, Intranet, or satellite broadcast, either synchronously or asynchronously (Conrad, 2006). ELearning heavily relies on the Internet, and is often described as web-based, web-distributed or web-capable. Whatever the terminology used, their primary connotation is the application of ICT tools and the Internet to mediate asynchronous as well as synchronous learning and teaching activities (Tavangarian et al., 2004; Naidu, 2006).

2.4 ICT Infrastructure and ELearning Preparedness

This section has been organised in line with the first three objectives of the study, which covers infrastructural elements such as access to computers at the workplace, quality of computers and reliability of Internet connectivity. The section also covers literature on ICT training programmes, timeliness of technical support, adequacy of technical support and annual budgetary allocation.

2.4.1 Access to functional and quality computers at the workplace

The preparedness for eLearning in universities is influenced by access to good quality computers at the workplace. The relationship between access to computers at the work place and eLearning preparedness has been a subject of empirical investigation in many countries. For instance, a study conducted by Albirini (2006) in Syria found that only 33% of the lecturers had access to computers at their places of work, which in turn, influenced the proportion using such facilities to support teaching activities. The study also noted that the adequacy of appropriate computers was a key factor influencing the decision and preparedness of lecturers to operate in an eLearning environment.

In addition, the study found that 57% of the respondents had computers in their homes. The analysis revealed that access to computers at home was significantly associated with computer use at the place of work. Up to 73% of regular users at the workplace reported having computers at home. Contrastingly, inconsistent users of such facilities at the work place indicated that they did not have computers at their residences. The author premised that access to computers at home provided lecturers with ample time to practice and develop their computing skills. Besides, the home environment ensures confidentiality required by lecturers to develop their skills (Albirini, 2006).

Hitt and Hartman (2002) also indicates that access to computers of the right specifications is fundamental in supporting the integration of eLearning

activities, including course development, delivery and evaluation. The study found a positive correlation between the model of computers allocated to lecturers and the frequency of use to develop teaching notes. In this regard, older models were complicated and broke down too often. Consequently, up to 46% of lecturers having Pentium II and Pentium III computers cited the poor condition and age as the key constraints to consistent computer use. Similarly, Gulbahar (2005) asserts that access to up-to-date computer hardware, software and network resources is a key feature for ICT integration in the teaching process.

A little earlier, Blankenship (1998) noted that the integration of eLearning activities was influenced by factors such as the number of computers available and accessible to lecturers, learners and the administrative staff at the workplace. Besides, successful integration of eLearning also depends on the quality of computers in terms of power to process information and navigate through resourceful websites; reliability and strength of internet connection, as well as peripheral equipment such as printers and scanners. However, the availability of such infrastructural facilities alone is not enough, it is also important for lecturers to know how such facilities are operated and how to address minor troubleshooting issues.

In Malaysia, Zakaria (2001) assessed factors influencing the integration and application of ICT equipment in government polytechnics. The study noted that one such factor was the inadequate access to modern computer hardware and

software resources by lecturers. A positive rank correlation was found between the computer age and the frequency of use to support academic activities. Based on this, inadequate investment in ICT infrastructure and the high cost of connectivity were identified as key challenges to effective use of computers by lecturers to facilitate course delivery. The study concluded that the use of technology in teaching was dependent on accessibility of high quality ICT equipment by lecturers.

In the United States, the Department of Education through its National Center for Educational Statistics (NCES) investigated ICT use in the teaching and learning processes. The study found that up to 87% of lecturers included in the study had access to functional computers at their places of work. Based on this, a positive correlation was established between availability of computers at the workplace and the frequency of use by lecturers. In this regard, lecturers who had access to computers at the workplace were more likely to use them in supporting the development of teaching materials, information search and actual delivery through PowerPoint presentations.

Contrastingly, lecturers who lacked access to computers at the workplace entirely relied on the traditional methods of course preparation and delivery. Others solicited the support of administrative staff to help them prepare their course materials. However, this approach was faulted for the time taken to correct typographical and factual errors arising out of lack of expertise on the part of

administrative staff. It also interferes with regular duties of such staff. In conclusion, the study noted that the integration of ICT in teaching and learning in the institutions of higher learning was a function of the number of functional computers available and accessible to lecturers, students and administrative staff (US Department of Education, 2000).

Assessing factors influencing the integration and application of ICT facilities in North Carolina Community Colleges, Hill (2003) also found that successful integration and use of eLearning systems was influenced by inadequate access to computers by lecturers. The study found that 75% of the academic staff had access to functional computers at the workplace; besides, the consistency of computer use in supporting teaching and learning materials was significantly associated with access to computers at the workplace. In other words, lecturers who had access to computers at their places of work were about four times more likely to use computers in preparing course materials, information search, data analysis and processing of student marks.

In China, Huang (2008) investigated factors influencing the adoption of eLearning in Chinese Universities. The study noted that the acceptance and integration of eLearning was subject to the influence of various factors, including physical infrastructure, organisational culture, support from institutional management as well as training and technical support to the academic staff. Regarding physical infrastructure, the study noted that access to ICT facilities

such as computers at the place of work was positively correlated with lecturers' computing competence. In other words, lecturers having access to computers at the workplace were likely to be better skilled than those lacking access to such facilities. However, access to computers alone may not be adequate in determining the level of preparedness for eLearning because other factors such as the strength, stability and reliability of the internet connection also play a critical role in determining the integration and application of eLearning facilities. In this regard, Huang (2008) noted that this was a limitation in his study; consequently, the need for further study on other factors influencing preparedness for eLearning was emphasised.

A study conducted by ANSTI (2005) on science and technology status in Africa, noted that the average staff-computer ratio for science and technology faculties in most African universities was about one computer per two staff members. The study also noted that a low computer-lecturer ratio limited opportunities for practice and skill development. In this regard, lecturers who lacked access to computers in their offices reported a lower level of computing competence than those having access to such facilities. The study suggested that this ratio could be improved by investing more into computer acquisition through a cost-sharing model where staff would be assisted to purchase computers through a recovery mechanism.

Furthermore, the study emphasised the need to improve access to ICT facilities to all academic staff in institutions of higher learning, particularly those focused on science and technology training. The study also revealed remarkable disparities in the number of computers in the surveyed universities, whereas in some universities, up to 68% of the academic staff had been provided with computers, in other institutions, computer coverage among the academic staff was less than 30%. In other words, less than one-third of the institutions provided computers to their staff at the workplace.

These statistics pointed to a situation that requires substantial resources to achieve an efficient ICT infrastructure and access that would be supportive to eLearning course delivery. To address the situation, the study recommended the need to establish ICT units within universities, with well-trained technical staff to manage network and bandwidth resources. Such units would be sustained by creating ICT budget lines to cater for maintenance and expansion (ANSTI, 2005). However, the study did not take cognizance of resource scarcity in most African university vis-à-vis the fact that eLearning is a capital-intensive venture.

2.4.2 Internet connection and reliability

The Internet is a technological development that has the potential to change not only the way society retains and accesses knowledge but also, to transform and restructure traditional models of higher education, particularly in terms of course materials, resources and delivery methods (Singh, O'Donoghue,

Worton, 2005). Similarly, Volery (2000) notes that the rapid expansion of the Internet and related technological advancements, in conjunction with limited budgets and social demands for improved access to higher education, has produced a substantial incentive for universities to introduce eLearning courses.

A report by done by the Asia-Pacific Economic Cooperation (APEC) in 2009 noted that there are tremendous discrepancies in Internet access across the globe, particularly between developed and developing countries. For instance, by 2009, fewer than 1 in 2,000 Malians in Africa used the Internet, while in Singapore; nearly three out of every ten people in did have internet access (APEC, 2009). Many countries have introduced 'flat rate' pricing structure for local telecommunications in order to increase Internet penetration and usage. Under a flat rate approach, consumers pay a fixed monthly fee to their telephone provider for connection to an Internet Service Provider (ISP). Unlike a flat rate system, metered rates inhibit time spent online and become counterproductive to promoting Internet usage (APEC, 2009).

Similarly, the 2001 OECD study, titled *Understanding the Digital Divide* indicated that metered rates have a serious dampening effect on Internet usage, which is also important in determining internet accessibility (OECD, 2008). In this regard, Internet subscriber penetration in countries with unmetered pricing is about 31% greater than in countries with metered pricing; besides, the time

Internet subscribers stay online is about 35% greater in countries with unmetered pricing than it is in countries with metered pricing (OECD, 2008).

For eLearning, the reliability of internet is of critical importance in determining the preparedness for eLearning. As noted by Mercado (2008), one of the critical requirements for eLearning is the access to a stable Internet connectivity and a dependable computer. Various studies have suggested that internet reliability is one of the critical challenges to the integration of eLearning in developing countries. For instance, Ndume et al. (2008) assessed the challenges of Adaptive eLearning in institutions of higher learning in Tanzania and noted that the availability of reliable internet connectivity was a critical part of preparation for eLearning.

In this regard, up to 34% of the respondents admitted experiencing difficulties connecting to the internet. Connectivity challenges were associated the unreliability of internet services in Tanzania. Among those having access to internet services, up to 52% reported that connection was often slow, making it more expensive and difficult to access requisite information. Concerning security in connecting to the Internet, the results showed that 32% agreed that they experienced security-related risks.

In a study that included 560 employees of seven institutions of higher learning in the United States, Japan, Indonesia and Zambia, Mungania (2003)

found that up to 66% of the academic staff had access to computers with internet connectivity. Access to such computers varied significantly between the countries and within the institutions involved in the study. More specifically, more lecturers in developed countries than developing countries had access to computers with internet connectivity.

The study noted that participants' opinion on the reliability of internet connection was significantly associated with the frequency of Internet use. In other words, those who opined that internet connectivity was very reliable were about 3 times more likely to have used internet in the preceding one-month period to support their teaching activities. Besides, internet use was higher in developed countries such as the United States and Japan than in developing countries, which included Indonesia and Zambia. This further implies that internet connectivity is more reliable in developed than in developing countries.

In their study titled *Training Teachers in eLearning without Internet Access*, Juradol, Pettersson, Christie and Seoane (2008) found that most developing countries are characterised by slow or unreliable internet connectivity. This was a key concern for institutions of higher learning interested in integrating eLearning. The study noted that internet unreliability was associated with the problem of weak bandwidths vis-à-vis the population of connected users. More particularly, most African countries lack reliable internet services, which can allow and support stronger eLearning programmes.

More still, Unwin (2008) conducted a survey of eLearning in African Universities. Part of the study focused on the availability and reliability of internet connectivity. In this regard, up to 13% of the reported that their internet connectivity was excellent, while 27% of the lecturers indicated that internet connectivity was poor or non-existent. Besides, up to 66% reported that their internet connectivity was inadequate and unreliable. The study established a significant association between the quality of internet connectivity and the frequency of internet use by lecturers for academic purposes in the preceding one-week period.

Additional findings indicated that the availability of computers, electricity and Internet connectivity in Africa are indeed far below those in many other parts of the world. Consequently, the author underscored the need for more investment in the communication sector by foreign companies to uplift the status of ICT infrastructure, which in turn will enable institutions of higher learning infuse eLearning. The study identified Internet unreliability as one of the key constraints to the adoption of eLearning in African Universities.

2.4.3 Institutional ICT policy and integration plans

Institutional ICT policy is also essential in guiding the institutionalisation of eLearning. A well-defined ICT policy describes the place of technology in an institution, the starting point and the goals to be achieved. Anderson and Dexter

(2000) indicates that a good ICT policy should have a clear vision and mission statements; created through a broad-based approach, involving administrators, lecturers, technical staff and learners. The broad-based approach to the formulation of institutional ICT policy promotes effective use of technology in teaching and learning processes (Bennett, 1996).

Besides a sound ICT policy, Strudler and Wetzel (1999) emphasises that educational institutions should have documented ICT integration plans, spelling out how lecturers are expected to initiate the use of ICT in their teaching. According to Bangkok (2004), an ICT master plan that is formulated in line with institutional vision and mission assures effective integration of eLearning. The importance of ICT master plans was also emphasised by Gulbahar (2005). In this regard, educational institutions must develop ICT plans to effectively use technology for teaching, learning and administrative purposes.

2.4.4 Institutional leadership and culture

Bosley and Moon (2003) also pointed out that leadership was among the key factors influencing the use of eLearning in academic institutions. Institutional leadership was particularly crucial in terms of timely formulation and implementation of appropriate policies on staffing, training and development, technical support, financial allocation and management, resource mobilisation, remuneration, change management, institutional culture among other elements of governance. According to Anderson and Dexter (2000), the role of institutional

leadership is central in addressing administrative, pedagogical and financing preconditions; which in turn, would facilitate the use of technology in teaching by educational institutions.

Fullan (1992) also concurs that institutional leadership is crucial for the successful use and integration of eLearning in educational institutions by creating enabling policies and structures. Institutional leadership would play its role more effectively when leaders are cognizant of the value that technology would add in their teaching obligations. Bangkok (2004) urges that to promote the use of eLearning, institutional leaders should formulate strategies that make technology part of lecturers' routine tasks. Such strategies may include regular use of e-mails as the formal mode of communication between staff and administration, as well as among staff themselves. The strategies may also include downloading lesson plans and schemes of work forms from the internet and completing the same using word processing software tools (Bangkok, 2004).

Dibiase (2000) also notes that institutional leadership should encourage lecturers to embrace eLearning by formulating and enforcing policies that would safeguard their intellectual property rights, especially where courses and resource materials are posted online. This was based on the finding that lecturers often worried about the risk of plagiarism when they upload their intellectual materials on to the internet for learners to access.

Gulbahar (2005) points out that the use of eLearning is a process of change, which arises from a state of dissatisfaction with the *status quo*. Effective management of this change process requires educational institutions to have appropriate policies on change management, as well as strong leadership that are also experienced in change management. In view of this, institutional leadership must assist staff who may fear that the use of technology in teaching may render them irrelevant should be assisted to overcome such fears (Miller 1995; Albirini, 2006).

The culture within educational institutions is an important factor influencing the use of eLearning (Tearle, 2003). Maslowski (2001) defines institutional culture as the informal norms, beliefs and values, shared by members such as the administrative, technical and academic staff as well as learners. These cultural elements modify attitudes and behaviour towards new technology within educational institutions. In this regard, where a technology is not well received by lecturers, there must be a mismatch between institutional culture and the new technology (Devos, 2007). ELearning is likely to be integrated in institutions where lecturers feel that the new approach is going to improve their status, income, or other benefits (Allan, 1999; Albirini, 2006). Based on this, an attractive incentive policy is likely to encourage positive attitudes among lecturers, which in turn, would facilitate the use of eLearning by educational institutions (OECD, 2005; Gulbahar, 2005).

ELearning is also a time-consuming venture, demanding the attention of lecturers in creating courses, facilitating discussions and responding to e-mails from learners around the clock (Levine & Sun, 2003). In view of this, Zakaria (2001) noted that heavy workload and time shortage were among the key factors influencing ICT use US universities. Again, in the study conducted by US Department of Education (2000), about 82% of the participants cited lack of time as one of the critical factors hindering the integration of ICT in teaching. Arguably, with a high number of regular classes to tend to, teachers lacked the time and opportunity to practice the use of various eLearning (US Department of Education, 2000).

2.4.5 ICT training programme for lecturers

The introduction of eLearning in institutions of higher learning may also be supported by establishing training programmes targeting lecturers, administrators and technical staff. All the staff involved in the delivery of eLearning requires a wide scope of ICT skills to effectively develop courses, upload lessons, moderate and evaluate learners (Gulbahar, 2005). This implies that academic institutions serious about eLearning should have well-developed training programmes to address skill gaps among staff (US Department of Education, 2000). Neil (2004) also affirms that well-developed ICT skills are crucial in using various eLearning. More importantly, lecturers need to understand new pedagogy for eLearning; that is, most effective practices for teaching within an eLearning environment (Inglis et al., 1999).

Saekow and Samson (2011) assessed eLearning readiness among Thai and United States universities. Among other components, the study focused on the readiness for eLearning in terms of training for lecturers. The study noted that all the 11 universities covered in Thailand had ICT training programmes. However, slightly more than one-half of the participants (52%) reported that such training programmes were inactive and had not benefitted most members of the academia. The study also found a significant relationship between the activeness of ICT training programmes and lecturers' self-perception of competence in working with computers. The study noted that lecturers have an important role of transferring knowledge to students through the eLearning mode.

The study further noted that failure of some lecturers to appreciate and warm up to eLearning was one of the key factors that delayed the integration and development of eLearning programmes. In other words, not many lecturers were interested in eLearning. Consequently, the training programme was not effective in helping lecturers improve their skills, particularly due to lack of appropriate strategies and funding. In view of this, the study emphasised the need for ICT training programmes targeting university lecturers to be revamped with necessary resources to enable university lecturers understand and appreciate the importance of eLearning mode. Besides, the study noted that a stronger training programme was also necessary in preparing them with appropriate ICT skills, as well as course delivery and administration skills within the new environment.

Among the United States universities, the study noted that lecturers were relatively more skilled in the application of eLearning tools. In terms of performance management, university authorities had initiated various non-monetary strategies to incentivise lecturers. Some of the strategies cited in the study included annual awards events, mentoring opportunities, and professional development opportunities to increase the level of attention and interest in taking on new challenges. In addition, while there is accumulating evidence that online instruction can deliver a rich learning experience, employing a wide variety of pedagogies and learning tools, lecturers' opinions seem to be mixed as to their embrace of eLearning. As content area experts, lecturers seem to be content with their traditional 'sage on the stage' role and are resistant to online education.

In a similar study, which covered 121 lecturers in a leading public university in the United States, Lion and Start (2010) found that up to 65% of the respondents indicated that the traditional lecture mode was the most effective way to achieve learning outcomes. Also cited as factors fuelling lecturers' resistance against eLearning included perceived incompatibility with online pedagogies, compensation issues, inadequate training, the time required to create online courses and lack of administrative support. The study suggests that lecturers' training is critical for them to accept the new mode of course delivery.

The authors argued that people always perceived change to a new system as a threat to their status. The change process is ridden with suspicion and anxiety; without proper management of the change process, very little can be achieved. However, training is key to effective management of suspicion and anxiety associated with the change process. An effective training programme for lecturers is indispensable for all lecturers in developed as well as developing countries.

In Botswana, Thurab-Nkhosi et al. (2004) assessed and documented the measures initiated by the University of Botswana to prepare academic staff for eLearning. The study found that although the University of Botswana eLearning (UBeL) initiative's course development process was collaborative, the Educational Technology Unit (EduTech) had experienced a number of challenges in involving academic staff. One of the main challenges was lecturer's unwillingness to participate in instructional design training. Instead of viewing instructional design as a process that ensures consistency and cohesion between elements of a course and that facilitates course evaluation, many faculty members viewed the instructional design process as unnecessary and time-consuming.

Furthermore, although the eLearning training courses were widely publicise on internal notice boards, in individual e-mail invitations, and in departmental invitations, participation was low. Out of 760 UB academic staff members, 28 lecturers (3%) registered for eLearning training courses. Of this

number, 17 (60%) lecturers attended the traditional course, while 11 (40%) registered for the online version of the course (Thurab-Nkhosi et al., 2004).

To address this challenge, EduTech has worked in collaboration with the Teaching and Learning Unit (TLU) to build the capacity of the academic staff to use the strategies they learn in the workshops and to emphasise the importance of using a systematic instructional design approach. In addition to the seven funded UBeL pilot courses, the resulting Guidelines for eLearning Course Development, and the additional funds that have been allocated to assist departments wishing to develop online courses in 2005, the TLU offered modified eLearning workshops to new faculty members in their orientation to teaching, research and service at the University.

The eLearning workshops have been established in conjunction with the Center for Academic Development (CAD) eLearning Certificate in 2003 as a further incentive for faculty to develop the skills, knowledge and attitudes that promote the use of ICTs in teaching and learning. In this regard, the CAD eLearning Certificate requires the completion of eight EduTech's 17 lecturer development workshops. The mandatory courses include Principles of eLearning Course Design; Introduction to eLearning; Teaching in the SMART classroom and Video Conferencing; Information and Computer Skills; Management Techniques; Online Information Gathering and Copyright on the WWW; Multimedia Production, and WebCT Refreshers (Thurab-Nkhosi et al., 2004).

The study also found that the strategy of offering workshops as part of a certificate course had achieved great success; while six lecturers obtained certificates in 2003, 17 lecturers obtained certificates in 2004, and in 2005, twenty-five more lecturers were expected to receive such certificates. Furthermore, since the introduction of the CAD eLearning Certificate, lecturers' participation in eLearning workshops had increased from 96 lecturers attending in 2002, to 221 lecturers attending in 2003, and 207 lecturers attending by June 2004. In addition, the average attendance of workshops increased from 8.5 in 2003 to 13.6 in 2004, while the average number of workshops that each lecturer attended rose from 3.4 in 2003 to 4.6 in 2004.

Agboola (2005) assessed the awareness and perceptions of academic staff in using eLearning tools for instructional delivery at the International Islamic University in Malaysia. The study found that training of lecturers was the most important factor explaining up to 7.4% of variance in eLearning adoption and readiness. The regression model explained up to 34% of the total variance in eLearning adoption and 32% of the total variance in eLearning readiness.

The findings suggested that the lack of appropriate training for lecturers was a serious obstacle to eLearning adoption and readiness. When asked to compare their ICT skills with their students, up to 67% of the lecturers indicated that their skills in the application of ICT tools was lower than that of their

students,; a situation which was attributed to lack of training. These findings suggest that more training and confidence building regarding the application of ICT tools would be worthwhile in enhancing the lecturers' preparedness to accept and to function in an eLearning environment.

Based on the findings, the author asserted that academic staff need to experience the personal value embedded in the technology as both productivity tools to increase efficiency and as mind tools for providing learning opportunities to students. Whereas the author emphasises the need for all academic staff to experience the power of technology to implement it, he points out that training remains the most critical factor for bonding lecturers with technology and subsequently, successful implementation and integration of eLearning methodology.

2.4.6 Adequacy and the timeliness of technical support

Technology is one of eLearning enablers whose proper application and usage facilitate learning. As noted by Gulbahar (2005), in traditional systems learners are equipped with books and pens to copy written notes from the traditional black board. However, in an eLearning environment, the opposite is the case; learners are happy with summarised notes projected on the boards, simulation and animations, provoking video images and stimulating sounds. In such settings, technical challenges are inevitable; thus, the need for sustained technical support for lecturers.

The amount of technical support provided to lecturers is one of the factors that influence the preparedness and use of various eLearning. Lecturers who may not be sure of where to turn for technical assistance in case of a problem remain apprehensive in the use of ICT facilities (Preston, 2000; OECD, 2005). In their study, Butler and Sellbom (2002) noted that lack of technical support was often stressful to lecturers, which in turn, influenced the acceptance of technology for teaching. Besides the need for technical support, the application of eLearning may also be enhanced by appointing an ICT coordinator to assure administrative and pedagogical support for lecturers (Bangkok, 2004).

More still, in the study conducted by the US Department of Education, 68% of the lecturers affirmed that lack of technical support hindered the integration of eLearning. The study also found that lecturers in institutions with no technical coordinators were more likely to cite lack of technical support as a barrier to their use of various eLearning than those in institutions with a technical coordinator. In view of this, the study concluded that lack of on-site technical and administrative support was a key reason for lecturers' inadequate use of technology in teaching and learning process (US Department of Education, 2000).

In their study, Saekow and Samson (2011) also amplified the value of technical support for lecturers, as one of the prerequisites for successful integration of eLearning initiatives. In this study, lecturers felt there the institution

did not have enough technicians to support the implementation of eLearning activities, which in turn, caused delays in launching certain eLearning courses. Besides, up to 60% of the lecturers expressed concern about lack of cooperation between lecturers and the few technical staff available. This affected the timeliness of response to issues raised by the academic staff.

On their part, ICT technicians also at the University cited concerns with the level of cooperation with academic staff. More than 40% of the technicians commented that the lecturers' negative attitude towards eLearning activities such as development of course content and that more than one-half were afraid that eLearning would faze them out. In conclusion, the authors emphasised the need for joint seminars to enable lecturers and technicians to understand each other's needs and develop cooperative work relations that are essential for the success of eLearning (Saekow & Samson, 2011).

2.4.7 Budgetary allocation for eLearning integration

ELearning is a costly undertaking that requires concrete financing plans (Schifter, 2000; Pelgrum, 2001). As a result, most institutions of higher learning find it difficult to finance eLearning projects single-handedly. This explains why the integration of eLearning in Africa and other developing regions lags behind compared to the status of eLearning adoption in the United States or Western Europe (Hjeltnes & Hansson, 2005). Financial planning for eLearning projects must never overlook the issue of funding reliability and sustainability (Clark &

Berge, 2003). Financial planning should also include a clear system for monitoring and evaluation to enhance efficiency as well as ensure accountability and that lessons are applied to similar projects (Breitner & Hoppe, 2005; Hjeltnes & Hansson, 2005).

Like any other business venture, eLearning projects have significant start-up as well as operational costs. Start-up costs include the purchase of computers, Internet infrastructure, software applications used to create the online presence, as well as develop and transmit course materials. Most importantly, start-up costs include the purchase of the Learning Management Systems (LMS), Learning Content Management System (LCMS) and authorizing software (Haney, 2008). Other costs include software maintenance, software licenses required to run the applications such as SQL Server, Cold Fusion, Crystal Reports, among others. Start-up costs also include training of academic, technical and administrative staff on about three or four different software applications (Hjeltnes & Hansson, 2005; Haney, 2008).

Financial resource is critical for successful integration of eLearning at the institutions of higher learning. In view of this, the linkage between funding adequacy and preparedness for eLearning has attracted empirical studies in various countries. For instance, a study conducted by Albirini (2006) in Syria revealed that inadequacy of financial resource to initiate and maintain ICT systems was one of the factors influencing the integration and utilisation of

eLearning in academic institutions. The study found a significant relationship between the amount allocated for ICT development and the number of computers accessible to lecturers in each department.

In his study, which focused on Singaporean universities, Gulbahar (2005) also reported that inadequate financial provisions played a crucial role in influencing the integration of eLearning projects. The study found that public universities differed significantly based on the amount of funds allocated for ICT development. Furthermore, the level of ICT use in each department significantly correlated with the funding level of ICT integration. In this regard, budgetary allocation accounted for up to 4.6% of variance in the proportion of lecturers consistently using computers. In relation to preparedness for eLearning, the study found that budgetary allocation explained up to 3.9% of variance in lecturers' perception of preparedness for eLearning.

Similar findings are also evident in the works of Schifter (2000), who noted that lack of funds for materials and expenses influenced the rate of integration and the use of Asynchronous Learning Networks (ALNs). According to Pelgrum (2001), eLearning is a capital-intensive undertaking, which most institutions cannot finance single-handedly; hence, its successful integration largely depends on the funding strategies and models adopted by an institution. Reaching out to the government and the corporate sector for funding support is

one of the models often documented for eLearning universities in developed countries (Pelgrum, 2001).

Nevertheless, institutional financial management policies also remain critical for the success of eLearning projects, as noted by Pelgrum (2001), Bates (1997) and Briggs (1999). In view of this, institutions of higher learning should have in place effective financial management policies and structures for timely response to issues arising from the eLearning project (Bates, 1997; Briggs, 1999). According to Dibiase (2000), institutions with devolved financial management systems are more likely to sustain eLearning projects at the faculty level, than institutions whose financial systems are centralised.

Given that the use of eLearning in educational institutions is a costly affair, financial management policies should emphasise strategies for resource mobilisation through internal initiatives and from external sources (Dibiase, 2000). Accordingly, institutional leadership should aggressively pursue collaborative linkages with potential funding partners. Educational institutions with external funding partners are likely to raise supplementary resources to finance eLearning activities (Briggs, 1999; Dibiase, 2000).

2.5 Lecturers' Competence and eLearning Preparedness

Lecturers' competence in using ICT tools is one of the key factors influencing the preparedness for eLearning. Inadequate ICT skills limit the

functions of lecturers in an ICT-dominated work environment. These premises have been reflected in various empirical studies, some of which have been reviewed in the following paragraphs. The empirical literature on the lecturers' computing competence exists in two sets. The first set of literature focuses on specific software tools such as word processing, spreadsheets, presentations, database, statistical analysis, Internet and e-mailing tools. The second set of literature focuses on the general ICT facilities used to facilitate teaching and learning processes.

2.5.1 Lecturers' competence in application of software packages

Computing competence is the ability to handle a wide range of varying computer applications for various purposes (van Braak, 2004). According to Albirini (2006), computing competence refers to user's beliefs about their computer knowledge and skills. Better still, computing competence includes basic computer operation to understanding of social, legal and ethical issues. Quite important though, computing competence is essential for the adoption of eLearning at the institutions of higher learning.

In their study, Luan et al. (2005) conducted a descriptive study, which investigated the gender differences in ICT competencies among academicians at the Universiti Putra Malaysia. The study investigated if there was any difference between men and women in terms of eight ICT tools, which included tools for

word processing, spreadsheets, databases, presentations, electronic mail, World Wide Web, multimedia and virtual class applications.

The study found that female and male academicians were most skilful in the use of word processing, followed by e-mailing tools. In this regard, lecturers perceived themselves to be competent in both these applications. Participants considered word processing as a writing tool to increase their productivity. Besides, up to 85% of the female lecturers against 64% of their male colleagues rated themselves as 'excellent' in the insertions and editing of texts in word processing. This suggests that female lecturers were more competent in the application of word documents. Again, a higher proportion of women than men (96% and 87%, respectively) rated their competence in the application of e-mailing tools as 'excellent'.

Regarding the application of e-mailing tools, lecturers considered this tool as a means for communication either for leisure or for academic purposes. The study noted that both men and women considered the Web more as a tool for acquiring information rather than a place for publishing their work. However, this finding was linked to the institution's policy on the integration of eLearning elements in lectures and emphasis on publications as a precondition for promotions.

Notably, both scenarios required academicians to acquire Internet application skills. Lecturers needed to search for information and materials to develop or update their lecture notes, as well as prepare their papers for publication. The study noted that these application software tools were widely used to facilitate the development of teaching materials. This was the main reason behind the high level of competence noted among participants in the study conducted by Luan et al. (2005). Academic staff often applies the three tools to enable them write, communicate and search for information. Regarding the application of Internet tools, up to 89% of female lecturers against 81% of the male lecturers rated their competence in the application of search engines and downloading files from the Web as 'excellent'.

The study also found that both men and women were competent in the application of presentation and spreadsheet tools. This finding was linked with the regular application of presentation tools during lectures and conferences. The study noted that all lecture halls at the university were equipped with Liquid Crystal Display (LCD) projectors, while others were equipped with desktop computers for instructors' convenience. There is no doubt that the availability of such facilities encouraged lecturers to use presentation tools to facilitate their work. The study noted that spreadsheets were also commonly used by lecturers, especially in the management of student grades and scores. In this regard, the study found a significant relationship between the frequency of software use and the competence in such tools.

In terms of gender variations, the study found that up to 71% of the female lecturers compared with 63% of their male colleagues rated their competence as 'excellent' in the insertion and deletion of texts using presentation tools. This also suggests that women lecturers were more competent in the application presentation tools than male lecturers. However, no significant difference was noted between members of the two groups when it comes to the application of spreadsheets tools.

Regarding the application of database tools, the study noted a lower level of competence among both men and women. Notably, database tools were least applied by lecturers to support their academic work. This is the main reason for the lower proportion of users among the participants. However, no significant difference was noted between members of the two groups when it comes to the application of database tools.

Furthermore, both men and women rated their competence in the application of multimedia and virtual class applications as poor. This is because such tools were considered specialised software requiring advanced skills. However, the low scores in the application of virtual class tools came as a surprise because the Universiti Putra Malaysia had embarked on a campus-wide training for the lecturers on the application of online systems, which was developed in 1999 to help lecturers manage their classes. The low scores further suggest that

the institution's effort to integrate eLearning had not achieved much in the preparation of academic staff with necessary skills. In terms of gender, the study noted that there was no significant difference between members of the two groups in the application of multimedia and virtual class tools.

In another study, Son et al. (2007) examined computer literacy and competency among Indonesian teachers of English as a Foreign Language (EFL). The study also assessed factors influencing the application of computers in classrooms. Based on self-rating of competence, the study found that computing competence among the teachers was high. However, the application of software tools was limited to only a few packages such as word processing tools. Furthermore, the knowledge and application of spreadsheets, presentations and database tools was rated as 'low' for more than half of the participants. In addition, primary school teachers reported the lowest level of computer use and competence. The level of computing competence was associated with factors such as limited access to computers, individual effort, lack of experience, particularly with most software tools. The level of competence was high for the package that is used most often, that is word processing. Of these factors, limited access to computers was the most important factor influencing the level of computing competence. Despite limited access to Internet-connected computers, the teachers showed highly positive attitudes toward the use of computers.

2.5.2 Lecturers' general ICT competence

In Malaysia, Koo (2008) assessed factors affecting lecturers' preparedness for eLearning and found that 85% of them could not function effectively in ICT environments due to limited skills. This was identified as the main factor limiting the number of lecturers using ICT facilities in teaching. Selim (2003) also investigated lecturers' acceptance of eLearning and noted that the inadequacy of ICT skills resulted to lack of confidence in using ICT tools; thus, influencing their preparedness for eLearning in Malaysian universities.

Still in Malaysia, Agboola (2008) investigated the preparedness of the lecturers for the introduction of eLearning at the International Islamic University Malaysia. Among other findings, the study revealed that training in ICT and self-confidence were significant predictors of both eLearning adoption and eLearning readiness. This implied that lecturers who had some training in ICT were more prepared to operate within an eLearning environment because they developed confidence in using ICT tools. The study also assessed the effect of background factors such gender and age, but whose influence on both eLearning adoption and eLearning readiness was weaker.

In Indonesia, Bauer and Kenton (2005) assessed the challenges experienced in integrating technology in schools. The study noted that although the availability and access to modern ICT facilities was fundamental for educational institutions to use eLearning, the number of skilled and innovative

lecturers also influenced the pace with which institutions integrated technology both as a teaching and learning tool.

In Taiwan, Lu et al. (2005) investigated factors influencing the adoption and use of eLearning websites in universities. The study found that the intention to use eLearning websites was influenced by perceived relative advantage, compatibility with new technology and previous experience in using ICT facilities. The use of eLearning websites among lecturers was also influenced by their competence in using ICT tools. Unlike incompetent lecturers, those who were competent in using ICT tools were quick to access and use the eLearning website. Nonetheless, the study findings may not be appropriate in explaining the integration of eLearning in African universities because it eluded the role of access to physical infrastructure.

In Bahrain, Al-Ammari and Hamad (2007) assessed factors influencing the adoption of eLearning at the University of Bahrain. The study, which was grounded on Technology Acceptance Model (TAM), found that perceived usefulness and perceived ease of use had significant positive effect on lecturers' intention to use eLearning. Also noted was that computer self-efficacy had a positive effect on lecturers' intention to accept eLearning facilities. In conclusion, the authors noted that enhancing ICT skills among lecturers would be important in influencing their perception, as regards usefulness of eLearning. However, the model applied in the study has been faulted for not taking into consideration the

socio-economic and cultural factors, which also shape an individual's psychological orientation on the use of ICT facilities (MacKeogh & Fox, 2009).

Lecturers' competence in using ICT tools may further be influenced by demographic factors, such as age and gender. In India, Venkatesh and Morris (2000) assessed the role of gender and social influence on technology acceptance behaviour among academic staff of public universities. Among other findings, the study revealed that men were more likely to accept a new technological innovation than women. In terms of age, younger lecturers were more receptive to new technologies than their older counterparts. It was argued that younger lecturers were more willing to learn new ideas, as opposed to their older colleagues, who viewed new ideas as a threat to their survival in ICT environments.

In Syria, Albirini (2006) assessed teachers' attitudes towards ICT tools and found that age was not a significant factor in explaining the acceptance of ICT among Syrian teachers. In Jordan, Abbad et al. (2009) investigated factors affecting the use of eLearning systems by university students and lecturers. The study found that age correlated negatively with the use of eLearning systems among lecturers. This result demonstrated that as lecturers' age increased, the use of eLearning decreased, implying that younger lecturers were more willing to use new methods of delivery than their older colleagues.

In Saudi Arabia, Almusalam (2001) assessed factors related to the use of computer technologies for professional tasks by business and administration lecturers at government technical colleges. The study noted that lecturers' attitude was one of the major predictors of the use of ICT in an eLearning environment. Arguably, the successful use of technology in classroom, to a large extent, depends on lecturers' attitude towards ICT tools. Besides, a positive attitude is likely to promote the implementation of technology-based activities in the classroom by encouraging all lecturers to acquire requisite skills through training and practice.

In the United States, Berner (2003) examined factors influencing lecturers in selected schools of education in the Commonwealth of Virginia to use computers in classroom. The study found that an individual's belief in his/her ICT competence was the greatest predictor of their use of computers to support teaching activities. The study concluded that developing ICT competence among lecturers would play a crucial role in facilitating the use of eLearning.

Still in the United States, Knezek and Christensen (2002) assessed the impact of new ICTs on lecturers' functions and learners' performance. The study hypothesized that a high level of ICT skills would produce higher levels of technology integration, which in turn, would reflect on student achievements positively. The model applied in the study postulated that lecturers with higher

levels of ICT skills would readily enable educational institutions to integrate technology in their lecture rooms.

In Ecuador, Harrison and Rainer (1992) assessed the influence of lecturers' personal attributes on computing skills in Ecuadorian public universities. The analysis indicated that lecturers with negative attitudes towards ICT were less skilled in computer use and were therefore less likely to accept and use ICT innovations than those with positive attitudes (Harrison & Rainer, 1992). The study concluded that changing lecturers' negative attitudes was essential for enhancing their ICT competence and operation in an eLearning environment. Therefore, if lecturers want to successfully use technology in their classes, they need to possess positive attitude to use ICT tools. Such attitude is developed when lecturers are sufficiently comfortable with technology and are knowledgeable on its use.

In a worldwide assessment of obstacles to the integration of ICT in educational institutions, Pelgrum (2001) found that lack of computer operation skills was one of the key factors influencing the use of technology in teaching. Additional findings indicated that lecturers' lack of ICT skills and knowledge was the second most inhibiting obstacle to the use of technology in educational institutions. However, the inadequacy of computer skills was noted to be severer in the African region than in other parts of the world. The study emphasised the

need to improve ICT skills and knowledge of lecturers for successful integration of technology in educational institutions.

In New Zealand, Nanayakkara and Whiddett (2008) assessed factors influencing the acceptance of eLearning technologies among lecturers of the Bay of Plenty Polytechnic. Among other findings, the study revealed that the degree of knowledge and skills in online content design strongly influenced the decision of lecturers to embrace eLearning technology. In this regard, about 60% of lecturers felt they lacked skills needed to operate in an eLearning environment. The study emphasised the need for adequate training and support before the use of such technology. The results further indicated that there was a strong relationship between ICT literacy rate of staff and the acceptance of eLearning technologies; hence, respondents with higher ICT literacy were more confident in applying eLearning tools.

In Australia, Shannon and Doube (2003) assessed factors impacting on the adoption and use of web-supported teaching at the University of Adelaide. The study found that even though most lecturers valued eLearning, only a few were actually using ICT tools in the teaching process. Besides, more staff valued web-based learning in higher education than they were adopting it. The principal reasons given were inadequacy of time as well as workload in preparing, administering and delivering courses within the eLearning framework.

In the United Kingdom, Thomas and Stratton (2006) examined the ICT use, attitudes and training needs of lecturers in middle-level colleges. The findings revealed that training was crucial for lecturers to learn how to manipulate ICT tools and integrate teaching activities into eLearning systems. Sufficient training also made lecturers feel that manipulating ICT tools was easy. Arguably, lecturers tend to use eLearning tools when they perceive that it is easy to manipulate. Through training, lecturers are likely to gain self-confidence and better manipulation skills of ICT tools, which in turn, would improve the use of eLearning.

Lecturers' competence in using ICT tools may also be influenced by the attitude towards ICT facilities. In this regard, Drent and Meelissen (2007) explored factors, which stimulate or limit the innovative use of ICT by lecturers in the Netherlands. The study found that ICT use among lecturers was influenced by several factors, including positive attitude towards ICT facilities, computer experience and personal motivation to acquire ICT skills. Further comparison of these factors noted that attitude towards ICT tools contributed most in explaining the use of ICT facilities among lecturers. In the same country, Roberts et al. (2003) also explored barriers to the use of technology for teaching and learning in Dutch universities and noted that elderly lecturers were less likely to use ICT tools in their teaching because some of them were trained long before the arrival of computers.

Houtz and Gupta (2001) explored gender roles, computer attitudes and dyadic computer interaction performance among Egyptian public university lecturers. Among the key findings, the study revealed that male lecturers were more confident and had a greater usage of computers compared to their female counterparts. Besides age, training in ICT skills also had an effect on lecturers' acceptance and use of technology. In general, younger lecturers had a greater tendency to use computers compared to their older and more experienced colleagues. The study emphasised the need for training interventions targeting female and older lecturers to enhance computer use.

In Nigeria, Tella (2007) investigated factors impeding ICT use by secondary school teachers. The study indicated that the inadequacy of ICT skills was the key factor influencing the confidence to utilise ICT equipment and software to support teaching and learning activities. Lack of confidence to use ICT tools was further perpetuated by the fear of faults occurring and recurring during teaching sessions. This prompted teachers to avoid using technology. The study underscored the need to enhance teachers' ICT competence through appropriate training and support.

More still, Mpofu (2004) examined lecturers' perceptions of factors that support or impede their use of ICT tools at the University of Namibia. Among other findings, the study noted that most lecturers were not using technology to facilitate learning and teaching. Among other factors, the low level of ICT use

was associated with negative attitude towards ICT facilities. Arguably, lecturers' positive attitude towards ICT tools was a crucial factor influencing the use of computers in the teaching process at the university.

In Botswana, Thurab-Nkhosi et al. (2004) also found that lecturers' computer proficiency was another challenge experienced under the UBeL initiative. In this regard, many of the participants in the traditional workshops reported limited computer skills and less than 20% described their proficiency as excellent. For some participants taking part in the training workshops, exposure to computers in course development context helped diminish their fears and anxiety; thus, helping improve their general computer skills.

Although participants in the online course reported a higher level of computer proficiency than those in the traditional course, inadequacy of computing skills among lecturers remains a challenge to the infusion of eLearning for teaching and learning at the University of Botswana. To address this challenge, EduTech initiated a budgeting process to secure the license for the International Computer Drivers License training course. However, this faculty training initiative has been transferred to UB's Centre for Continuing Education and has not yet been implemented.

In Kenya, Gakuu (2006) examined factors that influence lecturers' attitude towards the use of distance education and eLearning. Among key findings, the study revealed that although the use of ICT-based instructional modes was

relatively low, lecturers had a positive attitude towards the use of eLearning activities and the use of computers. Besides, the study revealed that there was no significant difference in attitude towards the use of eLearning across the University of Nairobi Colleges. Nevertheless, the influence of institutional infrastructure and lecturers' competence on the preparedness for eLearning was inadequately explored by the study. Better still, the study did not adequately reveal the extent of ICT training needs among lecturers as a precondition to effective operation in an eLearning environment.

2.6 Theoretical Framework

This study adopted three theoretical models to assess the infrastructural and skill gaps as well as training and support needs in relation to lecturers' preparedness for eLearning. These include the technology acceptance model, diffusion of innovation model and technology adoption model. Detailed description of these models is provided in chapter two under the subsection 2.4. Technology Acceptance Model was developed from the constructs of the Theory of Reasoned Action (TRA) and was inspired by the scholarly works of Fishbein and Ajzen (1975). TAM has been applied in various social contexts to explain technology acceptance and utilisation behaviours at the individual level. However, its scope leaves out key aspects of technology acceptance such as institutional infrastructure and policy attributes, which are also key determinants of technology acceptance (Mathieson, 1991; Venkatesh, 1999; Saadé & Bahli, 2005).

The diffusion of Innovation Model (DIM) was formulated by Rogers in 1995. The model outlines a five-stage process, consisting of actions and choices through which an individual or institution evaluates a new technology and decides on whether to adopt or otherwise. DIM's constructs are more focused on individual attributes and perceptions influencing technology adoption than on policy factors which also influence the adoption of eLearning at institutions of higher learning.

Technology adoption model (TAM) was developed by McNaught, Phillips, Rossiter and Winn in 2000. The model captures three key dimensions of technology adoption by institutions, viz. *policy framework, support infrastructure* and *institutional culture*. TAM is most applicable to empirical investigations involving factors influencing technology adoption by institutions, rather than individuals. However, it compliments with TRA and DIM, because institutions are run by individuals. This study adopted the TAM in its design, implementation, interpretation of findings and making conclusions.

For nearly half a century, social scientists have advanced various theoretical frameworks to explain technology acceptance behaviour. These theories provide details of technology acceptance process, as well as key personal factors influencing preparedness to use technological innovations. The literature review identified three different theoretical models, explaining lecturers' preparedness to use ICT facilities in the teaching process.

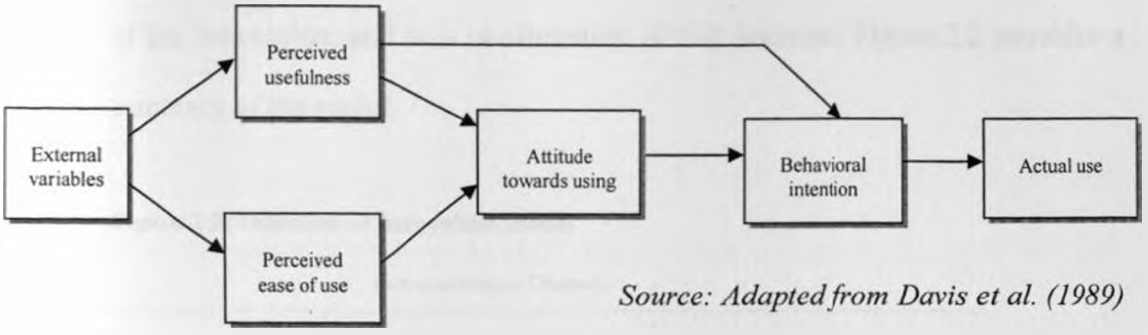
2.6.1 Technology Acceptance Model

Technology Acceptance Model (TAM) was formulated by Davis (1986). It is an intention-based model that was specifically tailored for modelling user acceptance of technology. It is capable of explaining user behaviour patterns towards technology across various populations, while at the same time being both parsimonious and theoretically justified (Davis et al., 1989). TAM was developed from the constructs of the Theory of Reasoned Action (TRA), which in turn was formulated by Fishbein and Ajzen (1975). The TRA is a widely-studied theoretical framework from social psychology, which is concerned with the determinants of consciously intended behaviours (Ajzen & Fishbein, 1977). The theory posits that a person's performance of a specified behaviour is determined by his or her behavioural intention to perform that behaviour; in turn, behavioural intention is jointly determined by the person's attitude and subjective norm concerning the behaviour in question.

The TRA provides a theoretical basis for specifying causal linkages between two key sets of constructs: one, *perceived usefulness* and *perceived ease of use;* and two, *user's attitude*, *behavioural intentions* and *actual computer usage behaviour*. Perceived usefulness is defined as the user's subjective probability that using a specific application system is likely to increase his or her job performance within an organisational context (Davis et al., 1989; Mathieson, 1991; Venkatesh,

1999). On the other hand, perceived ease of use refers to the degree to which users expect the targeted technological innovation to be free of effort regarding its transfer and utilisation. This measure reflects the potential difficulty for the adopting individual to utilise the new technology, especially if he/she is required to learn to use the new technology (Moon & Kim, 2001). Figure 2.1 summarises the theoretical model.

Figure 2.1: Technology Acceptance Model



Source: Adapted from Davis et al. (1989)

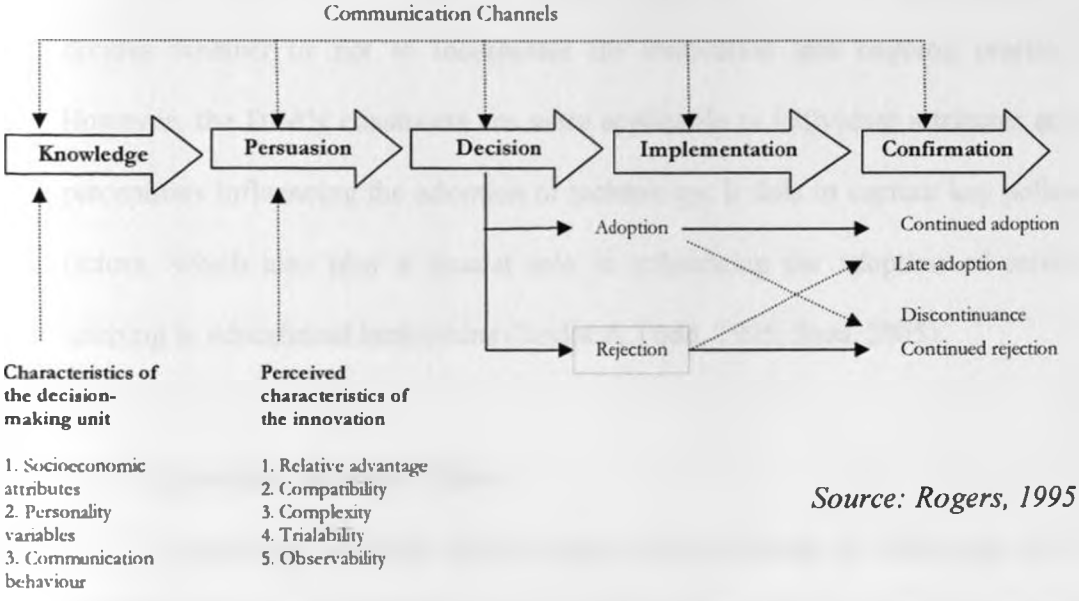
Both perceived usefulness and perceived ease of use predict attitude toward using a new technological innovation. Perceived usefulness may also affect behavioural intention directly. An innovation that is easy to implement can reduce the time and effort required for its adoption. Moreover, user's attitude influences an individual's behavioural intentions, which in turn, influences the actual use of an innovation. Although TAM has been widely applied in understanding technology acceptance and use behaviours, it is most appropriate in explaining technology adoption at the individual level. It however, fails to capture key institutional policy attributes that are fundamental in influencing adoption of online teaching in educational institutions (Mathieson, 1991; Venkatesh, 1999; Saadé & Bahli, 2005).

2.6.2 Diffusion of Innovation Model

The second theoretical model identified in the reviewed literature is the Diffusion of Innovation Model (DIM), which was developed by Rogers in 1995. The model entails a five-stage process through which an individual (institution)

passes from gaining the initial knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the innovation, and to a confirmation of this decision. Figure 2.2 provides a summary of the model.

Figure 2.2: Diffusion of Innovation Model



Source: Rogers, 1995

The stages of the innovation decision process include: 1) *knowledge* stage, which occurs when an individual (institution) is exposed to an innovation's existence and gains some understanding of how it functions; 2) *persuasion* stage, occurs when the individual (institution) forms a favourable or unfavourable attitude toward the innovation; 3) *decision* stage, occurs when the individual (institution) engages in activities that lead to a choice to adopt or to reject the innovation; 4) *implementation* stage, occurs when the individual (institution) puts an innovation into use; and 5) *confirmation* stage, occurs when an individual

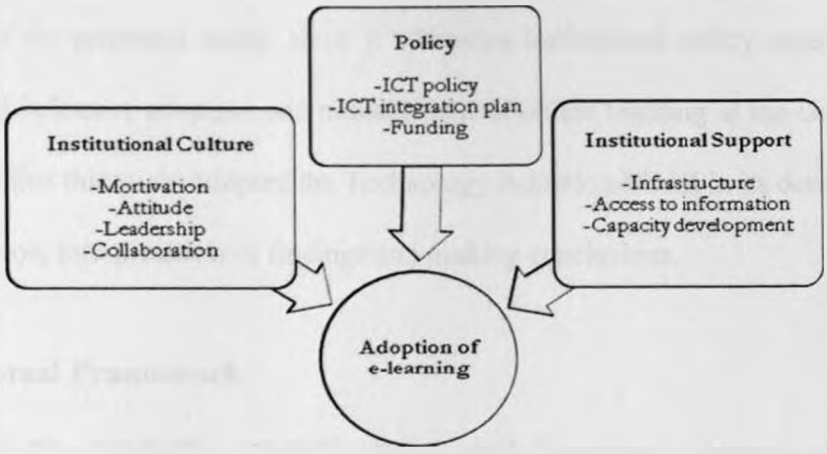
(institution) seeks reinforcement of an innovation decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about it (Rogers, 1995; Taylor & Todd, 1999).

The process as a whole consists of a series of actions and choices over time through which an individual (organisation) evaluates the new idea and decides whether or not to incorporate the innovation into ongoing practice. However, the DIM's constructs are more applicable to individual attributes and perceptions influencing the adoption of technology. It fails to capture key policy factors, which also play a crucial role in influencing the adoption of online teaching in educational institutions (Taylor & Todd, 1995; Shea, 2005).

2.6.3 Technology Adoption Model

Technology Adoption Model, which was formulated by McNaught et al. in 2000. The model highlights three key dimensions, namely *policy framework, support infrastructure* and *institutional culture* that influence the adoption of technology by an educational institution. As illustrated in figure 2.3, the *policy framework* dimension of the model includes leadership, specific institutional policies, the extent to which policies were aligned and congruent in an institution and strategic processes such as grant schemes, founded on the policies.

Figure 2.3: Technology adoption model



Source: McNaught et al. (2000)

The *institutional culture* dimension comprises factors such as the extent of collaboration with strategic partners, the personal motivation of innovators, as well as characteristics of the institution such as staff rewards, teaching and learning models and attitudes towards innovation. The third dimension, *institutional support*, represents the range of institutional infrastructure designed to assist and facilitate the adoption process, such as the library and information technology services, professional development of staff, student support, educational design support and IT literacy support for staff and students. The model posits that institutions that address the three dimensions are well-placed to adopt any new technology in its operations (McNaught et al., 2000).

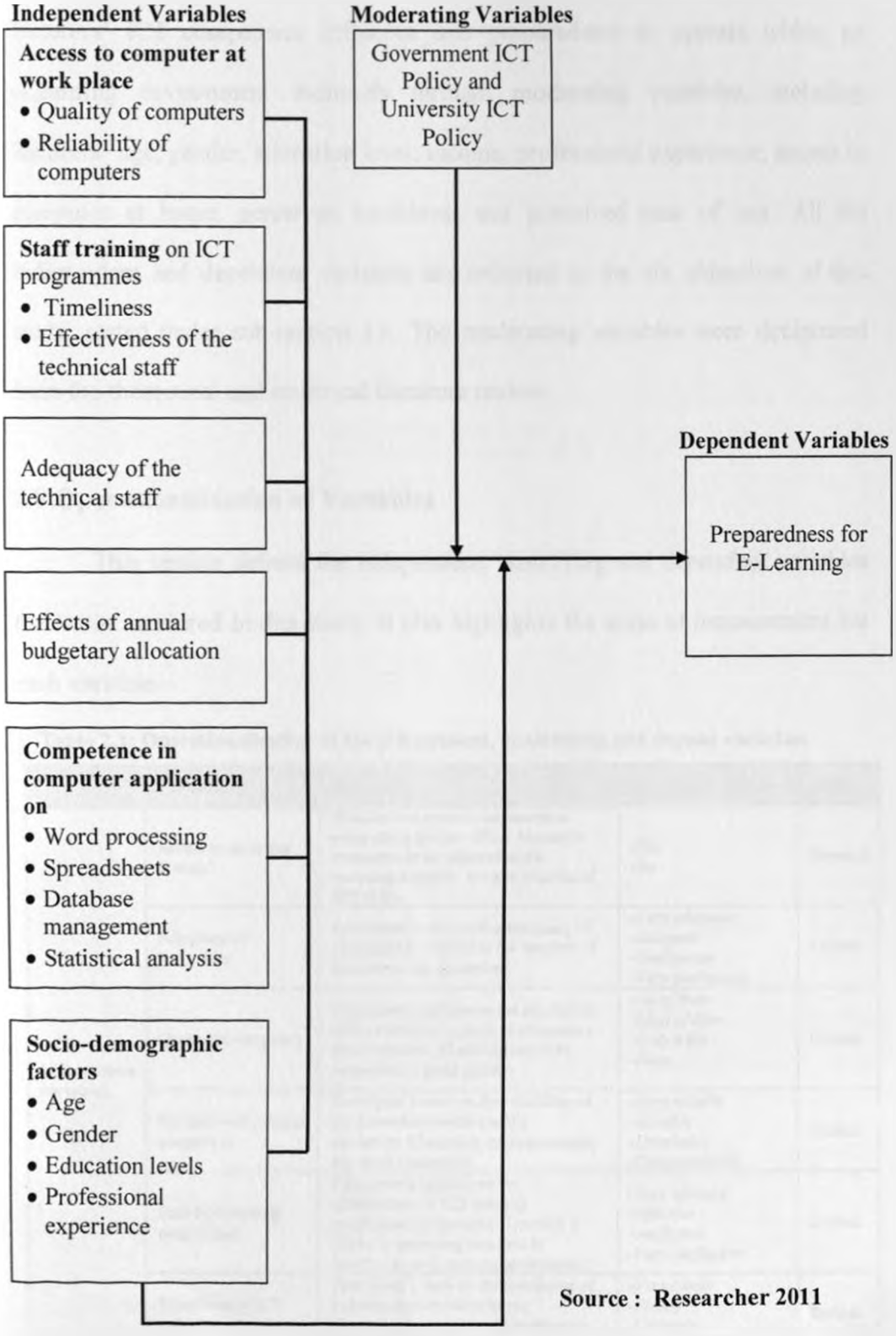
The model posits that the presence of these three dimensions would lead to widespread adoption of technology by all institutions. This is a condition in which the *policy framework, support infrastructure* and *institutional culture* have been all fulfilled. Of the three theoretical models highlighted, the researcher finds the

Technology Adoption Model by McNaught et al. (2000) to be most applicable to objectives of the proposed study, since it addresses institutional policy aspects, which would influence adoption and management of online teaching at the UoN. This implies that this study adopted the Technology Adoption Model in its design, implementation, interpretation of findings and making conclusions.

2.7 Conceptual Framework

From the reviewed empirical, policy and theoretical literature, the researcher proposes the following conceptual framework to identify the variables that were measured in this study. As indicated in figure 2.4, the variables have been categorised as independent, intermediate and dependent. Independent variables have further been classified under two broad concepts, viz. ICT infrastructure and lecturers' ICT competence.

Figure 2.4: Conceptual framework



Source : Researcher 2011

The conceptual framework shows that institutional ICT infrastructure and lecturers' ICT competence influence user preparedness to operate within an eLearning environment indirectly through moderating variables, including lecturers' age, gender, education level, income, professional experience, access to computer at home, perceived usefulness and perceived ease of use. All the independent and dependent variables are reflected in the six objectives of this study, stated under sub-section 1.4. The moderating variables were deciphered from the theoretical and empirical literature review.

2.8 Operationalisation of Variables

This section defines the independent, modifying and dependent variables that were measured in this study. It also highlights the scale of measurement for each variable.

Table 2.1: Operationalisation of the independent, moderating and depend variables

Variable type	Variable	Description	Variable indicators	Scale
Independent variables	Access to computer at work	Whether one owns or can access a computer at his/her office. Access to computers at the place of work encourages regular use and practice of ICT skills	*-Yes* *-No*	Nominal
	Adequacy of computers	Participant's view on the adequacy of computers in relation to the number of lecturers at the institution	*-Very adequate* *-Adequate* *-Inadequate* *-Very inadequate*	Ordinal
	Quality of computers	Participant's opinion on the proportion of the institution's stock of computers that is modern ELearning requires computers of good quality.	*-All of them* *-Most of them* *-Only a few* *-None*	Ordinal
	Reliability of internet connection	Participant's view on the reliability of the internet connection at the institution ELearning requires around-the-clock connection	*-Very reliable* *-Reliable* *-Unreliable* *-Very unreliable*	Ordinal
	Staff ICT training programme	Participant's opinion on the effectiveness of ICT training programme for lecturers Training is crucial in preparing lecturers to function in an eLearning environment	*-Very effective* *-Effective* *-Ineffective* *-Very ineffective*	Ordinal
	Timeliness of ICT technical support	Participant's view on the timeliness of technical support to lecturers. ELearning requires timely response to technical problems arising	*-Very timely* *-Timely* *-Untimely* *-Very untimely*	Ordinal

Variable type	Variable	Description	Variable indicators	Scale
	Adequacy of ICT technical staff	The proportion of technical support staff in relation to the number of lecturers to be supported	*-Very adequate* *-Adequate* *-Inadequate* *-Very inadequate*	Ordinal
	Adequacy of annual ICT budget	Participant's view on the adequacy of annual budgetary allocations for ICT integration.	*-Very adequate* *-Adequate* *-Inadequate* *-Very inadequate*	Ordinal
	Word processing software tools	Participant's opinion on his/her ability to use word processing tools	*-< 10%* *-10-24%* *-25-49%* *-50-74%* *-75-100%*	Nominal
	Spreadsheets	Participant's opinion on his/her ability to use spreadsheet software tools	*-< 10%* *-10-24%* *-25-49%* *-50-74%* *-75-100%*	Nominal
	Database management tools	Participant's opinion on his/her ability to use database management software tools	*-< 10%* *-10-24%* *-25-49%* *-50-74%* *-75-100%*	Nominal
	Presentation tools	Participant's opinion on his/her ability to use presentation software tools	*-< 10%* *-10-24%* *-25-49%* *-50-74%* *-75-100%*	Nominal
	Statistical analysis tools	Participant's opinion on his/her ability to use any statistical analysis software tools such as SAS, SPSS, Epi Info etc	*-< 10%* *-10-24%* *-25-49%* *-50-74%* *-75-100%*	Nominal
	Internet tools	Participant's opinion on his/her ability to use internet tools, including sending and receiving e-mails, uploading and downloading documents and general browsing. ELearning is an internet based approach; hence competence in internet use is likely to enhance lecturers' preparedness for eLearning.	*-< 10%* *-10-24%* *-25-49%* *-50-74%* *-75-100%*	Nominal
Moderating variables	Age	Participant's age in complete years. Younger lecturers are likely to be more receptive to ICT facilities than older lecturers	*-In complete years*	Interval
	Gender	Socio-cultural expectation on an individual based on whether one is female or male. Men and women have shown varying behaviour patterns towards ICT facilities	*-Male* *-Female*	Nominal
	Education level	Highest formal academic qualification of the participants. Education level influences the willingness and confidence to use ICT facilities.	*-Bachelors* *-Masters* *-PhD*	
	Income level	Average amount of money earned by a participant per month from formal and informal economic activities	*-<KES 50,000* *-KES 50,000 - 59,999* *-KES 60,000 – 69,999* *-KES 70,000 - 79,999* *-KES 80,000 - 89,999* *-KES 90,000+*	Nominal
	Professional experience	Total no. of years one has served in various ranks as lecturer. Experienced lecturers are likely to have undergone ICT trainings; thus, putting them in a	*-In complete years*	Interval

Variable type	Variable	Description	Variable indicators	Scale
		better position to function in an eLearning environment.		
	Access to computer at home	Whether a participant owns or can access a computer at home. Access to computers at home provides ample and confidential opportunity for lecturers to practice their ICT skills	*-Yes* *-No*	Nominal
	Perceived usefulness	Participant's view on the importance of eLearning in course delivery and expected benefits	*-Very useful* *-Useful* *-Fairly useful* *-Not useful*	Ordinal
	Perceived ease of use	Participant's opinion on how easy eLearning will be easy to apply. People are motivated to accept innovations which they will apply with minimal effort.	*-Very easy* *-Easy* *-Not easy*	Ordinal
Dependent variable	User preparedness	Participant's view on his/her readiness to operate in an eLearning environment	*-Prepared* *-Not prepared*	Nominal

The chapter has explored both empirical, policy and theoretical literature. The application of eLearning in teaching depends on infrastructural issues such as availability and access to appropriate ICT facilities. It also depends on institutional policies on ICT integration, funding, staff training, leadership as well as time and workload management. The integration of eLearning also depends on lecturers' competence in using various ICT tools. Also notable from the literature was that the documentation of eLearning experience was highest in Asia and least in Africa.

At the University of Nairobi, although attempts have been made to assess lecturers' attitude towards eLearning, little has been documented on infrastructural gaps, lecturers' ICT competence, as well as training and support needs; this is the gap that this study sought to fill up. Having reviewed the literature, the next chapter provides details of the design and methodology to be applied in sourcing, processing and analysing the requisite data.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides details on the research design and methodology that was applied to source, process and analyse the requisite data. The chapter also provides highlights on various methodology items, including target population, sampling procedures and sample size, research instruments, validity and reliability issues, pilot testing, data collection procedures as well as data processing and analysis techniques.

3.2 Research Design

This study applied a cross-sectional survey design, which allows the collection of requisite information from target population at a single point in time (Babbie, 1973; Fowler, 1993). The design is the most commonly used form of survey design; as the name suggests, cross-sectional surveys cross-analyse respondents' background information such as age, gender, ethnicity, as well as opinions and attitudes (American Statistical Association, 1999). Being a mixed method design, the quantitative approach consisted of structured questions, which elicited information used for descriptive and inferential purposes. The qualitative approach consisted of open-ended questions, which obtained in-depth information for validating descriptive and inferential statistics (Mwanje, 2001). The two dimensions were complementary and were used simultaneously for high quality

data. The design applied in this study has been used by various scholars, including Gakuu (2006), Albirini (2006) and Rambo (2008), among others.

Cross-sectional survey designs are cheaper than longitudinal designs in terms of finances and time. This quality makes cross-sectional designs most appropriate for academic researchers, who in most cases, are limited by budgetary constraints (Rindfleisch et al., 2008). Unlike longitudinal designs, cross-sectional designs are not vulnerable to confounding factors such as social, political or cultural changes because data is collected at one point in time.

According to Bryman and Cramer (1997), cross-sectional designs are capable of providing a wider range of information on population characteristics than other survey designs. It is also applauded for its ability to enhance validity of the data by subjecting all participants to standardised data collection instruments. Cross-sectional surveys are appropriate for studies that "examine concrete and externally-oriented constructs, sample highly educated respondents, employ a diverse array of measurement scales, and are strongly rooted in theory" (Rindfleisch et al., 2008, p. 2).

Nevertheless, cross-sectional survey designs have two inherent weaknesses. First, they are likely to suffer high non-response rate because they are conducted based on voluntary participation. Where respondents are not fully informed or motivated to give information, cross-sectional designs may be underproductive. To cope with this limitation, all the respondents were consented

before taking part in the study. The consenting processes involved a detailed explanation about purpose of the study, participants' rights, expectations, potential risks and confidentiality guarantee. This helped participants to understand the study and make informed decisions about their participation.

Secondly, cross-sectional designs are likely to yield socially-desirable responses. There is a psychological tendency of respondents to provide socially acceptable responses rather than ones that reflect their own true opinions (American Statistical Association, 1999; Rindfleisch et al., 2008). To overcome this limitation, participants were encouraged to be honest with their responses. They were assured that the information obtained would be used for research purposes only and that their identity would be protected. More still, the questionnaires were designed for self-administration to avoid the possibility of interviewer bias creeping into the results.

3.3 Target Population

The study targeted all lecturers and administrative staff at the University of Nairobi. The title of the study focused on lecturers' preparedness for eLearning; however, given that administrative staff play a crucial role on policy formulation, implementation and enforcement, their actions influence the work environment in which lecturers operate. Their inclusion in the study was purposed to identify policy gaps regarding ICT strategies, plans, budgetary allocations and ICT development, which are likely to influence lecturers' preparedness to

function in an eLearning environment. At the time of the study, the University had 958 academic staff, distributed as indicated in table 3a.

Table 3.1: Distribution of academic & administrative staff at the University of Nairobi

Colleges	Academic staff	Principals	DPs	Registrars	ARs	Deans/Dir	ADs/DDs	AAs
College of Humanities and Social Sciences								
Faculty of Arts: Professors-17 Associate Professors-22 Senior Lecturers-26 Lecturers-100 Assistant Lecturers-20 Tutorial Fellows-21	206				1			2
School of Law: Professors-00 Associate professors-6 Senior Lecturers-8 Lecturers-23 Assistant Lecturers -3	40				1			1
School of Business: Professors-2 Associate Professors-00 Senior Lecturers -7 Lecturers-21 Assistant Lecturers-41	71				1			3
School of Economics: Professors-3 Associate Professors -4 Senior Lecturers-8 Lecturers-13 Assistant Lecturers-3	30				1			1
Institute of Diplomacy & International Studies: Professors-00 Associate Professors-3 Senior Lecturers-1 Lecturers-1 Assistant Lecturers-5	10	1	1	1	1	5	3	1
Population Studies & Research Institute: Professors-00 Associate Professors-00 Senior Lecturers-3 Lecturers-5 Assistant Lecturers-1	9				1			1
School of Journalism: Professors-00 Associate Professors-00 Senior Lecturers-3 Lecturers-4	7				0			1
Institute of Development Studies: Professors-2 Associate Professors-5 Senior Research Fellows-5 Research fellows-5	19				1			1
Institute of Gender & African Studies: Professors-2 Assiociate professors- 1 Senior research fellows – 5 Research fellows - 1	9				0			1
Institute of Anthro., Gender & African Studies	11				1			1

Colleges	Academic staff	Principals	DPs	Registrars	ARs	Deans/Dir	ADs/DDs	AAs
Professors - 2 Assiociate professors- 3 Senior research fellows – 3 Research fellows - 3								
College of Biological & Physical Sciences								
Centre for Biotechnology & Bioinformatics Professors – 1 Associate professor – 3 Senior lecturer – 1 Lecturer - 1	6	1	1	1	0	4	2	1
School of Mathematics Professors – 3 Associate professor – 4 Lecturesr - 2	9				0			1
School of Nursing Sciences Professors – 0 Associate professor – 0 Senior Lecturers – 10 Lecturers - 6	16				0			1
School of Physical Sciences Professors – 13 Associate professor – 13 Senior Lecturers –19 Lecturers – 40 Assistant lecturers- 12	97				1			1
School of Biological Sciences Professors – 7 Associate professor – 4 Senior Lecturers –6 Lecturers – 4	21				1			1
School of Computing & Informatics Professors – 1 Associate professor – 2 Senior Lecturers –3 Lecturers – 15	21				1			1
College of Health Sciences								
School of Dental Sciences Professors – 3 Associate professor –3 Senior Lecturers –9 Lecturers – 24	39	1	1	1	1	2	2	1
Institute of Tropical & Infectious Diseases Professors – 0 Associate professor – 3 Senior Lecturers –7 Lecturers – 2	12				1			1
Centre for HIV Prevention & Research Professors – 0 Associate professor – 1 Senior Lecturers –0 Lecturers – 0	1				0			1
College of Education & External Studies								
School of Education Professors – 0 Associate professor – 8 Senior Lecturers –6	75	1	1	1	1	4	2	3

Colleges	Academic staff	Principals	DPs	Registrars	ARs	Deans/Dir	ADs/DDs	AAs
Lecturers – 46 Assistant lecturers - 15								
Centre for Open & Distance Learning Professors – 0 Associate professor – 0 Senior Lecturers –0 Lecturers – 0	0				0			1
Kenya Science Campus Professors – 0 Associate professor – 0 Senior Lecturers –0 Lecturers – 8 Assistant lecturers - 6	14				1			0
School of Continuing & Distance Education Professors – 1 Associate professor – 1 Senior Lecturers –8 Lecturers – 26 Assistant lecturers - 0	36				1			1
College of Agriculture & Veterinary Sciences								
Faculty of Agriculture Professors – 12 Associate professor – 15 Senior Lecturers –20 Lecturers – 33 Assistant lecturers - 2	82	1	1	1	1	2	2	4
Faculty of Veterinary Medicine Professors – 2 Associate professor – 3 Senior Lecturers –4 Lecturers – 3 Assistant lecturers - 0	12				1			1
College of Architecture & Engineering								
Institute of Nuclear Science & Technology Professors – 0 Associate professor – 1 Senior Lecturers –1 Lecturers – 3 Assistant lecturers - 0	5				1			1
School of Engineering Professors – 3 Associate professor – 15 Senior Lecturers –20 Lecturers – 40 Assistant lecturers - 13	91	1	1	1	1	3	2	1
School of Arts & Design Professors – 0 Associate professor – 0 Senior Lecturers –2 Lecturers – 5 Assistant lecturers - 2	9				0			1
Board of Post-graduate Studies								
	-	-	-	-	1	-	-	1
Total	**958**	**6**	**6**	**6**	**21**	**20**	**13**	**36**

Note: DPs – Deputy Principals, ARs – Assistant Registrars, Dir – Directors, ADs – Associate Deans, DDs – Deputy Directors, and AA – Administrative Assistants. *Source: Unpublished data, Office of Deputy Vice Chancellor, Finance and Administration*

Table 3a indicates that the University had 958 academic and 108 administrative staff. Even though some administrators double up as academic staff, the study targeted them purely as administrators; hence, they were not interviewed as academic staff. The administrators targeted for interviews included principals, deputy principals, college registrars, assistant registrars, deans and associate deans; directors and deputy directors, as well as administrative assistants.

3.4 Sampling Procedures and Sample Size

Subjecting the entire population of interest to investigations can be costly in terms of financial and temporal resources; hence, a sample is a sub-set of the population that can be studied at reasonable cost and used to predict population parameters (Mugenda & Mugenda, 1999). Samples should be representative of the population as much as possible, because a small sample is likely to yield under-estimated information due to the effect of sampling error.

3.4.1 Sampling Procedures

Stratified random sampling was applied to sample academic staff. The stratification was based on colleges, gender and cadre. This ensured proportionate representation of all colleges, as well as male and female academic staff. Stratification based on cadre ensured proportionate representation of assistant lecturers, lecturers, senior lecturers, associate professors and professors.

Proportionate samples from each stratum were obtained by first, calculating the sampling fraction, as a quotient of the desired sample size (n_i) and the population (N_i). This was calculated as indicated in the following subsection. From each stratum, simple random sampling was applied to select respondents. Stratified random sampling is a probability procedure often applied in social sciences. Stratified sampling procedure ensures that elements whose number in the population may be small are given a fair chance of representation in the study.

In addition, purposive sampling procedure was applied to sample administrative staff for inclusion in the study. Purposive sampling is a non-probability procedure, which allows a researcher to use cases that have the required information with respect to subject of the study. Such cases are often handpicked because they are informative or possess the required characteristics. In situations where a target population is too small, it is logical to include all elements in the sample (Mugenda & Mugenda, 1999). Based on this, 108 administrative staff were selected purposively based on the availability and voluntary acceptance to take part in the interviews. The Administrators included the academic staff who are also involved in the management of the various sectors within the University of Nairobi such as the Principals, Directors and Dean as well as Chairmen. This category also involve the various levels of Administrative support staffs in their various Units.

3.4.2 Sample Sizes

The University had about 958 academic staff. A representative sample size of academic staff was obtained by applied Fisher's for sample size determination from finite populations, as indicated below.

$$n = \left\{ \frac{\delta(1-\delta)}{[\alpha^2/Z^2] + \delta(1-\delta)/N} \right\} / R$$

n = Desired sample size
N = Population
δ = Estimated variance in population: 0.5
α = Desired precision: 0.05
Z = Confidence level: 1.96 for 95% on the Gaussian distribution curve
R = Expected response rate: 0.8 (computed using the composite response rate estimator).

Source: Fink, 1995

Proportionate sample sizes were determined at δ=0.5; α=0.05 and Z=1.96. This yielded a desired sample size of 213 academic staff. The quotient of the desired sample size *(n_i)* and the population *(N_i)* give a sampling fraction of 0.222338. To ensure representation of each stratum, the formula below was applied.

$n_I = n_{ij} f$ Where:

n_I – Stratum sample size,
n_{ij} – Stratum sampling frame
f – Sampling factor, obtained as quotient of n/N (0.222338)
N – Population sampling frame
n – Desired sample size

Fishers formula was applied to obtain proportionate samples of academic staff from each college as indicated in table 3b.

Table 3.2: Proportionate samples of academic staff for each college of University of Nairobi

Colleges	Sampling frame	Sample size
Humanities and Social Sciences	412	92
Biological & Physical Sciences	170	38
Health Sciences	52	12
Education & External Studies	125	28
Agriculture & Veterinary Sciences	94	21
Architecture & Engineering	105	23
Total	**958**	**213**

Within each college, the same principle was applied to obtain college-specific sampling fractions, which were then used to achieve gender and cadre representation in the ultimate sample. In addition, the administrative staff members were sample purposively based on the availability and willingness to take part in the interviews as key informants voluntarily. The distribution of sampled administrative staff is presented in table 3c.

Table 3.3: Sample size distribution of University of Nairobi administrative staff

Type of respondent	Sample size
Principals	6
Deputy principals	6
Registrars	6
Assistant Registrars	21
Deans/directors	20
Associate deans/deputy directors	13
Administrative assistants	36
Total	**108**

The administrators were selected purposively on the basis of their incumbency at the time of this study, as well as their involvement in policy formulation and implementation. They were involved in the interviews as key informants.

3.5 Research Instruments

The study utilised a survey questionnaire for lecturers, a key informant interview schedule for administrators and an observation schedule (see appendices IV, V and VI). The information sourced by the tools was complementary but covered all the variables outlined in the conceptual framework (see figure 2.4). The questionnaire was organised into five sections, which captured all the hypotheses outlined under subsection 1.6. The questionnaire was

applied to source information on the socio-demographic attributes of lecturers, ICT infrastructure; lecturers' competence in using ICT tools, as well as the preparedness for eLearning.

The questionnaire was designed for self-administration. One advantage of self-administered questionnaires approach is that it controls for interviewer bias, which often arise from non-verbal cues that may influence participants to give potentially misleading answers (Jaeger, 1984). The self-administered approach was also considered appropriate for the study because it gave participants the opportunity to complete questionnaires at their most convenient time.

The key informant interview guide captured information on physical infrastructure and access to computers; lecturers' competence in using ICT tools, institutional policies related to eLearning, attitudes towards ICT equipment, training and support needs, issues impeding institutional support, financing as well as preparedness to operate in an eLearning environment.

3.6 Validity and Reliability of the Instruments

Validity and reliability of the instruments are critical elements of data quality, which also ensure scientific usefulness of the findings (UNESCO, 2004). While validity is the extent to which an instrument actually captures what it purports to measure, reliability refers to the ability of a research instrument to measure the characteristics of interest consistently over time.

3.6.1 Validity of the Instruments

Validity of the instrument is critical in all forms of research and the acceptable level largely depends on logic and the level of a researcher's experience (UNESCO, 2004). In this study, a high level of validity was achieved by posing questions in the simplest way possible. Besides, the survey questionnaire contains side notes to enable the participants understand what is required of them thus provide valid responses (see appendix IV).

The data sourced were processed and discussed with University Supervisors (Dr. Joyce Mbwesa and Dr. Charles M. Rambo, both senior lecturers at the Department of Educational Studies and Department of Extra-Mural Studies, respectively). Discussion of results with University Supervisors ensured that the meaning derived there-from addressed objectives of the study. Validity of the instrument was further improved by using the self-administered approach to minimise the element of interviewer bias by giving participants opportunity to express their thoughts without influence.

3.6.2 Reliability of the Instruments

The inconsistency of a research instrument reflects the existence of random error, which may arise at the time of data collection due to inaccuracy by a researcher or the instrument used to elicit information (Mugenda & Mugenda, 1999; Nachmias & Nachmias, 1996). Although data collection was a one-time event, pre-testing played a crucial role in improving reliability of the

instrument. Further, the split-half technique was used to estimate reliability of the instruments. The resultant correlation co-efficient was adjusted using the Spearman-Brown prophecy formula and the results are summarised in table 3d.

Table 3.4: Reliability Summary Statistics

Cronbach's Alpha	Part 1	Value	.515
		N of Items	25
	Part 2	Value	.638
		N of Items	25
	Total N of Items		50
Correlation Between Forms			.733
Spearman-Brown Coefficient	Equal Length		.846
	Unequal Length		.846
Guttman Split-Half Coefficient			.533

The tabled results indicate that a Spearman-Brown Coefficient value of 0.846 was obtained from the reliability analysis. This suggests up to 84.6% chance that the main questionnaire used to source data from lecturers was reliable in capturing the intended information.

3.7 Pre-Testing

Pre-testing reveals what works and what does not, for instance, vague questions and unclear instructions. It also captures key comments and suggestions from participants that would enable an investigator to improve the instruments and adjust data collection approaches to maximise response rate (Mugenda & Mugenda, 1999). The instrument was pre-tested using 20 lecturers and 10 administrators, which was equivalent to about 10% of the sample sizes for each category.

The participants were sampled in line with the procedures described under sub-section 3.4, which included probability proportionate sampling for lectures across the University of Nairobi colleges. However, the administrators were selected purposively on the basis of their incumbency at the time of this study, as well as their involvement in policy formulation and implementation. Necessary adjustments such as re-statement of unclear questions and instructions; omission of irrelevant questions and grammatical errors were effected based on the results and comments from participants. The twenty lecturers and ten administrators were sourced by using convenience sampling techniques.This technique involves selecting the most conveniently available participants and the results are usually not generalized..

3.8 Data Collection Procedures

The researcher recruited one qualified and experienced assistant to help in data collection. A training session was held with the research assistant to enhance familiarity with the instrument and rehearse essential data sourcing skills, including how to approach participants, build a rapport, consent lecturers, as well as issue and collect questionnaires. Data collection began soon after the proposal was approved for full registration. Data was obtained by issuing questionnaires to lecturers who consented to participate in the study. The participants were allowed to stay with questionnaires for a maximum of two weeks. The investigator and the research assistant kept in touch with all participants and collected filled-up

questionnaires. The instigator, the research assistant and data clerk met every two days to review data trends.

Biases and unclear information were noted down and the investigator called the respondents for clarifications. This was done through telephone interviews as well as through face-to-face meetings with concerned respondents. A research permit was obtained from the Ministry of Higher Education, Science and Technology. The research permit complemented the authorisation letter from the University of Nairobi (see appendix II).

The administrators were interviewed at their places of work or other venues that were convenient for them. The investigator sought informed consent from each participant. In this regard, participants were briefed about the study, purpose, potential benefits and that participation was on voluntary terms.

3.9 Data Processing and Analysis Techniques

Both quantitative and qualitative techniques were applied to process, analyse and interpret data. Quantitative data processing involved coding open-ended data, entry, cleaning, transformation, analysis and interpretation (Obure, 2002). Quantitative data soured through the survey questionnaire were analysed at three levels, namely univariate, bivariate and multivariate. Univariate analysis yielded frequency distributions, percentages and measures of central tendency as appropriate; while bivariate analysis obtained crosstab distributions with Chi square (χ^2) significance tests.

The χ^2 statistic establishes the statistical association between two variables both of which must be in nominal or ordinal scales. The use of the χ^2 test necessitates preparation of cross-tabulations of the variables, which then generates significance test results. The χ^2 test can only show the presence or lack of statistical association; it cannot determine the magnitude and direction of such associations (Nachmias & Nachmias, 1996). The χ^2 test may be calculated from raw data using the formulae below: -

$$\chi^2 = \Sigma \frac{(f_o - f_e)^2}{f_e}$$

$$f_e = \frac{(Row\ total)\ (Column\ total)}{n}$$

Where: -

χ^2 – *Chi square test*

f_o – *Observed frequency*

f_e – *Expected frequency*

n – *Sample size*

Source: Nachmias & Nachmias, 1996

The χ^2 test was used to determine the statistical significance of the null hypotheses stated in table 3e. The independent and moderating variables that return a statistically significant relationship with the dependent variable was then included in multivariate analysis.

Table 3.5: Summary of the hypotheses to be tested in bivariate analysis

Objective	Hypotheses	Type of test	Interpretation
1. Determine the effect of access to computers at work, quality of computers and reliability of internet connection on lecturers' preparedness for eLearning.	$H_0$1: There is no relationship between access to computers at work and lecturers' preparedness for eLearning	Cross tabulation with Chi square (χ^2) test	The null hypothesis was rejected where the calculated χ^2 was greater than the critical χ^2 at 95% confidence level.
	$H_0$2: The relationship between quality of computers and lecturers' preparedness for eLearning is not statistically significant.		
2. Assess how staff ICT training programme and timeliness of technical support affects lecturers' preparedness for eLearning.	$H_0$3: The effectiveness of staff ICT training programme has no significant relationship with lecturers' preparedness for eLearning.	Cross tabulation with Chi square (χ^2) test	The null hypothesis was rejected where the calculated χ^2 was greater than the critical χ^2 at 95% confidence level
	$H_0$4: There is no significant relationship between the timeliness of technical support and lecturers' preparedness for eLearning.		
3. Examine the effect of technical staff and annual budgetary allocation on lecturers' preparedness for eLearning.	$H_0$5: There is no significant relationship between the adequacy of technical staff and lecturers' preparedness for eLearning.	Cross tabulation with Chi square (χ^2) test	The null hypothesis was rejected where the calculated χ^2 was greater than the critical χ^2 at 95% confidence level.
	$H_0$6: The relationship between annual budgetary allocation for ICT and lecturers' preparedness for eLearning is not statistically significant.		
4. Determine how lecturers' competence in word processing and spreadsheet tools affects their preparedness for eLearning.	$H_0$7: Lecturers' competence in word processing has no significant relationship with their preparedness for eLearning.	Cross tabulation with Chi square (χ^2) test	The null hypothesis was rejected where the calculated χ^2 was greater than the critical χ^2 at 95% confidence level
	$H_0$8: There is no significant relationship between lecturers' competence in spreadsheet tools and their preparedness for eLearning.		
5. Assess how lecturers' competence in database management and presentation tools affects their preparedness for eLearning.	$H_0$9: Lecturer's competence in using presentation tools has no significant relationship with their preparedness to apply eLearning.	Cross tabulation with Chi square (χ^2) test	The null hypothesis was rejected where the calculated χ^2 was greater than the critical χ^2 at 95% confidence level
6. Examine the effect of lecturers' competence in statistical analysis and internet tools on their preparedness for eLearning.	$H_0$10: There is no significant relationship between lecturers' competence using in statistical analysis tools and their preparedness to apply eLearning.	Cross tabulation with Chi square (χ^2) test	The null hypothesis was rejected where the calculated χ^2 was greater than the critical χ^2 at 95% confidence level.
	$H_0$11: The relationship between lecturers' competence in using internet tools and their preparedness to apply eLearning is not statistically significant.		

Given that χ^2 statistic cannot determine the magnitude and direction of effect between any two variables, the variables that had a positive relationship with the dependent variable were incorporated in the Binary Logistic Regression model, used to predict a dichotomous variable from a set of independent variables (Aldrich & Nelson, 1984). The purpose of the model was to determine the proportion of variance in lecturers' preparedness for eLearning explained by the independent variables and to rank the relative importance of each independent variable (Aldrich & Nelson, 1984; Wuensch, 2006).

In the model, the predicted variable takes the value 1 with a probability of success θ, or the value 0 with probability of failure $1-\theta$. In this study, the dependent variable is lecturers' preparedness for eLearning, with possible values being *prepared* and *not prepared*. The model often takes form of the equation expressed below.

$$\text{Logit } [\theta(Y)] = \log \left(\frac{\theta(Y)}{1-\theta(Y)} \right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_i X_i + \varepsilon$$

Source: Wuensch, 2006

Where Y = the predicted variable, which in this case is lecturers' preparedness for eLearning; $\theta(Y)$ = the probability that a particular lecturer is prepared for eLearning; $1-\theta(Y)$ = the probability that a particular lecturer is not prepared for eLearning; α = the constant term of the equation; $\beta_1, \beta_2 \ldots \beta_i$ = the regression co-efficients associated with independent variables; $X_1, X_2 \ldots X_i$ = independent variables and ε = the error term. The model incorporated independent

and moderating variables that returned statistically significant relationship with dependent variable at the bivariate analysis level.

Binary Logistic Regression model applies the *maximum likelihood estimation (MLE)* method after transforming lecturers' preparedness for eLearning into a logit variable, that is, the natural log of the odds that lecturers are prepared for eLearning or not, given a set of infrastructural, ICT capacity and personal attributes. Through the *MLE* method, the model derives the *log likelihood ratio*, designated by *-2 Log Likelihood.* This is also known as *goodness of fit* of the regression model. According to Scott (1995), the *-2 Log Likelihood* reflects how well variance in the dependent variable is accounted for by the independent and moderating variables. This shows that the *-2 Log Likelihood statistic* measures how well the model predicts lecturers' preparedness for eLearning, based on the infrastructural, ICT competence and personal attributes (Tabachnick & Fidell, 2001).

The model is particularly suitable for this study, because it accepts all types of independent variables irrespective of the scale of measurement. Besides, unlike linear regression, binary logistic regression makes no assumptions about the distributions of the independent variables. Although its output has several parameters, this study was interested in the *odds ratios* and *log likelihood function.* All the quantitative analyses at the univariate, bivariate and multivariate

levels were performed using the Statistical Package for Social Sciences (SPSS) and Ms-Excel packages.

In addition, qualitative data, which were sourced through key informant interviews and observation were processed and analysed following three steps. In the first step, data were organised and summarised in line with the thematic areas. The second step involved description of the summary sheets to produce a preliminary report. The third step involved systematic analysis and interpretation of the preliminary report, which was then integrated with quantitative data in the final report (Best & Khan, 2004).

3.10 Ethical Considerations

The study sought informed consent from the sampled lecturers and administrators. In this regard, lecturers were briefed on the research process and its purpose. They were notified that participation was purely on voluntary terms. Again, their withdrawal of consent would not affect their relationship with the university administration. In addition, participants were assured that information on their personal attributes and opinions would be handled and processed in confidentiality (Rivera, Borasky, Rice & Carayon, 2003). All questionnaires were kept confidential and anonymous (see appendix III).

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTREPRETATION AND DISCUSSIONS

4.1 Introduction

This chapter presents findings of the study, which have been organised and discussed under various thematic sub-sections in line with the study objectives. The thematic areas include background profile of academic staff, workplace infrastructure, lecturers' computing competence and factors influencing lecturers' preparedness for eLearning. Details have been presented and discussed in the following sub-sections.

4.2 Background Profile of Academic Staff

The study covered 212 academic staff from all the six colleges of the University of Nairobi. Of this number, 104 (49.1%) were stationed at the College of Humanities and Social Sciences (CHSS); 19 (9.0%) belonged to the College of Biological and Physical Sciences (CBPS); while 24 (11.3%) worked at the College of Health Sciences (CHS). From the College of Education and External Studies (CEES) were 29 (13.7%) participants; 20 (9.44%) were from the College of Agriculture and Veterinary Sciences (CAVS); while 16 (7.5%) served at the College of Architecture and Engineering (CAE).

In terms of gender, the lecturers from CHSS included 56 (53.8%) men and 48 (46.2%) women; from CBPS were 16 (84.2%) men and 3 (15.8%) women;

while from CHS were 20 (83.3%) men and 4 (16.7%) women. The CEES provided 23 (79.3%) men and 6 (20.7%) women; from CAVS were 17 (85.0%) men and 3 (15.0%) women; while the lecturers from CAE included 14 (87.5%) women and 2 (12.5%) women.

In addition, the study involved 96 administrative staff, including 34 (35.4%) administrative assistants, 6 (6.3%) college registrars and 15 (15.6%) assistant registrars; 10 (10.4%) departmental chairpersons; 10 (10.4%) faculty deans and 6 (6.3%) associated deans; as well as 8 (8.3%) directors and 7 (7.3%) deputy directors. In terms of gender, table 4a shows that the administrative staff included 64 (66.7%) men and 32 (33.3%) women.

Table 4.1: Distribution of sampled admin staff at the University of Nairobi by gender

Staff cadre	Male		Female	
	Frequency	*Percent*	*Frequency*	*Percent*
Administrative assistants	23	67.6	11	32.4
College registrars	6	100.0	0	0.0
Assistant registrars	9	60.0	6	40.0
Departmental chairs	6	60.0	4	40.0
Deans	8	80.0	2	20.0
Associate deans	3	50.0	3	50.0
Directors	5	62.5	3	37.5
Deputy directors	4	57.1	3	42.9
Total	**64**	**66.7**	**32**	**33.3**

Source: Survey data, 2011

The administrative staff members were interviewed as key informants; they provided qualitative information based on their experiences and opinions. The qualitative data sourced from members of this group was useful in validating and strengthening quantitative data that was obtained from the academic staff.

4.2.1 Preparedness for eLearning

Lecturers' preparedness for eLearning was measured in terms of their computing competence, which refers to the ability to execute commands and manipulate a range of software applications for various purposes (van Braak, 2004). Computing competence also includes basic computer operations, as well as understanding the social, legal and ethical issues associated with ICT applications. Based on this understanding, academic staff members were requested to rate their competence on each of the following computing software tools on a scale of 1-10: word processing, spreadsheets, presentation, statistical analysis, internet browsing and e-mailing.

The participants' ratings for each software tool were summed and mean scores determined. Resultant quotients were then rated on a scale of 0-49% and 50-100%. Participants whose mean scores were less than 50% were considered to be below average; thus, were likely to be unprepared to function in an eLearning environment. Conversely, those whose mean scores were above 50% were considered above average, and likely to be prepared for eLearning. This principle has been applied in various studies, including Son et al. (2007), Thomas and Stratton (2006), Luan et al. (2005), Silong (2001) and Cuckle (2000), among others.

Based on the principle, out of the 212 academic staff members, up to 103 (48.6%) had a mean score of 50 percent or more; while 109 (51.4%) scored less than 50 percent. This suggests that slightly more than one-half of the academic

staff were below average in terms of computing competence as well as preparedness for eLearning. In their study, Thomas and Stratton (2006) found that 54% of the university academic staff had a mean score of 50% or more; thus, suggesting that about 46% of the participants were likely to be below average in terms of computing skills. At the Universiti Putra Malaysia, Luan et al. (2005) noted that 64% of the lecturers were above average in terms of computing competence, while Son et al. (2007) who examined computer literacy and competency among Indonesian teachers of English as a Foreign Language (EFL), noted that up to 55% of the participants were above average in their computer application skills.

4.2.2 Preparedness for eLearning across colleges, cadre and experience

The study found variations in the level of preparedness across University colleges, staff cadres and level of experience. In this regard, Table 4b shows that the proportion of academic staff prepared for eLearning was higher than the proportion of those unprepared at the CHSS and CEES. More specifically, 53 (51.5%) lecturers at the CHSS, and 18 (17.5%) lecturers at the CEES were above average in terms of computing skills; hence, were likely to be prepared to function in an eLearning environment. However, in the remaining four colleges, the proportion of unprepared staff was more predominant than the proportion of those prepared. For instance, at the CBPS, up to 8 (7.8%) lecturers were prepared, while 11 (10.1%) were unprepared. At the CAVS, 8 (7.8%) lecturers were above average in computing skills, unlike 12 (11.0%).

Table 4.2: ELearning preparedness across colleges, ranks and experience

Attributes	Indicators	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
College	HSS	53	51.5	51	46.8
	BPS	8	7.8	11	10.1
	HS	9	8.7	15	13.8
	EES	18	17.5	11	10.1
	AVS	8	7.8	12	11.0
	AE	7	6.8	9	8.3
	Total	**103**	**100.0**	**109**	**100.0**
Rank	Assistant lecturer	10	9.7	3	2.8
	Lecturer	1	11.0	8	7.3
	Senior lecturer	64	52.1	60	55.0
	Associate professor	6	5.8	10	9.2
	Professor	22	21.4	28	25.7
	Total	**103**	**100.0**	**109**	**100.0**
Experience	<10 yrs	15	15.0	10	9.2
	10-19 yrs	61	59.0	50	45.9
	20-29 yrs	23	22.0	35	32.1
	30-39 yrs	4	4.0	11	10.1
	40+ yrs	0	0.0	3	2.8
	Total	**103**	**100.0**	**109**	**100.0**

Source: Survey data, 2011

Based on the pattern of eLearning preparedness across colleges, bivariate analysis obtained a calculated Chi square (χ^2) value of 4.586, with 5 degrees of freedom and a p-value of 0.469, which is not significant at any point within 0.1 error margin. This suggests that although University colleges varied in terms of the proportion of academic staff prepared for eLearning, the variation was not significant. In other words, no college can be rated as more prepared to embrace eLearning, at least, based on ICT competence among their academic staff. The proportion of staff competent in the application of computer packages was nearly uniform across the colleges.

Regarding the distribution by ranks, the study found that 124 (58.5%) participants were in the rank of lecturers, 50 (23.6%) ranked as senior lecturers, 16 (7.5%) were professors, another 13 (6.1%) were assistant lecturers, while 9

(4.2%) were in the rank of associate professors. Table 4b also shows that a higher proportion of assistant lecturers and lecturers were prepared for eLearning; however, in the remaining cadres, the proportion of unprepared staff was higher than the proportion of those prepared. The difference between those unprepared and those prepared for eLearning was highest among professors, followed by associate professors and senior lecturers.

Based on this pattern, bivariate analysis yielded a calculated Chi-square (χ^2) value of 10.902, with 4 degrees of freedom and a p-value of 0.028, which is significant at 0.05 error margin. This suggests that competence in working with software tools and preparedness for eLearning varied significantly across the ranks. In this regard, assistant lecturers indicated the highest level of preparedness to function in an eLearning environment, based on their competence in working with various software tools. This is possible because assistant lecturers are generally younger than their colleagues in higher cadres. The study noted that unlike the senior lecturers and professors, most assistant lecturers were trained in the era of information technology; where they were required to typeset most of their coursework assignments. This encouraged knowledge of computers applications, which put them in a better position than their colleagues who were trained in the era of handwritten coursework assignments.

Regarding professional experience, the study found that up to 111 (52.4%) participants had 10 to 19 years of experience, 8 (27.4%) had 20 to 29 years, another 25 (11.8%) reported an experience of below 10 years, while 18 (8.5%)

stated an experience of 30 years or more. The results summarised in table 4b confirm that the proportion of those prepared for eLearning was higher among staff with less than 20 years of experience, which is consistent with the findings in the preceding paragraph, which talks about ranks. As the length of experience increases, the proportion of those likely to be prepared for eLearning decreases.

Based on this pattern, the analysis obtained a calculated Chi-square (χ^2) value of 15.242, with 4 degrees of freedom and a p-value of 0.002, which is significant at 0.01 error margin. This implies a probability of up to 99% that preparedness for eLearning was significantly associated with the length of professional experience. In other words, less junior lecturers were more competent in computing than their superiors, mainly because of generational difference. Similar findings were reported by Houtz and Gupta (2001) who explored gender roles, computer attitudes and dyadic computer interaction performance among Egyptian public university lecturers. The study indicated that younger lecturers had a greater tendency to use computers than their older and more experienced colleagues.

4.2.3 ELearning preparedness and age distribution

The level of computing skills and preparedness for eLearning is likely to vary across different age groups. As with rank and the level of professional experience, the linkage between age and eLearning preparedness is a function of the generational gap between junior and senior members of academic staff. In view of this, table 4c shows that out of 212 participants who took part in the

study, 97 (45.8%) were in the 40 to 49 years age bracket; 4 (25.5%) were aged between 50 and 59 years, while 22 (10.4%) were in the 30 to 39 years bracket. Besides, another 22 (10.4%) reported to be 60 years or more, while 8 (3.7%) were aged below 30 years. Table 4b further shows that the proportion of staff unprepared for eLearning in the 50+ age category was more than the proportion of those prepared in the same age category.

Table 4.3: Background profile and preparedness for eLearning

Background attributes	Indicators	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Age	<30 yrs	8	8.3	0	0.0
	30-39 yrs	12	12.5	10	9.3
	40-49 yrs	45	46.9	52	48.6
	50-59 yrs	23	24.0	31	29.0
	60+ yrs	8	8.3	14	13.1
	Total	**96**	**100.0**	**107**	**100.0**
Gender	Male	69	67.0	77	70.6
	Female	34	33.0	32	29.4
	Total	**103**	**100.0**	**109**	**100.0**
Education level	Bachelors	1	1.0	4	3.7
	Masters	36	35.0	20	18.3
	PhD	66	64.1	85	78.0
	Total	**103**	**100.0**	**109**	**100.0**
Average monthly income	<KES 50,000	4	3.9	0	0.0
	KES 50,000-59,000	0	0.0	3	2.8
	KES 60,000-69,000	7	6.8	4	3.7
	KES 70,000-79,000	10	9.7	7	6.5
	KES 80,000-89,000	9	8.7	12	11.1
	KES 90,000+	73	70.9	82	75.9
	Total	**103**	**100.0**	**108**	**100.0**

Source: Survey data, 2011

Conversely, the proportion of staff prepared for eLearning aged below 40 years was higher than the proportion of those unprepared in the same age category. The pattern suggests that younger academic staff were likely to be more competent in working with software tools; hence, likely to be better prepared for eLearning than their relatively older colleagues. This is consistent with the findings under rank and length of experience, which have been discussed in the

preceding sub-section. Based on this, bivariate analysis obtained a calculated Chi-square (χ^2) value of 18.026, with 4 degrees of freedom and a p-value of 0.001, which is significant at 0.01 error margin. This shows a probability of up to 99% that lecturers' preparedness for eLearning was significantly associated with their age. These findings are based on the premise that younger lecturers are likely to be more willing to learn new ideas than their older colleagues, who may perceive new technology-based ideas as a threat to their survival in an ICT environment.

Similar findings on age and the level of computing competence were reported by Venkatesh and Morris (2000) who assessed the role of gender and social influence on technology acceptance behaviour among academic staff of Indian public universities. The study found that younger lecturers were more receptive to new technologies than their older counterparts. In Jordan, Abbad, Morris and Nahlik (2009) found a negative correlation between lecturers' age and the eLearning methods of delivery.

4.2.4 ELearning preparedness across gender

The study found that out of 212 participants, 146 (68.9%) were men and 66 (31.1%) were women. Table 4b shows that the proportion of women lecturers prepared for eLearning 34 (33.0%) was marginally higher than the proportion of those unprepared 32 (29.4%). However, the proportion of men prepared for eLearning 69 (67.0%) was lower than the proportion of those unprepared 77 (70.6%). Based on these findings, cross-tabulation analysis obtained a calculated

Chi-square (χ^2) value of 1.039 (corrected for continuity), with 1 degree of freedom and a p-value of 0.243, which is not significant.

These findings suggest that preparedness for eLearning was not significantly associated with gender. In other words, no gender was more competent in computing than the other gender; hence, none was likely to be more prepared than the other. This is however inconsistent with the findings of Luan et al (2005), who investigated gender differences in ICT competencies among academicians at the Universiti Putra Malaysia.

Among other findings, the study noted that female and male academicians were significantly different in terms of computing skills in relation to the application of software packages such as word processing, spreadsheets and presentation tools. However, in Egypt, Houtz and Gupta (2001) found that male lecturers were more confident and had a greater usage of computers compared to their female counterparts. Besides, Venkatesh and Morris (2000) noted that male lecturers were more likely to accept a new technological innovation than their female colleagues.

4.2.5 Educational attainment and preparedness for eLearning

The analysis indicated that up to 151 (71.2%) academic staff held PhD degrees as the highest education level, 56 (26.4%) held masters certificates, while 5 (2.4%) had bachelor's degree qualifications. Besides, the results summarised in

table 4b show that the proportion of PhD holders unprepared for eLearning was higher than the proportion of those prepared. Conversely, the proportion of masters' degree holders prepared for eLearning was higher than the proportion of those unprepared in the same category.

Based on this pattern, the analysis obtained a calculated Chi-square (χ^2) value of 11.031, with 2 degrees of freedom and p-value of 0.004, which was significant at 0.01 error margin. This suggests up to 99% chance that lecturers' preparedness for eLearning was significantly associated with their educational attainment. In other words, masters' degree holders, being relatively younger people, were likely to be more competent in computing; hence, better prepared for eLearning than PhD holders.

These findings are consistent with those reported by Roberts et al. (2003) who assessed barriers to the use of technology for teaching and learning among Dutch universities. Among other findings, the study noted that professors and associate professors were less likely to accept and use ICT tools in their teaching than junior lecturers. The report asserted that most professors were trained long before the arrival of computers; hence, most of them were slow in coping with the integration of ICT in university teaching.

4.2.6 Preparedness for eLearning and average monthly income

Participants were requested to indicate the average monthly income from formal and informal sources. The findings indicated that most participants 155 (73.1%) were earning KES 90,000 or more; 21 (9.9%) were in the KES 80,000 to 89,000 bracket; 17 (8.0%) averaged at between KES 70,000 and 79,000, while 11 (.2%) reported an income of KES 60,000 to 69,000. In addition, table 4b shows that the proportion of lecturers unprepared for eLearning in the top income bracket was higher than the proportion of those prepared at the same income category. Contrastingly, the proportion of participants prepared for eLearning in the income category of less than KES 60,000 was higher than the proportion of those unprepared.

Based on this, analysis yielded a calculated Chi-square (χ^2) value of 11.707, with 5 degrees of freedom and p-value of 0.039, which was significant at 0.05 error margin. This suggests a probability of up to 95% that preparedness for eLearning varied significantly across the income categories. More specifically, top earners, most of whom were senior lecturers, associate professors and professors were less competent in computing than participants in lower income brackets, including lecturers and assistant lecturers. Similarly, Venkatesh and Morris (2000) found a positive correlation between the frequency of computer use and lecturers' average income. The study noted that although lecturers in higher income brackets had a greater access to personal computers than those in lower

income scales, more than one-half did not use computers consistently to support their work due to limited ICT skills.

4.2.7 Access to computers at home and preparedness for eLearning

Access to computers at home provides ample opportunity for lecturers to develop their skills, away from the hustles and pressures of the office. The home environment also provides confidentiality required to practice computing skills without the fear of being looked down upon by junior colleagues. The home environment also provides flexibility and effective utilisation of time. In view of this, the study found that 177 (83.5%) academic staff had access to functional computers at their residences.

Furthermore, table 4d indicates that among participants having access to computers at home, the proportion of those prepared for eLearning [96 (93.2%)] was higher than the proportion of those unprepared [81 (74.3%)]. Conversely, among the participants that reported not having access to functional computers at their residences, the proportion unprepared for eLearning [28 (25.7%)] was higher than the proportion of those prepared [7 (6.8%)].

Based on this pattern, the analysis obtained a calculated Chi-square (χ^2) value of 12.376 (corrected for continuity), with 1 degree of freedom and a p-value of 0.000. The result was significant at 0.01 error margin; thus, implying up to 99% chance that lecturer's preparedness for eLearning was significantly linked to their access to computers at their residences. In this regard, those who had access

to functional computers at their residences [177 (83.5%)], had opportunity to improve their skills at their convenience; thus, were likely to be more competent in computing than those not having access to such facilities at home. Consequently, participants having access to computers at home were likely to be better prepared for eLearning than their counterparts not having such access.

Table 4.4: ELearning preparedness and access to computers at home

Questions	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Has a functional computer at home?	Yes	96	93.2	81	74.3
	No	7	6.8	28	25.7
	Total	**103**	**100.0**	**109**	**100.0**
Frequency of use	Never	2	2.1	3	3.7
	Occasionally	28	29.2	40	49.4
	Weekly	16	16.7	18	22.2
	Daily	50	52.1	20	24.7
	Total	**96**	**100.0**	**81**	**100.0**

Source: Survey data, 2011

Regarding the frequency of use, table 4d shows that the proportion prepared for eLearning among daily users was higher than the proportion of those unprepared. Contrastingly, the proportion unprepared for eLearning was more dominant among weekly, occasional and non-users. The pattern suggests that regular users of computers at home were likely to be more competent and better prepared for eLearning than irregular as well as non-users. In this regard, the analysis obtained a calculated Chi-square (χ^2) value of 14.123, with 2 degrees of freedom and a p-value of 0.003. This shows that the relationship between lecturers' preparedness for eLearning and the frequency of computer use at home was significant at 0.01 error margin.

In the past, access to computers at home and competence in the application of software packages was assessed by Albirini (2006), who found that up to 57% of lecturers in Syrian public universities had access to computers in their residences. The analysis revealed that access to computer at home was significantly associated with computer use at the place of work. The author premised that access to computer at home provided lecturers with ample time to practice and develop their ICT skills. Besides, the home environment ensured confidentiality needed by lecturers to develop their skills (Albirini, 2006).

4.2.8 Perceived usefulness of computers and ease of use

Perceived usefulness refers to lecturers' subjective estimation that working with computers is likely to add value to their teaching activities, while the perceived ease of use refers to an individual's estimation of the level of effort he/she will put in top work with computers. Based on this understanding, participants were requested to indicate their opinion regarding the usefulness of computers to their professional work. In response, close to two-thirds (57.1%) believed that computers were very useful to their work, 62 (29.2%) felt that computers were useful, 25 (11.8%) indicated fairly useful, while 4 (1.9%) hinted that computers were not useful to their work.

The results presented in figure 4.1 further shows that the nearly two-thirds of academic staff [121 (57.1%)] believed that computers were very useful to their work, irrespective of their computing competence and preparedness for eLearning. Based on this finding, a calculated Chi-square (χ^2) value of 6.061, with

3 degrees of freedom and a p-value of 0.109 were obtained. This suggests that preparedness for eLearning and perceived usefulness of computers were not significantly related.

Table 4.5: Perceived usefulness of computers and ease of use

Participants	Indicators	Condition	Percentage
Perceived Usefulness of computers	Very Useful	Prepared	59.2
		Unprepared	55.0
	Useful	Prepared	32.0
		Unprepared	26.6
	Fairly useful	Prepared	8.7
		unprepared	14.7
	Not useful	Prepared	0.0
		unprepared	3.7
Perceived ease of using computers	Very easy	Prepared	18.4
		Unprepared	7.3
	Easy	Prepared	56.3
		Unprepared	46.8
	Not easy	Prepared	25.2
		unprepared	45.9

Source: Survey data, 2011

Furthermore, slightly more than one-half 109 (51.4%) of the participants reported that working with computers was easy for them, another 76 (35.8%) participants hinted that working with computers was not easy for them, while 27 (12.7%) believed that working with computers was very easy. Figure 4.1 above, shows that the proportion prepared for eLearning was predominant among those who believed that working with computers was easy or very easy. Contrastingly,

among those indicated that working with computers was not easy, a larger proportion unprepared for eLearning.

In view of this, the analysis obtained a calculated Chi-square (χ^2) value of 12.350, with 2 degrees of freedom and a p-value of 0.002, which is significant at 0.01 error margin. This shows that lecturer's preparedness for eLearning was significantly associated with the perceived ease of using computers to support academic work. In other words, those who perceived computing to be easy or very easy were likely to be more competent and better prepared for eLearning that their colleagues who believed that working with computers was not easy.

Similar results were reported by Al-Ammari and Hamad (2007) who assessed factors influencing the adoption of eLearning at the University of Bahrain. The study, which was grounded on Technology Acceptance Model (TAM), found that perceived usefulness and perceived ease of use had significant positive effect on lecturers' intention to apply eLearning tools. Also noted was that computer self-efficacy had a positive effect on lecturers' intention to accept eLearning facilities. The study concluded that enhancing ICT skills among lecturers would be important in influencing their perception, as regards usefulness and ease of using eLearning tools.

4.3 Workplace Infrastructure and Programmes

Discussed under this thematic area are variables such as access to computers at the workplace, quality of computers at the workplace, frequency of computer use, main uses of computers and reliability of internet connectivity. In addition, the section covers availability and effectiveness of ICT training programme targeting academic staff; technical support programmes and timeliness of such support, as well as budgetary allocation to the departments for ICT development. The section also presents hypotheses-test results, which are detailed in the following sub-sections.

4.3.1 Access to computers at the workplace and frequency of use

Participants were requested to indicate if they had access to computers at their workstations. Those having computers at the workplace were further asked to state how often they used such computers. In this regard, out of 212 participants, 194 (91.5%) affirmed that they had access to functional computers at their workstations; only 18 (8.5%) did not have such facilities. Table 4e shows that the proportion of staff prepared for eLearning was more dominant among those who had access to computers at their workplace [99 (96.1%)], as opposed to those who lacked access to such facilities [95 (87.2%)].

Table 4.6: Access to computers at the workplace and frequency of use

Questions	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Has a functioning computer at work place?	Yes	99	96.1	95	87.2
	No	4	3.9	14	12.8
	Total	**103**	**100.0**	**109**	**100.0**
Frequency of use	Never	0	0.0	1	1.1
	Occasionally	12	12.1	32	33.7
	Weekly	20	20.2	24	25.3
	Daily	67	67.7	38	40.0
	Total	**99**	**100.0**	**95**	**100.0**

Based on this finding, bivariate analysis obtained a calculated Chi-square (χ^2) value of 4.380 (corrected for continuity, with 1 degree of freedom and a p-value of 0.036, which is significant at 0.05 error margin. This implies up to 95% chance that lecturer's preparedness for eLearning was significantly associated with their access to computers at the workplace.

In other words, participants having access to computers at their workplace were likely to be more competent in computing; thus better prepared to function in an eLearning environment than those who lacked such access. This finding prompted the rejection of the null hypothesis ($H_0 1$), *stating that there is no significant relationship between access to computers at work and lecturers' preparedness for eLearning*, because of inconsistency with empirical results. Workplace computers also provide academic staff with opportunity to practice and improve their computing skills, which enhances familiarity with computers and discourages anxiety, negative attitudes and phobia that may be associated with computer use.

However, through key informant interviews, the study revealed that a significant proportion of academic staff reporting access to functional computers at the respective workplaces were actually using their personal computers. The proportion having access to functional computers provided by the University was much lower than the 91% reporting access to such facilities at their workstations. Access to computers at the workplace has been assessed by various scholars,

including Albirini (2006), Gulbahar (2005) and Blankenship (1998). For instance, a study conducted by Albirini (2006) in Syria found that only 33% of the lecturers had access to computers at their places of work, which in turn, influenced the proportion of lecturers using ICT tools to support teaching activities. The study also noted that the adequacy of appropriate computers was a key factor influencing the decision and preparedness of lecturers to operate in an eLearning environment.

Regarding the frequency of use, 105 (54.1%) participants said they used workplace computers daily, 44 (20.8%) used workplace computers at least once a week, another 44 (20.8%) used workplace computers only occasionally. Table 4e further shows that frequent workplace computer users were likely to be more competent in computing and better prepared to function in an eLearning environment than infrequent users. In connection to this finding, the analysis yielded a calculated Chi-square (χ^2) value of 18.389, with 3 degrees of freedom and a p-value of 0.000, which was significant at 0.01 error margin. This confirms that regular workplace computer users were likely to be better prepared for eLearning than their irregular colleagues.

4.3.2 Common uses of workplace computers

The study found that workplace computers were used to accomplish various tasks. Among staff prepared for eLearning, table 4f shows that common uses of workplace computers, included communication 87 (87.9%), report writing 82 (82.8%) and developing teaching materials 73 (73.7%). In addition, up to 48

(48.5%) of the participants used workplace computers for data analysis; another 30 (30.3%) used the facilities for personal business.

Table 4.7: Common uses of workplace computers

Valid responses	Prepared		Not prepared	
	Frequency	*Pct of cases*	*Frequency*	*Pct of cases*
Communication	87	87.9	35	36.8
Data analysis	82	82.8	23	24.2
Developing teaching materials	73	73.7	25	26.3
Manuscript preparation	48	48.5	13	13.7
Personal business	30	30.3	6	6.3
Report writing	27	27.3	9	9.5
Total	**347**	**350.5**	**111**	**116.8**

Source: Survey data, 2011

The study also found that workplace computers were used for various purposes. For instance, among those unprepared for eLearning, common uses of workplace computers included communication 35 (36.8%); developing teaching materials 26 (26.3%), report writing 23 (24.2%), and data analysis 13 (13.7%). Furthermore, Table 4g, shows the software tools frequently used by academic staff. In this regard, word processing and internet browsing tools were used daily by the largest proportion of participants [139 (65.6%)] and [148 (69.8%)], regardless of their preparedness for eLearning.

Table 4.8: Frequently used software tools at the workplace

Software tools	Indicators	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Word processing	Never	2	1.9	1	0.9
	Occasionally	18	17.5	52	47.7
	Daily	83	80.6	56	51.4
	Total	**103**	**100.0**	**109**	**100.0**
Spread sheets	Never	7	6.8	13	11.9
	Occasionally	60	58.3	79	72.5
	Daily	36	35.0	17	15.6
	Total	**103**	**100.0**	**109**	**100.0**
Presentation	Never	12	11.7	3	2.8
	Occasionally	60	58.3	86	78.9
	Daily	31	30.1	20	18.3
	Total	**103**	**100.0**	**109**	**100.0**
Statistical analysis	Never	14	13.6	27	24.8
	Occasionally	85	82.5	73	67.0
	Daily	4	3.9	9	8.3
	Total	**103**	**100.0**	**109**	**100.0**

Internet	Never	3	2.9	4	3.7
	Occasionally	20	19.4	37	33.9
	Daily	80	77.7	68	62.4
	Total	**103**	**100.0**	**109**	**100.0**

Source: Survey data, 2011

Contrastingly, the least applicable software tools included those used for statistical analysis [13 (6.1%)], presentations [51 (24.1)] and spreadsheets [53 (25.0%)], irrespective of the preparedness for eLearning. In addition, the findings presented in table 4g suggest that participants prepared for eLearning were also predominantly regular users of word processing, internet, spreadsheets and presentation tools. In relation to preparedness for eLearning, Chi square test results are summarised in table 4h.

Table 4.9: ELearning preparedness & frequently used software tools

Dependent variable	Software tools	Summary of χ^2 results		
		Calculated χ^2	*df*	*p-value*
Preparedness for e-learning	Word processing	23.587	2	0.000*
	Spread sheet	12.255	2	0.007*
	Presentation	13.508	2	0.004*
	Statistical analysis	6.893	2	0.075**
	Internet	12.755	2	0.005*
	Emailing	14.316	2	0.003*

, **, * Significant at 0.01, 0.05 and 0.1 error margins, respectively*

The results suggest that preparedness for eLearning was significantly associated with the utilisation frequency of all the reference software tools. This implies that frequent utilisation of software tools enables academic staff to enhance their computing competence and consequently, their preparedness to operate and work in an eLearning environment. The level of competence in each of the reference software tools is covered under section 4.4.

4.3.3 Adequacy and quality of workplace computers

Consistent use of computers at the workplace to support academic activities is a function of the number of computers available in a department vis-à-vis the number of academic staff in that department. In views of this, participants were requested to indicate if all their colleagues had access to computers at their workstations. In response, up to 142 (67.0%) academic staff affirmed that all their colleagues had access to computers, 49 (23.1%) indicated that not all co-workers had access to functional computers, while 21 (9.9%) were not sure whether or not; all their colleagues had access to computers. In relation to the number of academic staff in their respective departments, up to 79 (37.3%) participants believed that workplace computers were inadequate, while 77 (36.3%) felt that such facilities were very inadequate. Another 44 (20.8%) believed that the computers adequate, while 12 (5.7%) opined that the computers were very adequate.

The most critical fact here is that more than two-thirds of the participants were not comfortable with the adequacy of workplace computers. The proportion of academic staff having access to functional computers has significant implications on an institutions preparedness to adopt eLearning. Inadequacy of computers for lecturers will certainly constrain their ICT competence, confidence and preparedness to function in an e-learning environment. This concurs with the findings of Blankenship (1998) who noted that the integration of eLearning

activities is purely a function of the number of computers available and accessible to lecturers, learners and the administrative staff at the workplace.

Furthermore, table 4i also illustrates that most participants believed that workplace computers were either inadequate [79 (37.3%)] or very inadequate [77 (36.3%)], irrespective of their preparedness for eLearning. Based on this finding, the analysis yielded a calculated Chi-square (χ^2) value of 2.573, with 3 degrees of freedom and a p-value of 0.462, which was not significant. This suggests that preparedness for eLearning was not significantly related with respondent's opinion on the adequacy of workplace computers. In other words, shortage of functional and efficient computers was a critical issue cited by most academic staff, regardless of their competence and preparedness for eLearning.

Table 4.10: Access to and quality of computers at the workplace

Questions	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
All colleagues have access to computers at the workplace?	Yes	75	72.8	67	61.5
	No	23	22.3	26	23.9
	Don't know	5	4.9	16	14.7
	Total	**103**	**100.0**	**109**	**100.0**
Adequacy of computers vis-à-vis academic staff	Very adequate	7	4.9	7	6.4
	Adequate	26	25.2	18	16.5
	Inadequate	37	35.9	42	38.5
	Very inadequate	35	34.0	42	38.5
	Total	**103**	**100.0**	**109**	**100.0**
Proportion of modern computers at workplace	All of them	24	23.3	17	15.6
	Most of them	53	51.5	54	49.5
	Only a few	23	22.3	34	31.2
	None	3	2.9	4	3.7
	Total	**103**	**100.0**	**109**	**100.0**

Source: Survey data, 2011

Key informant interviews indicated that the University had initiated a comprehensive programme to provide computers to all departments and to each academic staff. The purpose of this initiative is to improve the quality of teaching

by enabling lecturers to access latest research information through the internet to update their notes. Reportedly, where the initiative had been implemented, for instance, at the School of Mathematics, each academic staff has a computer connected to the internet. Despite this achievement, the study found that the project was still in its infancy stage, as many departments were yet to realize universal access to modern and efficient computers.

Regarding the quality of computers, table 4i further shows that a near-equal proportion of staff prepared for eLearning [53 (51.5%)] and those unprepared [54 (49.5%)] affirmed that most workplace computers were modern. Among those who reported that only a few computers were modern [57 (26.9%)], only 23 (22.3%) were prepared for eLearning; about one-third [34 (31.2%)] indicated that they were unprepared to operate in an eLearning environment. In connection to this finding, the analysis obtained a calculated Chi-square (χ^2) value of 3.303, with 3 degrees of freedom and a p-value of 0.347, which was not significant.

This implies that lecturer's preparedness for eLearning was not significantly associated with the quality of workplace computers. This implies that the quality of computers assigned to academic staff did not necessarily influence their preparedness for eLearning. Consequently, the null hypothesis *(H_02)* stating that *the relationship between quality of computers and lecturers' preparedness for eLearning is not statistically significant,* was not rejected due to insufficiency of empirical evidence to warrant such action. Besides computers,

key informants opined that each department requires ICT hardware equipment such as high resolution overhead projectors satellite TVs, internet servers and eLearning delivery rooms. Every department should have its own equipment for convenience.

These findings are consistent with those reported by Blankenship (1998), who notes that successful integration of eLearning depends on the quality of computers available, particularly in terms of power to process information and navigate through resourceful website. Hitt and Hartman (2002) also reported that computers of the right specifications are fundamental in supporting the integration of eLearning activities, including course development, delivery and evaluation. In Singapore, a study conducted by Gulbahar (2005) indicated that access to up-to-date hardware, software and network resources is fundamental for successful integration of ICT in the teaching process.

4.3.4 Reliability of internet connectivity

Of the 194 participants who reported having access to computers at their workplace, 185 (95.4%) indicated that their computers were connected to the internet. In terms of preparedness for eLearning, the results presented in table 4j shows that those who reported having internet connection, 97 (98.0%) were prepared for eLearning, while 88 (92.6%) were unprepared to work in an eLearning environment.

Table 4.11: Availability and reliability of internet connectivity

Question	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Internet connection at the workplace?	Yes	97	98.0	88	92.6
	No	2	2.0	7	7.4
	Total	**99**	**100.0**	**95**	**100.0**
Reliability of internet at workplace	Very reliable	6	6.2	15	17.0
	Reliable	61	62.9	42	47.7
	Unreliable	26	26.8	26	29.5
	Very unreliable	4	4.1	5	5.7
	Total	**97**	**100.0**	**88**	**100.0**

Source: Survey data, 2011

Besides, up to 84 (71.8%) participants said that internet connectivity was reliable. Table 4j shows that of this number, up to 51 (52.9%) were prepared for eLearning, while 33 (37.7%) were unprepared. Table 4j also shows that 36 (36.8%) of those prepared for eLearning and 39 (44.6%) of those unprepared stated that internet connectivity at the University of Nairobi was unreliable, while 4 (4.1%) of those prepared against 14 (15.7%) of those unprepared hinted that internet connectivity was very unreliable. The findings show that a significant proportion [about 40% of those prepared and 60% of those unprepared for eLearning], was not comfortable with internet reliability at the University. This suggests that internet connectivity at the institution has loopholes that should be addressed, as one of the pre-requisites for the integration of eLearning.

Contrastingly, those who indicated that internet connectivity was either unreliable [75 (59.1)] or very unreliable [18 (12.0)] were predominantly unprepared for eLearning. Based on this pattern, bivariate analysis obtained a calculated χ^2 value of 9.052, with 3 degrees of freedom and a p-value of 0.03, which was significant at 0.05 error margin. This suggests a probability of up to 95% that lecturer's preparedness for eLearning was significantly associated with

the reliability of internet connectivity. In other words, participants having reliable internet connectivity were likely to have better computing skills, which advantaged them when it comes to preparedness for eLearning. Weak or unreliable Internet connectivity is not only time-consuming but also frustrating to users; thus, discouraging consistent utilisation of the internet to support academic activities.

Still on internet reliability, interviews with key informants also confirmed that the University internet was unreliable and unstable in some campuses. Based on this challenge, sometimes it takes as long as five minutes to open certain URL links, which demoralizes and discourages consistent use by academic staff. In the words of an respondent, *"...sometimes you experience numerous time-outs before you access what you want..., in most cases you end up not accessing the information you are looking for, which is very disappointing"*. In addition, key informants pointed out that the University's webpage for eLearning is too shallow and some URL links are permanently inaccessible. Given these infrastructural gap, key informants called for the issue to be addressed as a matter of urgency.

Various studies conducted by scholars such as Mercado (2008), as well as Ndume et al. (2008) also noted that the reliability of internet is of critical importance in determining the preparedness for eLearning. More specifically, Mercado (2008) noted that a stable Internet connectivity and a dependable computer are some of the critical requirements for eLearning. However, these requirements remain key challenges to the adoption of eLearning in developing

countries. In their study, Ndume et al. (2008) assessed the challenges of adaptive eLearning in institutions of higher learning in Tanzania and noted that the availability of reliable internet connectivity was a critical part of preparation for eLearning. The study also noted that internet connectivity challenges were associated the unreliability of internet services in Tanzania. Slow and unreliability connectivity makes internet access too expensive and difficult to access requisite information.

4.3.5 Staff ICT training programme

In the competitive era of information technology, computer application skills are indispensable in daily life, particularly in the delivery of quality higher education. A high level of computer skills is required to tap technological opportunities such as eLearning to facilitate the development of knowledge-based economies. Consequently, training is the most important antecedent to lecturer's preparedness to function in an eLearning environment. A training programme is essential in helping academic staff to improve their ICT skills, as well as enable academic staff to understand eLearning and to appreciate its value in the delivery of quality university education.

Training is also necessary for attitude change in favour of eLearning. Lack of ICT skills is likely to undermine eLearning plans already in place; thus, delay the actualization of eLearning vision. Training is crucial for allaying fears and anxiety that may be associated with the introduction of new technology. In this regard, training facilitates the management of the change process from the

traditional to eLearning modes of course delivery. As noted by Gulbahar (2005), all the staff involved in the delivery of eLearning requires a wide scope of ICT skills to effectively develop courses, upload lessons, moderate and evaluate learners.

Based on this understanding, participants were requested to indicate their knowledge regarding the availability of a training programme on ICT, targeting academic staff. In this regard, up to 90 (42.5%) participants affirmed that the University had such programme in place; however, 81 (38.2%) participants stated that such programme was non-existent; while 41 (19.3%) did not know whether such programme was in place or not. In addition, table 4k shows that the majority, 49 (47.6%) of those prepared for eLearning were aware of the ICT training programme, while most of those unprepared, 48 (44.0%) indicated that such programme was non-existent at the University.

Table 4.12: Availability and effectiveness of ICT training programme

Questions	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
University has an ICT training programme for lecturers?	Yes	49	47.6	41	37.6
	No	33	32.0	48	44.0
	Don't know	21	20.4	20	18.3
	Total	**103**	**100.0**	**109**	**100.0**
Effectiveness of the ICT training programme for lecturers	Very effective	2	4.1	2	4.9
	Effective	32	65.3	26	63.4
	Ineffective	15	30.6	13	31.7
	Total	**49**	**100.0**	**41**	**100.0**

Source: Survey data, 2011

Based on participants' responses regarding the availability of an ICT training programme, the analysis obtained a calculated χ^2 value of 3.346, with 2 degrees of freedom and a p-value of 0.188, which was not significant at any point within 0.1 error margin. This suggests that lecturer's preparedness for eLearning

was not significantly associated with the existence of an ICT training programme for academic staff at the University. In other words, those who were aware of the programme and those who were not were not significantly different in terms of computing competence and preparedness for eLearning. This finding also implies that the training programme was less likely to be adding value in preparing academic staff to function in an eLearning environment. In relation to this finding, KII informants pointed out that most departments were yet to be reached with ICT training in preparation for eLearning. The programme was still young in terms of funding and strategies.

More still, 58 (64.4%) of those who affirmed the existence of ICT training programme at the University of Nairobi further indicated that the programme was effective in improving ICT competence among academic staff. Another 28 (31.1%) hinted that the training programme was ineffective, while 4 (4.4%) felt that it was very effective. In connection to this, table 4k, shows that there is no significant variation between those prepared for eLearning and those unprepared regarding perception on the effectiveness of the ICT training programme for academic staff.

This pattern yielded a calculated χ^2 value of 0.053, with 2 degrees of freedom and a p-value of 0.974, which was not significant. Thus, the perceived effectiveness of the ICT training programme for lecturers was less likely to influence their preparedness for eLearning. Consequently, the null hypothesis

($H_0$3) stating that the *effectiveness of ICT training programme has no significant relationship with lecturers' preparedness for eLearning* was not rejected because of inadequate empirical evidence. Furthermore, key informants underscored the need for training in ICT to be diversified, to cover various programmes, with a view to enabling lecturers develop, up-load, moderate and evaluate online courses. For this reason, participants emphasised need for the University to embark on training lecturers of all cadres on eLearning.

The study found that the University had established a team of eLearning experts to help academic staff understand eLearning, its importance in higher education, and its applicability in transforming courses to become web-based. However, key informants revealed that the team, which is based at the School of Computing and Informatics, had not achieved much discharging its mandate due to funding constraints and involvement in administrative as well as academic work. Besides, key informant interviews indicated that support for lecturers to improve their ICT skills may be improved through various actions, including creating partnerships with public and private sector organisations specialising in ICT, with a view to creating avenue for sharing information and other resources such as eLearning and teaching programmes.

These findings are in line with those reported by Saekow and Samson (2011) who noted that although most Thai Universities had established training programmes to help lecturers improve their skills and to develop positive attitude

towards eLearning, most lecturers failed to appreciate and warm up to eLearning. This was identified by the study as one of the key factors that delayed the integration and development of eLearning programmes in Thai universities. The main constraints cited by key informants involved in the study were lack of appropriate strategies and funding challenges. Consequently, the study emphasised the need for ICT training programmes targeting university lecturers to be revamped with necessary resources to enable academic staff understand and appreciate the importance of eLearning mode.

4.3.6 Timeliness of technical support

The amount of technical support provided to lecturers is one of the factors that influence the preparedness and use of various eLearning. As noted by Preston (2000), lecturers who may not be sure of where to turn for technical assistance in case of a problem remain apprehensive in the use of ICT facilities. In view of this, participants were also requested to indicate their knowledge about the availability of a support programme to enable academic staff overcome ICT-related challenges. In this regard, out of 212 participants, up to 125 (59.0%) affirmed that a support programme was actually in place, while 81 (38.2%) reported lack of knowledge on whether a technical support programme was in place or not. Most of the participants affirming the availability of technical support programme were those who had access to functional computers at the workplace.

In relation to the preparedness for eLearning, the results summarised in table 4l show that about two-thirds [61 (59.7%)] of the participants prepared for eLearning and another two-thirds [64 (58.7%)] of those unprepared affirmed that a support programme for academic staff was in place. However, up to 38 (36.9%) of those prepared against 43 (39.4%) of those unprepared were not sure of whether the programme was in place or not. Based on this finding, the Chi square test obtained a calculated χ^2 value of 0.878, with 2 degrees of freedom and a p-value of 0.645, which was not significant. This suggests that preparedness for eLearning was not significantly associated with awareness about the availability of an ICT support programme for lecturers. In other words, the two groups were not significantly different in terms of awareness about existence of the programme.

Table 4.13: Availability and timeliness of ICT technical support to lecturers

Questions	Responses	Prepared		Unprepared	
		Frequency	Percent	Frequency	Percent
University has an ICT support programme for lecturers?	Yes	61	59.2	64	58.7
	No	4	3.9	2	1.8
	Don't know	38	36.9	43	39.4
	Total	**103**	**100.0**	**109**	**100.0**
Timeliness of support to address ICT-related issues	Very timely	4	6.6	3	4.7
	Timely	38	62.3	25	39.1
	Untimely	16	26.2	27	42.2
	Very untimely	3	4.9	9	14.1
	Total	**61**	**100.0**	**64**	**100.0**

Source: Survey data, 2011

Another important dimension of technical support for lecturers is its timeliness. How soon the technical team is able to respond to issues raised by lecturers is a critical determinant of positive attitude towards eLearning. Inadequacy or untimely access to technical support is likely to encourage detachment between academic staff and their ICT facilities, including computers.

Similarly, Butler and Sellbom (2002) found that lack of or delay in providing technical services by the University was often stressful to lecturers, which in turn, influenced the acceptance of technology for teaching. In this study, up to 63 (50.4%) participants stated that the support provided was timely, 43 (34.4%) felt that the support was untimely, while 12 (9.6%) indicated that it was very untimely. In addition, figure 4.9 shows that up to 42 (68.9%) of those prepared for eLearning compared to 28 (43.8%) of those unprepared were comfortable with the timing of technical support provided by the University.

Contrastingly, majority [36 (56.3%)] of those uncomfortable with the timing of technical support were unprepared for eLearning. The analysis obtained a calculated χ^2 value of 18.572, with 3 degrees of freedom and a p-value of 0.000, which was significant at 0.01 error margin. Consequently, lecturers' preparedness for eLearning was significantly associated with the timeliness of technical support provided by the University. In other words, participants were more likely to be prepared for eLearning where technical support for ICT-related challenges was addressed in time. Such support provides a sense of security and helps lecturers to discover new computing skills. Based on this finding, the null hypothesis *($H_0$4)* stating that *there is no significant relationship between the timeliness of technical support and lecturers' preparedness for eLearning* was rejected for being inconsistent with empirical data.

Discussions with key informants revealed that the timeliness of technical support to academic staff was unpredictable; sometimes technical staff responds very fast to reported issues, while other times they take as long as a week to tend to such issues. Besides, the support team was more sensitive to issues experienced by central administrative units more than issues reported by individual academic staff. Worse still, most academic staff lack basic skills such as management of computer viruses or even installing an anti-virus programme. In view of this, key informants advocated for the decentralisation of ICT support centres to each department for timely response to reported issues and for personalised assistance to academic staff.

4.3.7 Adequacy of technical staff

There is no doubt that the adequacy of technical staff links to the timeliness of technical support provided to academic staff. Adequacy of technical staff is critical for ensuring that academic staff are supported as soon as a problem is encountered or reported. In view of this, participants were requested to indicate their opinion on the adequacy of technical support staff at the University. In response, 49 (39.2%) participants stated that such staff were adequate, 42 (33.6%) believed that technical support staff were inadequate, 26 (20.8%) were of the view that they were very inadequate. In addition, figure 4.2 indicates more than half of those prepared for eLearning [33 (54.8%)] believed that technical staff were either adequate or very adequate. Conversely, up to 41 (64.1%) of those unprepared for eLearning hinted that technical staff were either inadequate or very inadequate.

Table 4.14 : Adequacy of technical support staff

	Indicators	Condition	Percentage
ADEQUACY	V.adequate	Preparedness	6.6
		Unpreparedness	6.3
	Adequate	Preparedness	49.2
		Unpreparedness	29.7
	Inadequate	Preparedness	31.1
		Unpreparedness	35.9
	V.inadequate	Preparedness	13.1
		Unpreparedness	28.1

n=61 prepared & 64 unprepared

Source: Survey data, 2011

This implies that opinion about the adequacy of technical staff was divided among academic staff of the University. This suggests that some departments were better served by the ICT technical staff than others. Whereas those who are well supported by the technical team believed that they are adequate, lecturers in the underserved departments were of the contrary opinion. Based on the perceived adequacy of technical support staff, bivariate analysis obtained a calculated χ^2 value of 6.628, with 3 degrees of freedom and a-value of 0.085, which was significant at 0.1 error margin. This implies up to 90% chance that lecturers' preparedness for eLearning was significantly related with the adequacy of technical support staff. In other words, the number of technical support staff available at the University is likely to influence lecturer's preparedness for eLearning by determining the timeliness of support services. Based on this, the null hypothesis *($H_0$5)* stating that *there is no significant relationship between the adequacy of technical staff and lecturers' preparedness for eLearning* was rejected for not being correct.

4.3.8 Annual budgetary allocation

The amount of funds allocated for the development of ICT competence among lecturers is an important ingredient for enhancing lecturers' preparedness to function in an eLearning environment. In view of this, participants were asked to indicate their opinion about the amount of resources allocated by the University to support the development of ICT skills among academic staff in their faculties, departments, schools or centres. In this regard, only 51 (24.1%) believed that the resources allocated were adequate, 76 (35.8%) felt that allocations were inadequate; while the majority 85 (40.1%) did not know whether the allocations were adequate or not.

Key informants observed that although sharing information about budgetary allocation with staff members was a good management practice; this was not always the case at the University of Nairobi. Consequently, a significant proportion of academic staff members were not aware of ICT development budgets and programmes. Besides, table 4m confirms that a significant proportion of participants [36 (35.0%) and 49 (45.0%)], regardless of the preparedness for eLearning, did not know anything about budgetary allocation for ICT development.

Table 4.15: Adequacy of resources allocated to develop ICT programme

Questions	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Allocation for developing ICT programme adequate?	Yes	33	32.0	18	16.5
	No	34	33.0	42	38.5
	Don't know	36	35.0	49	45.0
	Total	**103**	**100.0**	**109**	**100.0**
How adequate?	Very adequate	15	22.4	4	6.7
	Adequate	21	31.3	18	30.0
	Inadequate	22	32.8	21	35.0
	Very inadequate	9	13.4	17	28.3
	Total	**67**	**100.0**	**60**	**100.0**

Source: Survey data, 2011

On the Likert scale, up to 31 (46.3%) of those prepared for eLearning compared to 38 (63.3%) of those unprepared believed that budgetary allocation was either inadequate or very inadequate. In this regard, the analysis obtained a calculated χ^2 value of 8.725, with 3 degrees of freedom and a p-value of 0.033, which was significant at 0.05 error margin. This implies that lecturer's preparedness for eLearning was significantly associated with the perceived adequacy of budgetary allocation for ICT programme at the departmental level. Consequently, budgetary allocation was likely to influence preparedness for eLearning. It is on this basis that the null hypothesis *(H_06)*, stating that *the relationship between annual budgetary allocation for ICT and lecturers' preparedness for eLearning is not statistically significant* was rejected for not holding true to reality.

The findings reveal that the eLearning programme at the University of Nairobi has not been well funded. The study conducted by Albirini (2006) revealed that inadequacy of financial resource to initiate and maintain systems was one of the factors influencing the integration and use of eLearning in academic institutions.

Similarly, Gulbahar (2005) also reported that inadequate financial provisions played a crucial role in influencing institutional use of eLearning in Singaporean universities. It is critical to note that eLearning is a capital-intensive

programme that requires adequate preparation in terms of financial resources. Furthermore, key informants reiterated the need to improve budgetary allocation for ICT development in all departments of the University. More specifically, this would ensure that each member of the academic staff has access to an office and a computer connected to the internet at their workstations.

4.4 Lecturer's Computing Competence & Preparedness for ELearning

As noted by van Braak (2004), computing competence is the ability to handle a wide range of varying computer applications for various purposes Computing competence can be enhanced through an effective training programme, which covers the application of basic software packages for word processing, spreadsheets, presentation, statistical analysis, internet browsing and e-mailing. There is no doubt that the knowledge of how such tools are applied among lecturers forms the foundation for preparedness to function in an eLearning environment.

4.4.1 Training in software tools

Out of 212 participants, up to 156 (73.6%) had received training in word processing tools; 119 (56.1%) had trained in spreadsheets; 135 (63.7%) had received training in presentation tools. The findings further indicated that 102 (48.1%) had trained in statistical analysis tools; 127 (59.9%) had trained in internet browsing tools; while 107 (50.5%) had undergone training for using e-mailing tools. In addition, table 4n shows that among participants who had

received training in all the software tools, the proportion of those prepared for eLearning was higher than the proportion unprepared.

The study found that most participants were trained in word processing tools [88 (85.4%) of those prepared and 68 (62.4%) of those unprepared for eLearning]. This is followed by presentation [75 (72.8%) of those prepared and 60 (55.0%) of those unprepared for eLearning] and spreadsheets [66 (64.1%) of those prepare and 53 (48.6%) of those unprepared for eLearning]. Those trained in internet browsing tools included 71 (68.9%) of the lecturers prepared and 56 (51.4%) of those unprepared for eLearning. For e-mailing tools, up to 58 (56.3%) of those prepared against 49 (45.0%) of those unprepared for eLearning had received training; while for statistical analysis tools, participants who had received some training included 57 (55.3%) of those prepared and 45 (41.3%) of those unprepared for eLearning. The pattern suggests that training was a critical component lecturer's preparedness for eLearning.

Table 4.16: Proportion of participants trained on software tools

Software tools	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Word processing	Yes	88	85.4	68	62.4
	No	15	14.6	41	37.6
	Total	**103**	**100.0**	**109**	**100.0**
Spread sheets	Yes	66	64.1	53	48.6
	No	37	35.9	56	51.4
	Total	**103**	**100.0**	**109**	**100.0**
Presentation	Yes	75	72.8	60	55.0
	No	28	27.2	49	45.0
	Total	**103**	**100.0**	**109**	**100.0**
Statistical analysis	Yes	57	55.3	45	41.3
	No	46	44.7	64	58.7
	Total	**103**	**100.0**	**109**	**100.0**
Internet	Yes	71	68.9	56	51.4
	No	32	31.1	53	48.6
	Total	**103**	**100.0**	**109**	**100.0**
Emailing	Yes	58	56.3	49	45.0
	No	45	43.7	60	55.0
	Total	**103**	**100.0**	**109**	**100.0**

Source: Survey data, 2011

Furthermore, table 4p indicates the Chi square results for lecturer's preparedness for eLearning and training in various software tools. The results show that training in all the software tools, except emailing was significantly associated with preparedness to work in an eLearning environment. For e-mailing, variation between the two groups was not significant; hence was less likely to influence their preparedness for eLearning. Notably, emailing tools were considered as a means for communication for personal and academic purposes, which had become more important than surface mail. This explains why there was no significant difference in preparedness for eLearning based on competence in working with emailing tools.

Table 4.17: Summary results of χ^2 tests

Dependent variable	Software tools	Summary of χ^2 results		
		Calculated χ^2	*df*	*p-value*
Preparedness for e-learning	Word processing	13.316	1	0.000*
	Spread sheet	4.528	1	0.033**
	Presentation	6.482	1	0.011**
	Statistical analysis	3.647	1	0.056***
	Internet	6.084	1	0.014**
	Emailing	2.297	1	0.130

, & *** Significance at 0.01, 0.05 & 0.1 error margins, respectively*

These findings amplify the importance of training in the application of software tools. In this regard, participants who reported having some training were likely to be better prepared for eLearning than those who had not trained in any software tools. Similar findings were obtained by Son et al. (2007) who noted that teachers who had some prior training in software packages including word-processing, spreadsheets and presentations were using computers in the classrooms more than their colleagues who had not undergone such training. Son

et al. (2007) further noted that among factors influencing the level of computing skills among teachers, previous training was the most important, accounting for up to 8% of variance in computing competence.

4.4.2 Training duration

The duration of training is also a critical factor likely to influence computing competence and preparedness for eLearning; the longer the duration, the better the competence and vice versa. For this matter, those who had trained in various software tools were requested to indicate the duration for which training was received. Table 4q shows the mean duration of training for each software tool in terms of weeks. The tabled results show that mean duration of training in word processing tools was the longest at 3.3 weeks, while the shortest training duration was in internet browsing at 1.7 weeks.

Table 4.18: Mean duration of training for software tools (weeks)

Software tools	Sum	n	Mean	Std. Deviation
Word processing	513	156	3.33	3.081
Spread sheet	286	119	2.40	1.230
Presentation	270	135	2.00	.898
Statistical analysis	228	102	2.24	1.759
Internet browsing	219	127	1.72	.804
E-mailing	218	107	2.04	1.165

Source: Survey data, 2011

Although there was no significant variation in the duration of training across the software tools, the common denominator is that the trainings were too short for a complete beginner; and barely matched the scope of software programmes such as Microsoft Word, Microsoft Excel and statistical analysis tools such as *SPSS*, *Epi info*, *SAS* or *CSpro*.

Compared to the guidelines provided by the Computer Society of Kenya (CSK), the reported durations of training are way below that recommended standards. For instance, training in word processing packages should take a minimum of four weeks and a maximum of six weeks. This implies that lecturers trained in these packages may require more training to explore the said packages fully. In relation to preparedness for eLearning, one-way ANOVA results summarised in table 4r show lack of significant difference between participants prepared for eLearning and those unprepared in terms of training duration for specific software tools.

Table 4.19: Training duration and preparedness for eLearning

Software tools		Sum of squares	df	Mean square	F	Sig.
Word processing	Between groups	.988	1	.988	.103	.748
	Within groups	1451.123	152	9.547		
	Total	1452.110	153			
Spread sheet	Between groups	2.051	1	2.051	1.359	.246
	Within groups	176.588	117	1.509		
	Total	178.639	118			
Presentation	Between groups	.315	1	.315	.389	.534
	Within groups	107.685	133	.810		
	Total	108.000	134			
Statistical analysis	Between groups	7.144	1	7.144	2.341	.129
	Within groups	305.209	100	3.052		
	Total	312.353	101			
Internet browsing	Between groups	.390	1	.390	.602	.439
	Within groups	80.965	125	.648		
	Total	81.354	126			

Source: Survey data, 2011

This suggests that there was no significant difference between members of the two groups in terms of training duration for all the software tools. In other words, training duration was standard for all participants, regardless of whether

they were prepared for eLearning or not. Key informant interviews revealed that training for most software tools were obtained from commercial colleges, which had standardised their course outlines to about two weeks per software tool to suit their commercial interests. However, reduction or compression of course contents to a period of two weeks, means that trainees with little or no prior computing experience are seriously disadvantaged. Thus, the computing competence of academic staff who had undergone some training was still wanting.

4.4.3 Funding sources for training in ICT software tools

The study found that most participants sponsored themselves for training in each of the software tools. More specifically, 108 (69.2%) participants sponsored themselves for training in word processing tools. Only 40 (25.6%) were sponsored by the current or previous employers. In the case of spreadsheets, up to 84 (70.6%) participants sponsored themselves, while 29 (24.4%) were sponsored by the employer. For presentation tools, up to 102 (75.6%) sponsored themselves, while 28 (20.7%) had been facilitated by the employer. The pattern was similar for training in statistical analysis, internet and e-mailing tools. Furthermore, table 4s shows that among self-sponsored trainees, the proportion of staff unprepared for eLearning was higher than the proportion of those prepared; contrastingly, among those sponsored by the employer, the proportion of those prepared for eLearning was higher.

Table 4.20: Sponsorship for training in software tools

Software tools	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Word processing	Self	56	63.6	52	76.5
	Employer	26	29.5	14	20.6
	Others	6	6.8	2	2.9
	Total	**88**	**100.0**	**68**	**100.0**
Spread sheets	Self	42	63.6	42	79.2
	Employer	18	27.3	11	20.8
	Others	6	9.1	0	0.0
	Total	**66**	**100.0**	**53**	**100.0**
Presentation	Self	52	69.3	50	83.3
	Employer	19	25.3	9	15.0
	Others	4	5.3	1	1.7
	Total	**75**	**100.0**	**60**	**100.0**
Statistical analysis	Self	33	57.9	30	66.7
	Employer	19	33.3	14	31.1
	Others	5	8.8	1	2.2
	Total	**57**	**100.0**	**45**	**100.0**

Source: Survey data, 2011

This suggests that training facilitated by the employer was likely to be more intensive than the training acquired through self-sponsorship. However, given that only about one-third of the participants had benefited from employer-sponsored training in software tools, key informant interviews revealed that the University training programme for academic staff was not supportive. Based on previous training or lack of training and experience, participants were requested to rate their competence in working with various software tools, as an indication of their preparedness to operate in an eLearning environment. Details are presented and discussed in the following sub-section.

4.4.4 Competence in using software tools

The purpose of training is to help beneficiaries develop their skills and competence. For this reason, participants were requested to rate their competence in applying each of the software tools on a scale of 0 to 10, which was them collapsed into a scale of <50% and 50% of more. Those who rated their competence below 50% were considered to be below average, while those whose competence was stated at 50% of more were above average. Based on this principle, up to 139 (65.6%) participants were found to be below average in applying word processing tools; another 73 (34.4%) were above average. In the case of spreadsheets, up to 121 (57.1%) participants were below average; 91 (42.9%) reported a score above average. For presentation tools, those below average were 122 (57.5%), while 90 (42.5%) were above average. In statistical analysis tools, those above average were 53 (25.0%); the majority (75.0%) was below average.

In addition, up to 168 (79.2%) were above average in working with internet browsing tools; only 44 (20.8%) were below average. For e-mailing, those above average were 167 (78.8%). These findings suggest that most participants were relatively more competent in working with internet, e-mailing and word processing tools than tools such as presentation, spreadsheets and statistical analysis. Furthermore, table 4t shows that among those who were above average in working with word processing tools, the proportion prepared for eLearning [87 (84.5%)] was higher than the proportion unprepared [52 947.7%)].

Table 4.21: Competence in software tools

Software tools	Responses	Prepared		Unprepared	
		Frequency	*Percent*	*Frequency*	*Percent*
Word processing	Below average	16	15.5	57	52.3
	Above average	87	84.5	52	47.7
	Total	**103**	**100.0**	**109**	**100.0**
Spread sheets	Below average	50	48.5	71	65.1
	Above average	53	51.5	38	34.9
	Total	**103**	**100.0**	**109**	**100.0**
Presentation	Below average	48	46.6	74	67.9
	Above average	55	53.4	35	32.1
	Total	**103**	**100.0**	**109**	**100.0**
Statistical analysis	Below average	67	65.0	92	84.4
	Above average	36	35.0	17	15.6
	Total	**103**	**100.0**	**109**	**100.0**
Internet	Below average	17	16.5	27	24.8
	Above average	86	83.5	82	75.2
	Total	**103**	**100.0**	**109**	**100.0**
Emailing	Below average	19	18.4	26	23.9
	Above average	84	81.6	83	76.1
	Total	**103**	**100.0**	**109**	**100.0**

Source: Survey data, 2011

Based on this finding, bivariate analysis obtained a calculated χ^2 value of 30.089 (corrected for continuity), with 1 degree of freedom and a p-value of 0.000, which was significant at 0.01 error margin. This suggests that lecturers' preparedness for eLearning was significantly associated with their competence in working with word processing tools. Consequently, participants whose competence in working with word processing tools was above average were likely to be better prepared for eLearning than those whose competence was below average. This prompted rejection of the null hypothesis *($H_0$7),* stating that *lecturers' competence in word processing has no significant relationship with their preparedness for eLearning* for not holding true to empirical evidence.

In the case of spreadsheet tools, the majority [50 (48.5%) of those prepared and 71 (65.1%) of those unprepared for eLearning)] was below average.

In connection to this finding, the analysis obtained a calculated χ^2 value of 5.294 (corrected for continuity), with 1 degree of freedom and a p-value of 0.021. This finding was significant at 0.05 error margin, implying up to 95% chance that lecturer's preparedness for eLearning was significantly related to competence in applying spreadsheet tools. Consequently, the null hypothesis *($H_0$8),* stating that *there is no significant relationship between lecturers' competence in spreadsheet tools and their preparedness for eLearning* was rejected.

For presentation tools, table 4t shows that staff unprepared for eLearning were predominant among those whose competence was below average [75 (67.9%)], while the proportion of those prepared for eLearning [55 (53.4%)] was higher among those above average. Based on this finding, the analysis yielded a calculated χ^2 value of 8.971 (corrected for continuity), with 1 degree of freedom and a p-value of 0.003, which was significant at 0.01 error margin. This suggests up to 99% chance that lecturers' preparedness for eLearning was significantly related to their competence in applying presentation tools. In this regard, the null hypothesis *($H_0$9)* stating that *lecturer's competence in using presentation tools has no significant relationship with their preparedness for eLearning* was also rejected.

Table 4t further shows that up to 67 (65.0%) of the staff prepared for eLearning and 92 (84.4%) of those unprepared were below average in terms competence in applying statistical analysis tools. Here, bivariate analysis obtained

a calculated χ^2 value of 9.574 (corrected for continuity), with 1 degree of freedom and a p-value of 0.002, which was significant at 0.01 error margin. This implies up to 99% chance that competence in working with statistical analysis tools was one of the factors likely to influence lecturer's preparedness to function in an eLearning environment. This led to rejection of the null hypothesis *($H_0 10$)*, which stated that *there is no significant relationship between lecturers' competence using in statistical analysis tools and their preparedness to apply eLearning.*

The software tools most applied by participants included the internet browsing tools such as *Mozilla Firefox* and *Google Chrome,* as well as e-mailing tools such as *Yahoo mail, Gmail, Eudora* and *Microsoft Outlook.* More specifically, table 4t shows that up to 86 (83.5%) of the staff prepared for eLearning against 82 (75.2%) of those unprepared were above average in working with internet browsing tools, while for e-mailing tools, up to 84 (81.6%) and 83 (76.1%) of those prepared and unprepared for eLearning respectively were above average. Bivariate analysis for competence on internet browsing yielded a calculated χ^2 value of 1.726 (corrected for continuity), with 1 degree of freedom and a p-value of 0.189, which was not significant. Consequently, the null hypothesis *($H_0 11$)* stating that *the relationship between lecturers' competence in using internet tools and their preparedness to apply eLearning is not statistically significant* was not rejected due to insufficiency of empirical evidence.

As for the e-mailing tools, bivariate analysis obtained a calculated χ^2 value of 0.631, with 1 degree of freedom and a p-value of 0.427, which was also not

significant. Consequently, those prepared and those unprepared for eLearning were not significantly different in terms of competence in using e-mailing tools. This implies that competence in using e-mailing tools was less likely to influence lecturer's preparedness for eLearning.

4.4.5 Impediments to computing competence & preparedness for eLearning

Data obtained from qualitative approaches indicate that the level of computing skills and preparedness for eLearning are affected by lack of formal training, inadequacy of time and financial resources to pursue training. Computing competence is also hindered by the ineffectiveness of ICT training programme targeting academic staff, which in the words of a key informant, is "underfunded, selective and secretive...most lecturers, even those already trained need refresher sessions to catch with technological changes. For instance, those who trained in Microsoft Windows 95 cannot affectively work with programmes based on new operating systems such as *Microsoft Windows Vista*, *Windows 7* or *Linux*."

Still on training, key informant interviews further indicated that computing competence was hindered by lecturers' engagement with administrative duties, which consumed all the time that could be used for training to acquire or sharpen ICT skills. "There is practically no time in my daily schedule for practice with computers" reported a key informant. The heavy workload was exacerbated by mass enrolment in regular and module two programmes. Reportedly, due to mass enrolment, some departments such as Communication Skills, with only 5

permanent and 2 part-time academic staff are strained in handling undergraduate students in the entire University.

Due to massification, work-related pressures and desire to make extra income from self-sponsored programmes are gradually diverting the interest of academic staff from developing their ICT skills. The available time is utilised for teaching various groups of students, marking and performing administrative duties. Lack of opportunity to enhance computing competence was also linked to uncertainty, anxiety and fear of going through the transition to an eLearning mode. Worse still, anxiety is perpetuated by the expectation to try new ideas as well as technological changes and advancement. Consequently, some software tools are perceived to be too complicated; prompting some academic staff to stick to the traditional mode or pen-paper or chalk-blackwall. Similarly, some academic staff perceive the transition to web-based teaching and learning as threat to their careers; "...they feel that taking their courses online is likely to render them redundant." Reportedly, this kind of attitude precipitated reluctance and in some cases resistance to transit to the eLearning mode. In addition, some informants linked the fear and anxiety to lack of consistent technical support and post-training guidance, particularly at the departmental level.

Shortage of modern and efficient computers at the workplace was also cited as one of the factors impeding academic staff's computing competence. Obsolete machines are not only time wasting but also reinforcing fear and anxiety about their ability to cope with teaching and learning challenges that are likely to

come with the new system. To cope with shortage of computers, some staff members are using their personal computers to undertake University work. Still on infrastructure, computing competence and preparedness for eLearning is impeded by unreliable internet connectivity. "Frequent disruption of internet access affects consistent use and familiarity with internet resources". In the words of a key informant, "...sometimes the University website is very frustrating...I avoid it as much as I can to avoid stress. That is why I cannot discard my *Yahoo!* e-mail address yet".

Key informant interviews further revealed that ICT incompetence and unpreparedness for eLearning was further accentuated by lack of ICT centres at the departmental level, where academic staff could go for quick consultations or for personalised services. This was particularly necessary because of the inadequacy of support staff at the University, which makes it difficult for lecturers to access technical support at the shortest notice. Given that most academic staff are loaded with administrative duties and classes, delays in technical support only widen distance between them and their computers. For this reason "...most of them find it more comfortable concentrating on the traditional methods of doing work, which they know best".

In addition, computing competence and preparedness for eLearning is affected by lack or inadequacy of eLearning resources. As pointed by a key informant, "...in case such resources are available, most academic staff are not aware of where or how they can be accessed". Also critical is the shortage of

specialised eLearning facilities, particularly online learning management systems (LMS) such as Blackboard, *WebCT, FirstClass, Moodle* and *Lotus Learning Space*, among others. LMS have the potential to save costs, time and can help to improve the effectiveness of learning processes. Other resource materials that should be considered by the University include specialised libraries where lecturers can access information to help them improve skills, as well as videoconferencing facilities.

4.5 Factors Influencing Lecturer's Preparedness for ELearning

Bivariate analysis, covered in section 4.2, revealed that lecturers' preparedness for eLearning was significantly associated with participants profile variables such as *age, education level, income level, access of computers at home* as well as *perceived ease of use*. In section 4.3, the analysis found a significant relationship between lecturers' preparedness for eLearning and infrastructural variables such as *access to computers at the workplace, internet reliability, timeliness of technical support, adequacy of technical support staff* and *adequacy of budgetary allocation for ICT development.*

More still, in section 4.4, the analysis indicated that lecturers' preparedness for eLearning was also significantly related to their computing competence in *word processing, spreadsheets, presentation* and *statistical analysis tools*. In this section, infrastructural and competence factors are treated as independent variables, while profile factors are considered moderating variables likely to modify the influence of independent variables on lecturer's preparedness for eLearning. However, bivariate analysis techniques are not capable of

determining how variation in each independent variable causes change in the dependent variable, while taking into account the modifying influence of intervening factors. For example, bivariate analysis does not tell whether increased access of computers at the workplace has a decreasing or increasing effect on lecturers' preparedness for eLearning. This necessitates the application of a multivariate analysis technique - binary logistic regression.

The application of this technique has been explained in chapter three; hence, does not need repetition in this section. The variables that were significantly associated with preparedness for eLearning were incorporated in regression models, using the *forward likelihood ratio* method. The analysis generated two models; with the first block incorporating independent variables only and the second block including independent and moderating variables together. Compressed results are contained in table 4v, while summary results are posted in appendix I.

Table 4.22: Summary results of binary logistic regression

COVARIATES	MODEL 1				MODEL 2			
	β	*S.E.*	*Sig.*	*Exp(β)*	*β*	*S.E.*	*Sig.*	*Exp(β)*
ACCESSwplace								
Yes	1.127	1.218	0.028**	3.086	1.012	0.957	0.012**	2.751
No (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
INTERNreli								
Very reliable	1.394	1.646	0.011**	4.031	1.916	3.727	0.021**	6.794
Reliable	0.617	1.412	0.162	1.853	0.699	3.499	0.075***	2.012
Unreliable	0.175	1.654	0.478	1.191	0.263	3.622	0.507	1.301
Very unreliable (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
ICTSUPPtime								
Very timely	1.468	1.810	0.017**	4.341	1.601	2.424	0.018**	4.958
Timely	0.014	1.218	0.148	1.014	0.554	1.556	0.118	1.740
Untimely	0.32	1.245	0.189	1.377	0.386	1.611	0.126	1.471
Very untimely (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
ADEQSstaff								
Very adequate	0.946	1.45	0.011**	2.575	1.097	2.034	0.017**	2.995
Adequate	0.311	0.982	0.074*	1.365	0.004	1.294	0.119	1.004
Inadequate	-1.015	1.196	0.110	0.362	-1.958	1.882	0.238	0.141
Very inadequate (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
ADEQBalloc								
Very adequate	0.975	1.41	0.042**	2.651	0.951	1.973	0.012**	2.588
Adequate	0.36	1.313	0.124	1.433	0.452	1.757	0.093*	1.571
Inadequate	-2.748	1.358	0.143	0.064	-2.673	1.995	0.118	0.069
Very inadequate (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
COMPwprocess								
Above average	1.321	0.744	0.046**	3.747	1.734	1.177	0.004*	5.663
Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
COMPssheets								
Above average	0.353	0.669	0.098***	1.423	0.806	0.854	0.062***	2.239
Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
COMPpres								
Above average	1.087	0.747	0.055***	2.965	1.627	1.1	0.003*	5.089
Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
COMPsanal								
Above average	0.027	0.864	0.106	1.027	0.521	1.182	0.159	1.684
Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Constant	**4.733**	**2.439**	**0.052*** **	**113.636**				
AGE								
<30 yrs	-	-	-	-	2.002	2.812	0.009*	7.404
30-39 yrs	-	-	-	-	1.718	2.214	0.022**	5.573
40-49 yrs	-	-	-	-	0.738	1.557	0.064***	2.092
50-59 yrs	-	-	-	-	0.143	2.196	0.203	1.154
60 yrs+ (RC)	-	-	-	-	xxx	xxx	xxx	xxx
EDUlevel								
Bachelors	-	-	-	-	1.607	1.539	0.014**	4.988
Masters	-	-	-	-	1.004	1.539	0.773	2.729
PhD (RC)	-	-	-	-	xxx	xxx	xxx	xxx
AVERincom								
<KES 50,000	-	-	-	-	1.588	2.775	0.012**	4.894
KES 50,000-59,000	-	-	-	-	0.936	2.382	0.036**	2.550
KES 60,000-69,000	-	-	-	-	0.408	1.517	0.151	1.504
KES 70,000-79,000	-	-	-	-	-0.517	1.234	0.275	0.596
KES 80,000-89,000	-	-	-	-	-0.817	1.057	0.223	0.442
KES 90,000+ (RC)	-	-	-	-	xxx	xxx	xxx	xxx
ACCESShome								
Yes	-	-	-	-	1.282	1.506	0.025**	3.604
No (RC)	-	-	-	-	xxx	xxx	xxx	xxx
PERCeuse								
Very easy	-	-	-	-	1.386	1.666	0.017**	3.999
Easy	-	-	-	-	0.785	1.125	0.069*	2.192
Not easy (RC)	-	-	-	-	xxx	xxx	xxx	xxx
Constant					**7.351**	**4.724**	**0.12****	**1557.754**

*, **, *** *Significant at 0.01, 0.05 and 0.1 error margins, respectively; RC-Reference category*

Source: Survey data, 2011

4.5.1 Access to computers at the workplace

Model 1 in table 4v shows that academic staff members having access to computers at the workplace were about 3.1 times more likely to be prepared for eLearning than their colleagues who did not have access. However, when moderating variables were incorporated in model 2 also found in table 4v, the odds ratio *[Exp(β)]* scaled down to about 2.8, suggesting that lecturers having access to computers at the workplace were about 2.8 times more likely to be competent and better prepared for eLearning than their colleagues lacking such access. The direction of effect is determined by the + or – signs before partial regression co-efficients *(β)*. Furthermore, the p-values *(Sig.)*, shows that variation between the two groups was significant at 0.05; which suggests up to a probability of up to 95% that access to workplace computers was significantly increased the odds of lecturers being prepared for eLearning.

4.5.2 Internet reliability

The participants who indicated that workplace internet connectivity was very reliable were about 4 times (model 1) more likely to be prepared for eLearning than their colleagues who felt that internet connectivity was very unreliable. However, when moderating variables were factored into the equation, model 2 shows that the odds ratio increased to 6.8 times. Variation between the two groups was significant at 0.05 error margin, again suggesting a probability of up to 95% that the reliability of workplace internet connectivity significantly influenced the odds than an individual was prepared for eLearning or not. Furthermore, looking at the trend of odds ratios across all groups, there is

evidence that the more reliable the internet connectivity, the better the odds that an individual was prepared for eLearning.

4.5.3 Timeliness of technical support

Regarding the timeliness of technical support to academic staff, model 1 shows that participants who indicated that such support was very timely were about 4.3 times more likely to be prepared for eLearning than their colleagues who felt that the support was very untimely. When the model was adjusted to incorporate moderating variables, the odds ration revised upwards to about 5 times, which means that participants who thought that technical support was very timely were about 5 times more likely to be prepared for eLearning than their colleagues in the reference category.

Given that variation between the two groups was significant at 0.05 error margin, it consequently implies that timeliness of technical support significantly influenced the chances of an individual being prepared for eLearning or not. In other words, more punctual the technical support the better the chances that an individual was competent in computing and prepared to work in an eLearning setting.

4.5.4 Adequacy of technical support staff

Participants reporting that technical support staff were very adequate were about 2.6 times more likely to be prepared for eLearning. However, the odds ratio increases marginally to 3 times when moderating variables are factored into the

equation. Thus, model 2 shows that participants reporting that technical support staff were very adequate were about 3 times more likely to be prepared for eLearning than their colleagues in the reference category.

Besides, variation between the two groups was significant at 0.05 error margin, suggesting the adequacy of technical support staff significantly influenced the odds of an individual being prepare for eLearning or not. Put in another way, the higher the adequacy of technical support staff the better the chances that an individual was prepared for eLearning.

In relation to this, key informant interviews revealed that adequacy of support staff was felt differently at different points within the University. In this regard, faculties and departments contiguous with the central administration were better served than those located in satellite campuses and centres across the country. Besides, departmental administrative units are also better served than individual academic staff, hence, administrators had a different opinion regarding adequacy of technical support staff.

4.5.5 Adequacy of budgetary allocation

Model 1 shows that participants who reported that budgetary allocation for ICT development in their respective departments was very adequate were about 2.7 times more likely to be prepared for eLearning than their colleagues in the reference category. However, in the second model, the odds ratio reduces

marginally to 2.6 times, which means participants indicating that allocations were very adequate were about 2.6 times more likely to be prepared for eLearning than members of the reference category.

In addition, variation between the two groups was significant at 0.05 error margin. Which shows that adequacy of budgetary allocations for ICT development significantly influenced the odds of an individual being prepared for eLearning or not. Besides, the odds ratios across all categories indicated that the higher the perceived adequacy of budgetary allocations, the better the chances that an individual is prepared for eLearning. Again, key informants pointed out that information on budgetary allocation for ICT development was barely shared with academic staff. Those who were privileged with such information were either involved in departmental administration or were close to administrators.

4.5.6 Competence in word processing tools

Regarding computing competence, model 1 indicates that participants who were above average in working with word processing tools were about 3.7 times more likely to be prepared for eLearning than their colleagues whose capability was below average. However, when the model is adjusted for moderating variables, the odds ratios scales up to 5.7 times, which shows that those above average were about 5.7 times more likely to be prepared for eLearning than their colleagues in the reference category. Variation between the two groups was significant at 0.01 error margin, which suggests a probability of up to 99% chance

that competence in word processing software tools was significantly influenced the chances of an individual's preparedness for eLearning or not.

4.5.7 Competence in spreadsheets

Participants whose computing competence using spreadsheets was above average were about 1.4 times more likely to be prepared for eLearning than their colleagues whose capability was below average. In the second model, however, the odds ratio adjusted upwards to 2.2, which shows that participants who were above average were about 2.2 times more likely to be prepared for eLearning than those in the reference category. Variation between the two groups was significant at 0.1 error margin. Consequently, increasing an individual's competence in working with spreadsheets put them at an advantageous position regarding preparedness for eLearning.

4.5.8 Competence in presentation tools

Model 1 shows that participants whose computing competence using presentation tools was above average were about 3 times more likely to be prepared for eLearning than those below average. However, adjusting the model for moderating variables makes this lot about 5.1 times more likely to be prepared for eLearning than their colleagues in the reference category. The variation between the two groups was significant at 0.01 error margin, which shows that improving the competence of academic staff in working with presentation software tools, increased the odds of their preparedness for eLearning.

4.5.9 Competence in statistical analysis tools

Furthermore, model 1 indicates that participants who were above average in applying statistical analysis tools were about 1 times as likely to be prepared for e-leaning as their colleagues who were below average. However, the model 2 adjusts the odds ratio to 1.7, which means that those above average in working with statistical analysis tools were about 1.7 times more likely to be prepared for eLearning. However, variation between the two groups was not significant, implying that improving competence in statistical analysis tools did not necessarily increase the odds of an individual's preparedness for eLearning.

4.5.10 Goodness-of-fit of the model

In binary logistic regression, the predictive power of a model is indicated by the change in -2 Log Likelihood (-2LL) statistic each time a variable is added into the equations. Each model generates an initial -2LL (chance model); the unit change in the value of -2LL statistic also represents the proportion of variance in the predicted variable, explained by a corresponding covariate. In the first model, the initial -2LL was 171.027 and after 9 iterations, the final -2LL statistic was 116.823. In the second model, the initial -2LL was 155.088. However, after 14 iterations, the model settled at 84.408. Usually, the small the -2LL statistic the better the model in predicting the phenomenon being investigated (Wuensch, 2006).

Figure 4.3 shows the covariates used in binary logistic regression models and the proportion of variance in lecturer's preparedness for eLearning that was

explained by each. In other words, the figure shows the effect caused by the addition of each covariate on the variance in lecturer's preparedness for eLearning, converted into percentages.

Figure 4.3: Proportion of variance accounted for by covariates

Internet Variability	Varances	Conditions	Percentage
Convariates	Access of Work place	Model1 Model 2	7.5 8.2
	Intrenreli	Model 1 Model 2	7.2 6.7
	Ict S upptime	Model1 Model2	8.8 10.1
	Adeqstaff	Model1 Model2	3.6 4.6
	Adequate Balloc	Model1 Model2	4.4 5.4
	Computerwprocess	Model1 Model2	7.5 7.0
	Compsheets	Model Model2	4.9 3.2
	Compress	Model1 Model 2	6.2 6.4
	Compsanal	Model1 Model2	4.1 2.3
	Age	Model2	3.6
	Edulevel	Model2	3.9
	everincom	Mode2	1.3
	Accesshome	Model2	3.6
	Perceuse	Model 2	4.3

Source: Survey data, 2011

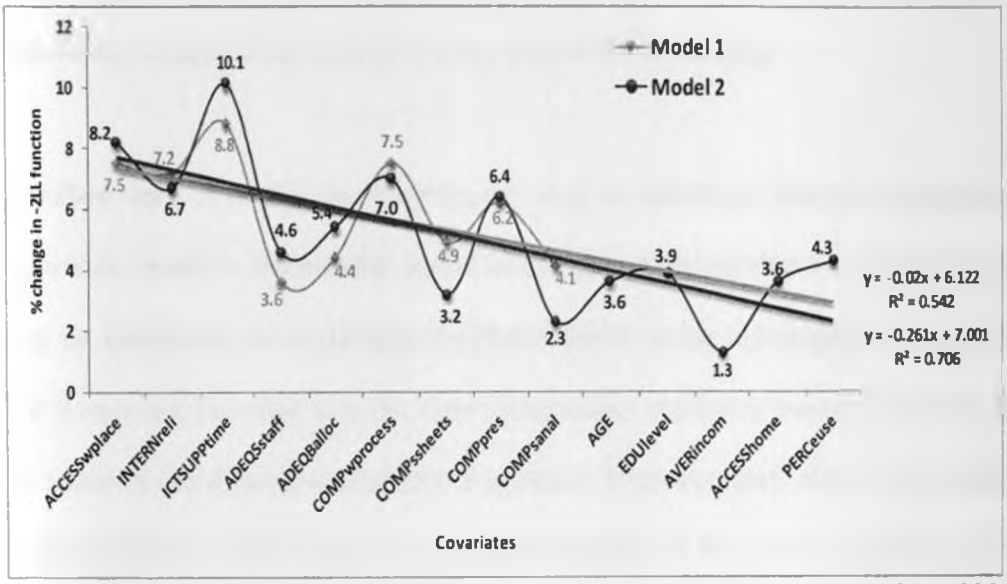
For example in model 1, access to computers at the workplace accounted for up to 7.5% of variance in lecturers' preparedness for eLearning. However,

when the model is adjusted to include moderating variables, the proportion of variance accounted for by the covariate increases to 8.2%. Internet reliability accounted for 7.2% variance in the lecturer's preparedness for eLearning; however, this scaled-down to 6.7% when the model is adjusted for moderating variables. The timeliness of technical support explained up to 8.8% variance in lecturers' preparedness for eLearning.

However, in the second model, the proportion accounted for by this covariate increased to 10.1%. Besides, competence in using word processing software tools accounted for 7.5% variance in model 1; however, the addition of moderating variables in the equation reduced the proportion of variance accounted for to 7.0%. As regards competence in working with presentation software tools, the proportion of variance explained increased marginally from 6.2% in model 1 to 6.4% in the second model.

Furthermore, model 2 shows that the timeliness of technical support (10.1%), was the most important covariate explaining lecturer's preparedness for eLearning. This is followed by access to computers at the workplace (8.2%); competence in working with word processing software tools (7.0%); internet reliability (6.7%) and competence in working with presentation software tools (6.4%). The explanatory power of the model was determined by plotting covariates on a scatter gram, as indicated in figure 4.4.

Figure 4.4: Distribution of covariates on scattergram & best-fit lines



Source: Survey data, 2011

The scatter gram also provides best-fit lines for the two models and the adjusted co-efficient of determination (R^2). In this regard, model 1 explained up to 54.2% of variance in lecturers' preparedness for eLearning; while model 2, which was adjusted for intervening factors, accounted for up to 70.6% of variance. This implies that up to 29.4% could not be explained by the covariates included in the second model. This proportion is likely to be accounted for by other variables, which were not captured by this study, or which failed to show significant relationship with lecturers' preparedness for eLearning at the bivariate level.

Furthermore, in model 1, omnibus tests of regression model co-efficients obtained a calculated Chi-square (χ^2) value of 28.285, with 16 degrees of freedom and a p-value of 0.029, which is significant at 0.05 error margin. In the second model, omnibus tests of model co-efficients yielded a calculated χ^2 value of 44.304, with 28 degrees of freedom and a p-value of 0.026, which was also

significant at 0.05 error margin. These results show that both models were significant in explaining lecturer's preparedness for eLearning.

Omnibus tests of model co-efficients are used to determine whether a resultant regression model is statistically significant or not. A model that is not significant may be inadequate in explaining the phenomenon under investigation, implying that it may not be containing the right independent variables causing variation in the value of the dependent variable in question. Omnibus tests allow researchers to ascertain the effectiveness of regression models in line with objectives of a study. in binary logistic regression, omnibus test results are generated automatically using software programmes such as SPSS and is presented as computed Chi-square (χ^2) values for each step of model-fitting.

This chapter presents findings of the study under four key thematic areas, namely background profile of academic staff, workplace infrastructure, lecturers' computing competence and factors influencing lecturers' preparedness for eLearning. Bivariate analysis in the first three thematic areas identifies the independent and moderating variables that are significantly associated with lecturers' preparedness for eLearning. Significant variables are then incorporated in binary logistic regression models to determine their influence on lecturers' preparedness for eLearning. The results generated through this process are summarised in chapter five, which also derives conclusions and recommendations for policy and programmatic action as well as for further research.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarises findings of the study and derives conclusions and implications of the findings to lecturers' preparedness for eLearning. The chapter also provides recommendations for appropriate interventions that should be put in place to improve preparedness for eLearning among lecturers at the University of Nairobi; this is followed by contribution of the study as well as recommendations for further research.

5.2 Summary of findings

The purpose of this study was to assess how infrastructural factors and computing competence influence lecturers' preparedness to function effectively in the envisaged eLearning setting. Consequently, the study was expected to highlight infrastructural, technical support and training needs among the academic staff, which should be targeted with appropriate interventions to bolster lecturers' preparedness for eLearning.

5.2.1 Background profile factors

The study found that 48.6% of the participants were above average in terms of computing competence, while slightly more than half (51.4%) were below average. Based on competence, those above average were likely to be

better prepared for eLearning in terms of necessary skills than their colleagues whose competence was below average.

The study also found that University colleges were not significantly different in terms of computing competence and eLearning preparedness among their academic staff *(χ^2= 4.586; df=5; p-value=0.469)*, as discussed on page 116., table 4.1. Put in another way, no college would be said to be better prepared than others to operate in an eLearning setting based on computing competence among the academic staff.

Furthermore, computing competence and preparedness for eLearning varied significantly across the cadres, with assistant lecturers showing the highest level of preparedness, based on their competence in applying software tools *(χ^2 =10.902; 4df; p-value = 0.028)*, page 117 table 4.1. The cadre that was least prepared for eLearning was that of associate professors.

The length of professional experience was inversely proportional to the probability of one's preparedness for eLearning *(χ^2=15.242; df=4; p-value=0.002)*, as detailed on page 118. In this regard, participants with relatively lower experience in teaching at the University were likely to be more competent in computing and better prepared for an eLearning environment than their experienced colleagues. Similarly, younger academic staff were likely to be better prepared for eLearning than their relatively older colleagues *(χ^2=18.026; df=4; p-value=0.001)*, detailed on page 120, table 4.1.

However, preparedness for eLearning was not significantly associated with gender *(χ^2=1.039; df=1; p-value=0.243)*, as detailed on page 121, table 4.1. In other words, male and female academic staff members were nearly at par in terms of competence in computing as well as preparedness for eLearning. In terms of academic background, preparedness for eLearning was significantly associated with lecturers' educational attainment *(χ^2=11.031; df=2; p-value=0.004)*, as discussed on page 122, table 4.1. In this regard, first degree holders, being relatively younger people, were likely to be more competent in computing; hence, better prepared for eLearning than PhD holders.

The study also found that preparedness for eLearning varied significantly across the income categories. Consequently, participants in relatively lower income brackets, most of whom were assistant lecturers and a few lecturers, were more competent in computing and thus; were likely to better prepared for eLearning than top earners, including senior lecturers, associate professors and professors *(χ^2=11.707; df=5; p-value=0.039)*, details are provided on page 123, table 4.1.

The study also found that participants having access to computers at home were likely to be better prepared for eLearning than their counterparts not having such access *(χ^2=12.376; df=1; p-value=0.000)*, as detailed on page 124., table 4.1 Besides, regular users of home computers were likely to be more competent and

better prepared for eLearning than irregular as well as non-users *(χ^2=14.123; df=2; p-value=0.003)*, details are provided on page 125.

Although perceived usefulness of computers was not significantly related to lecturers' competence and preparedness for eLearning *(χ^2=6.061; df=3; p-value=0.109)*, details are discussed on page 126, table 4.1; those who perceived computing to be easy or very easy were likely to be more competent and better prepared for eLearning that their colleagues who believed that working with computers was not easy *(χ^2=12.350; df=2; p-value=0.002)*, as detailed on page 127 of table 4.1.

5.2.2 Infrastructural and programme factors

Objective 1: Determine the effect of access to computers at work, quality of computers and reliability of internet connection on lecturers' preparedness for eLearning.

The study found that participants having access to computers at their workplace were likely to be more competent in computing; thus, better prepared to function in an eLearning environment than those who lacked such access *(χ^2=4.380; df=1; p-value=0.036)*, details are discussed on page 129, table 4.2. This finding prompted the rejection of the first null hypothesis ($H_0 1$) due to its inconsistency with empirical results.

More specifically, multivariate analysis indicated that participants having access to computers at the workplace were about 2.8 times more likely to be

competent and better prepared for eLearning than their colleagues lacking such access (see table 4v). Overall, access to workplace computers accounted for up to 8.2% of variance in lecturers; preparedness for eLearning (see tables 4.3 and 4.4).

The study also found that shortage of functional and efficient computers at the workplace was a critical issue cited by most academic staff, regardless of their competence and preparedness for eLearning. Consequently, lecturers' preparedness for eLearning was not significantly related to their perceived adequacy of workplace computers *(χ^2=2.573; df=3; p-value=0.462)*, as discussed on page 134 of table 4.5.

In addition, the quality of computers assigned to academic staff did not necessarily influence their preparedness for eLearning *(χ^2=3.303; df=3; p-value=0.347)*, as detailed on page 135-136, table 4.6 and 4.7. Consequently, the second null hypothesis *($H_0$2)* was not rejected due to insufficiency of empirical evidence to warrant such action.

However, participants having reliable internet connectivity were likely to have better computing skills, which put them at a better position for eLearning *(χ^2=9.052; df=3; p-value=0.03)*, as discussed on page 137-138 table 4.9. More still, those who indicated that workplace internet connectivity was very reliable were about 6.8 times more likely to be prepared for eLearning than their colleagues reporting that internet connectivity was very unreliable (see table 4v.

Internet reliability accounted for up to 6.7% of variation in lecturers' preparedness for eLearning (see table 4.3 and 4.4).

Objective 2: Assess how staff ICT training programme and timeliness of technical support affects lecturers' preparedness for eLearning.

Participants who were aware of the ICT training programme targeting academic staff and those unaware were not significantly different in terms of computing competence and preparedness for eLearning ($\chi^2=3.346$; $df=2$; $p\text{-value}=0.188$), detailed on page 145 of table 4.12. Thus, lecturer's preparedness for eLearning was not significantly associated with the existence of an ICT training programme for academic staff at the University. In addition, perceived effectiveness of the ICT training programme for lecturers was less likely to influence their preparedness for eLearning ($\chi^2=0.053$; $df=2$; $p\text{-value}=0.974$); thus, the null hypothesis (H_03) was not rejected (refer to page 142).

The study found that participants were more likely to be prepared for eLearning where technical support for ICT-related challenges were addressed in time; thus, preparedness for eLearning was significantly associated with the timeliness of technical support ($\chi^2=18.572$; $df=3$; $p\text{-value}=0.000$), details are discussed on page 145 and 146. Based on this finding, the null hypothesis (H_04) was rejected. Furthermore, participants who felt that technical support was very time were about 5 times more likely to be prepared for eLearning than their colleagues in the reference category (see table 4v). Besides, the timeliness of

technical support accounted for up to 10.1% of the variance in lecturers' preparedness for eLearning (see tables 4.3 and 4.4).

Objective 3: Examine the effect of technical staff and annual budgetary allocation on lecturers' preparedness for eLearning.

The study found that the number of technical support staff available at the University was likely to influence lecturer's preparedness for eLearning by determining the timeliness of support services *(χ^2=6.628; df=3; p-value=0.085)*, refer to page 152. Based on this, the null hypothesis *($H_0$5)* was rejected for being incorrect. Besides, multivariate analysis indicated that participants reporting that technical support staff were very adequate were about 3 times more likely to be prepared for eLearning than their colleagues in the reference category (table 4.14). Thus, the higher the adequacy of technical support staff the better the chances that an individual was prepared for eLearning. Adequacy of technical support staff explained up to 4.6% of variation in lecturers' preparedness for eLearning (see figures 4.3 and 4.4).

Regarding budgetary allocation, the study found that lecturer's preparedness for eLearning was significantly associated with perceived adequacy of budgetary allocation for ICT development at the departmental level *(χ^2=8.725; df=3; p-value=0.033)*, as discussed on page 153 of table 4.15. In this regard, budgetary allocation was likely to influence preparedness for eLearning. This finding prompted rejection of the sixth null hypothesis *($H_0$6)*. Additional finding indicated that participants reporting that allocations were very adequate were

about 2.6 times more likely to be prepared for eLearning than their colleagues stating that the allocations were very inadequate (table 4v). Overall, the adequacy of budgetary allocations accounted for up to 5.4% of variance in lecturers' preparedness for eLearning (see tables 4.3 and 4.4).

5.2.3 Competence in computing and lecturers' preparedness for eLearning

Objective 4: Determine how lecturers' competence in word processing and spreadsheet tools affects their preparedness for eLearning.

Under this objective, the study found that participants whose competence in working with word processing tools was above average were likely to be better prepared for eLearning than those whose competence was below average *(χ^2=30.089; df=1; p-value=0.000)*, refer to page 156 table 4.16. This prompted rejection of the seventh null hypothesis *(H_07),* for not holding true to empirical evidence. Multivariate analysis found that participants who competence in word processing tools was above average were about 5.7 times more likely to be prepared for eLearning than their colleagues in the reference category (table 4v). Besides, competence in word processing tools accounted for up to 7.0% of variance in lecturers' preparedness for eLearning (see tables 4.3 and 4.4).

More still, preparedness for eLearning was significantly related to competence in applying spreadsheet tools *(χ^2=5.294; df=1; p-value=0.021)*, leading to rejection of the eighth null hypothesis *(H_08)*, as detailed on page 159. The study also found that participants whose competence on spreadsheets was

above average were about 2.2 times more likely to be prepared for eLearning than those in the reference category (see table 4.20). Overall, competence in spread sheets explained up to 3.2% of variance in lecturers' preparedness for eLearning (see tables 4.3 and 4.4).

Objective 5: Assess how lecturers' competence in presentation tools affects their preparedness for eLearning.

Here, the study found that lecturers' preparedness for eLearning was significantly related to their competence in presentation tools *(χ^2=8.971; df=1; p-value=0.003)*, as discussed on page 160, table 4.16 In this regard, those whose competence was above average were more likely to be prepared for eLearning than their colleagues below average. Based on this, the ninth null hypothesis *($H_0$9)* was also rejected. Other findings showed that participants whose competence was above average were about 5.1 times more likely to be prepared for eLearning than their colleagues in the reference category (refer to table 4.20). This variable accounted for up to 6.4% variance in lecturers' preparedness for eLearning (see table 4.3 and 4.4).

Objective 6: Examine the effect of lecturers' competence in statistical analysis and internet tools on their preparedness for eLearning.

Competence in working with statistical analysis tools was one of the factors likely to influence lecturer's preparedness to function in an eLearning environment *(χ^2=9.574; df=1; p-value=0.002)*, refer to page 160, table 4.20. Thus, the tenth null hypothesis *($H_0$10)* was rejected. The study also found that

participants whose competence in statistical analysis tools was above average were about 1.7 times more likely to be prepared for eLearning (table 4.20). Given that variation between the two groups was not significant, improving competence in statistical analysis tools may not necessarily increase the odds of an individual's preparedness for eLearning. Overall, the addition of the variable in the equation explained up to 2.3% of variation in the dependent variable (see tables 4.3 and 4.4).

Finally, the study found that lecturer's preparedness for eLearning and competence in internet browsing tools was not significant *(χ^2=1.726; df=1; p-value=0.189)*, details are discussed on page 161, table 4.17. In this regard, the eleventh null hypothesis *($H_0$11)* was not rejected due to insufficiency of empirical evidence.

5.3 Conclusions

Modern and efficient computers make work easier, less stressful and timesaving. Based on this, efficient computers are encouraging and motivating to users. Access to computers at the workplace is one of the factors significantly associated with preparedness for eLearning. This gives academic staff ample time to practice and improve their computing skills, which in turn, is crucial for them to become familiar with computers; thus, help them overcome fears, anxiety and negative attitudes associated with computer use.

Although the quality of computers was not significantly associated with lecturers' preparedness for eLearning, logically speaking, working with obsolete machines is not only time wasting but also frustrating and may have far-reaching health implications. Such machines also reinforce fear and anxiety about their ability to cope with teaching and learning challenges that are likely to accompany the eLearning system.

In view of this, ensuring that each academic staff is able to access at least a functional computer at their workstations remains one of the most important undertakings for any institution of higher learning committed to helping academic staff to prepare for eLearning. Even though the University had earlier initiated an ambitious project to ensure universal computerisation, many departments and academic staff were yet to benefit from the initiative.

Some academic staff coped with the challenge by using their own computers to undertake University work, but at their own risk and cost of maintenance. Nevertheless, universal computerisation should be fast-tracked to reinforce University's infrastructural requirements for eLearning. Fast tracking is also necessitated by the fact that technology is changing rapidly and may overtake the computerisation initiative.

Providing computers and other ICT hardware may not be adequate without a strong, ubiquitous and omnipresent back-up support. Presently, the technical

support system in place is unpredictable; sometimes technicians respond very fast, other times they take as long as a week to address reported issues. Besides, some administrative units are readily supported more than the academic staff. This however, is attributed to shortage of technical support staff and centralization of support services.

The timeliness of technical support is one of the factors significantly associated with lecturers' preparedness for eLearning. Inadequacy or untimely access to technical support is likely to encourage detachment between academic staff and their ICT facilities, including computers. In other words, lack of support encourages user apprehension in accepting technology to support and improve their work. Thus, some academic staff find it comfortable concentrating on traditional methods of doing their work.

In view of this, strengthening and decentralising ICT support to the departmental level is a key intervention that should be considered by the University to ensure that technical support to academic staff is readily available to help them open-up to technology and build confidence.

ELearning is an educational mode that is entirely supported by the internet. Its success, therefore, depends on the availability and stability of the internet. As pointed out by key informants and up to 32.3% of the academic staff internet connectivity at the University is not available always. Besides, peripheral

campuses experience difficulties accessing the University website or specific URL links.

Frequent disappointment in accessing the internet is likely to reinforce user apprehensiveness, which in turn, discourages academic staff from developing their skills in searching for information to update their notes, communicate through e-mails or support their research activities. Given the nature of eLearning, stable and reliable internet connectivity is indispensable; making it one of the key infrastructural systems that must be strengthened as a precursor to eLearning.

Training in computing skills is necessary and essential as part of preparedness for eLearning. Although up to 73.5% of the academic staff had undergone some training in working with various software tools, more than two-thirds had not benefitted from training provided by the University. Most participants had financed their own training in commercial colleges. However, basic computer training in Kenya has been too commercialised to the extent that most facilities do not meet the threshold necessary for quality training in computer software tools. Consequently, even the academic staff who had trained were still not competent enough to function in an eLearning setting.

At the University of Nairobi, computing competence training is provided by the School of Computing and Informatics. However, most academic staff were yet to benefit from the initiative, on account of issues such as funding constraints,

lack of awareness, preoccupation with academic and administrative duties. Lack of time to undergo training is a reality that should be considered to create room for academic staff.

This is particularly critical for departments experiencing over-enrolment in module II programmes. Structuring the training programme and harmonising its schedules with academic semesters is one of the critical measures that should enable academic staff acquire skills necessary to work in an eLearning environment. Other critical options include making the University training programme continuous to take care of refresher needs as well as staff attrition.

The effort to prepare academic staff to function in an eLearning setting should not ignore issues such as uncertainty and anxiety of going through the transition process from traditional modes of delivery to the eLearning mode. Anxiety is particularly perpetuated by the expectation to try new ideas as well as technological changes. Unmanaged uncertainty and anxiety are likely to precipitate reluctance and in some cases, resistance to transit to eLearning. Uncertainty and anxiety are also likely to prevent academic staff from accepting training, as well as influence negatively the perception on the ease of using technology in teaching and learning processes.

This calls for pragmatic methods of change management to help academic staff adjust psychologically and develop attitudes that may favour the adoption of

eLearning. Change is a fearful process that is also filled with anxiety. People fear that change may bring new challenges or deprive them of certain opportunities or privileges. Change management involves influencing people's mindset to perceive a process of change positively by focusing on its merits rather than demerits. To ensure that all academic staff share in the vision of eLearning and walk along with the change process, sustained sensitisation and education is an indispensable pre-requisite.

Change is a multidimensional phenomenon; however, its success particularly depends on the psychosocial orientation of the target groups. Sustained sensitisation is particularly necessary because changing mindset takes time and cannot be achieved over night. Besides academic staff, the change process should target top leaders of the University. As a matter of fact, change can be realised faster when leaders and administrators become role models. They should undergo training in computing and eLearning processes to inspire their junior colleagues.

Considering the requirements for an effective eLearning systems, including universal access to computers, technical support, internet strengthening, staff training, as well as sustained sensitisation and education, there is no doubt that eLearning is a costly initiative, particularly to resource-poor countries. However, eLearning remains important in helping both academic staff and learners to develop skills and competencies necessary for tackling social and

economic development challenges experienced in the 21st century. In other words, eLearning has the potential to enhance digital literacy skills required for national development and posterity. It is a particularly useful ingredient in creating knowledge-based economies, envisaged in international and national development blueprints.

Furthermore, many universities in the world are going the eLearning way to remain afloat and competitive in the digital age and competitive market of higher education. Thus, the University of Nairobi should follow suit, by integrating eLearning to transform its teaching and learning activities; cope with the increasing demand for change and modernisation in higher education; as well as become a world-class university committed to academic excellence.

However, being a capital-intensive investment, there is no doubt that implementing eLearning in an environment of resource scarcity and competing priorities may be a key challenge to the University. This necessitates the creation of linkages with key funding partners to ensure a smooth transition from the traditional modes of course delivery to eLearning.

5.4 Recommendations

1. Strengthen the computing training programme

This may be achieved through increased funding, developing routine training programmes and circulating these in all departments, structuring training

schedules and levels of competence training, for instance, basic, intermediate and advanced. The advanced module should be specific to eLearning.

The training should be examinable and should cover areas such as administration of eLearning, learner registration, learner support, course content development, uploading, e-moderation as well as performance assessment and evaluation. Training should also cover the management and operation of ICT facilities and equipment such as internet, intranet, audio or video recording, satellite TV, and CD-ROM development.

Advanced levels of training should be made as practical as possible by ensuring that all academic staff are themselves, trained through the eLearning mode. For this matter, an eLearning training centre should be established and equipped with all necessary equipment and operating systems.

To encourage the uptake of training services, the University should consider creating staff release time to enable them concentrate on their training. The university should also create incentives and rewards for successful trainees. Besides, computing competence should be made mandatory and should form part of the requirements for promotions, recruitment, appointments and retention.

2. Initiate appropriate sensitisation interventions

This may be achieved through website adverts, newsletters, fliers, banners and plaques placed in strategic positions within University premises. Continuous sensitisation is critical for shaping attitude towards computing and eLearning mode. It is particularly important in helping academic staff to manage anxiety, as regards their job security in eLearning era. Besides, academic staff need to be informed and updated on technological changes that may influence their preparedness or functions in an eLearning setting.

3. Enhance access to relevant resource materials on eLearning

This may be achieved by procuring ebooks and ejournals, setting a section within library reference sections with eLearning materials, linking with international journals on eLearning and sharing link codes with academic staff.

4. Strengthen technical support programme

Technical support programme may be strengthened through decentralisation of support centres to departments, recruitment of more support staff and better pay for technical staff. The team should also monitor challenges experience by staff through regular visits. The department should be strengthened through funding and policy guidance. Decentralised ICT centres at the departmental level will enable staff members make quick consultations and access personalised services. Besides, post-training guidance should enable trained staff learn how to apply newly acquired skills in an enabling environment.

5. Improve infrastructural facilities

This calls for acquisition of more modern computers and fast-tracking the universal computerisation initiative. Improving ICT infrastructural facilities will also entail making the internet accessible, stable and easy to use.

6. Develop an eLearning strategy

The strategy should have a clear vision of the desired outcomes regarding access to university education, staff capacity and competence, attitudes and a coherent set of steps to move from the current mode of teaching to an eLearning setting. The strategy is necessary for the adoption of eLearning at the University and should incorporate an investment plan for infrastructural and systems development.

7. Establish partnerships with public and private sector organisations specialising in ICT, with a view to creating avenue for sharing information and other resources such as eLearning and teaching programmes.

5.5 Contribution of the study

ELearning is a relatively new venture in developing countries, particularly the sub-Saharan Africa. Consequently, there is a dearth of empirical literature to that may inform institutions of higher learning on how to adopt eLearning. An earlier study that partially touched on eLearning in relation to lecturers' attitude was conducted by Gakuu (2006), some six years ago. In view of this, Kenyan

public universities, particularly the University of Nairobi may find this thesis a useful resource material, alongside others, as they plan to shift from traditional delivery modes to eLearning.

The study incorporated two theoretical constructs of the Technology Acceptance Model (TAM). These included perceived usefulness and perceived ease of use. In this regard, the study contributes to the TAM, with the suggestion of a model for addressing several antecedents of perceived usefulness and perceived ease-of-use constructs. The study has also contributed to existing literature on eLearning adoption by institutions of higher learning, particularly in Sub-Sahara African countries. This is an area where few systematic studies have been conducted; hence, experiences a dearth of literature.

5.6 Recommendations for further research

This study focused on only one institution of higher learning in Kenya. Yet, the country has seven public universities. It would be appropriate if the study is replicated in other universities or scaled-up to the national level. A similar study with national scope will be important for confirming findings of this study; making a more comprehensive analysis of factors influencing lecturers' preparedness for eLearning in Kenya.

This study focused on academic staff, however, little is known about learners' preparedness for eLearning in terms of computing competence.

Although most learners have grown up in the digital age, not all high schools provide basic training in computers. Consequently, learners from some parts of the country are likely to have difficulties studying in an eLearning environment. Future studies should focus on learners' preparedness for eLearning at the institutional as well as national level.

The conduct of this study perceived a pure eLearning system, where all courses are developed, delivered, moderated and evaluated through the internet. However, a sift through relevant literature shows that some institutions have come up with hybrid models of eLearning, which are more suited to environments of resource scarcity and competing priorities. It would be appropriate for future studies to focus of hybrid models of eLearning, their advantages, disadvantages and applicability in Kenyan Universities.

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APPENDICES

Appendix I: Research Permit

Appendix II: Summary results of Binary Logistic Regression

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig
Step 1	Step	28.285	16	.029
	Block	28.285	16	.029
	Model	28.285	16	.029

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	171.027[a]	.325	.434
a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.			

Variables in the Equation One							
		B	S.E.	Wald	df	Sig	Exp(B)
Step 1[a]	ACCESSwplace			1.248	1	0.036**	
	Yes	1.127	1.218	2.736	1	0.028**	3.086
	No (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	INTERNrel			0.555	3	0.070***	
	Very reliable	1.394	1.646	0.057	1	0.011**	4.031
	Reliable	0.617	1.412	0.191	1	0.162	1.853
	Unreliable	0.175	1.654	0.504	1	0.478	1.191
	Very unreliable (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ICTSUPPtime			2.868	3	0.038**	
	Very timely	1.468	1.810	0.658	1	0.017**	4.341
	Timely	0.014	1.218	2.736	1	0.148	1.014
	Untimely	0.32	1.245	1.124	1	0.189	1.377
	Very untimely (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ADEQStaff			3.396	3	0.065***	
	Very adequate	0.946	1.45	0.057	1	0.011**	2.575
	Adequate	0.311	0.982	0.270	1	0.074*	1.365
	Inadequate	-1.015	1.196	2.702	1	0.110	0.362
	Very inadequate (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ADEQBalloc			9.347	3	0.033**	
	Very adequate	0.975	1.41	9.193	1	0.042**	2.651
	Adequate	0.36	1.313	5.084	1	0.124	1.433
	Inadequate	-2.748	1.358	4.095	1	0.143	0.064
	Very inadequate (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPsprocess			2.516	1	0.000*	
	Above average	1.321	0.744	3.152	1	0.046**	3.747
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPssheets			4.186	1	0.021**	
	Above average	0.353	0.669	0.278	1	0.098***	1.423
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPpres			1.382	1	0.003*	
	Above average	1.087	0.747	2.119	1	0.055***	2.965
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPsanal			2.371	1	0.002*	
	Above average	0.027	0.864	0.001	1	0.106	1.027
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	Constant	4.753	2.439	3.798	1	0.052***	113.636
a. Variable(s) entered on step 1: q3.5, q3.12, q3.16, q3.17, q3.19, q4.5$1, q4.5$2, q4.5$3, q4.5$4.							

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig
Step 1	Step	44.304	28	026
	Block	44.304	28	026
	Model	44.304	28	026

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	155.008[a]	460	.614
a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found			

Variables in the Equation Two							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	ACCESSwplace			1.047	1	0.003[a]	
	Yes	1.012	0.957	1.683	1	0.012**	2.751
	No (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	INTERNrel			0.729	3	0.026**	
	Very reliable	1.916	3.727	0.264	1	0.021**	6.794
	Reliable	0.699	3.499	0.512	1	0.075***	2.012
	Unreliable	0.263	3.622	0.265	1	0.507	1.301
	Very unreliable (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ICTSUPPtime			1.213	3	0.015**	
	Very timely	1.601	2.424	0.171	1	0.018**	4.958
	Timely	0.554	1.556	0.998	1	0.118	1.740
	Untimely	0.386	1.611	0.238	1	0.126	1.471
	Very untimely (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ADEQStaff			2.111	3	0.014**	
	Very adequate	1.097	2.034	0.066	1	0.017**	2.995
	Adequate	0.004	1.294	0.411	1	0.119	1.004
	Inadequate	-1.958	1.882	1.084	1	0.238	0.141
	Very inadequate (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ADEQBalloc			7.003	3	0.071***	
	Very adequate	0.951	1.973	6.295	1	0.012**	2.588
	Adequate	0.452	1.757	2.821	1	0.093*	1.571
	Inadequate	-2.673	1.995	1.794	1	0.118	0.069
	Very inadequate (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPsprocess			2.316	1	0.032**	
	Above average	1.734	1.177	0.321	1	0.004*	5.663
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPsshests			3.558	1	0.048**	
	Above average	0.806	0.854	0.058	1	0.062***	2.239
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPpres			2.157	1	0.022**	
	Above average	1.627	1.1	3.735	1	0.003*	5.089
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	COMPsanal			2.932	1	0.068***	
	Above average	0.521	1.182	0.194	1	0.159	1.684
	Below average (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	AGE			4.062	4	0.001*	
	<30 yrs	2.002	2.812	3.288	1	0.009*	7.404
	30-39 yrs	1.718	2.214	1.507	1	0.022**	5.573
	40-49 yrs	0.738	1.557	1.246	1	0.064***	2.092
	50-59 yrs	0.143	2.196	0.271	1	0.203	1.154
	60 yrs+ (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	EDUlevel			0.083	1	0.004*	
	Bachelors	1.607	1.539	0.083	1	0.014**	4.988
	Masters	1.004	1.539	0.083	1	0.773	2.729
	PhD (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	AVERincom			1.425	4	0.039**	
	<KES 50,000	1.588	2.775	0.726	1	0.012**	4.894
	KES 50,000-59,000	0.936	2.382	0.843	1	0.036**	2.550
	KES 60,000-69,000	0.408	1.517	0.869	1	0.151	1.504
	KES 70,000-79,000	-0.517	1.234	0.175	1	0.275	0.596
	KES 80,000-89,000	-0.817	1.057	0.152	1	0.223	0.442
	KES 90,000+ (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	ACCESSchems			3.029	1	0.000*	
	Yes	1.282	1.506	0.725	1	0.025**	3.604
	No (RC)	xxx	xxx	xxx	xxx	xxx	xxx
	PERCause			0.185	2	0.002*	
	Very easy	1.386	1.666	0.054	1	0.017**	3.999
	Easy	0.785	1.125	0.027	1	0.069*	2.192
	Not easy	xxx	xxx	xxx	xxx	xxx	xxx
	Constant	7.351	4.724	2.421	1	0.12**	1557.754
a. Variable(s) entered on step 1: q3.5, q3.12, q3.16, q3.17, q3.19, q4.5$1, q4.5$2, q4.5$3, q4.5$4, q2.1$1, q2.3, q2.4, q3.1, q5.3.							

Appendix III: Consent Form

Hello. My name is _____. I'm a PhD student at the University of Nairobi. Currently, am conducting a survey on *The Influence of ICT Infrastructure and Competence among Lecturers on the Preparedness to Use Electronic Learning: A Case of University of Nairobi.* I'm working with a research assistant and we intend to issue self-administered questionnaires to lecturers who volunteer to take part in the study. Filling a questionnaire is estimated to take between 20 and 30 minutes.

The purpose of this consent form is to give you the information you may need to decide whether to take part in the study or not. You may ask questions on anything about the survey and on your participation. When all your questions have been answered, you can decide to volunteer or decline. If you need a copy of this form, we will give it to you. Besides academic credit, the output of this study will strengthen advocacy for appropriate interventions to address infrastructural gaps, ICT training and support needs of lecturers; thus, increase their ability to function in an eLearning environment.

Given the importance of the study, you are requested to volunteer your time and complete a questionnaire. The study has no direct benefits to participants. Besides, there are no risks to your participation. You are free to volunteer or decline this request or even withdraw from the study at any time without penalty. The information obtained will be used for research purposes only and will be kept confidential. Should you decline to volunteer or decide to withdraw half-way, there is no penalty. However, I hope that you will participate since your views are important.

At this juncture, do you have any question on the study?
Do you accept to participate in the study? If yes, please sign the form below.

Participant's statement:
This study has been explained to me and I have had a chance to ask questions. I volunteer to participate.

Signature of respondent _____ Date _____

(If no, thank the participant)

Appendix IV: Survey Questionnaire

SURVEY QUESTIONNAIRE

The Influence of ICT Infrastructure and Competence among Lecturers on the Preparedness to Use Electronic Learning: A Case of University of Nairobi

	QUESTIONS	RESPONSES	INSTRUCTIONS
1.0	**INTRODUCTION**		
1.1	Date	_____/_____/ 2010	*DD/MM/YY*
1.2	College	☐ Humanities and Social Sciences ☐ Biological & Physical Sciences ☐ Health Sciences ☐ Education & External Studies ☐ Agriculture & Veterinary Sciences ☐ Architecture & Engineering	*TICK THE MOST APPROPRIATE*
1.3	Name of your school/institute/centre	_____	
1.4	Department	_____	
1.5	What is your official designation?	_____	
2.0	**SOCIO-DEMOGRAPHIC ATTRIBUTES**		
2.1	Age	_____	*IN COMPLETE YEARS*
2.2	Gender	☐ Male ☐ Female	*TICK THE MOST APPROPRIATE*
2.3	What is your highest education level?	☐ Bachelors ☐ Masters ☐ PhD	
2.4	What is your average monthly income from formal and informal economic activities?	☐ <KES 50,000 ☐ KES 50,000-59,999 ☐ KES 60,000-69,000 ☐ KES 70,000-79,999 ☐ KES 80,000-89,000 ☐ KES 90,000+	*TICK THE MOST APPROPRIATE*
2.5	Years of professional experience as a university lecturer	_____	*IN COMPLETE YEARS*
3.0	**ICT INFRASTRUCTURE**		
3.1	Do you have a functioning computer at home?	☐ Yes ☐ No	*EITHER A LAPTOP OR A DESKTOP COMPUTER*
3.2	If Yes, does it have internet connection?	☐ Yes ☐ No	*CONTINUE*
3.3	How often do you use the computer at your home?	☐ Never ☐ Occasionally ☐ Weekly ☐ Daily	*TICK THE MOST APPROPRIATE*
3.4	For what purpose do you use the computer at your home?	☐Communication ☐Developing teaching materials ☐Data analysis ☐Report writing	*TICK ALL THAT APPLY* *SPECIFY 'OTHERS'*

		☐Manuscript preparation ☐ Personal business ☐Others _____ _____	
3.5	Do you have a functioning computer at your workplace?	☐ Yes ☐ No	*EITHER LAPTOP OR DESKTOP*
3.6	If Yes, does it have internet connection?	☐ Yes ☐ No	*CONTINUE*
3.7	How often do you use the computer at your workplace?	☐ Never ☐ Occasionally ☐ Weekly ☐ Daily	*TICK THE MOST APPROPRIATE*
3.8	For what purpose do you use the computer at your work place?	☐Communication ☐Developing teaching materials ☐Data analysis ☐Report writing ☐Manuscript preparation ☐ Personal business ☐Others _____ _____	*TICK ALL THAT APPLY* *SPECIFY 'OTHERS'*
3.9	Do all your colleagues have access to computers at the workplace?	☐ Yes ☐ No	*CONTINUE*
3.10	How would you describe the adequacy of computers in relation to the number of lecturers?	☐ Very adequate ☐ Adequate ☐ Inadequate ☐ Very inadequate	*TICK THE MOST APPROPRIATE*
3.11	What proportion of computers available at your workplace is modern?	☐ All of them ☐ Most of them ☐ Only a few ☐ None	*MODERN = PURCHASED WITHIN THE PAST TWO YEARS FROM FIRST HAND DEALERS*
3.12	How reliable is the internet connection at your workplace?	☐ Very reliable ☐ Reliable ☐ Unreliable ☐ Very unreliable	*TICK THE MOST APPROPRIATE*
3.13	Does the University have an ICT training programme for lecturers?	☐ Yes ☐ No ☐ Don't know	*IF YES, CONTINUE* *IF NO OR DON'T KNOW, SKIP TO Q 3.15*
3.14	If Yes, how effective is the ICT training programme targeting lecturers?	☐ Very effective ☐ Effective ☐ Ineffective ☐ Very ineffective	*IN RELATION TO THE NUMBER OF LECTURERS TRAINED EACH YEAR* *TICK THE MOST APPROPRIATE*
3.15	Does the university have an ICT support programme for lecturers?	☐ Yes ☐ No ☐ Don't know	*IF YES, CONTINUE* *IF NO OR DON'T KNOW, SKIP TO Q 3.18*
	In your opinion, how timely is the ICT support	☐ Very timely	*TICK THE MOST APPROPRIATE*

3.16	to lecturers whenever they have ICT –related challenges?	☐ Timely ☐ Untimely ☐ Very untimely	
3.17	How would you rate the adequacy of ICT technical staff at the University, in relation to the number of lecturers that would require their services?	☐ Very adequate ☐ Adequate ☐ Inadequate ☐ Very inadequate	
3.18	Do you think the University is allocating adequate budgetary resources for the integration of eLearning?	☐ Yes ☐ No	*CONTINUE*
3.19	How would you rate the adequacy of budgetary allocation for the establishment of ICT programme at the University?	☐ Very adequate ☐ Adequate ☐ Inadequate ☐ Very inadequate	*TICK THE MOST APPROPRIATE*
4.0	**ICT COMPETENCE**		

4.1	How often do you use these software tools?	**ICT software tool**	**Never**	**Occasionally**	**Weekly**	**Daily**	*TICK THE MOST APPROPRIATE*
		Word processing					
		Spreadsheet					
		Presentation					
		Statistical analysis					
		Internet browsing					
		E-mailing					

4.2	Have you ever received any training on how to use these software tools?	**ICT software tool**	**Yes**	**No**	*TICK THE MOST APPROPRIATE*
		Word processing			
		Spreadsheet			
		Presentation			
		Statistical analysis			
		Internet browsing			
		E-mailing			

4.3	If Yes, how long was the training?	**ICT software tool**	**Duration of training (weeks)**	*INDICATE IN TERMS OF WEEKS*
		Word processing		
		Spreadsheet		
		Presentation		
		Statistical analysis		
		Internet browsing		
		E-mailing		

4.4	Who sponsored the training?	**ICT software tool**	**Self**	**Employer**	**Others**	*TICK THE MOST APPROPRIATE* *SPECIFY 'OTHERS'*
		Word processing				
		Spreadsheet				
		Presentation				
		Statistical analysis				
		Internet browsing				
		E-mailing				

4.5	On a scale of 0 to 10, how would you rate your competence in using these software tools?	**ICT software tool**	**<10%**	**10-24%**	**25-49%**	**50-74%**	**75-100%**	*TICK THE SCORE THAT BEST REFLECTS YOUR CAPABILITY*
		Word processing						
		Spreadsheet						
		Presentation						
		Statistical analysis						
		Internet browsing						
		E-mailing						

	In your opinion, what factors hinder your		*STATE ANY TWO MOST*

4.6	competence in using the stated software tools?	_____ _____ _____ _____	*IMPORTANT*
4.7	What kinds of support are provided by the University to lecturers, as regards ICT use?	☐ Provide computers ☐ Provide internet connectivity ☐ Provide training ☐ Provide post-training guidance ☐ Others _____ _____	*TICK ALL THAT APPLY* *SPECIFY 'OTHERS'*
4.8	Indicate your opinion on how the support provided by your institution is helpful in enhancing your ICT skills.		*TICK THE MOST APPROPRIATE*

Type of support	Very useful	Useful	Not useful
1. Provide computers			
2. Provide internet com.			
3. Provide training			
4. Provide guidance			
5.			
6.			

4.9	In your opinion, what measures should be taken to improve the support provided by the University in relation to your ICT skill needs?	_____ _____ _____ _____	*STATE ANY TWO MOST IMPORTANT*
4.10	Do you think you need more training in any of the software tools stated in ☐ 4.5 above?	☐ Yes ☐ No	*IF YES, CONTINUE* *IF NO, SKIP TO ☐ 5.1*
4.11	If Yes, indicate the software tools in which you need training/more training?	_____ _____ _____ _____	*STATE ANY SIX*
5.0	**PREPAREDNESS TO USE ELEARNING**		
5.1	Considering your level of competence in using ICT software tools, do you think you are prepared to use eLearning?	☐ Yes ☐ No	*CONTINUE*
5.2	In your opinion, how useful would be eLearning to you vis-à-vis your duties?	☐ Very useful ☐ Useful ☐ Fairly useful ☐ Not useful	*TICK THE MOST APPROPRIATE*
5.3	How easy is it for you to apply eLearning?	☐ Very easy ☐ Easy ☐ Not easy	
5.4	In your opinion, what factors impede your preparedness for eLearning?	_____ _____ _____ _____	*LIST ANY FOUR MOST IMPORTANT*
	THANK YOU		

Appendix V: The Key Informant Interview Schedule

KEY INFORMANT INTERVIEW SCHEDULE

The Influence of ICT Infrastructure and Competence among Lecturers on the Preparedness to Use Electronic Learning: A Case of University of Nairobi

	QUESTIONS	*RESPONSES*	*INSTRUCTIONS*
1.0	**INTRODUCTION**		
1.1	Date of interview	____/____/ 2010	*DD/MM/YY*
1.2	College	_____	
1.3	School/institute/centre	_____	
1.4	Department	_____	*WHERE APPLICABLE*
1.5	Official designation	_____	
2.0	**ICT POLICIES AND FUNDING**		
2.1	Does the University have an eLearning plan/policy?	☐ Yes ☐ No, why? _____ _____ _____ _____ ☐ Don't know	*PROBE EXHAUSTIVELY* *IF NO, SKIP TO Q 2.3*
2.2	If Yes, when was it formulated? What are the key features of the policy/plan? How has it influenced the integration of eLearning?	_____ _____ _____ _____ _____ _____	*PROBE EXHAUSTIVELY*
2.3	How much was allocated for ICT development at your school/institute/center in the last financial year?	KES_____ ☐ don't know	
2.4	In your opinion, how adequate is the annual budgetary allocation for ICT development in your institution?	☐ Very adequate ☐ Adequate ☐ Inadequate ☐ Very inadequate	*TICK THE MOST APPROPRIATE*
3.0	**TRAINING AND SUPPORT NEEDS**		
3.1	Does the University have an ICT training programme for lecturers?	☐ Yes ☐ No, why? _____ _____ _____	*PROBE EXHAUSTIVELY* *IF NO, SKIP TO Q3.4*

		☐ Don't know	
3.2	If Yes, how would you describe the effectiveness of training programme, in addressing ICT training needs of lecturers?	_____ _____ _____ _____	
3.3	What proportion of academic staff in your school/institute/center has been trained so far?	☐ All of them ☐ Most of them ☐ Only a few ☐ None	*TICK THE MOST APPROPRIATE*
3.4	In your opinion, what proportion of academic staff that is competent in using ICT facilities?	☐ All of them ☐ Most of them ☐ Only a few ☐ None	
3.5	What would you say about access to computer by lecturers in their offices? Do all lecturers at your school/institute/center have access to at least a computer in their offices? Why?	_____ _____ _____ _____ _____	*PROBE EXHAUSTIVELY*
3.6	In your opinion, how adequate are the computers compared to the number of lecturers?	☐ Very adequate ☐ Adequate ☐ Inadequate ☐ Very inadequate	*TICK THE MOST APPROPRIATE*
3.7	For those who have computers in their offices, what proportion of these computers has internet connection?	☐ All of them ☐ Most of them ☐ Only a few ☐ None	*TICK THE MOST APPROPRIATE*
3.8	How would you rate the reliability of internet connection for academic staff at your school/institute/center?	☐ Very reliable ☐ Reliable ☐ Unreliable ☐ Very unreliable	
3.9	Does the University have ICT support services for lecturers?	☐ Yes ☐ No, why? _____ _____ _____ _____ ☐ Don't know	*PROBE EXHAUSTIVELY* *IF NI, SKIP TO Q 4.1*
3.10	If Yes, what kinds of services are provided under this programme? How timely are the ICT support services for lecturers?	_____ _____ _____ _____ _____ _____	*PROBE EXHAUSTIVELY*
3.11	What factors influence the accessibility of ICT support services for lecturers?	_____ _____ _____ _____	
4.0	**PREPAREDNESS FOR ELEARNING**		

4.1	Do you think all lecturers in your school/institute/center are adequately prepared to use eLearning? Why?	_____ _____ _____ _____ _____	*PROBE EXHAUSTIVELY*
4.2	In your opinion, what factors impede lecturers' preparedness for eLearning?	_____ _____ _____ _____ _____	
4.3	What measures should be taken to improve the support provided to enable lecturers prepare for the integration of eLearning?	_____ _____ _____ _____ _____	
	THANK YOU		

Appendix VI: Observation Schedule

OBSERVATION SCHEDULE

The Influence of ICT Infrastructure and Competence among Lecturers on the Preparedness to Use Electronic Learning: A Case of University of Nairobi

1.1	Date	_____/_____/ 2010	*DD/MM/YY*
1.2	College	_____	
1.3	School/institute/centre	_____	
1.4	Department	_____	

1.5	Number of lecturers	*Gender*	*Permanent*	*Contract*	*Total*
		Males			
		Females			

2.0 ICT FACILITIES USED TO SUPPORT ELEARNING

	ICT facility	No.	Frequency of use	Condition	Adequacy	Remarks
2.1						
2.2						
2.3						
2.4						
2.5						
2.6						
2.7						
2.8						
2.9						
2.10						
2.11						
2.12						
2.13						
2.14						
2.15						
2.16						
2.17						
2.18						
2.19						
2.20						

			-Always -Occasionally -Rarely -Never	-Excellent -Good -Poor -Very poor	-Very adequate -Adequate -Inadequate -Very inadequate	