FACTORS AFFECTING EFFECTIVE ADOPTION OF E-LEARNING IN KENYAN UNIVERSITIES: THE CASE OF JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

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KAMAU NGAMAU

UNITED STATES INTERNATIONAL UNIVERSITY

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A Project Report Submitted to the Chandaria School of Business in Partial Fulfillment of the Requirement for the Degree of Executive Master of Science in Organizational Development (EMOD)

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FALL 2013

STUDENT'S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University in Nairobi for academic credit.

Signed: _____ Date: _____

Kamau Ngamau (ID 637927)

This project has been presented for examination with my approval as the appointed supervisor.

Signed: _____ Date: _____

Prof. Jimmy Macharia

Signed: _____ Date: _____

Dean, Chandaria School of Business

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ABSTRACT

This study aimed to analyse the reasons for the limited success in implementation of eLearning at JKUAT. The study analyzed to what extent individual, organizational and technological or system factors contributed to poor adoption of eLearning by JKUAT faculty. A descriptive and correlational research design were applied to collect and analyze data from a sample 146 faculty at the University's main campus. A stratified sampling technique was used. The sample was stratified according to the Schools within the main campus proportionately allocated from each of the 7 schools. The main data collection instrument was a questionnaire administered to the faculty. Data analysis was done using both the descriptive (frequency counts, percentages, and means) and inferential statistics (correlation analysis, regression analysis and principal component analysis). The study was undertaken in May / June 2013.

The total number of respondents that were registered on the Learning Management System LMS were 39.7%. The highest percentage of registered faculty were found in Institute of Computer Science and Information Technology (ICSIT) (58.3%) followed closely by Agriculture (50.0%). The lowest registration was found in the School of Architecture and Building Sciences (SABS) (16.7%) and the College of Health Sciences (COHES) (33.3%). The attendance of LMS training was 43.2 % showing that the majority of the faculty had not attended a training. On the most limiting factor for using the LMS, access to internet (49.3%), inadequate training (48.0%) and insufficient incentives (50.0%) were rated high (level 4 and 5) by almost half of the respondents. The majority of the respondents accessed internet using their own broadband modem.

Among individual factors, computer literacy was significantly correlated to the period of LMS usage, frequency of LMS use and LMS adoption. Computer anxiety and age were found to be significantly negatively correlated with LMS adoption. From the regression analysis, none of the individual factors were significant predictors of LMS adoption. Among the organizational factors, management support, institutional leadership, school and institution wide eLearning strategy, ease of use of the system and ICT infrastructure were rated below average, showing that the faculty had a negative perception about the variables. The school and institution wide eLearning strategy, management support and social influence were found to be significantly correlated to the frequency of LMS use. In

the linear regression, management support was the only predictor variable that was significant and therefore explained the variance of the frequency of LMS use.

Among technological factors, ICT infrastructure, perceived usefulness, output quality and job relevance were rated above average, showing the faculty had a slightly positive perception about the variables while perceived ease of use was rated low. Perceived usefulness, perceived ease of use, output quality and job relevance were found to be significantly correlated with the frequency of LMS use. On linear regression, ICT infrastructure, perceived usefulness and job relevance were the only predictor variables that were significant, showing they were significant predictors of behavioral intention.

Efforts to improve eLearning adoption should therefore concentrate on improving computer literacy. The faculty had a negative perception of management support, institutional leadership and school and institutional wide eLearning strategy accorded to eLearning. The University therefore requires to undertake measures to enhance management support such as training support, incentives, provision of necessary resources to support use of the system, help desk support, and sufficient time to design and deliver online content. The faculty had a slightly negative perception on the ease of use of the system showing that they were not very comfortable with the system. The university should invest more on ICT infrastructure such as in fast and reliable internet access and provide a dedicated mirrored server for eLearning. The university should also integrate eLearning into the university strategic plan and annual work plans and develop a clear policy and also fund eLearning initiatives.

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DEDICATION

I dedicate this report to my dear wife Catherine and our two lovely daughters Njoki and Muthoni. May the Almighty bless you.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

COD	Chairman of Department
COETEC	College of Engineering and Technology
COHES	College of Health Sciences (Formerly ITROMID)
DVC	Deputy Vice Chancellor
ICSIT	Institute for Computer Science and Information Technology
ITROMID	Institute of Tropical Medicine and Infectious Diseases
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KENET	Kenya Education Network
LMS	Learning Management System
RUFORUM	Regional Universities Forum for Capacity Building in Agriculture
SHRD	School for Human Resource Development
SODeL	School of Open Distance and eLearning
USIU	United States International University
VC	Vice Chancellor

LIST OF TABLES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Problem Background

Digital technologies are revolutionizing the practices of teaching and learning at colleges and universities all around the world and the teaching institutions are making significant efforts in eLearning development and investing significantly in associated information technology infrastructure with the expectation of high return on their investment (Nanayakkara, 2007). However, in spite of this effort and investment the teachers and faculty do not always use the technology as expected and more often eLearning systems continue to be underutilised.

The origin of the term eLearning is not certain, although it is suggested that the term most likely originated during the 1980's, within the similar time frame of another delivery mode, online learning (Moore, Dickson-Deane, and Galyen, 2011). In its broadest sense, eLearning can be defined as instruction delivered via all electronic media including the internet, intranets, extranets, satellite broadcasts, audio/video tape, interactive TV and CD-Rom (Frimpon, 2012). ELearning has also been described as teaching and learning that is web-enabled (Govindasamy, 2002). Different teaching and learning methods can be employed together with eLearning; eLearning is blended with traditional methods (usually traditional classroom learning), distance learning, any face-to-face contact with tutors and/or other e-course participants, and degree of freedom (participants can choose place, pace and time) (Snajder, Verlic, Povalej, and Debevc, 2007). There are many strategies for delivering eLearning, including asynchronous, synchronous, hybrid-instructor led, and self-paced learning (Tucker and Gentry, 2009).

ELearning is becoming increasingly prominent in tertiary education, with universities increasing provision and more students signing up (OECD, 2005). Tremendous growth in eLearning has been reported in many countries such as Korea (Park, 2012), Malaysia (Ali, nd), South Africa (Ravjee, 2007), United States (Edelson and Pittman, 2001) and Denmark (Rytkønen and Rasmussen, 2010). In Denmark the UC/LIFE is reported to be among the leading universities in eLearning (Rytkønen and Rasmussen, 2010). Approximately 95% of the teachers use ICT to communicate with their students and to plan their teaching. Around 14% mix in addition their face-to-face teaching with online

exercises such as tests and online discussions, and UC/LIFE has moreover developed a number of complete online courses at Master level and as continuing education. In Northern Ireland, the University of Ulster is the most advanced in the region in terms of development and delivery of eLearning (Uhomoibhi, 2006). Presently, students on online postgraduate programmes now constitute approximately 25 per cent of all taught postgraduate students in the University. On the other hand, Queen's University Belfast has adopted a blended approach to eLearning, which involves the integration of eLearning with traditional media and methods in line with course content, level and students (Uhomoibhi, 2006). In Canada, eLearning appeared to be more effective in distance education, where technology use is required than in face-to-face instructional settings (Abrami, Bernard, and Wade, 2006).

ELearning is a catalyst for change, transforming processes, breaking down barriers and opening-up access (Diaz, 2004). It is also an enabler for lifelong and lifewide learning, giving unprecedented access to learning resources and facilitating personal learning pathways. Amongst the many advantages of eLearning are that it is less expensive to deliver, it is self-paced, provides consistent content, faster and works anywhere and at anytime for learners (Uhomoibhi, 2006). Also, the instructional materials are easily updated and permit the use of multimedia which leads to reinforced learning through the use of video, audio, quizzes and other forms of interaction. The disadvantages are that it may cost more to develop and requires new skills for the production of content (Uhomoibhi, 2006). The associated technology might be intimidating, at times confusing, frustrating and costly. ELearning requires on the part of the learner, more responsibility and self-discipline to keep up with an unconstrained and robust learning process.

Despite imperfect access to ICT, African higher education institutions are embracing new forms of learning networks to respond to the challenges posed by a rapidly changing and increasingly interdependent world (Beeba, 2003). Africa is lagging behind in the implementation of eLearning. Despite eLearning's potential to help meet Africa's educational and manpower needs, erratic power supplies, weak ICT infrastructure, poor educational funding and an absence of experts have combined to rob the continent of a vital chance at improving its stake in the digital economy therefore Africa has little chance of using eLearning to leapfrog into the fast-evolving information society (Oruame, 2008). Bates, (2009) reported that given the particular challenges faced by universities in

Africa (poor and expensive Internet infrastructure, relatively high cost of computers, shortage of quality IT staff and eLearning specialists, and the need for more 'knowledge-workers'), universities need to be very focused and strategic in their use of eLearning.

Most academic institutions in sub-Saharan Africa suffer from financial difficulties which hamper easy procurement of relevant ICT and other support for students (Mutula, 2005). In a survey of 147 eLearning practitioners from 34 countries in Africa only 33% reported that they were delivering eLearning in a variety of different ways (Hollow, 2008). In Nigeria, inequality of access to technology, internet connectivity, energy related problems, and limited expertise have been listed as the main barriers preventing the successful implementation of eLearning (Ekundayo and Ekundayo, 2009). Rytkønen and Rasmussen, (2010) reported that Sokoine University of Agriculture, Tanzania, had no experiences with eLearning while University of Nairobi, Kenya, and Makerere University, Uganda, had been working with eLearning since 2005 and 1997, respectively.

Information technology adoption and use in the workplace remains a central concern of information systems research and practice and despite impressive advances in hardware and software capabilities, the troubling problem of underutilized systems continue resulting in the "productivity paradox" (Venkatesh and Davis, 2000). Frimpon, (2012) identified 17 critical success factors that are critical for successful deployment of eLearning which were partitioned into four natural roles of student, instructor, technology and institution. Various models have been developed to explain acceptance of technology and usage behavior. Davis, Bagozzi, and Warshaw, (1989) developed the technology acceptance model (TAM) which suggests that two specific beliefs—perceived ease of use and perceived usefulness— determine one's behavioral intention to use a technology (Appendix 1 page 92). Similarly, Venkatesh, (2000) developed a model of the determinants of perceived ease of use based on several anchors related to individuals' general beliefs regarding computers and computer use i.e. computer self-efficacy, computer anxiety, and computer playfulness, and perceptions of external control (or facilitating conditions) (Appendix 2 page 93).

Venkatesh, Morris, Davis, and Davis, (2003) compared eight models and their extensions on user intentions to use information technology and formulated a unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), with four core

determinants of intention and usage, and up to four moderators of key relationships (Appendix 3 page 94). Venkatesh and Davis, (2000) developed and tested a theoretical extension of TAM (TAM2) that explained perceived usefulness and usage intentions in terms of social influence (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) which significantly influenced user acceptance (Appendix 4 page 95).

Venkatesh and Bala, (2008) proposed the Technology Acceptance Model 3 (TAM3) based on TAM by Davis, Bagozzi, and Warshaw, (1989) (Appendix 5 page 96). They reported that perceived usefulness strongly influenced peoples' intentions. On the other hand, perceived ease of use had a small but significant effect on the intentions as well but this subsided over time.

Nanayakkara, (2007) developed a new unified framework for eLearning user acceptance, incorporating the factors that were directly relevant for eLearning as well as the appropriate information systems user acceptance elements from published technology acceptance models such as TAM, TAM2 and UTAUT (Appendix 6 page 97). The results showed that whilst individual and system factors had a strong influence on users' attitudes to system adoption, the organizational factors were most crucial for user acceptance in eLearning technologies (Nanayakkara, 2007). The users ranked release time for staff, the ease of use of LMS, perceived usefulness of LMS, training and support to develop online content and the reliability of information and communication technology infrastructure as the five most essential factors for staff uptake in eLearning systems. This study sought to study the individual, organizational and technological factors affecting effective adoption of eLearning by faculty in JKUAT.

1.2 Problem Statement

Information technology adoption and use in the workplace remains a central concern of information systems research and practice and despite impressive advances in hardware and software capabilities, the troubling problem of underutilized systems continue (Venkatesh and Davis, 2000). Various models have been developed to explain technology adoption such as Technology Acceptance Model (TAM) (Davis, Bagozzi, and Warshaw,

1989), TAM 2 (Venkatesh and Davis, 2000), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, and Davis, 2003) and TAM 3 (Venkatesh and Bala, 2008). However, none of the models consisted of all factors - individual, system and organisational, that have been identified for eLearning system acceptance (Nanayakkara, 2007).

Despite many years and several attempts at implementing eLearning, JKUAT is yet to fully implement the system. Various reasons have been given for JKUAT's partial success in this endeavour despite being a leading University in Computer Science and Information Technology. The failure may be due to knowledge, policy and practice gaps in the implementation of eLearning at the University. Previous studies at JKUAT have reported poor internet connection, power failures, availability of networked computers, lack of time to develop content, lack of compensation, lack of proper training, lack of personnel in the eLearning department to train lecturers, lack of management support among others as some of the challenges affecting use of eLearning (Kang'ethe *et al*, 2008; Kihoro, 2012; JKUAT, 2011; Mukiri, 2011). However, the studies did not quantify them or categorise them into individual, organizational and system factors. The studies also did not clearly define eLearning adoption. This study aims to determine the individual, organizational and system (technological) factors on affecting adoption of eLearning by faculty in JKUAT with a view to address and develop a successful implementation plan.

1.3 Purpose of Study

The purpose of this study was to study the factors affecting the effective adoption of eLearning by the faculty in JKUAT and to propose appropriate solutions to help improve future adoption.

1.4 Research Questions

1.4.1 To what extent do individual factors contribute to poor adoption of eLearning by JKUAT lecturers?

1.4.2 To what extent do organisational factors contribute to poor adoption of eLearning by JKUAT lecturers?

1.4.3 To what extent do technological or system factors contribute to poor adoption of eLearning by JKUAT lecturers?

For each research question a null and alternative hypothesis were developed for testing.
H_0: This independent variable is not a significant predictor of the dependent
H_A: This independent variable is a significant predictor of the dependent

1.5 Importance of Study

The study will be important to the university which has already invested heavily in eLearning. The benefits will also accrue to students and the country. These include:

1.5.1 Increased access to higher education

The study will enable the University to identify the constraints in implementation of eLearning in the University and seek ways to address them. This will enable the University to allocate its resources and concentrate its efforts in the critical areas to ensure success of the programme. If successful, it will enable the University successfully implement eLearning, thereby opening a new avenue for effective teaching and increased access to many students. It will also enable Kenya achieve its objectives in higher education of increasing its Gross Enrollment Ratio (GER) which is about 130,000 (3%) to 10% by 2015 (MoHEST, 2008).

1.5.2 Improved Quality of Teaching

The quality of teaching is also expected to improve tremendously as the students will be able to access learning materials from the learning management system and therefore learn at their pace. The lecturers will also be able to deliver content in new and innovative ways, thereby improving the quality of teaching. ELearning is self-paced and can lead to increased retention and a stronger grasp on the subject due to repeated exposure to the content.

1.5.3 Reduced Cost for Education

ELearning is a key content delivery tool to distance learners under the recently approved School of Open Distance and eLearning (SODeL). As is the trend world over, it is expected that in the long run it will be less expensive to offer distance programmes due to

use of electronic systems in managing the learning process (Kihoro, 2012). This will result in enhanced access to higher education due to more affordable programmes.

1.6 Scope of the Study

The study examined the individual factors that inhibit successful adoption of eLearning. This included individual characteristics - skills and knowledge needed to develop and deliver online courses and individual perception - influence on colleagues, system relationship to quality of teaching, its relationship to face to face teaching and the effects of school culture for eLearning technologies.

The study also looked at organisational factors such as a) organisational support - training and support for content development, time allowances, incentives and rewarding mechanisms, IT training and helpdesk support and b) organisational characteristics – faculty culture, school wide eLearning strategy, institutional leadership and institutional strategy. The study also looked at system or technological factors such as LMS system characteristics - limitation on LMS system functionalities, flexibility, its usefulness and its user friendliness and External system characteristics - the capacity of ICT infrastructure, reliability of ICT infrastructure and availability of other administrative systems to complement the delivery of online classes.

The study was undertaken at JKUAT's main campus located at Juja, Kenya and involved interviews with lecturers in the Faculty of Agriculture, Faculty of Science, School for Human Resource Development, School of Architecture and Building Sciences, Institute of Computer Science and Information Technology, College of Engineering and Technology and the College of Health Sciences. A proportional sample of lecturers from each faculty/school/institute/college was sampled to assess their attitudes, knowledge and experience in application of eLearning giving a total of sample size of 152. The selected faculty were requested to complete a questionnaire on individual, system and organizational factors affecting effective adoption of eLearning in the University and on their usage of the LMS system.

1.7 Definition of Terms

1.7.1 ELearning

This is all forms of electronically supported, mediated or enhanced learning through use of computers or other electronic devices. ELearning refers to the use of information and communications technology (ICT) to enhance and/or support learning in tertiary education (OECD, 2005). A web-based educational system (LearningCare management system) that utilizes IT and computer networks (internet and intranet) (Hsbollah and Idris, 2009).

1.7.2 ELearning Platform

Virtual Learning Environment (VLE) are electronic platforms that can be used to provide and track eLearning courses and enhance face-to-face instruction with online components (Frimpon, 2012).

1.7.3 Gross Enrolment Ratio

Total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year (UNESCO, 2009).

1.7.4 Module

This is a standardized or self-contained segment that with other such segments constitutes an educational course or training program.

1.7.5 Synchrous

Learners and Teachers communicate in real time (Hrastinski, 2008).

1.7.6 Asynchrous

Learners log onto an eLearning environment at any time and download or send messages to the teacher or peers (Hrastinski, 2008).

1.8 Chapter Summary

ELearning has emerged as a very important tool for enhancing the quality of teaching and access of education in Universities in various parts of the world. Institutions in Africa

have also embraced the technology but have experienced challenges in its implementation. In Kenya constraints have also been identified in the use of ICT in Universities, middle level colleges and research institutions. JKUAT is a leading University in Computer Science and Information Technology in Kenya. However, despite many years and several attempts at implementing eLearning, JKUAT is yet to fully implement the system. Various reasons have been given for JKUAT's partial success in this endeavour.

Various models that have been developed to explain technology adoption such as (TAM) (Davis, Bagozzi, and Warshaw, 1989), TAM 2 (Venkatesh and Davis, 2000), (UTAUT) (Venkatesh, Morris, Davis, and Davis, 2003) and TAM 3 (Venkatesh and Bala, 2008) were considered with a view to select appropriate methods for studying the adoption of eLearning by faculty in JKUAT.

The study investigated the constraints that have beset the adoption of eLearning by JKUAT faculty with a view to address and develop a successful implementation plan. The study examined individual, organizational and system or technological factors affecting JKUAT faculty's adoption of eLearning. A survey of faculty was conducted to establish the individual, organizational and system or technological factors for the limited success of the programme and probe how this could be improved. The study will enable the University identify the constraints in the adoption of eLearning and this will enable the University to allocate its resources and concentrate its efforts in the critical areas to ensure success of the programme. If successful, it will enable the University successfully implement eLearning, thereby opening a new avenue for effective teaching and increased access to many students, improving quality of teaching and in the long run resulting in affordable programmes through distance learning.

Chapter 2 looks at the existing literature on the subject, while chapter 3 outlines the methodologies utilized in the study and chapter 4 presents the results of the study. Chapter five presents the discussions, conclusions and recommendations from the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Despite many years and several attempts at implementing eLearning, JKUAT is yet to fully implement eLearning. Various reasons have been given for JKUAT's partial success in this endeavour despite being a leading University in Computer Science and Information Technology. This study aims at investigating the individual, organizational and technological factors that have affected the successful adoption of eLearning by JKUAT with a view to address and develop a successful implementation plan. The chapter reviews the individual, organizational and system or technological factors affecting the adoption of eLearning by JKUAT faculty.

2.2 Individual Factors Affecting Adoption eLearning

2.2.1 Individual characteristics

Individual characteristics have been found to influence eLearning adoption. Grunwald, (2002) in a review of the literature on factors that affect the adoption of instructional technology identified variables such as potential adopter traits: risk aversion, gender; potential adopter usage style; personal conviction, motivation, experience, self-efficacy and academic discipline and age. Individual difference variables included personality and/or demographics (e.g., traits or states of individuals, gender, and age) that can influence individuals' perceptions of perceived usefulness and perceived ease of use (Venkatesh and Bala, 2008). In an ex-post facto study of faculty adoption of instructional technology across fifteen institutions in Nebraska, Waugh (2002) as cited by Grunwald, (2002) found discipline and age, but not rank and gender to be significant personal characteristics related to adoption. On the other hand, Vodanovich and Piotrowski, (2005) found no differences on the survey responses by rank or years of employment on faculty attitudes toward web-based instruction at University of West Florida, Pensacola. Overall, 73.6% of the faculty indicated a positive view of using the Internet for instructional purposes and 69.4% believed that the Internet is an effective teaching tool.

The second most commonly cited adopter-based theory of diffusion is Hall, Wallace and Dossett's (1973) Concerns-Based Adoption Model (CBAM) which assumes that the

change process has a personal dimension whereby the individuals and their feelings, perceptions and motivations are much more influential to adoption of an innovation than the amount of technical support for the innovation (Grunwald, 2002).

Nanayakkara, (2007) in a study within universities and ITP's in New Zealand involving a survey of ninety five teaching staff from a cross section of different academic programmes to ascertain their views on adopting a LMS in their teaching practice found that the degree of eLearning knowledge was varied according to age group. Staff over 50 years old had a lower knowledge than staff less than 50 years old. The eLearning knowledge, however, was greater among the experienced staff (over 10 years) and staff with masters and doctorate degrees than those who had lesser experience and qualifications. Nakintu and Neema-Abooki, (2011) investigated the extent to which computers were applied in the teaching and learning at tertiary-level institutions in four primary teachers' colleges Uganda. They reported that the respondents did vary in relation to skills and experience in computer usage.

Nanayakkara and Whiddelt, (2005) and Nanayakkara, (2007) investigated the factors that influence or inhibit the adoption of eLearning systems in the universities, institutes of technology and polytechnics in New Zealand. The study revealed three key groups of factors: individual, system and organizational, affected the adoption of eLearning systems in the tertiary institutions by tutors. The sub factors under the individual factors were individual characteristics and individual perception. The individual characteristics highlighted included the skills and knowledge needed to develop and deliver online courses. The aspects relating to the individual perception included influence on colleagues, system relationship to quality of teaching, its relationship to face to face teaching and the effects of school culture for eLearning technologies.

At the individual level, the study revealed that the degree of knowledge and skills in online content design and development would strongly impact on the decision of academic staff to embrace this technology (Nanayakkara and Whiddelt, 2005). About 60% of respondents indicated that they felt they lacked the knowledge needed to develop and deliver content, despite the fact that they had been on a training course. Adequate training and support during the system implementation stage is therefore required. The study indicated that the failure to provide extensive training would result in high level of

user apprehension in accepting the technology. The results also indicated that there was a strong relationship between the IT literacy rate of staff and system adoption. Similarly, Nanayakkara, (2007) observed that at the individual level, the degree of knowledge and skills in online content design and delivery would strongly impact on the decision of academic staff to embrace this technology. This signified the need for adequate training and support during the system implementation stage. It indicates that the failure to provide training will result in high level of user apprehension in accepting this technology.

Hsbollah and Idris, (2009), studied the adoption decision among lecturers in education line and examined factors influencing lecturers to adopt eLearning as a teaching tool at the Universiti Utara Malaysia. They reported that academic specialization was significantly related to the adoption decision. The Faculty of Accountancy, Faculty of Cognitive Sciences and Education, Faculty of Finance and Banking, Faculty of Information Technology, and Faculty of Management of Technology were significant, compared to those from the Faculty of Tourism, Hospitality, and Environmental Management as the reference group.

KENET, (2007) in an e-readiness survey of 17 Kenyan Universities reported apparent "digital-divides" of different academic departments in large institutions on e-readiness. They reported that about 68% of faculty had access to computers in their offices which ranged from over 79% of faculty members in humanities and social sciences departments to about 50% of faculty in engineering.

Mukiri, (2011) reported that age, gender, period of service and academic rank were not a major factor when choosing to adopt information technology. However, there was a very obvious difference between faculties. Those from School for Human Resource Development (SHRD) and Institute for Computer Science and Information Technology (ICSIT) were more flexible and believed that eLearning was compatible with their teaching methodology while those from Engineering, Architecture, Institute of Tropical Medicine and Infectious Diseases and Science especially felt that it would be difficult to use eLearning for the practical laboratory sessions and were of the view that face to face contact was preferable. On the other hand, 15% of the respondents would not be comfortable uploading their content unless they were sure of the right of ownership and

security of the data. She also reported that half of the lecturers believed that eLearning would be easy to use for their teaching while the other half felt that it wouldn't be easy. She also reported that lecturers across all faculties agreed that eLearning was good for their image.

Mukiri, (2011) used a descriptive case study and utilised purposive sampling to select respondents from among lecturers in JKUAT faculties, Schools and Colleges. However. She did not report on the sample size. Nanayakkara, (2007) interviewed a total of 95 teaching staff from eight tertiary institutions (two universities and six institutes of Technology and polytechnics) in New Zealand using a survey approach. He used an online questionnaire structured into three parts. The first part asked questions relating to demographic details such as, the name of the institution, staff job title, subject area, teaching experience, highest qualifications, age and gender.

On the other hand, Kang'ethe, Simiyu, Kihoro and Gichuru (2008) reported that some academic staff in JKUAT had a negative attitude towards eLearning due to fear of loss of jobs, technophobia, misunderstanding, resistance to change and computer illiteracy. Kang'ethe used a stratified random sample of 100 academic staff from different faculties in the main campus at Juja and had a 70% response rate. This study establish if the individual factors such as gender, age, period of service, faculty / school / institute, level of education and designation influence eLearning adoption. The next section discusses the effect of individual perception on eLearning adoption.

2.2.2 Individual Perception

Individual perception and faculty culture plays an important role in tutors acceptance or rejection of eLearning systems (Nanayakkara, 2007). Faculties express much apprehension towards online education. In particular they perceive that online dialogue will replace the face to face interaction. There is also a concern that online teaching would be mandated rather than a supplementary option for faculty and students. Wrong or negative perceptions or misinterpretation of eLearning on the part of both the teachers and learners could affect the successful implementation of eLearning. Grunwald, (2002) has also reported that potential adopters' beliefs and attitudes: perceived goals, positive attitudes towards technology and perceived usefulness and perceived ease of use influence technology adoption.

Venkatesh, (2000) studied the factors that influence perceived ease of use, which is an important factor influencing user acceptance and usage behavior of information technologies and how it developed over time. He proposed that control (internal and external – computer self-efficacy and facilitating conditions, respectively), intrinsic motivation (computer playfulness), and emotion (computer anxiety) as anchors that determine early perceptions about ease of use of a system. Computer anxiety was defined as an individual's apprehension, or even fear, when she/he is faced with possibility of using computers and has been shown to have significant impact on attitudes. On the other hand, playful individuals are expected to rate any new system as being easier to use compared to those who are less playful (Venkatesh, 2000). Computer playfulness was defined as the degree of cognitive spontaneity in microcomputer interactions. He conducted three longitudinal studies in voluntary systems and made three measurements over three months. He found that control (internal and external conceptualized as computer self-efficacy and facilitating conditions), intrinsic motivation (computer playfulness) and emotion (computer anxiety) served as anchors that users employ in forming perceived ease of use about a new system. Computer self-efficacy was defined as the degree to which an individual believes that he or she has the ability to perform specific task/job using computer. This study aims at determining the individual perceptions that influence eLearning adoption in JKUAT.

Individual factors include individual characteristics and individual perceptions. Among individual characteristics, gender, age, academic discipline and years of experience have been found to affect eLearning adoption. Computer playfulness, computer anxiety and computer self efficacy have been identified as individual perceptions that influence an individual's acceptance of eLearning systems. The next section studies the organizational factors affecting eLearning adoption.

2.3 Organizational Factors

Organizational support refers to informal or formal activities or functions to assist employees in using a new system effectively. Organizations can provide support in various forms—providing the necessary infrastructure, creating dedicated helpdesks, hiring system and business process experts, and sending employees to off-the-job training

(Venkatesh and Bala, 2008). They therefore reported that organizational support can play a key role in determining perceived usefulness and perceived ease of use. Organizational support is a key source of perceptions of external control. Further, the presence of organizational support, particularly in the context of complex systems, can reduce anxiety associated with system use.

Training has been suggested as one of the most important postimplementation interventions that leads to greater user acceptance and system success (Venkatesh and Bala, 2008). While training can be conducted before or during the implementation of a new system, they consider training as a postimplementation intervention because, in most cases, training is conducted after a system is deployed and ready to be used by potential users. The role of training is even more important in the context of complex systems (e.g., enterprise systems) that are more central to employees' work life. As these systems are more likely to invoke negative reactions from employees due to their disruptive nature, effective training interventions can mitigate these negative reactions and help employees form favorable perceptions toward these systems.

Venkatesh and Bala, (2008) suggested that incentive alignment can be an important intervention in the preimplementation stage that can potentially enhance user acceptance. In terms of organizational factors, the faculty facilitation of staff skill development in e-content design and delivery and staff release time for online engagement were key contributory factors for staff uptake in eLearning (Nanayakkara, 2007). In addition to the eLearning specific skills, sufficient training in information and communication technologies and facilitating efficient helpdesk services to complement the e-delivery would greatly boost staff interest in eLearning uptake. By manipulating the level of system-specific enjoyment through training, not only was it found that perceived ease of use could be enhanced but also the salience of perceived ease of use as a determinant of intention increased (Venkatesh, 1999).

The implementation of eLearning relies on teacher competence, computer provision and access (Uhomoibhi, 2006). As the use of eLearning systems requires learners to interact with the eLearning system hardware and software interfaces, it is important that users of eLearning systems pre-acquire adequate competence in the use of the relevant eLearning device and its interface as well as acquiring competence in using the eLearning

application interface. Training of employees and students must occur, and a decision about beta testing made, before a full-blown launch of eLearning can take place (Tucker and Gentry, 2009). In addition, in the course of developing and maintaining eLearning courses, much time is required (Eke, 2010). This is because the instructors may often need to spend substantial time and effort reengineering the course to adapt it for online delivery. Andersson, (2008) used an extensive framework for eLearning enablers and disablers (including 37 factors) to identify the most salient challenges for eLearning courses in Sri Lanka. She reported that the major challenges were Support, Flexibility, Teaching and Learning Activities, Access, Academic confidence, Localization and Attitudes.

Hsbollah and Idris, (2009), studied the adoption decision among lecturers in education line and examined factors influencing lecturers to adopt eLearning as a teaching tool at the Universiti Utara Malaysia. They reported that relative advantages and trialability dominated the lecturer's decision in adopting eLearning. At Makerere University the teachers claimed that they needed additional skills to: develop eLearning content, to use modern media in the course design, and skills to find and access authenticated resources (Rytkønen and Rasmussen, 2010). In a survey undertaken by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) in 20 member Universities in Eastern, Central and Southern Africa, Teaching staff in 30% of the Universities indicated that they were not adequately provided with pedagogical support and professional development in using eLearning, while only 5% found the provision fully adequate (RUFORUM, 2010).

In Kenyatta University, a Development and Deployment of Open Learning Content for Distance Education Students with Limited Access to Internet project was undertaken with the support of KENET (Mwita and Muia, 2012). A total of 82 Modules were to be developed. A total of 57 lecturers, student assistants and KENET Technicians were trained on multimedia content development and Moodle LMS, while students were trained on the basic computer skills, Internet skills, Moodle LMS and how to use the material provided to them. A total of 66 units have been developed to date. In Strathmore University, the analysis of the data on the eLearning Moodle platform indicated that over the last eight months in the year 2009, 67 out of 110 (61%) of the academic staff members were actively using the learner management system (Shabaya, 2009).

At JKUAT, Faculty members were reported as yet to embrace eLearning fully and some members of the faculty were yet to attend sensitization seminars which were largely voluntary (Mukiri, 2011). A total of 81 units had been uploaded on the LMS platform from 30 departments (JKUAT, 2011). The department with highest number of units was Biochemistry (20), followed by Horticulture (16) and Statistics and Actuarial Science and the Department and Zoology (11). All other departments had less than 10 units uploaded, with 14 departments without a single unit uploaded on the platform. No reasons were given for this situation. Mukiri, (2011) reported that only 5.7% of the lecturers were using eLearning for teaching while 23% had attended an eLearning training session. On the other hand 68% of the respondents felt that classroom teaching was more convenient that eLearning. This could be due to resistance to change and preference to the known.

On the other hand, Kang'ethe, Simiyu, Kihoro and Gichuru (2008) reported institutional challenges in eLearning usage at JKUAT. These included difficulty to train members of staff to use eLearning, inadequate time for material preparation, lack of good will and support from university management in improving infrastructure and reward to performers, lack of incentives for compliance, bureaucracy and lack of payment of staff for module development. The next section looks at the specific organizational factors affecting eLearning to be studied. These include the management support, social influence, institutional leadership and the school and institution wide eLearning strategy.

2.3.1 Management Support

Management support refers to the degree to which an individual believes that management is committed to the successful implementation and use of a system (Venkatesh and Bala, 2008). While management support has been suggested as an important antecedent of IT implementation success, it was not conceptualized as an intervention that can influence the determinants of user acceptance. Bixler and Spotts, (2000) identified seven parameters affecting the successful implementation of eLearning. These are: institutional support; course development; teaching and learning; course structure; student support; faculty support; and evaluation and assessment.

Grunwald, (2002) identified factors that influence technology adoption such as organizational and cultural context including faculty support: resources, equipment availability, staff development opportunities, prompt technical support, incentives, instructional design support, strong culture which provides leadership and support for the new technology and encourages risk-taking, mission statements, supportive institutional culture and cultural context. Barriers to adoption of instructional technology identified in the literature included: lack of time, inability to receive credit towards tenure and promotion, insufficient or obsolete hardware and software, inadequate facilities and support services, lack of information about good practice, underestimation of the difficulties, inadequate training and professional development, and the time trade-off not being worth it (Grunwald, 2002).

Jasperson *et al*. (2005) as cited by Venkatesh and Bala, (2008) suggested that managers (e.g., direct supervisors, middle managers, and senior executives) are important sources of interventions and can intervene indirectly (e.g., sponsoring or championing, providing resource, and issuing directives and/or mandates) or directly (e.g., using features of IT, directing modification or enhancement of IT applications, incentive structures, or work tasks/processes) in the implementation process of an IT. Venkatesh and Bala, (2008) suggested that management support can influence users' perceptions of the subjective norm and image—two important determinants of perceived usefulness and that management support, particularly in the form of direct involvement in the system development and implementation processes, will help employees form judgments regarding job relevance, output quality, and result demonstrability of a system.

While distance learning provides a host of teaching and learning practices that may be convenient for students, it is far more labour intensive than traditional face to face teaching practice; creating courses, maintaining discussion forums and responding to emails from students around the clock requires far more time than effort from educators (Nanayakkara, 2007). Educators point out lack of time to design, develop, maintain and support online classes is a major barrier in adopting eLearning systems. In addition staff need to acquire organisation and administrative skills to design and develop online courses.

Nanayakkara, (2007) found that organization factors such as the faculty facilitation of staff skill development in e-content design and delivery and staff release time for online engagement were key contributory factors for staff uptake in eLearning. In addition to the eLearning specific skills, sufficient training in information and communication technologies and facilitating efficient communication, help-desk services to complement e-delivery would greatly boost staff interest in eLearning uptake. Nanayakkara and Whiddelt, (2005) and Nanayakkara, (2007) found that three key groups of factors: individual, system and organizational, affected the adoption of eLearning systems in the tertiary institutions by tutors. At the organizational level, the faculty support for staff release time (80% of respondents), incentives and rewards (60% of respondents), IT training and help desk services (90% of respondents) were key contributory factors for system adoption.

Mukiri, (2011) investigated the problem of low eLearning adoption among lecturers at JKUAT. Challenges ranged from poor internet connection, power failures, availability of networked computers, lack of time to develop content, lack of compensation, lack of proper training, lack of personnel in the eLearning department to train lecturers, lack of management support among others. She reported that majority of the lecturers were willing to adopt eLearning for their teaching if they had enough time to develop their teaching courses. She also reported that the majority of lecturers (76%) needed assistance/training to be able to use eLearning. Similarly 91% indicated that they would require online support while 71% indicated that they were willing to adopt eLearning as long as there was support to guide the lecturers to use it for their teaching. However, Mukiri did not investigate the effect of management support on eLearning adoption. This study aims to determine the influence of management support on eLearning adoption. The next section looks at the social influence factors affecting eLearning adoption.

2.3.2 Social Influence

Social influence is defined as the degree to which an individual perceives that important others believe he or she should use a new system and is represented as subjective norm or image in some models (Venkatesh, Morris, Davis, and Davis, 2003). They reported that none of the social influence constructs were significant in voluntary contexts but were

significant when use was mandated. Similarly, Venkatesh and Davis, (2000) reported that subjective norm defined as a "person's perception that most people who are important to him think he should or should not perform the behavior in question" did have a direct effect on intention to use technology at T1 and T2 when usage was mandatory. The effect of subjective norm on perceived usefulness (internalization) which refers to the process by which, when one perceives that an important referent thinks one should use a system, one incorporates the referent's belief into one's own belief structure was significant at T1 and T2, but weakened by T3.

The influence of image on perceived usefulness was significant at all three points of measurement. Also, the effect of subjective norm on image defined as was significant at all points of measurement. They observed that as individuals gained direct experience with a system over time, they relied less on social information in forming perceived usefulness and intention but continued to judge a system's usefulness on the basis of potential status benefits resulting from use. Similarly Venkatesh and Bala, (2008) found that perceived ease of use, subjective norm, image, and result demonstrability were significant predictors of perceived usefulness at all time periods. They also found that experience moderated the effects of subjective norm on perceived usefulness such that the effect was weaker with increasing experience. On the other hand, the effect of image on subjective norm was significant at all points of measurements. Venkatesh and Bala, (2008) also found that the anchors—that is, computer self-efficacy, perceptions of external control, computer anxiety, and computer playfulness—were significant predictors of perceived ease of use at all points of measurement. They also observed that experience moderated the effect of computer anxiety on perceived ease of use such that the effect became weaker with increasing experience.

Nanayakkara and Whiddelt, (2005) and Nanayakkara, (2007) observed that individual perception towards eLearning was a significant factor for system acceptance. In particular, it was found that influence from colleagues would strongly contribute to their decision to adopt this technology (70% of respondents) (Nanayakkara and Whiddelt, 2005). Further, results revealed that the majority of the staff saw that an eLearning system would have a positive impact on the quality of learning and would also enhance the traditional teaching with improved flexibility for distance students. The influence of colleagues was a key factor, but not all pervasive (Nanayakkara, 2007). Slightly over half

of the survey sample agreed that the influence of their colleagues would impact upon the adoption whereas around a quarter of the survey sample felt that the opinion of their colleagues would not influence adoption. The opinion of over half the survey sample was that they would adopt LMS technology if they believed that it would improve the face to face delivery.

Nanayakkara's methodology involved a questionnaire divided into sections which were further was divided to sub sections, incorporating questions pertaining to different aspects of system adoption. The sub sections were: individual characteristics, individual perception. All questions in these sub sections contained response categories anchored to a five point Likert scale to ascertain staff opinion on LMS adoption factors.

At the University of Nairobi and Makerere University some teachers (and students) were reported to be resistant toward eLearning (Rytkønen and Rasmussen, 2010) due to inadequate understanding of ICT and the potential benefits of eLearning and lack of specific incentive-structures for teachers to focus on eLearning. At the University of Nairobi eLearning sounded complicated and the teachers could not see its benefit. It was perceived as something negative that would lower the quality in the teaching, the teachers were afraid of losing their jobs as the digitized material belonged to the university (copy-right issue), eLearning was not part of the curriculum, but considered as a supplement to the face-to-face teaching which resulted in low students participation and minimal interest among the teachers and poor internet connection, slow PCs, rapid change of LMSs and an inconvenient user interface were mentioned to lower the motivation among students and staff for working with IT based teaching. No literature was available on the influence of social influence on eLearning adoption in JKUAT. This study aims at determining the influence of social influence on eLearning adoption. The next section looks at effect of institutional leadership on eLearning adoption.

2.3.3 Institutional Leadership

Institutions are investing a large amount of money in eLearning development with little progress towards organizational outcomes and organizations lack an enterprise-wide strategic approach for eLearning development across the organization (Graves, 2001) as cited by (Nanayakkara, 2007). He points out that to achieve real progress, eLearning

development should tie back into the institution mission, and that institutions must have strategies that are enterprise-wide in scope. In Northwest Missouri State University, Massy and Wilger (1998) as cited in (Grunwald, 2002) found that faculty overwhelmingly reported the importance of the institutional context in their decision to integrate technology into their teaching. The faculty also cited the institution's culture of quality and their ability to have a say in administrative decisions about technology as promoters of technology integration even though no faculty member is forced to use it.

Nanayakkara and Whiddelt, (2005) and Nanayakkara, (2007) reported that institutional leadership needs to lead the eLearning development and should facilitate the infrastructure and training support for staff adoption. At the University of Nairobi the top management in 2005, decided as part of the eLearning strategy, that all course material should be digitized and put online to be available for the students as supplementary material to their face-to-face teaching (Rytkønen and Rasmussen, 2010). They reported that over 200 courses were digitized according to the template, but that vast majority of the courses were not used by the teachers and students. On the other hand, the effect of management support for eLearning was rated by tutors as having neither a facilitating nor an inhibiting effect on their uptake of eLearning, but with a trend towards the former effect (Mitchell, Clayton, Gower, Barr, and Bright, 2005).

According to Jones and Laffey, (2000) as cited by (Grunwald, 2002), there is a need for a strong culture, which provides leadership and support for the new technology, incentives/rewards to use it, and encourages risk-taking. Birch, (2008) reviewed literature on factors influencing academics' development of interactive multimodal technology-mediated distance higher education courses. He reported that academic leadership and top management commitment have been found to be critical for the effective integration of education technology in higher education, and this high level of support is necessary from the beginning of the initiative. He also reported that institutional support needs to extend beyond the tangible to reflect the culture, mission and vision of the organization. Nanayakkara, (2007) found that institutional leadership needs to lead eLearning development and should facilitate the infrastructure and training support for staff adoption.

KENET, (2007) reported on the impact of institutional ICT strategy indicator on overall performance in other indicators. They found that the institutional leadership, particularly vice chancellors, championed ICT within the institutions showing that the heads of institutions matter more than the few external factors affecting ICT diffusion in Kenya (KENET, 2007). They also reported that the retention of ICT staff was poor and only the institutional leadership could address this problem.

The questionnaires were administered in 25 KENET member institutions that included 17 universities, and eight tertiary institutions. The study developed a modified e-readiness framework and a set of 17 ICT indicators of e-readiness. The new e-readiness framework was used to stage each of the 17 indicators on a scale of 1 to 4, where 1 represented unprepared and 4 the highest degree of readiness for that indicator. This study aims at determining the influence of institutional leadership on eLearning adoption in JKUAT. The next section looks at the effect of school and institutional wide eLearning strategy.

2.3.4 School and Institutional wide eLearning Strategy

Quinn *et al*. (1988) as cited by Boezerooij, (2006) defined the concept of strategy as the pattern or plan that integrates an organization's major goals, policies and action sequences into a cohesive whole. A well-formulated strategy helps to marshal and allocate an organization's resources into a unique and viable posture based on its relative internal competencies and shortcomings, anticipated changes in the environment and contingent moves by intelligent opponents (p.3). Lingard, (2007) reported that adoption and implementation of VLEs (Virtual Learning Environment) has been widely adopted by institutions in the UK initially by individual enthusiastic tutors but more recently institutional strategies driven by the national ones have come to the fore. Barton, (2010) reported that teachers developing online learning skills require a certain level of trust in management. Being convinced that management is correct and committed in its direction of development, teachers' expectations are reasonable and that effort will be recognized is essential to the success of the project.

Nanayakkara, (2007) reported that the need for institutions to invest in a strategic plan for eLearning development across the institute is critical to the successful adoption of eLearning. Any strategic plan developed needs to incorporate an investment plan for redevelopment of organizational administration and support systems to meet distance

learners needs. Although intellectual property rights constituted the third last rated issue, Mitchell, Clayton, Gower, Barr, and Bright, (2005) have recommended that clear intellectual policies relating to eLearning be developed. They had a similar view on rewards and incentives.

In the KENET e-readiness survey, the Institutional ICT Policy and Strategy indicator required an institution to have an ICT policy and strategic plan that was tightly linked to corporate strategic plan and to have the head of ICT report to the CEO and a be member of the top decision-making body (KENET, 2007). As regards the average institutional policy stages, Kabarak University was at 3.1 whereas Maseno University was at 1.0 while the rest of the universities were between 2.8 and 1.3. They reported a score of 2.0 and below in ICT strategy and ICT financing, indicating that ICT was not yet a strategic priority for the higher education institutions. Consequently, the profile of heads of ICT was low and budget allocation for Internet bandwidth was less than 0.5% of the operational budgets. Institutions were allocating low operational budgets to ICT, had not invested adequately in campus networks, and were not giving attention to the use of ICT to enhance education and research. KENET, (2007) concluded that the institutional leadership does not yet consider ICT a strategic priority for their institutions.

In a survey undertaken by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) in 20 member Universities in Eastern, Central and Southern Africa, only 40% indicated that their course development, design and delivery were guided and informed by formally developed eLearning procedures and standards and only 5% was fully adequate (RUFORUM, 2010).

KENET recommended the following strategies for JKUAT to successfully implement eLearning the University should create and implement a strategy for integration of ICT in teaching and learning (Waema, 2012). This study aimed at determining the influence of School and Institution-wide eLearning Strategies on eLearning adoption in JKUAT.

From the literature studied, organizational factors are very important in determining eLearning adoption in an institution. Management support factors can influence users perceptions of subjective norm and image, which are important determinants of perceived usefulness of a system. Social influence has also been found to significantly affect use of

a system when use was mandatory but weakens with experience. Institutional leadership is required for successful eLearning adoption especially at the highest management level. However, in Kenya the level of institutional leadership is low. The school and institutional wide eLearning strategy is also critical for successful adoption of eLearning. This has also been observed to be low in Kenya. The next section looks at the technological factors affecting eLearning adoption, which include perceived usefulness, perceived ease of use, and ICT infrastructure.

2.4 Technological Factors Influence on ELearning Adoption

2.4.1 Perceived Usefulness

Perceived usefulness is the extent to which a person believes that using a technology will enhance her/his productivity (Venkatesh, 2000) since all else being equal, the less effortful a system is to use, the more using it can increase job performance (Venkatesh and Davis, 2000). TAM posits that two particular beliefs, perceived usefulness and perceived ease of use are of primary relevance for computer acceptance behaviors (Davis, Bagozzi, and Warshaw, 1989). Davis *et al* (1989) observed that usefulness had a very strong effect on behavioral intention at both time periods and that usefulness had significant explanatory power beyond attitude and social norms at both time periods. Therefore usefulness was a major determinant of people's intention to use computers. Grunwald, (2002) reported that factors influencing technology adoption included innovation characteristics: relative advantage over traditional teaching, compatibility with materials, perceived value, ease of use, time needed to learn, innovation amenability and adaptability, trialability and visibility.

Nanayakkara and Whiddelt, (2005) investigated the factors that influence or inhibit the adoption of eLearning systems in the universities, institutes of technology and polytechnics in New Zealand. On system or technological factors, they reported that Blackboard LMS lacked desired functionality and flexibility to adopt into varying teaching situations. In particular the study found that the Blackboard was seen to have limitations to create specialised interactive training materials and tools to create course simulations (60% of respondents). Due to such limitations the study found that Blackboard was not suitable to deliver specialised interactive online courses. Blackboard

was, however, suitable to be used as complementary tool for face-to-face teaching practice.

Venkatesh, Morris, Davis, and Davis, (2003) described performance expectancy as degree to which an individual believes that using the system will help him or her attain gains in job performance. They formulated and empirically tested the UTAUT model which provided strong empirical support of the three determinants of intention to use (performance expectancy, effort expectancy and social influence and two determinants of usage behavior (intention and facilitating conditions). UTAUT was able to account for 70% of the variance in usage intention. Actual usage behavior was measured as duration of use via system logs. No literature has been found on studies on perceived usefulness that have been done locally. The objective of the study was to determine the influence of perceived usefulness of the system on eLearning adoption in JKUAT. The next section looks at the effect of perceived ease of use on eLearning adoption.

2.4.2 Perceived Ease of Use

Perceived ease of use is the extent to which a person believes that using a technology will be free of effort (Venkatesh, 2000). Davis, Bagozzi, and Warshaw, (1989) hypothesized that EOU had a significant effect on attitude and that TAM influences attitudes and behavior through self-efficacy and instrumentality. Davis *et al* (1989) found that ease of use had a significant direct effect on behavioral intention over and above attitude and usefulness in time period 1 but not in time period 2. Ease of use had a significant effect on attitude at time 2 only. Behavioral intention was significantly correlated with usage. Venkatesh and Davis, (2000) reported that result demonstrability and perceived ease of use were significant across all four studies and three time periods. The main effects of job relevance defined as “an individual’s perception regarding the degree to which the target system is applicable to his or her job” and output quality defined as “how well the system performs those tasks” were found to be significant on perceived usefulness. Grunwald, (2002) reported that factors influencing technology adoption included performance impact of the instructional technology: improved student learning and result demonstrability.

Venkatesh, (2000) developed a model of the determinants of perceived ease of use based on several anchors related to individuals’ general beliefs regarding computers and

computer use. Constructs related to control, intrinsic motivation, and emotion were proposed as general anchors for the formation of perceived ease of use regarding a new system. Specifically, control was divided into perceptions of internal control (computer self-efficacy) and perceptions of external control (facilitating conditions), intrinsic motivation was conceptualized as computer playfulness, and emotion was conceptualized as computer anxiety.

Omondi, (2009) undertook a study of the eLearning platforms used in JKUAT and USIU. The study involved the usability of the platforms by students. He observed that students from both institutions had high perceptions that the eLearning platforms implemented in their institutions were not interactive and had low usability capabilities. Omondi also reported low adoption of eLearning in JKUAT. He reported that the MOODLE platform used by JKUAT was not user-friendly as it had no help menu, making its use difficult for students. There was also a lack of control by users which would enable a user to cancel an action selected by mistake. Mukiri, (2011) reported that half of the lecturers in JKUAT believed that eLearning would be easy to use for their teaching while the other half felt that it wouldn't be easy. Respondents from ICSIT were the majority of those who believed that eLearning would be easy to use.

Davis, Bagozzi, and Warshaw, (1989) used 4-item instruments to operationalise TAM's ease of use. System usage was measured using 2 questions regarding the frequency with which the respondent currently uses WriteOne, a word processing programme. Data was gathered from 107 MBA students. At the beginning of the semester the MBA students were given a one-hour introduction to the programme and data was taken at the end of the introduction and 14 weeks later. This study sought to determine if perceived ease of use significantly influenced eLearning adoption at JKUAT. The next section looks at effect of ICT infrastructure on eLearning adoption.

2.4.3 ICT Infrastructure

Sound information and communication infrastructure plays a key role in successful the delivery of online content to distance students (Nanayakkara, 2007). Nanayakkara also reported that more often institutions have at least core ICT infrastructure needed to support distributed learning. However, developing online courses requires additional equipment and specialised software, for example, additional servers and a course

management system. Student access requires network bandwidth and modem pools or internet service provider connections. These facilities need to be well managed and maintained to achieve a high degree of reliability. Lack of reliability, performance and timely support on infrastructure could inhibit both the tutor and the student from accepting this technology. Similarly, Tucker and Gentry, (2009) reported that successful implementation of eLearning programs and curriculum depends upon the infrastructure being firmly in place. Galamoyo, (2011) noted that the ultimate delivery of an eLearning solution relies on the availability of appropriate and adequate technology. Once the development process is solid – the learning platform is in place and proven, then roll out strategies can be implemented.

Graves (2001) as cited by (Nanayakkara, 2007) asserted that most institutions had adopted eLearning technologies, however, they lacked sufficient integration to other administrative systems within the organization. In addition to providing online courses, the institutions needed to provide electronic access to student services such as distance library services, course enrolment, student advice and support services, financial aid and the book store (Nanayakkara, 2007). Nanayakkara and Whiddelt, (2005) investigated the factors that influence or inhibit the adoption of eLearning systems in the universities, institutes of technology and polytechnics in New Zealand. The study revealed that external systems characteristics such as capacity and reliability of IT infrastructure were significant factors for user adoption (100% of respondents). It was also observed that establishing a wide range of distance administrative systems such as distance library services and distance student support services would significantly enhance the staff adoption in eLearning technologies (90% of respondents).

Infrastructure often describes a bottom "layer" of an architectural description or diagram, indicating network hardware components, communications processes, services and protocols (Blinco, Mason, McLean, and Wilson, 2004). However, for others, it can also serve as a label that includes the "applications layers" or even more broadly, the entire platform required to deliver services. Networks and connectivity are almost universally assumed to be critical to the development of successful infrastructure (Blinco, Mason, McLean, and Wilson, 2004). The development of eLearning products and the provision of eLearning opportunities is one of the most rapidly expanding areas of education and

training (Attwell, 2006). Whether this is through an intranet, the internet, multimedia, interactive TV or computer based training, the growth of eLearning is accelerating.

One of the important challenges of most developing countries is lack of high speed internet access, due to a myriad of factors including but not limited to intermittent electricity, use of expensive low bandwidth satellite technology and inadequately trained personnel (Omidinia, Masrom, and Selamat, 2011). Bates, (2009) reported that given the particular challenges faced by universities in Africa (poor and expensive Internet infrastructure, relatively high cost of computers, shortage of quality IT staff and eLearning specialists, and the need for more 'knowledge-workers'), universities need to be very focused and strategic in their use of eLearning.

Unwin, (2008) also reported on the challenges of eLearning in Africa. In a survey of 147 eLearning practitioners from 34 countries in Africa only 33% reported that they were delivering eLearning in a variety of different ways (Hollow, 2008). KENET, (2007) also reported lack of operational course management systems for eLearning in many institutions and recommended the setting up a course management systems. A few institutions had installed course management software like Moodle, WeBCT or Blackboard and faculty were using them to supplement their classroom teaching but none of the institutions had data on the percentage of courses that were using the eLearning platform (KENET, 2007).

The findings of a survey in six public universities in Tanzania in early 2011 showed that all the universities surveyed had basic ICT infrastructure to support teaching and learning activities (Emerald, 2012). However, these universities faced a number of challenges in their adoption and use of Web 2.0, including poor technological infrastructure and the often prohibitive cost of educational technologies and the lack of ICT technical support to support eLearning initiatives. KENET recommended the accession strategies for JKUAT such as; increase Internet budget per 1000 students to at least $15,000 or 2% of total expenditure and increase ICT instructional designers supporting faculty (Waema, 2012).

The bandwidth and access to updated equipment were reported to cause problems for the implementation of eLearning as distance education at the University of Nairobi and Makerere University, but were not the limiting factor to the implementation of blended

learning distributed on the internal network (Rytkønen and Rasmussen, 2010). They also reported that a media Lab should be part of the overall support strategy for smoothing and improving the implementation of eLearning by establishing easy access to support and new and updated equipment and software. A media Lab was however nonexistent at the UoN and Makerere. For successful implementation of eLearning, the following agents designed to support the learning design process were found to be necessary: an Instruction Agent; a Lesson Planning Agent; and a Resource Location Agent (Gregg, 2007).

In Kenya, KENET carried out a diagnostic assessment of the overall e-readiness of 17 universities, eight middle-level colleges (including polytechnics), and five research institutions that are members of Kenya Education Network (KENET) with a particular focus on the use of ICT in teaching, learning, and research (KENET, 2007). They reported that on average most institutions scored poorly in all the network access and networked campus categories of indicators. Internet availability was only in stage 1.4 suggesting that overall the institutions were not ready to use ICT for eLearning. KENET, (2007) also reported that institutions were purchasing less than 512 kb/s per 1,000 of downlink bandwidth and less than 128 kb/s per 1,000 students of uplink bandwidth. This was unacceptably low and it is not surprising that students and faculty were dissatisfied with the speed. They suggested that in order to be ready to use ICT to enhance learning, it was necessary for the institutions to move to at least stage 3 in all the strategic indicators.

By 2010, KENET reported Internet bandwidth distributed of 1950 Mb/s, a total number of students in connected institutions of 231,000, a total number of staff, 29,000, a total of 40,000 networked PCs, an estimated 40,000 student-owned laptops (20% of students), Student PCs per 100 students of 8.6 and Bandwidth ratio (BW per 1000 students) of 8.4 Mb/s (Kashorda, 2012). In the RUFORUM survey, only 5% indicated that all the elements of their physical eLearning infrastructure were reliable, robust and sufficient, while 30% indicated that they were not adequate (RUFORUM, 2010).

JKUAT, (2011) reported on the status of eLearning infrastructure at JKUAT. The Learning Management System in use at JKUAT was the Moodle Platform, which is an open source software. The internet bandwidth to Main Campus was 20 Mbps. The University had no eLearning Systems / Content Administrators, eLearning Content

Developers and dedicated user Support staff. A computer census in 2011 reported 1,200 computers were available at the University's computer laboratories in JKUAT, while the student population was about 21,000 students (JKUAT, 2011). There were no lecture rooms equipped with LCD projectors and only one boardroom was equipped with a white board.

Mukiri, (2011) reported that while some lecturers used their personal laptops and modems for their research, they would not be willing to use their resources for teaching without any compensation. Resources were a major setback with some lecturers having no computers or internet in their offices and therefore were skeptical about using eLearning. About 60% indicated that they did not have access to resources for eLearning. Similarly, Kang'ethe, Simiyu, Kihoro and Gichuru (2008) reported technological challenges in eLearning usage at JKUAT. These included use of different platforms, inadequate facilities, problem of uploading teaching materials, slow internet connection, power blackouts and lack of funds. This study aims to determine the influence of ICT infrastructure on eLearning adoption at JKUAT.

Technological factors include perceived usefulness, perceived ease of use and ICT infrastructure. Perceived usefulness is a major determinant of people's intention to use computers. Similarly, perceived ease of use has a significant direct effect on behavioral intention over and above attitude and usefulness. The capacity and reliability of IT infrastructure are significant factors for user adoption of eLearning.

2.5 Chapter Summary

The chapter investigated the factors affecting the adoption of eLearning by JKUAT lecturers. This included the individual, organizational and system factors affecting successful adoption of eLearning by lecturers. Individual factors include individual characteristics and individual perceptions. Among individual characteristics, gender, age, academic discipline and years of experience have been found to affect eLearning adoption. Computer playfulness, computer anxiety and computer self efficacy have been identified as individual perceptions that influence an individual's acceptance of eLearning systems.

Organizational factors are very important in determining eLearning adoption in an institution. Management support factors can influence users perceptions of subjective norm and image, which are important determinants of perceived usefulness of a system. Social influence has also been found to significantly affect use of a system when use was mandatory but weakens with experience. Institutional leadership is required for successful eLearning adoption especially at the highest management level. The school and institutional wide eLearning strategy is also critical for successful adoption of eLearning.

Technological factors include perceived usefulness, perceived ease of use and ICT infrastructure. Perceived usefulness is a major determinant of people's intention to use computers. Similarly, perceived ease of use has a significant direct effect on behavioral intention over and above attitude and usefulness. The capacity and reliability of IT infrastructure are significant factors for user adoption of eLearning. Previous studies at JKUAT on eLearning and their outcomes and the current status of eLearning at the University are also outlined.

Chapter 3 looked at the methodology that was used to achieve the study objective. It focused on the research design, population and sampling design, data collection methods, research procedures, and data analysis method.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides information on the methodology used in the study, research design, population and sampling design, data collection methods, research procedure, data analysis method and chapter summary.

3.2 Research Design

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2004). It is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. The research design was both descriptive and correlational. The descriptive design describes phenomena or characteristics associated with the population and estimates proportions of population that have these characteristics. The correlational design assesses associations among different variables. The choice of design was to quantify the effects of the characteristics of the population as most of the information was not available. The correlational design was to enable associations among different variables to be determined in order to determine which were the most important factors affecting eLearning adoption. The study was also *ex post facto*. The method of data collection was interrogation/communication and involved administration of questionnaires to faculty (lecturers) to obtain their responses. It was also a cross-sectional study and involved obtaining information at a certain point in time. It was also a formal study which tested hypotheses developed earlier. The independent variables included were individual factors, organizational factors and technological factors. The dependent variable was eLearning adoption which was measured by various parameters including the duration (period of) LMS usage, the frequency of LMS usage and an adoption index developed from a respondent's usage of eLearning applications.

3.3 Population and Sampling

3.3.1 Population

The study population refers to the subjects under study (Cooper and Schindler, 2001). In this case the study population comprised of 666 faculty (teaching staff) in the various academic disciplines; College of Engineering and Technology (CoETec), College of Health Sciences (COHES), Faculty of Agriculture, Faculty of Science, School of Architecture and Building Sciences (SABS), School for Human Resource Development (SHRD) and Institute of Computer Science and Information Technology (ICSIT). Table 1 shows the number of faculty in the various Colleges, Faculties, Schools and Institutes.

Table 3.1 Population Distribution of Faculty in JKUAT

Sno.	Stratum	No. of Faculty
1	COETEC	180
2	AGRICULTURE	63
3	SCIENCE	138
4	SABS	72
5	SHRD	88
6	ICSIT	57
7	COHES	68
	Total	**666**

Source: JKUAT Personnel Registry

3.3.2 Sampling Design

3.3.2.1 Sampling Frame

The sampling frame for academic staff were the personnel records at the personnel registry at the university. The record of registered users on the LMS platform also served as a secondary sampling frame. This was important to capture those staff who are already exposed to the technology and staff having attended eLearning training.

3.3.2.2 Sampling Technique

The research utilized a stratified sampling technique as the population was not homogeneous (Kothari, 2004). The sample was stratified using Colleges, Faculties, Institutes and Schools within the main campus of the University as strata i.e. the College of Engineering and Technology (CoETec), Faculty of Agriculture, Faculty of Science, School of Architecture and Building Sciences (SABS), School of Human Resource Development (SHRD), Institute of Computer Science and Information Technology (ICSIT), and the College of Health Sciences (COHES). The total number of teaching staff

(faculty) in the selected Faculties/Colleges/Institutes/Schools was 666. The objective was to ensure that responses from all faculties were obtained in order to compare the responses and use the data to formulate recommendations.

3.3.2.3 Sample size

The sample size was determined according to the formula:

$n = \frac{z^2 . p . q}{e^2}$, where z = 1.96 (standard variate for given confidence level), p = sample proportion of successes, q = (1-p), e = margin of error, n = size of the sample (Kothari, 2004).

Adjusting for finite population: $n_a = \frac{nN}{n+N}$ where: n = size of the sample, N = population size.

Assumption:

Adoption of LMS is 15±5%

Therefore p = 0.15; q = 0.85; N = 666

$n = \frac{1.96^2 0.15x0.85}{0.05^2}$, = 196

Adjustment for finite population $n_a = \frac{196x666}{196+666}$ = 151.4

A sample of lecturers from each of the 7 schools, faculties, institutes of colleges were selected according to proportional allocation to assess their attitudes, knowledge and experience in application of eLearning, giving a total of 152 staff.

Table 3.2 Sample Size Distribution

Sno.	Stratum	No. of Faculty	Sample size
1	COETEC	180	41
2	AGRICULTURE	63	15
3	SCIENCE	138	31
4	SABS	72	16
5	SHRD	88	20
6	ICSIT	57	13
7	COHES	68	16
	Total	**666**	**152**

3.4 Data Collection Methods

The main data collection instrument was the questionnaire which was administered to teaching staff (faculty) (Appendix 8). The data sought was both ordinal and nominal and

included determining the characteristics of the respondents and their perceptions on eLearning adoption in order to determine the factors affecting eLearning adoption. The questionnaire consisted of two sections. The first section was divided into two parts. Part I asked questions relating to demographic details such as, gender, interviewee age profile, teaching experience, faculty or school, department, highest academic qualifications, designation, and subject area. The type of data collected was ordinal data. Part II included questions relating to computer literacy and LMS usage. They included self rating of their computer literacy skills, registration status on the LMS, LMS training and on the usage of the LMS and other eLearning applications for teaching. This information was used to compute an eLearning adoption index for each respondent (Appendix 9). Section II investigated the factors for LMS adoption and was divided into subsections incorporating questions pertaining to different aspects of system adoption. The subsections were: Individual factors (individual characteristics, individual perceptions – self efficacy, anxiety, and computer playfulness), organizational factors (management support, social influence, institutional leadership, school and institutional-wide eLearning strategy), Technological factors (perceived usefulness, output quality, job relevance, perceived ease of use and ICT infrastructure) and behavioral intention. All questions in these subsections contained multi-item response categories anchored to a five point Likert scale to ascertain staff opinion on LMS adoption factors based on the factors identified in the theoretical model by (Nanayakkara, 2007) with some modifications. The questionnaire assessed attitudes of staff using a 5-Point Likert Scale, where 1 = Strongly Disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly Agree as by (Kothari, 2004). The third section included self-reported usage behavior on duration of usage, "How long have you used the LMS system" and frequency of usage "How many times do you believe you use the LMS system during a week?" An eLearning adoption index was computed for each respondent using criteria indicated on Appendix 8 using the following parameters: Registered LMS user, Number of units uploaded on LMS, Resources uploaded, eLearning methods used, Period of using LMS and LMS usage. Each parameter was given a weight giving a total weight of 59. The adoption index was then converted to a percentage.

3.5 Research Procedure

The design and development of the survey instrument was completed in May 2013. At the onset of the field study, the questionnaires were pre-tested with five respondents in order

to detect weaknesses and assess the respondents' general understanding and ability to respond to the questions. A review was done to incorporate changes to the weaknesses identified. Thereafter, in May/June 2013, the questionnaires were administered to faculty (lecturers) at the main campus of the University, who were the targeted respondents. The questionnaire was administered to the selected staff using proportional allocation. The questionnaires were distributed to the selected faculty either online through email invitation to participate in a lime survey or hardcopy questionnaires given to staff in their respective faculties/schools/institutes/colleges by either the research assistant or researcher. A letter explaining the purpose of research and making a request for respondent's participation was attached to all questionnaires.

Online questionnaires were developed as a lime survey and invitations sent to participants using their email addresses. The email contained a hyperlink through which the participant could access and complete the survey and submit it online. Ninety respondents completed the online questionnaire while fifty six completed the hardcopy survey. The respondents were given one week in which to complete the questionnaires after which they were collected. To ensure a high response rate, all respondents were assured of confidentiality and information received would be disseminated to them in appreciation of their participation. Follow-up for responses was done by the researcher through emails and telephone calls. The deadline was extended twice and those who had not completed were sent reminders. To ensure completeness, the online-questionnaire prompted respondents whenever some questions were not answered. Staff were selected per faculty for the questionnaire survey, using stratified random sampling while a structured self administered questionnaire was used in data collection.

3.6 Data Analysis

Responses from the online questionnaires were then downloaded into excel and coded accordingly ready for analysis. Data analysis was done using both the descriptive (frequency counts, percentages, and means and cross tabulations) and inferential statistics (correlation analysis, regression analysis and principal component analysis). Reliability of the measurement scales was determined using Cronbach alpha coefficients. Exploratory factor analysis using principal components analysis with varimax rotation and an extraction criterion of eigenvalue greater than one was conducted. Data was presented in

figures and tables as appropriate. To address the possibility that some of the constructs combined multiplicatively rather than additively, stepwise regression analysis was conducted to determine any significant two-way interactions. Any significant interaction term was added to the model and all parameters reestimated. Data analysis was undertaken using IBM SPSS version 2, Release 21.0.0.0. (2012).

3.7 Chapter Summary

This chapter outlines the methodology used to establish the critical factors limiting the success of JKUAT's implementation of eLearning. The methodology covers the three broad areas of individual, system and organizational factors. The study was undertaken at JKUAT's main campus located at Juja, Kenya and involved a questionnaire survey with faculty to assess factors affecting user acceptance of eLearning technology in JKUAT.

The research design was both descriptive and correlational. The population involved in the study was the number of teaching staff (faculty) at the University's main campus. The sampling frame for teaching staff was from personnel records at the personnel registry at the university. The record of registered users on the LMS platform also served as a secondary sampling frame. The research utilized a stratified sampling technique. The main data collection instrument was the questionnaire which was both online and hard copy.

Data analysis was done using both the descriptive (frequency counts, percentages, and means) and inferential statistics (correlation analyses, regression analyses and principal component analysis). The study was undertaken in May/June 2013. Chapter four presents the findings of the study.

CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This chapter presents the results of the data collected according to the study objectives i.e. to what extent individual factors, organizational factors and technological or system factors contributed to poor adoption of eLearning by JKUAT faculty.

4.2 General Information of the Respondents

4.2.1 Response Rate

A total of 146 respondents participated in the survey which represented 96.1% of the targeted 152 respondents in the seven Faculties. Gender representation was 73.3% and 26.7% male to female, respectively. This fairly reflected the gender representation among faculty in the University to a great extent which was 75.8 % to 24.2 % male to female ratio. Adequate number of respondents were obtained for all faculties except the School of Architecture and Building Sciences (SABS) and the College of Health Sciences (COHES) where the response was low. These findings are presented in Table 4.1.

Table 4.1 The Number of Respondents to eLearning Survey

Sno.	Stratum	Female faculty	Male Faculty	Total faculty	Targeted respondents	Respondents obtained
1	COETEC	23	157	180	41	43
2	AGRICULTURE	16	47	63	15	22
3	SCIENCE	34	104	138	31	35
4	SABS	13	59	72	16	6
5	SHRD	34	54	88	20	20
6	ICSIT	15	42	57	13	12
7	COHES	26	42	68	16	8
	Total	**161**	**505**	**666**	**152**	**146**

4.2.2 Demography of Participants

The respondents were classified according to age profile, the number of years of experience, highest academic qualification, and the academic grade/designation. The category of highest academic qualification with the lowest number of respondents was Bachelors degree with 8 participants (5.5%) while the majority had PhD degree with 83 participants (56.8%). The results are presented in Table 4.2.

Table 4.2 The Number of Respondents by Highest Academic Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelors	8	5.5	5.5	5.5
	Masters	55	37.7	37.7	43.2
	PhD	83	56.8	56.8	100.0
	Total	**146**	**100.0**	**100.0**	

The age profile was as follows; 21 - 25 yrs - 2.7%, 26 - 30 yrs 10.3%, 31 - 40 yrs – 31.5%, 41 - 45 yrs - 20.5%, 46 - 50 yrs - 12.3%, 51 - 55 - 12.3% and 56 and above - 10.3%. The age group with the highest number of respondents was the 31 – 40 years which had 46 respondents (31.5%) and the lowest was the 21 – 25 years age group with 4 participants (2.7%). Table 4.3 shows these findings.

Table 4.3 The Number of Respondents by Interviewee Age Profile

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-25 Yrs	4	2.7	2.7	2.7
	26-30 Yrs	15	10.3	10.3	13.0
	31-40 Yrs	46	31.5	31.5	44.5
	41-45 Yrs	30	20.5	20.5	65.1
	46-50 Yrs	18	12.3	12.3	77.4
	51-55 Yrs	18	12.3	12.3	89.7
	>56 Yrs	15	10.3	10.3	100.0
	Total	**146**	**100.0**	**100.0**	

The number of respondents per faculty is presented in Table 4.4. The highest number was from COETeC (29.5%) and the lowest from SABS (4.1%).

Table 4.4 The Number of Respondents by Faculty / School / Institute

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	22	15.1	15.1	15.1
	COETeC	43	29.5	29.5	44.5
	COHES	8	5.5	5.5	50.0
	ICSIT	12	8.2	8.2	58.2
	SABS	6	4.1	4.1	62.3
	Science	35	24.0	24.0	86.3
	SHRD	20	13.7	13.7	100.0
	Total	**146**	**100.0**	**100.0**	

The grade/designation with the highest number of respondents were Lecturers with 41 respondents (28.1%), followed by the Assistant Lecturers / TF with 39 (26.7%). On the

other hand, the grade/designation with the lowest number of respondents was Professors with 5 (3.4%). These findings are presented in Table 4.5.

Table 4.5 The Number of Respondents by Designation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Teaching Assistant	11	7.5	7.5	7.5
	Assistant Lecturer	39	26.7	26.7	34.2
	Lecturer	41	28.1	28.1	62.3
	Senior Lecturer	34	23.3	23.3	85.6
	Associate Professor	16	11.0	11.0	96.6
	Professor	5	3.4	3.4	100.0
	Total	**146**	**100.0**	**100.0**	

The category with the highest number of respondents based on the number of years of experience was the 5 – 9 years with 53 respondents (36.3%), while the lowest had more than 24 years of experience with 4 (2.7%). The findings are presented in Table 4.6.

Table 4.6 The Number of Respondents by Period of Service

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<5 Yrs	37	25.3	25.3	25.3
	5-9 Yrs	53	36.3	36.3	61.6
	10-14 Yrs	10	6.8	6.8	68.5
	15-19 Yrs	12	8.2	8.2	76.7
	20-24 Yrs	30	20.5	20.5	97.3
	>24 Yrs	4	2.7	2.7	100.0
	Total	**146**	**100.0**	**100.0**	

Registration on the LMS system

The total number of respondents that were registered on the Learning Management System were 58 (39.7%). The number of female faculty registered were 15 (10.3%) as compared to 43 (29.4%) for males. Overall, 38.5% of the female faculty were registered on the LMS as compared to 40.2% for male faculty. The results are shown in Table 4.7.

Table 4.7 Frequency Distribution of Registered Users on LMS by Gender

		Gender					
		Female		Male		Total	
Question		*f*	(%)	*f*	(%)	*f*	(%)
Are you registered as a user on the JKUAT eLearning system?	No	24	16.4	64	43.8	88	60.3
	Yes	15	10.3	43	29.4	58	39.7
	Total	**39**	**26.7**	**107**	**73.3**	**146**	**100**

The level of LMS registration when measured as a percentage of respondents in the respective school was highest in ICSIT (58.3%) followed closely by the faculty of Agriculture (50.0%). The lowest registration was found in the School of Architecture and Building Sciences (SABS) (16.7%) and the College of Health Sciences (33.3%). The results are presented in Table 4.8.

Table 4.8 Frequency Distribution of Registered Users on LMS by School

		Distribution		Distribution		Distribution		
		No		Yes		Total		% of faculty
Question	School	*f*	(%)	*f*	(%)	*f*	(%)	(%)
Are you registered as a user on the JKUAT eLearning system?	Agriculture	11	7.5	11	7.5	22	15.1	50.0
	COETEC	27	18.5	16	11.0	43	29.5	37.2
	COHES	6	4.1	2	1.4	8	5.5	33.3
	ICSIT	5	3.4	7	4.8	12	8.2	58.3
	SABS	5	3.4	1	0.7	6	4.1	16.7
	Science	21	14.4	14	9.6	35	24.0	40.0
	SHRD	13	8.9	7	4.7	20	13.7	35.0
	Total	**88**	**60.3**	**58**	**39.7**	**146**	**100**	

LMS registration was highest among Assistant Lecturers / TF (66.7%) followed distantly by Senior Lecturers (38.2%) and Teaching Assistants (36.4%). The lowest registration was among Professors (20.0%) followed by Lecturers (22.0%) and Associate Professors (31.3%). The findings are presented in Table 4.9.

Table 4.9 Frequency Distribution of Registered Users on LMS by Designation

		Distribution		Distribution		Distribution		
		No		Yes		Total		% of faculty
Question	Designation	*f*	(%)	*f*	(%)	*f*	(%)	(%)
Are you registered as a user on the JKUAT eLearning system?	TA	7	4.8	4	2.7	11	7.5	36.4
	AL / TF	13	8.9	26	17.8	39	26.7	66.7
	Lecturer	32	21.9	9	6.2	41	28.1	22.0
	Senior Lecturer	21	14.4	13	8.9	34	23.3	38.2
	Associate Prof	11	7.5	5	3.4	16	11.0	31.3
	Professor	4	2.7	1	0.7	5	3.4	20.0
	Grand Total	**88**	**60.3**	**58**	**39.7**	**146**	**100**	

Attendance of LMS Training

The level of attendance of LMS training overall was 43.2 % showing that majority of the faculty had not attended a training on LMS. The level of attendance when computed as a percentage of respondents in the respective school was highest in the faculty of

Agriculture (68.2%) followed closely by ICSIT (66.7%). The lowest attendance of training was found in the SABS (16.7%) and the COETEC (20.9 %). The results are presented in Table 4.10.

Table 4.10 Frequency Distribution of Attendance of LMS Training by School

		Distribution		Distribution		Distribution		
		No		Yes		Total		Overall
Question	School	*f*	(%)	*f*	(%)	*f*	(%)	(%)
Have you attended a training on LMS?	Agriculture	7	4.8	15	10.3	22	15.1	68.2
	COETEC	34	23.3	9	6.2	43	29.5	20.9
	COHES	5	3.4	3	2.1	8	5.5	37.5
	ICSIT	4	2.7	8	5.5	12	8.2	66.7
	SABS	5	3.4	1	0.7	6	4.1	16.7
	Science	16	11.0	19	13.0	35	24.0	54.3
	SHRD	12	8.2	8	5.5	20	13.7	40.0
	Total	**83**	**56.8**	**63**	**43.2**	**146**	**100**	

Table 4.11 shows the frequency distribution of attendance of LMS training by designation. The level of attendance of LMS training overall was highest among Assistant Lecturers / TF (59.0%) followed closely by Senior Lecturers (58.9%). The lowest attendance of training was found in Teaching Assistants (9.1 %).

Table 4.11 Frequency Distribution of Attendance of LMS Training by Designation

		Distribution		Distribution		Distribution		
		No		Yes		Total		Overall
Question	Designation	*f*	(%)	*f*	(%)	*f*	(%)	(%)
Are you registered as a user on the JKUAT eLearning system?	TA	10	6.8	1	0.7	11	7.5	9.1
	AL / TF	16	11.0	23	15.8	39	26.7	59.0
	Lecturer	29	19.9	12	8.2	41	28.1	41.4
	Senior Lecturer	14	9.6	20	13.7	34	23.3	58.9
	Associate Prof	11	7.5	5	3.4	16	11.0	31.3
	Professor	3	2.1	2	1.4	5	3.5	40.0
	Total	**81**	**55.5**	**63**	**43.2**	**146**	**100**	

Factors Limiting Use of the LMS

Table 4.12 shows the respondents' opinion on the most limiting factor for using the LMS. Access to computers was generally rated very low by most of the respondents (42.5%) while 13.7 % rated it very high. Access to internet was rated very high (35.6%) and high (13.7%) by almost half of the respondents (49.3%). Similarly, inadequate training was rated very high (29.5%) and high (18.5%5) by almost half of the respondents (48.0%).

Lack of time was rated very low (24.0%) and low (24.7%) by almost half of the respondents (48.7%). Insufficient incentives was rated very high (28.1%) and high (21.9%) by half of the respondents (50.0%).

Table 4.12 Frequency Distribution on the Most Limiting Factor in Using the LMS

		Access to computers		Access to Internet		Inadequate training		Lack of Time		Insufficient incentives	
Question	Scale	*f.*	(%)	*f.*	(%)	*f.*	(%)	*f.*	%	*f.*	%
What is the most limiting factor in using the LMS?	1 V. Low	62	42.5	20	13.7	14	9.6	35	24.0	17	11.6
	2 Low	19	13.1	19	13.1	21	14.4	36	24.7	16	11.0
	3 Medium	22	15.1	22	15.1	29	19.9	29	19.9	26	17.8
	4 High	5	2.7	20	13.7	27	18.5	21	14.4	32	21.9
	5 V High	20	13.7	52	35.6	43	29.5	11	7.5	41	28.1
	No answer	18	12.3	13	8.9	12	8.3	14	9.6	14	9.6
	Total	146	100	146	100	146	100	146	100	146	100

Table 4.13 presents the gadget used by faculty to access the LMS. Majority of the respondents had never used any of the gadgets to access the LMS: Desktop computer (52.7 %), University provided laptop (71.2 %), Own laptop (42.5 %), Mobile phone (63.0 %) and IPAD / Tablet (68.4 %). Among those who had used, own laptop was the most frequently used gadget with 19.9 % of the respondents using it always, and 11.0% using it mostly. On the other hand, a university provided laptop was least used with about 1.0 % using it always and 2.1% using it mostly.

Table 4.13 Frequency Distribution on Gadget Used to Access the LMS Platform

		Desktop computer		Univ provided laptop		Own laptop		Mobile phone		IPAD / Tablet	
Question	Scale	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Which Gadget Do You Use to Access the LMS	Never	77	52.7	104	71.2	62	42.5	92	63.0	100	68.4
	Seldom	13	8.9	8	5.5	9	6.2	7	4.8	6	4.1
	Quite a bit	11	7.5	3	2.1	11	7.5	9	6.2	4	2.7
	Mostly	13	8.9	3	2.1	16	11.0	5	3.4	6	4.1
	Always	9	6.2	1	1.0	29	19.9	8	5.5	6	4.1
	No answer	23	15.8	27	18.5	19	13.0	25	17.1	24	16.4
	Total	**146**	**100**	**146**	**100**	**146**	**100**	**146**	**100**	**146**	

Access to Internet

Table 4.14 shows how respondents access internet. Majority of the respondents accessed to internet using their own broadband modem, with 38.4 % using it always and 28.8 % using it mostly. Only 4.8 % of the respondents had never used own broadband modems.

University WIFI was the least used means of accessing internet. About 50% of the respondents (49.3 %) had never used university WIFI, while only 2.7 % used it always.

Table 4.14 Frequency Distribution on Access the Internet

		University server		University WIFI		Own broadband modem		Mobile phone	
Question	Scale	*f*	%	*f*	%	*f*	%	*f*	%
How Do You Access the Internet?	Never	21	14.4	72	49.3	7	4.8	17	11.6
	Seldom	31	21.2	33	22.6	9	6.2	18	12.3
	Quite a bit	26	17.8	14	9.6	21	14.4	29	19.9
	Mostly	46	31.5	7	4.8	42	28.8	30	20.5
	Always	16	11.0	4	2.7	56	38.4	42	28.8
	No response	6	4.1	16	11.0	11	7.5	10	6.8
	Total	**146**	**100**	**146**	**100**	**146**	**100**	**146**	**100**

Computer Literacy

Table 4.15 shows the frequency distribution on computer literacy. Majority of the respondents rated their computer literacy as high (45.2%) to very high (35.6%). Only 1.4 % of the respondents rated their computer literacy as very low and 2.1% as low. On the other hand, 15.8% rated their computer literacy as medium.

Table 4.15 Computer Literacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very low	2	1.4	1.4	1.4
	Low	3	2.1	2.1	3.4
	Medium	23	15.8	15.8	19.2
	High	66	45.2	45.2	64.4
	Very high	52	35.6	35.6	100.0
	Total	146	100.0	100.0	

Use of Computer Applications

Table 4.16 presents results on the use of computer applications. Copying and transferring of files (4.36), word processor (4.33) and scanning and creating of pdf files were the computer applications where the respondents rated their literacy highest while databases (3.08), presentation software and spreadsheets or excel were rated medium. On the other hand, use of statistics packages was rated low (2.92).

Table 4.16 Use of Computer Applications

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Statistics package	143	1	5	2.92	.099	1.181
Database /	143	1	5	3.08	.099	1.190
Presentation	145	1	5	3.96	.085	1.027
Spreadsheets	146	1	5	3.99	.082	.993
Scanning	143	1	5	4.22	.089	1.062
Word processor	146	1	5	4.33	.069	.840
Copying files	145	1	5	4.36	.081	.970
Valid N (listwise)	139					

Use of LMS Applications

Table 4.17 presents the results on the use of LMS applications. The use of most LMS applications was rated very low by the majority of the respondents. The application that was mostly used was uploading of course outlines (1.99) followed by uploading of lecture notes (1.62). The lowest applications were use of forums (1.17) and chats (1.17) followed by quizzes (1.30) and assignments (1.44).

Table 4.17 Use of LMS Applications

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Forums	127	1	4	1.17	.052	.588
Chat	127	1	4	1.17	.051	.574
Quizzes	127	1	5	1.30	.074	.829
Assignments	125	1	5	1.44	.093	1.035
Notes	127	1	5	1.62	.106	1.195
Outline	128	1	5	1.99	.128	1.444
Valid N (listwise)	124					

Use of eLearning Methods

Table 4.18 presents results on use of eLearning methods. The use of most eLearning methods were rated very low by majority of the respondents. The methods that were mostly used were web-based course materials (2.63), e-databases (2.20), and email discussion groups (2.02). The least used methods were audio conferencing via computers (1.15), video/audio conferencing (1.21), web-based testing (1.41), and streaming audio or video files (1.56). Those that were intermediate included discussion groups and chat rooms (1.61), web-based administration materials (1.66), CDROMS (1.80) and downloadable audio and video files (1.86).

Table 4.18 Usage of ELearning Methods

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Audio	136	1	4	1.15	.040	.469
Video	135	1	4	1.21	.049	.574
Web-based-T	136	1	5	1.41	.071	.830
Streaming	135	1	5	1.56	.081	.936
chat	137	1	5	1.61	.084	.987
Web-based-A	136	1	5	1.66	.095	1.110
CDROMS	136	1	4	1.80	.088	1.024
Downloadable	136	1	5	1.86	.095	1.103
Email	135	1	5	2.02	.098	1.143
e-databases	136	1	5	2.20	.110	1.281
Web-based	137	1	5	2.63	.123	1.440
Valid N (listwise)	132					

In summary, the age group with the highest number of respondents was the 31 – 40 years which had 46 respondents (31.5%) and the lowest was the 21 – 25 years age group with 4 participants (2.7%). The grade/designation with the highest number of respondents were Lecturers with 41 respondents (28.1%). The category with the highest number of respondents based on the number of years of experience was the 5 – 9 years with 53 respondents (36.3%). The category of highest academic qualification with the highest number of respondents PhD degree with 83 participants (56.8%).

The total number of respondents that were registered on the LMS were 58 (39.7%). Overall, 38.5% of the female faculty were registered on the LMS as compared to 40.2% for male faculty. The level of LMS registration when measured as a percentage of respondents in the respective school was highest in ICSIT (58.3%) and lowest in (SABS) (16.7%) and the COHES (33.3%). Registration was highest among Assistant Lecturers / TF (66.7%) and lowest among Professors (20.0%).

The level of attendance of LMS training was 43.2 % showing that majority of the faculty had not attended a training on LMS. The level of attendance was highest in the faculty of Agriculture (68.2%) followed closely by ICSIT (66.7%) while the lowest attendance of training was found in the SABS (16.7%) and the COETEC (20.9 %). Attendance was highest among Assistant Lecturers / TF (59.0%) and lowest was in Teaching Assistants (9.1 %).

On the most limiting factor for using the LMS, access to internet was rated very high (35.6%) and high (13.7%) by almost half of the respondents (49.3%). Similarly,

inadequate training was rated very high (29.5%) and high (18.5%5) by almost half of the respondents (48.0%). Insufficient incentives was rated very high (28.1%) and high (21.9%) by half of the respondents (50.0%).

Majority of the respondents had never used any of the gadgets to access the LMS. On the gadget used by faculty to access the LMS, own laptop was the most frequently used gadget. On the other hand, majority of the respondents accessed to internet using their own broadband modem. Majority of the respondents rated their computer literacy as high (45.2%) to very high (35.6%). Copying and transferring of files (4.36), word processor (4.33) and scanning and creating of pdf files were the computer applications where the respondents rated their literacy highest. On the other hand, use of statistics packages was rated low (2.92). The use of most eLearning methods were rated very low by majority of the respondents. The least used methods were audio conferencing via computers (1.15), video/audio conferencing (1.21), web-based testing (1.41), and streaming audio or video files (1.56). The next section looks at individual factor affecting eLearning.

4.3 Individual Factors

An eLearning adoption index was computed for each respondent using criteria indicated on Appendix 9 using the following parameters: Registered LMS user, Number of units uploaded on LMS, Resources uploaded, eLearning methods used, Period of using LMS and LMS usage. Each parameter was given a weight giving a total weight of 59. The adoption index was then converted to a percentage. The lowest adoption index was 0 while the highest was 69.5. The mean eLearning adoption was 14.8.

Exploratory factor analysis was undertaken for the individual factors affecting eLearning which included anxiety (ANX), behavioral intention (BI), self efficacy (SE) and computer playfulness (CP) using the principal component analysis extraction method. This is used to reduce a large number of variables into a smaller set of variables (factors), establish underlying dimensions between measured variables and latent constructs, thereby allowing the formation and refinement of theory and provides construct validity evidence of self-reporting scales (Williams, Brown, and Onsman, 2010). Components with eigenvalues below 0.5 were excluded and the factor analysis run again. Four components

were found which explained 69.443% of the variance. Table 4.19 shows the total variance explained for individual factors affecting eLearning.

Table 4.19 Total Variance Explained for Individual Factors affecting eLearning

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.908	26.440	26.440	2.908	26.440	26.440	2.259	20.535	20.535
2	2.284	20.766	47.206	2.284	20.766	47.206	2.118	19.254	39.789
3	1.355	12.321	59.527	1.355	12.321	59.527	2.030	18.459	58.248
4	1.091	9.916	69.443	1.091	9.916	69.443	1.231	11.195	69.443
5	.884	8.039	77.482						
6	.659	5.990	83.472						
7	.546	4.960	88.432						
8	.431	3.915	92.347						
9	.373	3.387	95.734						
10	.267	2.428	98.162						
11	.202	1.838	100.000						

Extraction Method: Principal Component Analysis.

The rotation converged in 5 iterations using Varimax rotation with Kaiser Normalisation. Component 1 contained ANX2, ANX3 and ANX4, component 2 contained BI1, BI2, and BI3, component 3 contained SE2, SE3 and SE4 while component 4 contained CP1 and CP3. The rotated component matrix after principal component analysis is presented in Table 4.20.

Table 4.20 Rotated Component Matrix

	Component			
	1	2	3	4
ANX2	.826	-.074	.114	-.057
ANX3	.883	-.117	.022	-.051
ANX4	.804	-.175	-.006	.038
BI1	-.073	.893	.031	-.053
BI2	-.124	.887	.094	.067
BI3	-.208	.648	.166	.246
SE2	-.050	.175	.784	.057
SE3	.175	.021	.776	.191
SE4	.021	.057	.855	-.028
CP1	-.183	-.007	.179	.641
CP3	.142	.168	-.025	.840

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

The reliability statistics determined using Cronbach's Alpha are given in Table 4.21. Anxiety (ANX) had a reliability of 0.798, behavioral intention (BI), 0.784, self efficacy (SE), 0.751 and computer playfulness (CP), 0.300. This shows that anxiety, behavioral intention and self efficacy had high reliability. Cronbach's coefficient alpha estimates the reliability by determining the internal consistency of the test or the average correlation of items within the test (SAS, 2014).

Table 4.21 Reliability Statistics for Individual Factors Affecting eLearning

Variable name	Cronbach's Alpha	N of Items
ANX	.796	3
BI	.784	3
SE	.751	3
CP	.300	2

The multiple items that were selected after the factor analysis had their means computed to determine performance of each variable. The descriptive statistics are presented in Table 4.22. Anxiety (9.8) was very low, while behavioral intention (20.2), self efficacy (17.9) and computer playfulness (16.7) were high (medium = 15).

Table 4.22 Descriptive Statistics of Individual Factors Affecting eLearning Adoption

	N	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ANX_m	136	5.00	20.00	9.8652	.36615	4.26998	18.233	.268	.208	-1.271	.413
BI_m	136	10.00	25.00	20.1838	.31004	3.61565	13.073	-.608	.208	.333	.413
SE_m	135	5.00	25.00	17.9136	.39409	4.57895	20.967	-.776	.209	.789	.414
CP_m	136	5.00	25.00	16.6728	.38442	4.48305	20.098	-.257	.208	.291	.413
AUsage	137	1	5	1.69	.091	1.068	1.141	1.743	.207	2.298	.411
AIndex	146	0	59	14.09	1.083	13.083	171.171	1.029	.201	.661	.399
AFrequency	136	1	6	1.80	.106	1.234	1.523	1.538	.208	1.376	.413
Adoption	146	.000	6.949E1	1.473E1	1.218E0	1.472E1	216.728	1.275	.201	1.451	.399
Valid N (listwise)	128										

A Pearson correlation analysis of the individual factors affecting eLearning adoption was undertaken using the two tailed test. Correlation analysis answers the question if there exists association or correlation between the two (or more) variables and to what degree. The correlation matrix is presented in Table 4.23.

Table 4.23 Correlation Matrix of Individual Factors Affecting eLearning Adoption

	ANX_m	BI_m	SE_m	CP_m	Gender	Age	Period	Faculty	Edlevel	Design	Literacy	AUsage	AIndex	AFrequency	Adoption
ANX_m															
BI_m	-.293**														
SE_m	0.062	.208*													
CP_m	-0.032	.209*	0.153												
Gender	0.103	-0.025	.172*	0.088											
Age	0.006	-0.058	-0.113	-.244**	-.214**										
Period	0.012	-0.056	0.003	-0.107	-0.134	.668**									
Faculty	-0.014	-0.023	-0.028	0.153	.180*	-0.016	0.03								
Edlevel	0.05	-.171*	-0.016	-.169*	-0.156	.486**	.447**	0.049							
Design	-0.038	-0.148	-0.008	-.224**	-.180*	.624**	.627**	0.109	.746**						
Literacy	-.199*	.224**	.251**	.224**	0.027	-.254**	-0.12	-0.06	0.004	-0.141					
AUsage	-.185*	0.086	-0.024	0.054	-0.092	-0.066	-0.043	0.069	0.051	0.035	.228**				
AIndex	-0.161	0.037	0.056	0.079	-0.1	-.191*	-0.097	0.06	-0.02	-0.071	.227**	.742**			
AFrequency	-0.143	0.046	-0.03	0.001	-0.07	-0.081	-0.029	0.104	0.056	-0.04	.188*	.762**	.741**		
Adoption	-.183*	0.058	0.057	0.113	-0.067	-.195*	-0.11	0.082	-0.037	-0.085	.240**	.823**	.958**	.787**	

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

*. Correlation is significant at the 0.05 level (2-tailed).

Computer anxiety was found to be significantly negatively correlated with behavioral intention (r=-0.293, p<0.01), computer literacy (r=-0.199, p<0.05), LMS usage (r=-0.185, p<0.05), and LMS adoption (r=-0.183, p<0.05). Behavioral intention was significantly correlated to self efficacy (r=0.208, p<0.05), computer playfulness (r=0.209, p<0.05) and computer literacy (r=0.224, p<0.01) and significantly negatively correlated to education level (r=-0.171, p<0.05). Self efficacy was significantly correlated to gender (r=0.172, p<0.05) and computer literacy (r=0.251, p<0.01). Computer playfulness was significantly negatively correlated with age (r=0.244, p<0.05), educational level (r=-0.169, p<0.05), designation (r=-0.224, p<0.01), and significantly positively correlated to computer literacy (r=0.224, p<0.01). Gender was significantly correlated to faculty (r=0.180, p<0.05) and significantly negatively correlated to age (r=-0.214, p<0.01), and designation (r=-0.180, p<0.05). Age was significantly correlated to period of service (r=0.688, p<0.01), education level (r=0.486, p<0.01), designation (r=0.624, p<0.01) and significantly negatively correlated to computer literacy (r=-0.254, p<0.01) and LMS adoption (r=-0.195, p<0.05). The period of service was significantly correlated to educational level (r=0.447, p<0.010) and designation (r=0.627, p<0.01). Education level was significantly correlated to designation (r=0.746, p<0.01). Computer literacy was significantly correlated to the period of LMS usage (0.228, p<0.01) and LMS frequency of use (r=0.188, p<0.05) and LMS adoption (r=0.240, p<0.01).

A linear regression was undertaken using the dependent variables for adoption using the method enter. Regression analysis answers the question if there is any cause and effect relationship between the dependent variable and two or more independent variables and to what degree and in which direction. The regression analysis table showing variables entered / removed using LMS Adoption as the dependent variable is presented on Table 4.24. This shows the variables entered in the model.

Table 4.24 Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	AFrequency , CP_m, Gender, Period, ANX_m, Faculty, SE_m, BI_m, Literacy, Edlevel, AIndex, Age, AUsage, Design[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Adoption

The model summary is presented in Table 4.25. The model summary was highly significant (p=0.000) showing that the model was functional. The model had an R square value of 0.950 indicating that the percentage of the dependent variable variance that was explained by the independent variables was 95%.

Table 4.25Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.975[a]	.950	.944	3.564479690827230E0	.950	153.212	14	113	.000	2.131

a. Predictors: (Constant), AFrequency , CP_m, Gender, Period, ANX_m, Faculty, SE_m, BI_m, Literacy, Edlevel, AIndex, Age, AUsage, Design

b. Dependent Variable: Adoption

The ANOVA table for the individual factors affecting eLearning is presented in Table 4.26. The coefficient of determination was significant (p=0.000) showing the model was functional and that at least one of the independent variables was a significant predictor of the dependent.

Table 4.26 ANOVA Table for Individual Factors Affecting eLearning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27252.850	14	1946.632	153.212	.000[a]
	Residual	1435.723	113	12.706		
	Total	28688.573	127			

a. Predictors: (Constant), AFrequency , CP_m, Gender, Period, ANX_m, Faculty, SE_m, BI_m, Literacy, Edlevel, AIndex, Age, AUsage, Design

b. Dependent Variable: Adoption

The coefficients for the individual factors affecting eLearning adoption are presented in Table 4.27. For each of the predictor variables there were two hypothesis:

H_0: This independent variable is not a significant predictor of the dependent

H_A: This independent variable is a significant predictor of the dependent

LMS Usage duration (p=0.000), LMS Adoption Index (p=0.000) and Frequency of LMS use (p=0.000) were the only predictor variables that were significant. The null hypothesis was therefore rejected and the alternative accepted that they were significant predictors of Adoption.

Table 4.27 Coefficients for Individual Factors Affecting eLearning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-4.189	3.519		-1.190	.236	-11.161	2.784		
	ANX_m	-.049	.081	-.014	-.600	.550	-.210	.113	.820	1.220
	BI_m	-.043	.099	-.010	-.436	.664	-.238	.152	.785	1.274
	SE_m	.058	.077	.018	.756	.451	-.094	.210	.797	1.255
	CP_m	.115	.078	.035	1.468	.145	-.040	.270	.800	1.250
	Gender	.551	.752	.017	.732	.466	-.940	2.041	.854	1.171
	Age	.037	.332	.004	.111	.912	-.620	.694	.392	2.551
	Period	.068	.321	.007	.212	.833	-.569	.705	.410	2.437
	Faculty	-.014	.154	-.002	-.089	.929	-.319	.291	.873	1.146
	Edlevel	-.593	.857	-.024	-.692	.490	-2.292	1.105	.376	2.660
	Design	-.146	.484	-.012	-.302	.763	-1.105	.813	.267	3.743
	Literacy	-.034	.429	-.002	-.079	.937	-.883	.815	.736	1.360
	AUsage	2.776	.515	.202	5.390	.000	1.755	3.796	.316	3.169
	AIndex	.847	.041	.739	20.545	.000	.766	.929	.342	2.921
	AFrequency	1.080	.449	.089	2.406	.018	.191	1.970	.321	3.112

a. Dependent Variable: Adoption

In summary, factor analysis was undertaken for the individual, factors affecting eLearning. Reliability of the measurement scales was determined using Cronbach alpha coefficients. Exploratory factor analysis using principal components analysis with varimax rotation and an extraction criterion of eigenvalue greater than one was conducted. Data analysis was done using correlation analyses, analysis of variance (ANOVA), and regression analysis.

Among individual factors, computer anxiety was found to be significantly negatively correlated with computer literacy, LMS usage, frequency of LMS use and LMS adoption. Behavioral intention was significantly correlated to self efficacy, computer playfulness and computer literacy and significantly negatively correlated to education level. Self efficacy was significantly correlated to gender and computer literacy. Computer playfulness was significantly negatively correlated with age, educational level, designation, and significantly positively correlated to computer literacy. Gender was significantly correlated to faculty and significantly negatively correlated to age, and designation. Age was significantly correlated to period of service, education level, designation and significantly negatively correlated to computer literacy and LMS adoption. The period of service was significantly correlated to educational level and designation. Education level was significantly correlated to designation. Computer literacy was significantly correlated to the period of LMS usage and LMS frequency of use and LMS adoption. From the regression analysis, none of the individual factors were

able to explain eLearning adoption. The next section looks at organizational factors affecting eLearning.

4.4 Organizational Factors

Exploratory factor analysis was undertaken for the organizational factors that affect eLearning which included management support (MSU) (9 items), social influence (SI) (4 items), institutional leadership (IL) (4 items), and school and institution wide eLearning strategy (SES) (4 items) using the principal component analysis extraction method. This is used to reduce a large number of variables into a smaller set of variables (factors), establish underlying dimensions between measured variables and latent constructs, thereby allowing the formation and refinement of theory and provides construct validity evidence of self-reporting scales (Williams, Brown, and Onsman, 2010). Components with eigenvalues below 0.5 were excluded and the factor analysis run again. Four components were obtained which explained 65.386% of the variance. The total variance explained for organisational factors affecting eLearning is presented in Table 4.28.

Table 4.28 Total Variance Explained for Organizational Factors Affecting eLearning

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.138	32.110	32.110	5.138	32.110	32.110	3.928	24.549	24.549
2	2.342	14.635	46.745	2.342	14.635	46.745	2.196	13.725	38.275
3	1.794	11.215	57.960	1.794	11.215	57.960	2.173	13.582	51.857
4	1.188	7.426	65.386	1.188	7.426	65.386	2.165	13.529	65.386
5	.923	5.767	71.153						
6	.723	4.517	75.670						
7	.648	4.047	79.717						
8	.559	3.493	83.210						
9	.549	3.429	86.640						
10	.450	2.815	89.455						
11	.371	2.317	91.772						
12	.329	2.054	93.826						
13	.319	1.993	95.819						
14	.288	1.802	97.622						
15	.207	1.294	98.915						
16	.174	1.085	100.000						

Extraction Method: Principal Component Analysis.

The rotation converged in 7 iterations using Varimax rotation with Kaiser Normalisation. Component 1 contained IL1, IL2, IL3, IL4, SES1, SES2, and SES3, component 2 contained MSU6, MSU7 and MSU8, component 3 contained SI1, SI3 and SI4 while component 4 contained BI1, BI2 and BI3. The rotated component matrix for organisational factor analysis presented in Table 4.29.

Table 4.29 Rotated Component Matrix for Organizational Factors

Rotated Component Matrix[a]

	Component			
	1	2	3	4
IL1	.647	.041	.438	-.037
IL2	.723	.033	.221	.010
IL3	.684	.040	.470	.020
IL4	.617	-.032	.202	-.057
SES1	.756	.184	.079	.038
SES2	.782	.123	-.156	.151
SES3	.762	.235	-.089	.047
MSU6	.102	.691	.334	-.007
MSU7	.176	.793	.060	-.162
MSU8	.095	.865	.153	.022
BI1	.078	-.120	-.111	.868
BI2	-.014	-.148	-.078	.883
BI3	.048	.140	.238	.747
SI1	-.133	.245	.603	.103
SI3	.375	.328	.720	-.055
SI4	.394	.094	.733	-.053

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

The reliability statistics determined using Cronbach's Alpha are given in Table 4.30. Institutional leadership (IL) had a reliability of 0.822, school and institution wide eLearning strategy (SES), 0.804, management support (MSU), 0.788, behavioral intention (BI) 0.784 and social influence (SI), 0.725. This shows that all factors had high reliability above 0.700. Cronbach's coefficient alpha estimates the reliability by determining the internal consistency of the test or the average correlation of items within the test (SAS, 2014).

Table 4.30 Reliability Statistics for Organizational Factors

Reliability Statistics

Variable name	Cronbach's Alpha	N of Items
IL	.822	4
SES	.804	3
MSU	.788	3
BI	.784	3
SI	.725	3

The multiple items that were selected after the factor analysis had their means computed to determine performance of each variable. The descriptive statistics are presented in Table 4.31. Institutional leadership (13.5), school and institution wide strategy (12.8), management support (12.7) and social influence (14.3) were low, while behavioral intention (20.2) was high.

Table 4.31 Descriptive Statistics of Organizational Factors Affecting eLearning

	N	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
IL_m	137	5.00	22.50	13.5401	.35833	4.19419	17.591	-.286	.207	-.385	.411
SES_m	137	5.00	25.00	12.8467	.37680	4.41033	19.451	.017	.207	-.386	.411
MSU_m	136	5.00	25.00	12.7696	.41937	4.89066	23.919	.305	.208	-.443	.413
BI_m	136	10.00	25.00	20.1838	.31004	3.61565	13.073	-.608	.208	.333	.413
SI_m	137	5.00	25.00	14.2822	.38255	4.47759	20.049	-.276	.207	-.422	.411
AUsage	137	1	5	1.69	.091	1.068	1.141	1.743	.207	2.298	.411
AIndex	146	0	59	14.09	1.083	13.083	171.171	1.029	.201	.661	.399
AFrequency	136	1	6	1.80	.106	1.234	1.523	1.538	.208	1.376	.413
Adoption	146	.000	6.949E1	1.473E1	1.218E0	1.472E1	216.728	1.275	.201	1.451	.399
Valid N (listwise)	130										

A Pearson correlation analysis of the organizational factors affecting eLearning adoption was undertaken using the two tailed test. Correlation analysis answers the question if there exists association or correlation between the two (or more) variables and to what degree. The correlation matrix is presented in Table 4.32. Institutional leadership was found to be significantly correlated to school and institution wide eLearning strategy ($r=0.617$, $p<0.01$), management support ($r=0.305$, $p<0.01$), and social influence ($r=0.488$ $p<0.01$). The school and institution wide eLearning strategy was found to be significantly correlated to management support ($r=0.239$, $p<0.01$), social influence ($r=0.324$, $p<0.01$) and the frequency of LMS use ($r=0.181$, $p<0.05$). Management support was found to be

significantly correlated to social influence (r=0.365, p<0.01) and the frequency of LMS use (r=0.268, p<0.01). Social influence was found to be significantly correlated duration of LMS usage (r=0.258, p<0.01), LMS adoption (r=0.259, p<0.01) and the frequency of LMS use (r=0.247, p<0.01).

Table 4.32 Correlation Analysis of Organizational Factors Affecting eLearning

	IL_m	SES_m	MSU_m	BI_m	SI_m	AUsage	AIndex	AFrequency	Adoption
IL_m									
SES_m	.617**								
MSU_m	.305**	.239**							
BI_m	0.065	0.109	-0.062						
SI_m	.488**	.324**	.365**	0.002					
AUsage	0.088	0.076	0.107	0.086	.258**				
AIndex	0.116	0.115	0.151	0.037	.270**	.742**			
AFrequency	0.159	.181*	.268**	0.046	.247**	.762**	.741**		
Adoption	0.114	0.112	0.165	0.058	.259**	.823**	.958**	.787**	

A linear regression was undertaken using the dependent variables for adoption using the method enter. Regression analysis answers the question if there is any cause and effect relationship between the dependent variable and two or more independent variables and to what degree and in which direction. The regression analysis table showing the variables entered / removed using the frequency of LMS use as the dependent variable is presented on Table 4.33.

Table 4.33 Regression Analysis Variables Entered / Removed

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Adoption, BI_m, IL_m, MSU_m, SI_m, SES_m, AUsage, AIndex[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: AFrequency

The model summary is presented in Table 4.34. The model summary was highly significant (p=0.000) showing that the model was functional. The model had an R square value of 0.718 indicating that the percentage of the dependent variable variance that was explained by the independent variables was 71.8%.

Table 4.34 Model Summary for Regression Analysis for Organizational Factors Affecting eLearning

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.847[a]	.718	.699	.669	.718	38.490	8	121	.000	1.981

a. Predictors: (Constant), Adoption, BI_m, IL_m, MSU_m, SI_m, SES_m, AUsage, AIndex

b. Dependent Variable: AFrequency

The ANOVA table for the organizational factors affecting eLearning is presented in Table 4.35. The coefficient of determination was significant (p=0.000) showing the model was functional and that at least one of the independent variables was a significant predictor of the dependent.

Table 4.35 ANOVA Table for Organizational Factors Affecting eLearning

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	137.814	8	17.227	38.490	.000[a]
	Residual	54.155	121	.448		
	Total	191.969	129			

a. Predictors: (Constant), Adoption, BI_m, IL_m, MSU_m, SI_m, SES_m, AUsage, AIndex

b. Dependent Variable: AFrequency

The coefficients for the organizational factors affecting eLearning adoption are presented in Table 4.36. For each of the predictor variables there were two hypothesis:

H_0: This independent variable is not a significant predictor of the dependent

H_A: This independent variable is a significant predictor of the dependent

Management support (p=0.005) was the only predictor variable that was significant. The null hypothesis was therefore rejected and the alternative accepted that management support was a significant predictor of the frequency of LMS use.

The regression equation from this output was:

Frequency LMS of use = 0.08 – 0.011(IL) + 0.021 (SES) + 0.04 (MSU) – 0.004 (BI) – 0.014 (SI) + 0.429 (AUsage) + 0.01 (AIndex) + 0.03 (Adoption)

Table 4.36 Coefficients for Organizational Factors Affecting eLearning Adoption

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.080	.416		.193	.847	-.743	.904		
	IL_m	-.011	.020	-.037	-.555	.580	-.050	.028	.532	1.880
	SES_m	.021	.017	.076	1.236	.219	-.012	.054	.614	1.628
	MSU_m	.040	.014	.157	2.844	.005	.012	.068	.768	1.302
	BI_m	-.004	.016	-.012	-.254	.800	-.037	.028	.967	1.034
	SI_m	-.014	.017	-.052	-.849	.397	-.047	.019	.616	1.623
	AUsage	.429	.100	.383	4.296	.000	.231	.627	.293	3.411
	AIndex	.010	.016	.113	.650	.517	-.021	.042	.077	12.905
	Adoption	.030	.017	.369	1.808	.073	-.003	.063	.056	17.849

a. Dependent Variable: AFrequency

In summary, among the organizational factors, institutional leadership was found to be significantly correlated to school and institution wide eLearning strategy, management support, and social influence. The school and institution wide eLearning strategy was found to be significantly correlated to management support, social influence and the frequency of LMS use. Management support was found to be significantly correlated to social influence and the frequency of LMS use. Social influence was found to be significantly correlated to the duration of LMS usage, LMS adoption and the frequency of LMS use. In the linear regression, management support (p=0.05) was the only predictor variable that was significant and therefore explained the variance of the frequency of LMS use.

4.5 Technological factors

Exploratory factor analysis was undertaken for the technological factors affecting eLearning which included perceived usefulness (PU) (4 items), output quality (OQU) (4 items), job relevance (REL) (3 items), perceived ease of use (PEOU) (5 items) and ICT infrastructure (ICT) (9 items) using the principal component analysis extraction method.

Table 4.37 Total Variance Explained for Technological Factors Affecting eLearning

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.776	29.909	29.909	7.776	29.909	29.909	5.804	22.322	22.322
2	5.867	22.567	52.476	5.867	22.567	52.476	4.856	18.678	40.999
3	2.546	9.792	62.268	2.546	9.792	62.268	3.743	14.395	55.394
4	1.635	6.289	68.557	1.635	6.289	68.557	2.333	8.973	64.367
5	1.390	5.348	73.905	1.390	5.348	73.905	2.180	8.385	72.752
6	1.015	3.904	77.809	1.015	3.904	77.809	1.315	5.057	77.809
7	.816	3.140	80.949						
8	.641	2.466	83.415						
9	.571	2.197	85.612						
10	.497	1.912	87.524						
11	.451	1.736	89.260						
12	.414	1.591	90.851						
13	.331	1.275	92.126						
14	.283	1.087	93.213						
15	.271	1.041	94.254						
16	.244	.938	95.192						
17	.230	.886	96.078						
18	.187	.721	96.799						
19	.170	.655	97.454						
20	.166	.637	98.090						
21	.149	.572	98.662						
22	.102	.394	99.055						
23	.094	.363	99.419						
24	.058	.224	99.643						
25	.053	.202	99.845						
26	.040	.155	100.000						

Extraction Method: Principal Component Analysis.

This is used to reduce a large number of variables into a smaller set of variables (factors), establish underlying dimensions between measured variables and latent constructs, thereby allowing the formation and refinement of theory and provides construct validity evidence of self-reporting scales (Williams, Brown, and Onsman, 2010).

Components with eigenvalues below 0.5 were excluded and the factor analysis run again. Six components were found which explained 77.809% of the variance. The total variance explained for technological factors affecting eLearning are presented in 4.37.

The rotation converged in 7 iterations using Varimax rotation with Kaiser Normalisation. Component 1 contained ICT1, ICT3, ICT4, ICT5, ICT6, ICT7, ICT8 and ICT9, component 2 contained PU1, PU2, PU3 and PU4, component 3 contained PEOU1, PEOU2, PEOU3, PEOU4 and PEOU5, component 4 contained OQU1, OQU2, OQU3 and OQU4, component 5 contained BI1, BI2, and BI3 while component 6 contained REL1 and REL2. The rotated component matrix is presented in Table 4.38.

Table 4.38 Rotated Component Matrix of Technological Factors Affecting eLearning

	Component					
	1	2	3	4	5	6
ICT1	.689	.032	-.089	.118	.097	-.378
ICT3	.855	.080	-.087	-.017	-.140	-.153
ICT4	.818	.096	-.059	.044	.157	-.165
ICT5	.861	.040	.087	-.012	.053	.211
ICT6	.915	.029	-.039	-.007	-.013	.129
ICT7	.841	-.076	-.057	-.005	.172	.047
ICT8	.894	.013	-.003	.045	.057	.049
ICT9	.826	-.016	-.005	.018	.147	.150
PU1	-.009	.868	.343	.182	.135	.013
PU2	-.024	.884	.241	.146	.180	-.036
PU3	-.017	.889	.240	.083	.189	.024
PU4	.081	.835	.239	.198	.162	.129
PEOV1	-.025	.020	.706	.392	-.057	.346
PEOV2	-.009	.117	.818	.001	.037	.004
PEOV3	-.075	.312	.830	.151	.047	-.096
PEOV4	-.038	.156	.882	.024	.045	.013
PEOV5	-.079	.300	.790	.154	-.001	-.033
OQU1	-.130	-.452	-.072	.610	.116	-.191
OQU2	.145	.411	.208	.701	.030	-.104
OQU3	-.003	.303	.252	.746	.079	.223
OQU4	.126	.387	.184	.733	.029	.153
BI1	.202	.234	.115	.012	.814	.106
BI2	.161	.147	-.027	.054	.886	-.109
BI3	.015	.358	.007	.123	.600	.289
REL1	.114	.634	.031	.146	.255	.530
REL2	.076	.601	-.027	.128	.228	.613

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

The reliability statistics determined using Cronbach's Alpha are given in Table 4.39. ICT infrastructure (ICT) had a reliability of 0.942, perceived usefulness (PU), 0.965, perceived ease of use (PEOU), 0.894, output quality (OQU), 0.681, behavioral intention

(BI), 0.784, and job relevance (REL), 0.936. This shows that all factors had high reliability. Cronbach's coefficient alpha estimates the reliability by determining the internal consistency of the test or the average correlation of items within the test (SAS, 2014).

Table 4.39 Reliability Statistics for Technological Factors Affecting eLearning

Variable name	Cronbach's Alpha	N of Items
ICT	.942	8
PU	.965	4
PEOU	.894	5
OQU	.681	4
BI	.784	3
RE	.936	2

The multiple items that were selected after the factor analysis had their means computed to determine performance of each variable. The descriptive statistics are presented in Table 4.40. The perceived ease of use (14.7) was low, while ICT infrastructure (17.9), perceived usefulness (17.7), job relevance (18.7) and behavioral intention (20.2) were high. Output quality (15.1) was medium.

Table 4.40 Descriptive Statistics of Technological Factors Affecting eLearning Adoption

	N	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ICT_m	134	5.00	25.00	17.8778	.40604	4.70026	22.092	-.446	.209	-.022	.416
PU_m	136	5.00	25.00	17.7298	.40574	4.73170	22.389	-.387	.208	-.023	.413
PEO_m	129	5.00	25.00	14.7442	.35206	3.99859	15.989	-.164	.213	.859	.423
OQU_m	133	5.00	25.00	15.0564	.29196	3.36701	11.337	-.282	.210	2.581	.417
BI_m	136	10.00	25.00	20.1838	.31004	3.61565	13.073	-.608	.208	.333	.413
REL_m	135	5.00	25.00	18.7222	.43660	5.07285	25.734	-.808	.209	.474	.414
AUsage	137	1	5	1.69	.091	1.068	1.141	1.743	.207	2.298	.411
AIndex	146	0	59	14.09	1.083	13.083	171.171	1.029	.201	.661	.399
AFrequency	136	1	6	1.80	.106	1.234	1.523	1.538	.208	1.376	.413
Adoption	146	.000	6.949E1	1.473E1	1.218E0	1.472E1	216.728	1.275	.201	1.451	.399
Valid N (listwise)	126										

A Pearson correlation analysis of the individual factors affecting eLearning adoption was undertaken using the two tailed test. Correlation analysis answers the question if there exists association or correlation between the two (or more) variables and to what degree. The correlation matrix is presented in Table 4.41. ICT infrastructure was found to be

significantly correlated with behavioral intention (r=0.233, p<0.01). Perceived usefulness was found to be significantly correlated with perceived ease of use (r=0.486, p<0.01), output quality (r=0.398, p<0.01), behavioral intention (r=0.457, p<0.01), job relevance (r=0.645, p<0.01), LMS usage duration (r=0.197, p<0.05), frequency of LMS use (r=0.297, p<0.01) and LMS adoption (r=0.266, p<0.01). Perceived ease of use was found to be significantly correlated with output quality (r=0.373, p<0.01), job relevance (r=0.222, p<0.05), LMS usage duration (r=0.213, p<0.05), frequency of LMS use (r=0.342, p<0.01) and LMS adoption (r=0.323, p<0.01). Output quality was found to be significantly correlated with behavioral intention (r=0.236, p<0.01), job relevance (r=0.298, p<0.01), frequency of LMS use (r=0.182, p<0.05) and LMS adoption (r=0.226, p<0.01). Behavioral intention was found to be significantly correlated with job relevance (r=0.445, p<0.01). Job relevance was found to be significantly correlated with frequency of LMS use (r=0.265, p<0.01) and LMS adoption (r=0.181, p<0.05).

Table 4.41 Correlation Analysis of Technological Factors Affecting eLearning

	ICT_m	PU_m	PEO_m	OQU_m	BI_m	REL_m	AUsage	AIndex	AFrequency	Adoption
ICT_m										
PU_m	0.046									
PEO_m	-0.075	.486**								
OQU_m	0.057	.398**	.373**							
BI_m	.223**	.457**	0.101	.236**						
REL_m	0.147	.645**	.222*	.298**	.445**					
AUsage	-0.144	.197*	.213*	0.132	0.086	0.138				
AIndex	-0.12	.267**	.311**	.218*	0.037	0.16	.742**			
AFrequency	-0.071	.297**	.342**	.182*	0.046	.265**	.762**	.741**		
Adoption	-0.086	.266**	.323**	.226**	0.058	.181*	.823**	.958**	.787**	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

A linear regression was undertaken using the dependent variables for adoption using the method enter. Regression analysis answers the question if there is any cause and effect relationship between the dependent variable and two or more independent variables and to what degree and in which direction. The regression analysis table showing variables entered / removed using Behavioral Intention as the dependent variable is presented on Table 4.33.

Table 4.42 Regression Analysis on Technological Factors Variables Entered / Removed

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	Adoption, ICT_m, REL_m, OQU_m, PEO_m, PU_m, AFrequency , AUsage, AIndex[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: BI_m

The model summary is presented in Table 4.43. The model summary was highly significant (p=0.000) showing that the model was functional. The model had an R square value of 0.264 indicating that the percentage of the dependent variable variance that was explained by the independent variables was 26.4%.

Table 4.43 Model Summary for Regression Analysis for Technological Factors Affecting eLearning

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.563[a]	.317	.264	3.02638	.317	5.971	9	116	.000	2.208

a. Predictors: (Constant), Adoption, ICT_m, REL_m, OQU_m, PEO_m, PU_m, AFrequency , AUsage, AIndex

b. Dependent Variable: BI_m

The ANOVA table for the technological factors affecting eLearning is presented in Table 4.44. The coefficient of determination was significant (p=0.000) showing the model was functional and that at least one of the independent variables was a significant predictor of the dependent.

Table 4.44 ANOVA Table for Technological Factors Affecting eLearning

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	492.170	9	54.686	5.971	.000[a]
	Residual	1062.438	116	9.159		
	Total	1554.608	125			

a. Predictors: (Constant), Adoption, ICT_m, REL_m, OQU_m, PEO_m, PU_m, AFrequency , AUsage, AIndex

b. Dependent Variable: BI_m

The coefficients for the technological factors affecting eLearning adoption are presented in Table 4.45. For each of the predictor variables there were two hypothesis:

H_0: This independent variable is not a significant predictor of the dependent
H_A: This independent variable is a significant predictor of the dependent

ICT infrastructure (p=0.049), perceived usefulness (p=0.007) and job relevance (p=0.009) were the only predictor variables that were significant. The null hypothesis was therefore rejected and the alternative accepted that they were significant predictors of behavioral intention.

The regression equation from this output was:
Behavioral Intention = 10.295 + 0.12(ICT) + 0.239 (PU) – 0.050 (PEOU) + 0.059 (OQU) + 0.192 (REL) + 0.667 (AUsage) – 0.043 (AIndex) – 0.663 (Afrequency) + 0.034 (Adoption)

Table 4.45 Coefficients for Technological Factors Affecting eLearning Adoption

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	10.295	1.930		5.333	.000	6.472	14.118		
	ICT_m	.120	.060	.159	1.990	.049	.001	.239	.919	1.088
	PU_m	.239	.086	.317	2.767	.007	.068	.411	.448	2.231
	PEO_m	-.050	.084	-.057	-.597	.552	-.215	.116	.645	1.549
	OQU_m	.059	.091	.056	.647	.519	-.121	.239	.778	1.286
	REL_m	.192	.072	.274	2.646	.009	.048	.335	.548	1.824
	AUsage	.667	.490	.207	1.360	.176	-.304	1.638	.254	3.942
	AIndex	-.043	.074	-.163	-.581	.562	-.191	.104	.075	13.393
	AFrequency	-.663	.387	-.238	-1.711	.090	-1.430	.104	.305	3.277
	Adoption	.034	.080	.144	.426	.671	-.124	.192	.051	19.486

a. Dependent Variable: BI_m

Among technological factors, infrastructure was found to be significantly correlated with behavioral intention. Perceived usefulness was found to be significantly correlated with perceived ease of use, output quality, behavioral intention, job relevance, LMS usage duration, frequency of LMS use and LMS adoption. Perceived ease of use was found to be significantly correlated with output quality, job relevance, LMS usage duration,

frequency of LMS use and LMS adoption. Output quality was found to be significantly correlated with behavioral intention, job relevance, frequency of LMS use and LMS adoption. Behavioral intention was found to be significantly correlated with job relevance. Job relevance was found to be significantly correlated with frequency of LMS use and LMS adoption. On linear regression, ICT infrastructure, perceived usefulness and job relevance were the only predictor variables that were significant showing they were significant predictors of behavioral intention.

4.5.1 Chapter Summary

This chapter presented the findings from the study based on the three research questions;

(i) to determine to what extent individual factors contribute to poor adoption of eLearning by JKUAT faculty, (ii) to determine to what extent organizational factors contribute to poor adoption of eLearning by JKUAT faculty and (iii) to determine to what extent technological or system factors contribute to poor adoption of eLearning by JKUAT faculty.

Factor analysis was undertaken for the individual, organizational and technological factors affecting eLearning. Reliability of the measurement scales was determined using Cronbach alpha coefficients. Exploratory factor analysis using principal components analysis with varimax rotation and an extraction criterion of eigenvalue greater than one was conducted. Data analysis was done using correlation analyses, analysis of variance (ANOVA), and regression analysis.

Among individual factors, computer anxiety was found to be significantly negatively correlated with computer literacy, LMS usage, frequency of LMS use and LMS adoption. Behavioral intention was significantly correlated to self efficacy, computer playfulness and computer literacy and significantly negatively correlated to education level. Self efficacy was significantly correlated to gender and computer literacy. Computer playfulness was significantly negatively correlated with age, educational level, designation, and significantly positively correlated to computer literacy. Gender was significantly correlated to faculty and significantly negatively correlated to age, and designation. Age was significantly correlated to period of service, education level, designation and significantly negatively correlated to computer literacy and LMS

adoption. The period of service was significantly correlated to educational level and designation. Education level was significantly correlated to designation. Computer literacy was significantly correlated to the period of LMS usage and LMS frequency of use and LMS adoption. From the regression analysis, none of the individual factors were able to explain eLearning adoption.

Among the organizational factors, institutional leadership was found to be significantly correlated to school and institution wide eLearning strategy, management support, and social influence. The school and institution wide eLearning strategy was found to be significantly correlated to management support, social influence and the frequency of LMS use. Management support was found to be significantly correlated to social influence and the frequency of LMS use. Social influence was found to be significantly correlated to the duration of LMS usage, LMS adoption and the frequency of LMS use. In the linear regression, management support ($p=0.05$) was the only predictor variable that was significant and therefore explained the variance of the frequency of LMS use.

Among technological factors, infrastructure was found to be significantly correlated with behavioral intention. Perceived usefulness was found to be significantly correlated with perceived ease of use, output quality, behavioral intention, job relevance, LMS usage duration, frequency of LMS use and LMS adoption. Perceived ease of use was found to be significantly correlated with output quality, job relevance, LMS usage duration, frequency of LMS use and LMS adoption. Output quality was found to be significantly correlated with behavioral intention, job relevance, frequency of LMS use and LMS adoption. Behavioral intention was found to be significantly correlated with job relevance. Job relevance was found to be significantly correlated with frequency of LMS use and LMS adoption. On linear regression, ICT infrastructure, perceived usefulness and job relevance were the only predictor variables that were significant showing they were significant predictors of behavioral intention.

CHAPTER FIVE

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarises the results and findings of the study on the individual factors, organizational factors and technological or system factors affecting the adoption of eLearning by JKUAT faculty, engages in discussions of the results and findings, makes conclusions from the study and makes recommendations for improvements and further study.

5.2 Summary

The purpose of this study was to analyze the reasons for the limited success in the adoption of eLearning by faculty in JKUAT and to propose appropriate solutions to help improve future uptake. The study was undertaken to (i) determine to what extent individual factors contribute to poor adoption of eLearning by JKUAT faculty, (ii) determine to what extent organizational factors contribute to poor adoption of eLearning by JKUAT faculty and (iii) determine to what extent technological or system factors contribute to poor adoption of eLearning by JKUAT faculty.

The research design was a both descriptive and correlational. The population involved in the study was the number of teaching staff at the University's main campus. The sampling frame for teaching staff (faculty) was from personnel records at the personnel registry at the university. The record of registered users on the LMS platform also served as a secondary sampling frame. The research utilized a stratified sampling technique and the sample was stratified according to faculties as they were not homogeneous. The main data collection instrument was the questionnaire which was both online and hard copy. Data analysis was done using both the descriptive (frequency counts, percentages, and means) and inferential statistics (correlation analyses, regression analyses and principal component analysis). The study was undertaken in May/June 2013. The size of the population was 666 faculty (teaching staff) and the sample selected was 152.

A total of 146 respondents participated in the survey which represented 96.1% of the targeted respondents. The total number of respondents that were registered on the LMS were 58 (39.7%). The highest percentage of registered faculty was found in ICSIT

(58.3%) followed closely by Agriculture (50.0%). The lowest registration was found in SABS (16.7%) and COHES (33.3%). The level of attendance of LMS training overall was 43.2 % showing that majority of the faculty had not attended a training on LMS. On the most limiting factor for using the LMS, access to internet (49.3%), inadequate training (48.0%) and insufficient incentives (50.0%) were rated high (level 4 and 5) by almost half of the respondents. Majority of the respondents accessed internet using their own broadband modems, with 38.4 % using it always and 28.8 % using it mostly. Majority of the respondents rated their computer literacy as high and very high. Use of LMS applications and eLearning methods was however very low.

Among individual factors, computer anxiety was found to be significantly negatively correlated with computer literacy, LMS usage, frequency of LMS use and LMS adoption. Behavioral intention was significantly correlated to self efficacy, computer playfulness and computer literacy and significantly negatively correlated to education level. Self efficacy was significantly correlated to gender and computer literacy. Computer playfulness was significantly negatively correlated with age, educational level, designation, and significantly positively correlated to computer literacy. Gender was significantly correlated to faculty and significantly negatively correlated to age, and designation. Age was significantly correlated to period of service, education level, designation and significantly negatively correlated to computer literacy and LMS adoption. The period of service was significantly correlated to educational level and designation. Education level was significantly correlated to designation. Computer literacy was significantly correlated to the period of LMS usage and frequency of LMS use and LMS adoption. From the regression analysis, none of the individual factors were significant predictors of LMS adoption.

Among the organizational factors, institutional leadership was found to be significantly correlated to school and institution wide eLearning strategy, management support, and social influence. The school and institution wide eLearning strategy was found to be significantly correlated to management support, social influence and the frequency of LMS use. Management support was found to be significantly correlated to social influence and the frequency of LMS use. Social influence was found to be significantly correlated to the duration of LMS usage, LMS adoption and the frequency of LMS use. In

the linear regression, management support (p=0.05) was the only predictor variable that was significant and therefore explained the variance of the frequency of LMS use.

Among technological factors, infrastructure was found to be significantly correlated with behavioral intention. Perceived usefulness was found to be significantly correlated with perceived ease of use, output quality, behavioral intention, job relevance, LMS usage duration, frequency of LMS use and LMS adoption. Perceived ease of use was found to be significantly correlated with output quality, job relevance, LMS usage duration, frequency of LMS use and LMS adoption. Output quality was found to be significantly correlated with behavioral intention, job relevance, frequency of LMS use and LMS adoption. Behavioral intention was found to be significantly correlated with job relevance. Job relevance was found to be significantly correlated with frequency of LMS use and LMS adoption. On Linear Regression, ICT infrastructure, perceived usefulness and job relevance were the only predictor variables that were significant showing they were significant predictors of behavioral intention.

5.3 Discussion

5.3.1 Individual Factors

Gender was significantly correlated to faculty and significantly negatively correlated to age, and designation. However, gender was not significantly correlated to LMS usage duration, frequency of LMS usage or LMS adoption. Similarly, Mukiri, (2011) reported that, the two genders agreed on most of the issues concerning eLearning in JKUAT. On the other hand, KENET, (2007) reported a higher usage of internet and web portals by males than females in an e-readiness survey of 17 Kenyan Universities and 8 Colleges. They observed that 35% of male respondents used the Internet daily compared to 30% for the female respondents. Similarly, about 40% of the female respondents did not visit any Web portals compared to 33% of the male respondents. Mitchell, Clayton, Gower, Barr, and Bright, (2005) also reported that there were no gender differences in the levels of adoption of eLearning. On the other hand, Venkatesh, Morris, Davis, and Davis, (2003) developed the UTAUT model and validated the model empirically using post-training data pooled across studies. They reported that performance expectancy was moderated by gender and age. Their findings suggested that as younger cohort employees in the

workforce mature, gender differences in how each perceives information technology may disappear.

The eLearning adoption was not significantly correlated to the Faculty / School / Institute ($p = 0.082$). On the other hand, Mukiri (2011) observed that there were differences between faculties in that those from SHRD and ICSIT were more flexible and believed that eLearning was compatible with their teaching methodology. Those from Engineering, Architecture, ITROMID (now COHES) and Sciences especially felt that it would be difficult to use eLearning for the practical laboratory sessions and were of the view that face to face contact was preferable. The faculty in ICSIT by the nature of their area of specialization are expected to have higher computer literacy level and were able to utilize it in their teaching. KENET, (2007) observed that students in the humanities and languages were more intense of users of Internet than students in engineering, science and medical sciences.

Age was significantly correlated to the period of service, education level, designation and significantly negatively correlated to computer literacy and LMS adoption. Therefore as age increased there was lower computer literacy and LMS adoption. Mukiri, (2011) similarly reported that faculty over 50years of age believed that the face to face mode of teaching was best. Similarly, Nanayakkara, (2007) reported that staff over 50 years old had a lower knowledge than staff less than 50 years old. However, Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that age was not related to the level of adoption of eLearning.

Education level was significantly correlated to designation. The education level was not significantly correlated to eLearning adoption. On the other hand, Nanayakkara, (2007) reported that eLearning knowledge was greater among the experienced staff (over 10 years) and staff with masters and doctorate degrees than those who had lesser experience and qualifications. The period of service was significantly correlated to educational level and designation. However, the period of service was not significantly correlated to eLearning adoption. On the other hand, Nanayakkara, (2007) reported that eLearning knowledge was greater among the experienced staff (over 10 years) and staff with masters and doctorate degrees than those who had lesser experience and qualifications.

JKUAT faculty rated their computer literacy as high. Computer literacy was significantly correlated to behavioral intention, self efficacy, computer playfulness, period of LMS usage and frequency of LMS use and LMS adoption and significantly negatively correlated to computer anxiety and age. Mitchell, Clayton, Gower, Barr, and Bright, (2005) similarly reported that technological competence was more facilitating than inhibiting, with a moderately positive relationship between tutors' levels of eLearning adoption and their ratings of technological competence. Similarly, Nanayakkara and Whiddelt, (2005) observed that there was a strong relationship between the IT literacy rate of staff and system adoption.

The individual perception consisted multiple items on computer self-efficacy, computer playfulness and computer anxiety. Overall computer anxiety (9.8) was very low, while behavioral intention (20.2), self efficacy (17.9) and computer playfulness (16.7) were high. This showed that on average, the faculty had a low anxiety in using the system and had a positive attitude to eLearning (Mean = 15). Computer anxiety was found to be significantly negatively correlated with computer literacy, LMS usage, frequency of LMS use and LMS adoption. Behavioral intention was significantly correlated to computer playfulness and computer literacy and significantly negatively correlated to education level. Self efficacy was significantly correlated to gender and computer literacy. Computer playfulness was significantly negatively correlated with age, educational level, designation, and significantly positively correlated to computer literacy. From the regression analysis, none of the individual factors were able to explain eLearning adoption.

Davis, Bagozzi, and Warshaw, (1989) has reported that attitudes have been shown to correlate highly with behavioral intentions in voluntary settings. Similarly, Venkatesh, (2000) found that control (internal and external conceptualized as computer self-efficacy and facilitating conditions), intrinsic motivation (computer playfulness) and emotion (computer anxiety) served as anchors that users employ in forming perceived ease of use about a new system. He suggested that practitioners should attempt to adapt interventions which enhance self efficacy and reduce anxiety in end-user training contexts. Similarly, research should focus on designing managerial interventions that will provide facilitating conditions that favor the creation of positive perceptions about ease of use of a specific

system via perceptions of external control. The next section looks at the organizational factors affecting eLearning adoption.

5.3.2 Organizational Factors

Among the organizational factors, institutional leadership was found to be significantly correlated to school and institution wide eLearning strategy, management support, and social influence. The school and institution wide eLearning strategy was found to be significantly correlated to management support, social influence and the frequency of LMS use. Management support was found to be significantly correlated to social influence and the frequency of LMS use. Social influence was found to be significantly correlated duration of LMS usage, LMS adoption and the frequency of LMS use. In the linear regression, management support ($p=0.05$) was the only predictor variable that was significant and was therefore a significant predictor of the frequency of LMS use.

The management support consisted multiple items on facilitating conditions which included questions on availability of necessary resources, compatibility of systems, support, training, availability of time, incentives for online teaching and helpdesk support. The overall management support was 12.7, showing that on average, the faculty had a negative perception about management support (Mean = 15).

The study also showed that the most limiting factors in using the LMS included inadequate training and insufficient incentives which are management support factors. Lack of time was not ranked highly. Holland and Light (1999) as cited by Venkatesh and Bala, (2008) suggested management support as one of the most critical success factors for complex systems. Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that management support for eLearning was rated by tutors as having neither a facilitating nor an inhibiting effect on their uptake of eLearning but with a tendency towards the former. They reported that participants in all 3 institutions were aware of the need to adequately resource the introduction of eLearning. This involves the funding for professional development opportunities, providing time for tutors to create digital material and providing a reliable technical infrastructure. However, without management support and encouragement, eLearning will develop only slowly, if at all (Mitchell, Clayton, Gower, Barr, and Bright, 2005). Venkatesh and Bala, (2008) suggested that management support can influence users' perceptions of subjective norm and image—two important

determinants of perceived usefulness and that management support, particularly in the form of direct involvement in the system development and implementation processes, will help employees form judgments regarding job relevance, output quality, and result demonstrability of a system. Nanayakkara, (2007) observed that the five essential factors for eLearning adoption fall within the system and organisational factor groupings and included release time, training and support which have similar representation in the UTAUT model.

At the organisational level, the faculty support for staff release time (80% of respondents), incentives and rewards (60% of respondents), IT training and help desk services (90% of respondents) were key contributory factors for system adoption. Grunwald, (2002) identified factors such as inability to receive credit towards tenure and promotion as barriers to adoption of instructional technology. Mukiri, (2011) also reported that factors for low eLearning adoption among lecturers at JKUAT ranged from poor internet connection, power failures, availability of networked computers, lack of time to develop content, lack of compensation, lack of proper training, lack of personnel in the eLearning department to train lecturers, lack of management support among others. She also reported that the majority of lecturers (76%) needed assistance/training to be able to use eLearning. This shows that most of the lecturers cannot start on their own and would need thorough training on the subject. Similarly, 91% indicated that they would require online support while 71% indicated that they were willing to adopt eLearning as long as there was support to guide the lecturers to use it for their teaching.

Similarly, Kang'ethe, Simiyu, Kihoro and Gichuru (2008) reported institutional challenges in eLearning usage at JKUAT. These included difficulty to train members of staff to use eLearning, inadequate time for material preparation, lack of good will and support from university management in improving infrastructure and reward to performers, lack of incentives for compliance, bureaucracy and lack of payment of staff for module development. This study therefore concurred with earlier studies that management support factors are critical to successful eLearning adoption.

The social influence construct consisted of multiple items on how people influenced the behavior of the respondent toward eLearning. The overall perception of social influence was 14.3, showing that on average, there was low social influence on system adoption

(Mean = 15). The social influence did not significantly influence eLearning adoption. However, social influence was significantly correlated to institutional leadership, school and institutional wide eLearning strategy, management support, the duration of LMS usage, LMS adoption and the frequency of LMS use.

Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that availability of mentors was neither facilitation nor inhibiting, although mentors could have played a significant role in facilitating Embracers adoption of eLearning. They reported that in all three case studies, availability of peer support, guidance and advice, both from internal and external colleagues was considered essential. Venkatesh, Morris, Davis, and Davis, (2003) similarly reported that none of the social influence constructs were significant in voluntary settings but each became significant when use was mandated. In JKUAT use of eLearning is voluntary and there is no penalty for non-use. Venkatesh *et al* (2003) also suggested that social influence only appears to be important in the early stages of individual experience, and erodes over time and becomes non significant with sustained use. Similarly, Venkatesh and Davis (2000) reported that subjective norm had a significant effect prior to system development but the effect became nonsignificant after system implementation. This is because after implementation, when more about a system's strengths and weaknesses are known through direct experience, the normative influence subsides. In JKUAT the eLearning system has been around for a long time since it was first introduced in 2006. Therefore the effect of social influence may have declined.

The institutional leadership construct consisted of multiple items on how the respondent perceived institutional leadership on eLearning. The overall perception on institutional leadership was 13.5, showing that on average, the faculty had a negative perception about institutional leadership (Mean = 15). The institutional leadership did not significantly influence eLearning adoption. However, institutional leadership was found to be significantly correlated to school and institution wide eLearning strategy, management support, and social influence. Nanayakkara, (2007) reported that institutional leadership needs to lead eLearning development and should facilitate the infrastructure and training support for staff adoption. The perception in JKUAT is that there is inadequate institutional leadership in eLearning.

The school and institution wide eLearning strategy consisted multiple items on the respondent's perception on school and institution wide eLearning strategy on eLearning. The overall perception was 12.8, showing that on average, the faculty had a negative perception about school and institution wide eLearning strategy (Mean = 15). The school and institution wide eLearning strategy did not significantly influence eLearning adoption. The school and institution wide eLearning strategy was found to be significantly correlated to management support, social influence and the frequency of LMS use. This concurs with observations by KENET (2007) that most of the institutions in Kenya were not using ICT for learning and their ICT strategy was often not aligned to the educational goals of the institutions.

Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that one third of the tutors of Institutes of Technology in New Zealand rated institutional policy on eLearning as a major or significant barrier to adoption, while another third as a moderate barrier and in the final third it was only a minor barrier or no barrier at all. They reported that all 3 case study institutions had long-term policies in place, although some were more advanced than others. All were committed to eLearning and establishing comprehensive and specific policies was an important goal in each of them. Nanayakkara (2007) pointed out that to achieve real progress, eLearning development should tie back into the institution mission and that institutions must have strategies that are enterprise-wide in scope. He emphasized that the need for institutions to invest in a strategic plan for eLearning development across the Institute is critical to the successful adoption of eLearning and that any strategic plan developed needs to incorporate an investment plan for redevelopment of the organization administration and support systems to meet distance learning needs. This study found that the school institution wide strategy was inadequate and concurs with the previous studies on its importance for eLearning adoption. The next section looks at technological factors affecting eLearning.

5.3.3 Technological factors

Among technological factors, ICT infrastructure was found to be significantly correlated with behavioral intention. Perceived usefulness was found to be significantly correlated with perceived ease of use, output quality, behavioral intention, job relevance, LMS usage duration, frequency of LMS use and LMS adoption. Perceived ease of use was found to be significantly correlated with output quality, job relevance, LMS usage duration,

frequency of LMS use and LMS adoption. Output quality was found to be significantly correlated with behavioral intention, job relevance, frequency of LMS use and LMS adoption. Behavioral intention was found to be significantly correlated with job relevance. Job relevance was found to be significantly correlated with frequency of LMS use and LMS adoption. On Linear Regression, ICT infrastructure (p=0.049), perceived usefulness (p=0.007) and job relevance (p=0.009) were the only predictor variables that were significant showing they were significant predictors of behavioral intention.

The perceived usefulness construct consisted of multiple items on the respondent's perception on the usefulness of the system to improve job performance, productivity, and effectiveness. The overall perceived usefulness rating was 17.7, showing that on average, the faculty had a positive perception about the usefulness of eLearning on their job (Mean = 15). The perception on perceived usefulness was significantly correlated to perceived ease of use, output quality, behavioral intention, job relevance, period of LMS usage, frequency of LMS use and LMS adoption. Perceived usefulness was also a significant predictor of behavioral intention.

Similarly, Venkatesh and Bala, (2008) found that perceived usefulness was the strongest predictor of behavioral intention at all time periods. They found that perceived ease of use, subjective norm, image and result demonstrability were significant predictors of perceived usefulness at all time periods in a longitudinal field study conducted to test TAM3 in two organizations where the new system was voluntary. TAM 3 was able to explain between 52% and 67% of the variance in perceived usefulness across the different time periods. Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that tutors generally considered that the relevance of eLearning to their subject areas to be rather more facilitating than inhibiting. This study concurs with the previous studies on the importance of perceived usefulness on system adoption. The faculty's perception was positive indicating they found the system useful.

The perceived ease of use construct consisted of multiple items on the respondent's perception on ease of using the system. The overall perceived ease of use rating was 14.7, showing that on average, the faculty had a slightly negative perception about the ease of use of the system (Mean 15). This showed that the faculty were not very comfortable with

the system. Perceived ease of use was found to be significantly correlated with output quality, job relevance, LMS usage duration, frequency of LMS use and LMS adoption.

Omondi, (2009) similarly reported that the Moodle platform used in JKUAT was not user friendly. Venkatesh and Bala, (2008) reported that the role of training is even more important in the context of complex systems (e.g., enterprise systems) that are more central to employees' work life. As these systems are more likely to invoke negative reactions from employees due to their disruptive nature, effective training interventions can mitigate these negative reactions and help employees form favorable perceptions toward these systems. Venkatesh and Bala, (2008) found that the anchors – that is, computer efficacy, perceptions of external control, computer anxiety, and computer playfulness – were significant predictors of ease of use at all points of measurement in a longitudinal field study conducted to test TAM3 in two organizations where the new system was voluntary. None of the determinants of perceived usefulness had a significant effect on perceived ease of use. TAM3 explained between 43% and 52% of the variance in perceived ease of use across different points of measurements and models. Low utilization of the LMS by the JKUAT faculty observed may be due to the low perceived ease of use. The low perceived ease of use may also be related the low attendance of LMS training.

The ICT infrastructure construct consisted of multiple items on the respondent's perception on adequacy of the ICT infrastructure for eLearning. The overall perception on ICT infrastructure was 17.9, showing that on average, the faculty had a slightly positive perception about the ICT infrastructure for eLearning (Mean = 15). The perception on the ICT infrastructure was significantly correlated to behavioral intention. Similarly, ICT infrastructure was significantly correlated to behavioral intention.

Similarly, Nanayakkara and Whiddelt, (2005) reported that external systems characteristics such as capacity and reliability of IT infrastructure were significant factors for user adoption (100% of respondents). Nanayakkara, (2007) has reported that developing online courses requires additional equipment and specialised software, for example, additional servers and a course management system and that lack of reliability, performance and timely support on infrastructure could inhibit both tutor and the student from accepting technology. Galamoyo, (2011) noted that the ultimate delivery of an

eLearning solution relies on the availability of appropriate and adequate technology. Nanayakkara and Whiddelt, (2005) reported that external systems characteristics such as capacity and reliability of IT infrastructure were significant factors for user adoption (100% of respondents). Similarly, the bandwidth and access to updated equipment were reported to cause problems for the implementation of eLearning as distance education at the University of Nairobi and Makerere University, but were not the limiting factor to the implementation of blended learning distributed on the internal network (Rytkønen and Rasmussen, 2010). On the other hand, Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that the reliability of computer technology was neither facilitating nor inhibiting, but with a trend toward the former. Factors reported to limit LMS adoption by JKUAT faculty included poor internet access, however access to computers was rated low. This indicates that access to computers was not a limitation for eLearning adoption.

The job relevance construct consisted of multiple items on the respondent's perception on the relevance of eLearning on their jobs. The overall perception on job relevance was 18.7, showing that on average, the faculty had a positive perception about the relevance of eLearning on their jobs (Mean = 15). The perception on job relevance was significantly correlated to perceived usefulness, perceived ease of use, output quality, behavioral intention, frequency of LMS use and LMS adoption. Job relevance was also a significant predictor of behavioral intention. Similarly, Venkatesh, Morris, Davis and Davis (2003) observed that job-fit was significant at all time periods in MPUC (Model of PC utilization) which was defined as the extent to which an individual believes that using a technology can enhance the performance of his or her job. Venkatesh and Bala (2008) similarly reported that job relevance and output quality had an interactive effect on perceived usefulness such that with increasing output quality, effect of job relevance on perceived usefulness was stronger. Job relevance was significantly correlated to perceived usefulness, perceived ease of use, computer self efficacy and perceptions of external control. Venkatesh and Davis (2000) hypothesized that job relevance would have a positive effect on perceived usefulness. They observed that the main effects of job relevance and output quality were significant before introduction of the interaction term in the regression model. They observed an interactive effect between job relevance and output quality in determining perceived usefulness. This study concurred on the importance of job relevance of eLearning adoption. The positive perception on job relevance showed that the faculty appreciated the relevance of the system for their work.

The output quality construct consisted of multiple items on the respondent's perception on the output quality of using the eLearning system. The overall perception on output quality was 15.1, showing that on average, the faculty had a very slight positive perception about the output quality of the LMS system (Mean = 15). The perception on output quality was significantly correlated to perceived usefulness, perceived ease of use, behavioral intention, job relevance, frequency of LMS use and LMS adoption. Output quality was not a significant predictor of behavioral intention.

Venkatesh and Bala (2008) similarly reported that job relevance and output quality had an interactive effect on perceived usefulness such that with increasing output quality, the effect of job relevance on perceived usefulness was stronger. Output quality was significantly correlated to perceived usefulness, perceived ease of use, subjective norm, image and job relevance. Venkatesh and Davis (2000) observed that the main effects of job relevance and output quality were significant before introduction of the interaction term in the regression model. They observed an interactive effect between job relevance and output quality in determining perceived usefulness. This implied that judgements about a system's usefulness are affected by an individual's cognitive matching of their job goals with the consequences of system use (job relevance), and that output quality takes on greater importance in proportion to a system's job relevance. The JKUAT faculty had a very slight positive perception about the output quality of the LMS system. This may have been due to their low utilization of the system.

5.4 Conclusions

5.4.1 Individual Factors

The study observed that the level of eLearning adoption in JKUAT was still low with less than 40% of the faculty registered on the LMS and an average eLearning adoption was 14.8 out of 100. The factors which were quoted as the most limiting for adoption of eLearning were access to the internet, inadequate training and insufficient incentives. Majority of the respondents used their own broadband modems to access internet. Only 43.2% of the respondents had attended a training on LMS, indicating that the majority were yet to be trained. JKUAT faculty rated their computer literacy as high but their utilization of the LMS and eLearning methods was low. This may be due to inadequate

training on LMS use, poor internet access, lack of management support among other challenges.

Among individual factors, computer literacy was significantly correlated to the period of LMS usage, frequency LMS of use and LMS adoption. Therefore computer literacy appears key to eLearning adoption. Computer anxiety was low showing that the faculty were not fearful of computers, while self efficacy and computer playfulness were high showing that they had individual beliefs on the ability to perform specific tasks using a computer and had a high degree of cognitive spontaneity in microcomputer interactions. The behavioral intention was also high, showing their willingness to use the system. The behavioral intention was also highly correlated with computer literacy. Computer playfulness was significantly negatively correlated to age, education level and designation. Therefore computer playfulness would be expected to be higher among younger faculty, who had lower educational level and consequently lower designation. This may be due to lower computer literacy of the older faculty.

5.4.2 Organisational Factors

Among organisational factors, only management support was found to be a significant predictor of eLearning adoption. Management support was the only factor picked by the regression model as significant predictor of eLearning adoption. Overall, the management support was below average indicating that the faculty had a negative perception on management support accorded to eLearning. Institutional leadership and school and institutional wide eLearning strategy did not significantly influence eLearning adoption, but were both below average, showing that faculty had a negative perception on these variables. This showed that the faculty were not satisfied by the institutional leadership and strategies by the management for eLearning adoption. ELearning has not been integrated in the institution's strategic plan, the eLearning policy is not well understood and there's no clear university funding policy for eLearning. Social influence was significantly correlated to institutional leadership, school and institutional wide eLearning strategy and management support. Since the LMS system has been in use in JKUAT for some time and its use is not mandatory, social influence is less important as a basis of intentions to use a system.

5.4.3 Technological Factors

Among technological factors, ICT infrastructure, perceived usefulness and job relevance were found to be significant predictors of behavioral intention. Perceived usefulness, output quality and job relevance were rated high, showing that the faculty appreciate the usefulness of the eLearning system, its output quality and job relevance and with optimal conditions for use, they would increasingly use the system. Overall, perceived ease of use was below average, indicating that the faculty had a slightly negative perception on the ease of use of the system. This showed that the faculty were not very comfortable with the system and would require training to use the system. ICT Infrastructure was a significant predictor of behavioral intention and was significantly correlated to behavioral intention. The overall perception on ICT infrastructure was above average, showing that the faculty had a slightly positive perception about the ICT infrastructure for eLearning. This study concurred with previous studies on the importance of ICT infrastructure on eLearning adoption by faculty. Among the most limiting factors listed that affect adoption of eLearning was access to internet which was rated as high. Most faculty access internet through own broadband modems possibly due to the poor internet access through the university network. Without fast and reliable internet access, eLearning would be severely curtailed. Access to computers was not listed as a major limitation. This may be because most faculty have their own laptops. Other aspects of ICT infrastructure being reliable and efficient include a dedicated mirrored server for eLearning. Currently JKUAT does not have a dedicated server for eLearning and has been using the KENET server. During the course of the study the KENET server crashed, resulting in loss of crucial data stored in the eLearning system.

5.5 Recommendations

5.5.1 Recommendations for Improvement

5.5.1.1 Integration of eLearning into University strategic plan

The University should integrate eLearning into the university strategic plan in order to improve institutional leadership and school and institutional wide strategies for eLearning. This should be led by the top management that includes the Vice Chancellor and the Deputy Vice Chancellor (Academic Affairs). It should also include the integration of eLearning into the annual work plans, performance contracts, developing a clear policy and also funding eLearning initiatives. Champions should also be identified in the

faculties, trained and equipped in order to spearhead the implementation. They should be appointed as eLearning coordinators with clear job description and terms of reference. Integration of eLearning in the university strategic plan will ensure focus on eLearning implementation.

5.5.1.2 Improving Management Support for eLearning

The top university management i.e the VC, DVCs, Principals, Deans and CoDs may not clearly understand the importance of eLearning and therefore a sensitization workshop for management is required. The section in charge of eLearning, i.e. SODeL, should organize a sensitization workshop for top management. This will enable the top management to improve management support for eLearning through training of staff, provision of incentives, time off to develop modules, help desk support and ICT support. The top management therefore requires allocate more resources to support use of the system, recruit additional staff for help desk support, and system administrators and instructional designers to train faculty to design and deliver online content. Incentives should be provided to encourage faculty to adopt the system. This includes payment for developing and teaching using online content and recognition of such content for promotion. This will ensure improved management support for eLearning and therefore adoption.

5.5.1.3 Increasing Computer Literacy and LMS training

Computer literacy should be improved in order to improve uptake of eLearning. The training for computer literacy and use of LMS for faculty should especially target the faculties / schools / institutes where adoption has been low such as the School of Architecture and Building Sciences (SABS) and the College of Health Sciences (COHES). SODeL should organize a programme for computer literacy and LMS training for all faculty which should be made compulsory. This will improve computer literacy and therefore enhance computer playfulness and computer self efficacy and also reduce computer anxiety. It will also enhance ease of use. This will all lead to increased eLearning adoption.

5.5.1.4 Improvement of ICT Infrastructure

The ICT infrastructure should be improved and especially access to the internet for efficient and reliable connections, improvement of LMS user friendliness and providing a dedicated and mirrored server for eLearning system. The top management should allocate

adequate budget for ICT infrastructure. The ICT department should invest more in fast and reliable internet access to improve access and reduce down time. ICT department also should invest in a dedicated server to host the eLearning platform to avoid loss of content uploaded on the system and this should be mirrored. Alternatively, other cost effective technologies could be explored such as cloud hosting. SODeL may consider installing a more user friendly LMS system. Upgrading of the infrastructure will therefore lead to enhanced utilization of the system and therefore increased eLearning adoption.

5.5.2 Recommendations for Further Studies

There are many factors that influence eLearning adoption. However, this study only focused on individual, organizational and technological factors affecting adoption of eLearning by JKUAT faculty. Hence there is need for further study on factors affecting eLearning adoption by students.

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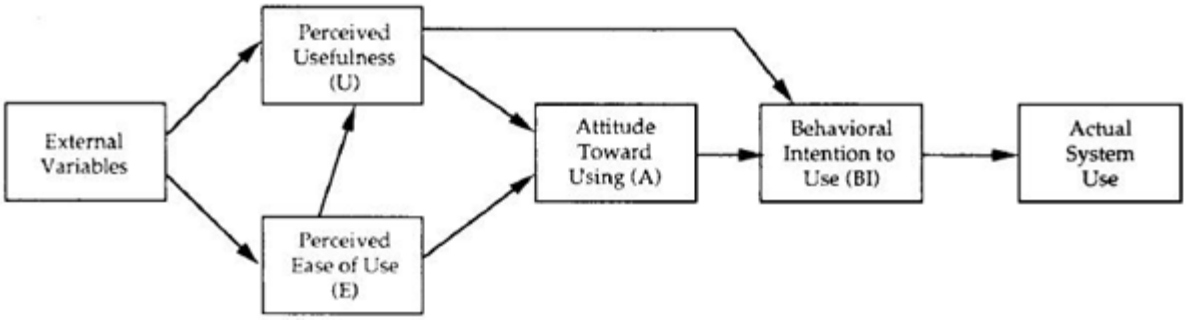
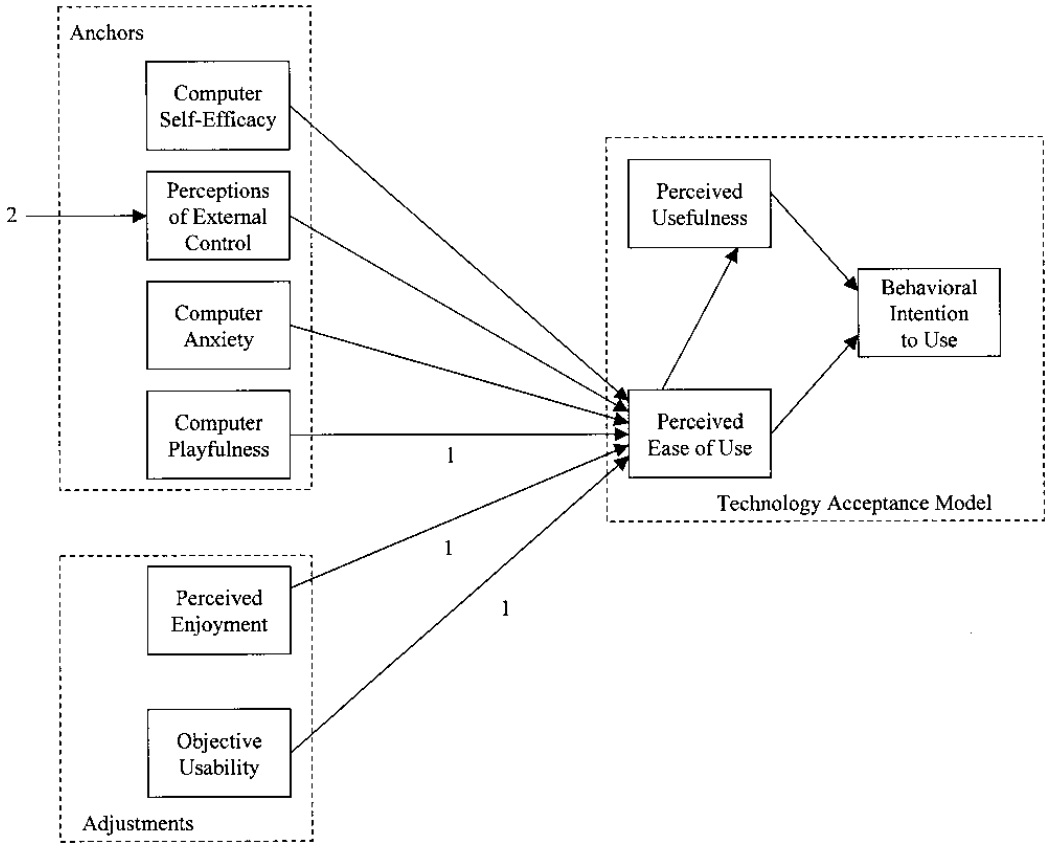
APPENDICES

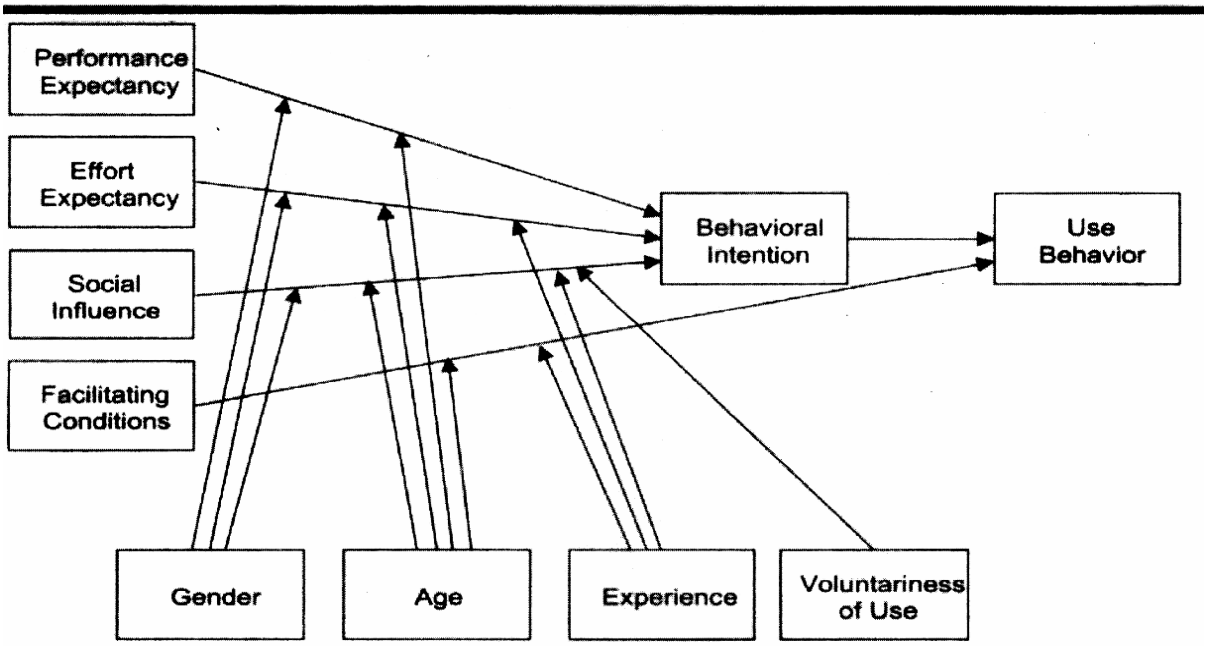
Appendix 1 TAM (Davis, Bagozzi, & Warshaw, 1989)



Appendix 2 Determinants of Perceived Ease of Use (Venkatesh, 2000)

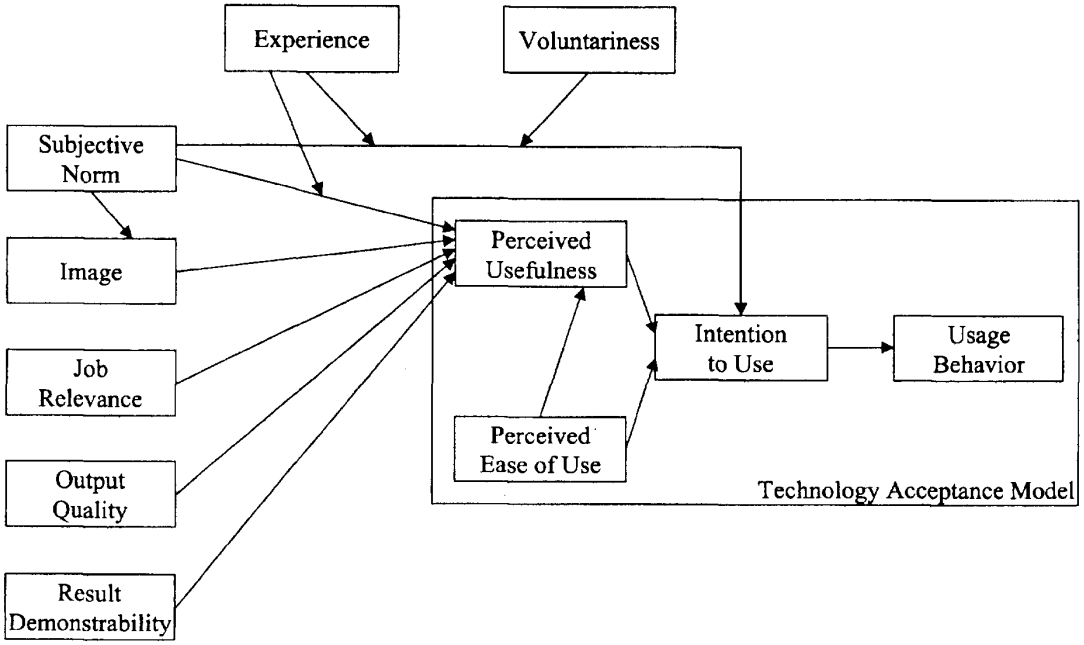


Appendix 3 Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis & Davis, 2003)

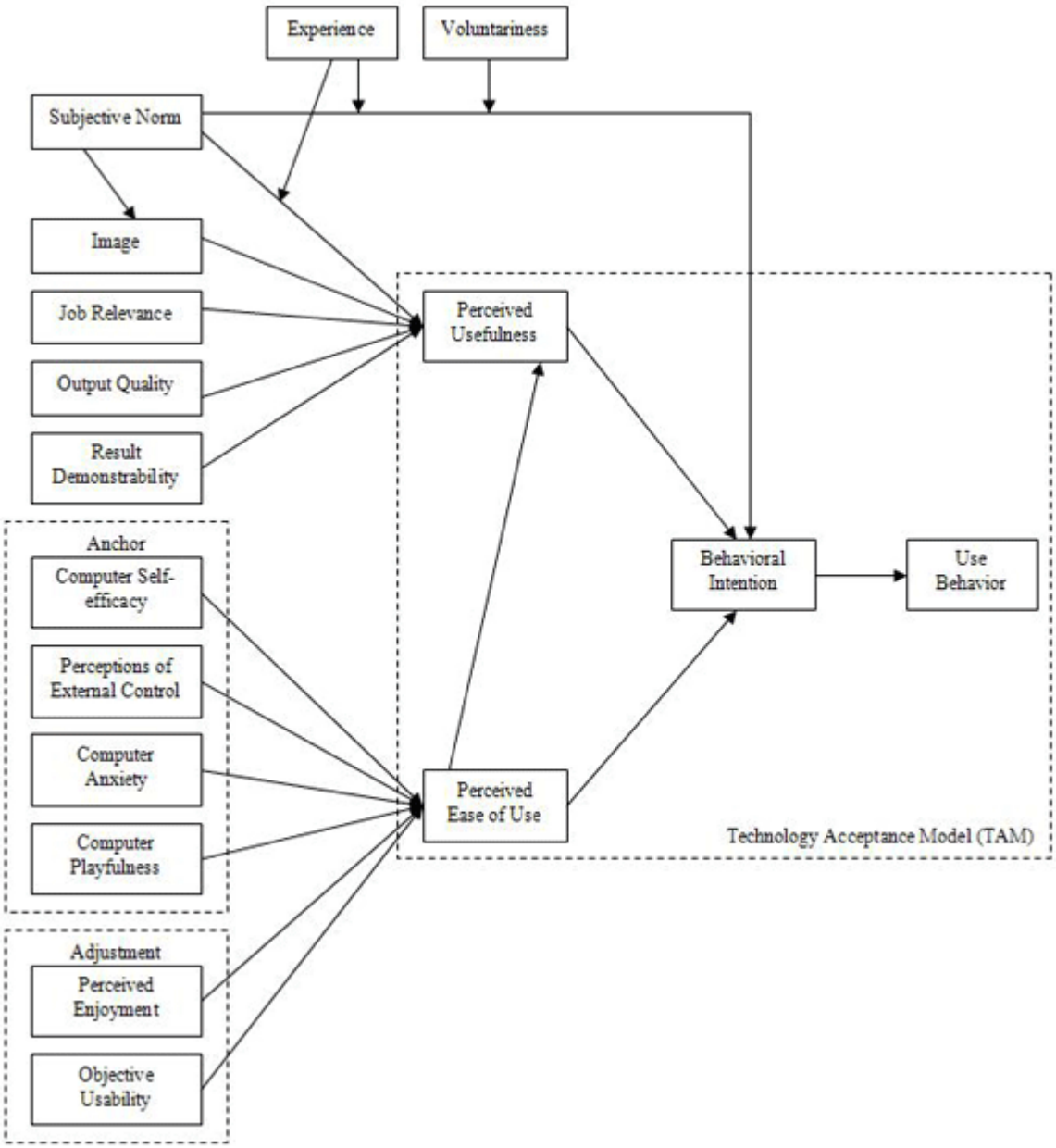


Appendix 4 TAM 2 (Venkatesh & Davis, 2000)

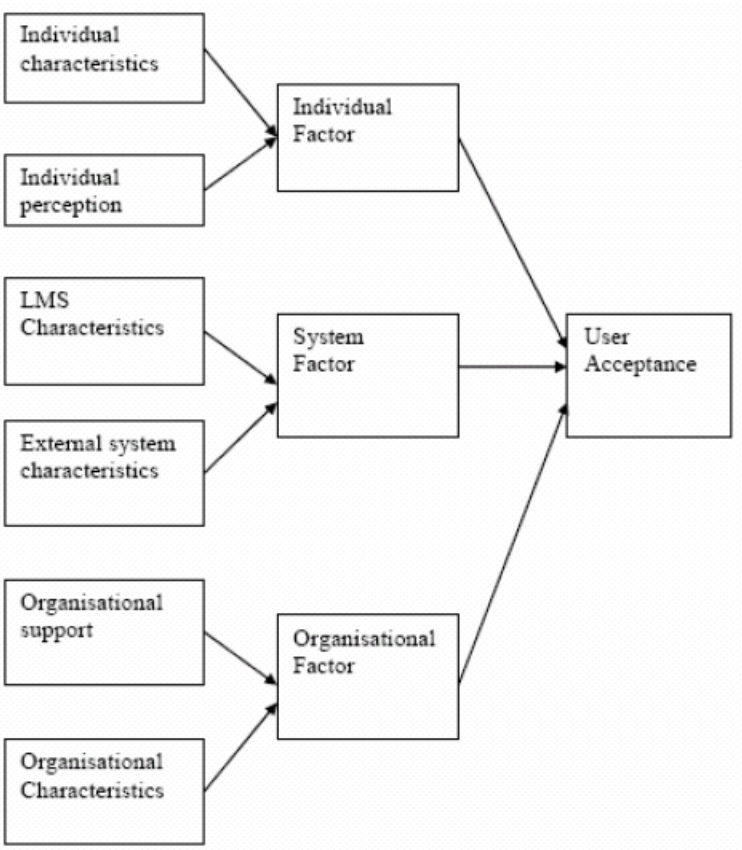
Figure 1 **Proposed TAM2—Extension of the Technology Acceptance Model**



Appendix 5 TAM 3 (Venkatesh & Bala, 2008)



Appendix 6 Theoretical Framework for User Acceptance of Learning Management Systems (Nanayakkara, 2007)



Appendix 7 Invitation to Participate in the eLearning Survey

Dear _____ ,

You have been invited to participate in a survey titled:

" FACTORS AFFECTING EFFECTIVE ADOPTION OF E-LEARNING IN JKUAT "

JKUAT is making strides toward integrating ICTs in teaching/lecturing. This is the current trend world over. However, in spite of this effort and investment, the lecturers do not always use the technology as expected and sometimes eLearning systems used tend to be underutilized.

In collaboration with the School of Open, Distance and eLearning (SODeL), the undersigned is involved in a study on the challenges of eLearning in JKUAT. This is to kindly request you to complete the following questionnaire online.

The deadline for completion is Sunday, 9th June 2013.

Thank you for your cooperation.
Sincerely,

Kamau Ngamau – Researcher,
Dr. John Kihoro – Deputy Director SODEL

To participate, please click on the link below.

Click here to do the survey:
http://elearn.jkuat.ac.ke/limesurvey/index.php?lang=en&sid=56826&token=azx7nex5b5tj5mn

Appendix 8 Survey Instrument

There are 38 questions in this survey

Section I (Demographic details).

Part 1: Demographic details

Q1 Gender (Male = 1, Female =2)

Q2 Interviewee Profile: Age 1) > 20 years, 2) 21 – 25 years, 3) 26 – 30 years, 4) 31 – 40 years, 5) 41 – 45 years, 6) 46 – 50 years 7) 51 – 55 years, 8) 56 years and above

Q3 Period of Service

1. Less 5 years
2. 5 – 9 years
3. 10 – 14 years
4. 15 – 19 years
5. 20 – 24 years
6. More than 24 years

Q4 Faculty/School/Institute

1. Agriculture
2. COETeC
3. COHES
4. ICSIT
5. SABS
6. Science
7. SHRD

Q5 Highest Academic qualification

1. Degree
2. Masters
3. PhD

Q6 Designation

1. Teaching Assistant
2. Assistant Lecturer
3. Lecturer
4. Senior Lecturer
5. Associate Professor
6. Professor

Part II. Computer and LMS literacy

Kindly circle the appropriate response.	1	2	(3)	4	5
	Strongly agree				Strongly disagree
Q7 My computer literacy rate is high	1	2	3	4	5

Q8 Computer Literacy level: Kindly rate your skills in the use of following 1-5: 1 Low, 5 High

a. word processor,	1	2	3	4	5
b. spreadsheets or excel,	1	2	3	4	5
c. databases,	1	2	3	4	5
d. statistics package,	1	2	3	4	5
e. presentation software,	1	2	3	4	5
f. copy and transferring of files,	1	2	3	4	5
g. scanning and creating PDF files.	1	2	3	4	5

Q9 Are you registered as a user on the JKUAT eLearning system? a) Yes = 1, b) No = 2

Q10 Have you ever been invited / been required to attend an LMS training? a) Yes = 1, b) No = 2

Q11 Have you attended a training on LMS? a) Yes = 1, b) No = 2

Q12 If yes, Was the training adequate?

1. Very adequate
2. Mostly adequate
3. Partly adequate

4. Not adequate

Q13 How many units have you uploaded on the LMS?

a) None =1 b) 1 =2, c) 2 = 3 d) 3 =4, e) More than 3 = 5

Q14 What resource(s) have you uploaded on the LMS?

1 – Never, 2 – Seldom, 3 – Quite a bit, 4 – Mostly, 5 – Always

a.	Course outline	1	2	3	4	5
b.	Lecture notes	1	2	3	4	5
c.	Assignments	1	2	3	4	5
d.	Quizzes	1	2	3	4	5
e.	Forums	1	2	3	4	5
f.	Chats	1	2	3	4	5

Q15 Which gadget do you mainly use to access the LMS platform? 1 – Never, 2 – Seldom, 3 – Quite a bit, 4 – Mostly, 5 – Always

a.	Desktop computer	1	2	3	4	5
b.	University provided laptop	1	2	3	4	5
c.	Own Laptop computer	1	2	3	4	5
d.	Mobile phone	1	2	3	4	5
e.	Ipad/Tablet	1	2	3	4	5

Q16 Rate your access of the internet? 1 – Never, 2 – Seldom, 3 – Quite a bit, 4 – Mostly, 5 – Always

a.	University server	1	2	3	4	5
b.	University WiFi	1	2	3	4	5
c.	Own broadband modem	1	2	3	4	5
d.	Mobile phone	1	2	3	4	5
e.	Other. Please specify_____	1	2	3	4	5

Q17 What in your opinion is the most limiting factor in using the LMS? 1 = Low, 5 High

a.	Access to computers	1	2	3	4	5

b.	Access to internet	1	2	3	4	5
c.	Inadequate training	1	2	3	4	5
d.	Lack of time	1	2	3	4	5
e.	Insufficient incentives	1	2	3	4	5
f.	Other. Please specify	1	2	3	4	5

Q18 Rate your use the following ELearning methods you use in teaching. 1 – Never, 2 – Seldom, 3 – Quite a bit, 4 – Mostly, 5 – Always

a)	Audio conferencing via computers	1	2	3	4	5
b)	Email discussion groups	1	2	3	4	5
c)	Video/audio conferencing	1	2	3	4	5
d)	Discussion groups and chat rooms	1	2	3	4	5
e)	Remote access to library e-databases	1	2	3	4	5
f)	Web-based course materials	1	2	3	4	5
g)	CDROMS	1	2	3	4	5
h)	Downloadable audio or video files	1	2	3	4	5
i)	Streaming audio or video files	1	2	3	4	5
j)	Web-based testing	1	2	3	4	5
k)	Web-based administration materials	1	2	3	4	5

Section II (Factors for LMS Adoption)

Please circle your responses using the following scale. 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor Disagree, 4 = Agree; 5 = Strongly agree.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
b) Perceptions					
Self-efficacy (SE) I could complete a job or task using the system… SE1 If there was no one around to tell me what to do as I go.	1	2	3	4	5
SE2 If I could call someone for help if I got stuck.	1	2	3	4	5
SE 3 If I had a lot of time to complete the job for which the software was provided.	1	2	3	4	5
SE 4 If I had just the built-in help facility for assistance.	1	2	3	4	5
Anxiety (ANX) ANX1 I feel apprehensive about using the system.	1	2	3	4	5
ANX2 It scares me to think that I could lose a lot of information using the system by hitting the wrong key	1	2	3	4	5
ANX3 I hesitate to use the system for fear of making mistakes I cannot correct	1	2	3	4	5
ANX4 The system is somewhat intimidating to me.	1	2	3	4	5
Computer Playfulness (CP) How you would characterize yourself when you use computers: CP1 spontaneous	1	2	3	4	5
CP2 creative	1	2	3	4	5
CP3 playful	1	2	3	4	5
CP4 unoriginal	1	2	3	4	5
2. Organizational factors **a) Management support (MSU)**					
Facilitating conditions MSU1 I have the resources necessary to use the system.	1	2	3	4	5
MSU2 I have the knowledge necessary to use the system.	1	2	3	4	5
MSU3 The system is not compatible with other systems I use.	1	2	3	4	5
MSU4 A specific person (or group) is available for assistance with system difficulties.	1	2	3	4	5
MSU5 Adequate training and support is available to design and deliver online papers	1	2	3	4	5
MSU6 I am given sufficient time to design and deliver online papers	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MSU7 I am offered incentives to teach online	1	2	3	4	5
MSU8 There is sufficient ICT training and support to teach online	1	2	3	4	5
MSU9 There is suitable IT helpdesk support to teach online	1	2	3	4	5
b) Organizational culture					
Social influence (SI) SI1 People who influence my behavior think that I should use the system.	1	2	3	4	5
SI2 People who are important to me think that I should use the system.	1	2	3	4	5
SI3 The senior management of this business has been helpful in the use of the system.	1	2	3	4	5
SI4 In general, the organization has supported the use of the system.	1	2	3	4	5
c) Institutional leadership (IL)	1	2	3	4	5
IL1 There is a university-wide e-learning strategy for e-learning development	1	2	3	4	5
IL2 There is a university policy on e-learning	1	2	3	4	5
IL3 There is strong institutional leadership for e-learning at university level	1	2	3	4	5
IL4 There is a university funding priority for e-learning development	1	2	3	4	5
d) School and institutional wide eLearning strategy (SES)					
SES1 There is a faculty-wide e-learning strategy for e-learning development	1	2	3	4	5
SES2 The organisation culture is positive towards e-learning	1	2	3	4	5
SES3 There is strong institutional leadership for e-learning	1	2	3	4	5
SES4 There is an institute wide e-learning strategy and funding priority for e-learning development	1	2	3	4	5
3. Technological factors **a) Usefulness (PU)**					
PU1 Using the system improves my performance in my job.	1	2	3	4	5
PU2 Using the system in my job increases my productivity.	1	2	3	4	5
PU3 Using the system enhances my effectiveness in my job.	1	2	3	4	5
PU4 I find the system to be useful in my job.	1	2	3	4	5
Output quality (OQU) OQU1 I find the system to be useful in my job.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OQU2 The quality of the output I get from the system is high.	1	2	3	4	5
OQU3 I have no problem with the quality of the system's output.	1	2	3	4	5
OQU4 I rate the results from the system to be excellent.	1	2	3	4	5
Job Relevance (REL) REL1 In my job, usage of the system is important.	1	2	3	4	5
REL2 In my job, usage of the system is relevant.	1	2	3	4	5
REL3 The use of the system is pertinent to my various job-related tasks.	1	2	3	4	5
b) LMS Ease of Use (User Friendliness) (PEOU)					
PEOU1 My interaction with the system is clear and understandable.	1	2	3	4	5
PEOU2 Interacting with the system does not require a lot of my mental effort.	1	2	3	4	5
PEOU3 I find the system to be easy to use.	1	2	3	4	5
PEOU4 I find it easy to get the system to do what I want it to do.	1	2	3	4	5
PEOU5 I find the LMS is easy to learn	1	2	3	4	5
b) ICT Infrastructure (ICT)					
I would be more likely to adopt if: ICT1 There is sufficient ICT infrastructure available	1	2	3	4	5
ICT2 The LMS platform was suitable	1	2	3	4	5
ICT3 The ICT infrastructure was reliable and efficient	1	2	3	4	5
ICT4 An online enrolment system is available	1	2	3	4	5
ICT5 There is adequate technical support for module development	1	2	3	4	5
ICT6 There is adequate technical support for system difficulties	1	2	3	4	5
ICT7 Distance library services are available	1	2	3	4	5
ICT8 Distance student support services are available	1	2	3	4	5
ICT9 Online assessments are reliable and secure	1	2	3	4	5

Section III (Usage of LMS)

Self Reported Usage Behaviour

Q19 How long have you used the LMS system

1. Not used
2. Less than a year
3. One year
4. Two year
5. Three or more years

Q20 How many times do you believe you use LMS system during a week?

1. Not at all
2. Less than once a week
3. About once a week
4. 2 or 3 times a week
5. Several times a week
6. About once a day
7. Several times a day

Appendix 9 Adoption Index

		Level	Weight	Total weight
1	Registered LMS User	Yes	2	2
		No	0	
2	No. of Units Uploaded	0	0	8
		1	2	
		2	4	
		3	6	
		>3	8	
3	Resources uploaded	Course Outline	1	13
		Lecture Notes	4	
		Assignments	2	
		Quizzes	4	
		Forums	1	
		Chats	1	
4	ELearning methods used	Audio conferencing	2	22
		Email discussion	2	
		Audio/video	2	
		Discussion groups	2	
		Remote Access to e	2	
		Web-based course materials	2	
		CDROMS	2	
		Downloadable Audio/video	2	
		Streaming audio/video	2	
		Web-based testing	2	
		Web-based administration materials	2	
5	Period of using LMS	Never	0	8
		< 1 yr	2	
		1 – 2 yrs	4	
		2 – 3 yrs	6	
		3 or more years	8	
6	Usage (Actual use)	Not at all	0	6
		Less than once/ week	1	
		About 1/week	2	
		2 – 3 times/week	3	
		Several times per week	4	
		About once/day	5	
		Several times/ day	6	
	Total			59