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A Model to Facilitate Effective E-learning in Technology-Enhanced Learning Environments within Universities

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ABSTRACT

By

BEATRICE AGUTI

E-learning has come to be a standard for course delivery in higher education as it provides a platform to support learning. Most universities are now engaging in technology-enhanced face-to-face classroom teaching through self-paced e-learning and / or distance online learning as a way to diversify access to education. The motivation for this research study was to understand the current practices of e-learning and investigate the factors that can be used to harness effective and sustained e-learning. In order to realise the aim of the study, the research was conducted in three major stages namely; literature review, exploratory pilot study and fieldwork experiment which resulted into three major contributions. Firstly, the literature study led to the identification of factors necessary for facilitating effective e-learning. Secondly, the pilot study conducted led to discovery of factors regarded important for promoting effective e-learning. As a result an initial model was developed. The initial model was then used to develop a questionnaire instrument used to conduct the fieldwork experiment to confirm the model. The data gathered was analysed using multiple regression modelling and the results showed that there were some significant relationships between variables and factors in the model. The study results and findings indicate that effective e-learning can be achieved by having well-established e-learning policies, institutional readiness for e-learning, quality e-learning systems, quality in course design, awareness of e-learning benefits, experience in e-learning, and interactive discussions. These factors are a generic representation of what is required to facilitate effective e-learning. The proposed model will act as a benchmarking tool to help university stakeholders effectively use and sustain e-learning. In other words, the proposed model will be used by university administrators, lecturers, e-learning practitioners, policy makers and Governments to help inform their decisions about implementation and sustained use of e-learning.

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Declaration of Authorship

I, Beatrice Aguti

Declare that this thesis titled "A Model To Facilitate Effective E-Learning in Technology-Enhanced Learning Environments within Universities" and the work presented in it is my own and has been generated by me as a result of my own original research.

I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University;
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- Where I have consulted the published work of others, this is always clearly attributed;
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- Parts of this work have been published as:

  [1] Aguti, B., Walters, R. J. and Wills, G. B. (2014). Effective Use of E-Learning Technologies to Promote Student-Centred Learning Paradigms within Higher Education Institutions. In the International Journal for e-Learning Security (IJeLS), Volume 4, Issue 3/4, 2014.

  [2] Aguti, B., Walters, R. J. and Wills, G. B. (2014). An Evaluation of Factors that Impact on the Effectiveness of Blended E-learning within Universities. In the International conference on Information Society (i-Society 2014), November 10-12, 2014, London, United Kingdom.

  [3] Aguti, B., Walters, R. J. And Wills, G. B. (2013). A Framework for Evaluating the Effectiveness of Blended E-learning within Universities. In 24th International Conference on Society for Information Technology and Teacher Education (SITE 2013) part of the Association for the Advancement of Computing in Education, March 25-29, 2013, New Orleans, Louisiana, United States.

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Dedication

To God the Father, God the Son and God the Holy Spirit; without you Holy Trinity, none of this would have been possible.

To their Excellencies Jesseh Areu Apila and Joshua Alemu Apila.

Abbreviations and Definitions

ADDIE	Analyse, Design, Develop, Implement, and Evaluate
ADeC	Academic Development Centre
ANOVA	Analysis of Variance
ASTD	American Society of Training and Development
CIPP	Context, Input, Process, Product
CMS	Course Management System
E-learning	Electronic Learning
HEI	Higher Education Institution
ICT	Information and Communication Technology
IS	Information System
ISD	Instructional System Design
IT	Information Technology
KPI	Key Performance Indicator
LMS	Learning Management System
ODeL	Open, Distance and e-Learning
ODL	Open and Distance Learning
PCA	Principal Component Analysis
SCT	Social Cognitive Theory
SOL	Solent Online Learning
SPSS	Statistical Package for the Social Sciences
TOE	Technology-Organization-Environment
TOEP	Technology-Organization-Environment-People
VLE	Virtual Learning Environment

Chapter 1 Introduction

The use of e-learning in universities has increased dramatically with the development of a range of e-learning systems also known as educational technologies to support traditional teaching and learning. Universities are now using e-learning to provide a mixture of face-to-face classroom teaching, live e-learning, self-paced e-learning and distance learning. These e-learning platforms offer many benefits to higher education institutions. Social environments are created to support student's learning and cognitive development. Student-centred learning focuses on fostering communicative and collaborative skills amongst the students making them more engaged in their learning process. E-learning technologies also have the ability to support social-interactions between students and teachers and amongst students. Experiences about e-learning reveal that there is a prevalence of lack of motivation to engage in e-learning. In order to harness the benefits of e-learning, it was necessary to understand the current practices of e-learning in universities and recommend an appropriate model to help promote effective e-learning. This became the inspiration behind this research.

An extensive literature review was conducted for the purpose of understanding the trends of e-learning within universities. An exploratory study was then conducted using quantitative and qualitative research methods to explore issues relating to achieving effective e-learning. This was done to help understand the factors required to facilitate effective e-learning. As a result of the literature study and exploratory pilot study, an initial model was developed. The initial model was used to design the questionnaire instrument for conducting the fieldwork experiment. The fieldwork study was done to confirm the initial model. Data was collected from e-learning educationalists and e-learning technologists and analysed using multiple regression analysis and factor analysis to establish the validity of the factors and variables.

The empirical results and findings identified 8 factors and 8 variables necessary for facilitating effective e-learning. The factors include; E-learning Support, E-learning Infrastructure, Quality LMS, Quality of Service Delivery, Course Content, Course Evaluation, Student Assessment, Course Delivery while the variables included; E-learning Policies, Interactive Discussions, Prior Experience in E-learning, E-learning Benefits Awareness, Quality of Course Design, E-learning Readiness, Quality of E-learning Systems and Effective E-learning. As a result of the analysis, the strength of the model was established.

The model is to be used as a tool to inform decisions made by policy makers, Universities and Governments regarding the implementation and sustained use of e-learning as well as improve the quality of teachers, research and education in universities.

1.1 Research Goals

The goal of this research was to develop a model for facilitating effective e-learning in Universities. The aim was to investigate factors necessary for facilitating effective e-learning.

1.2 Research Questions

In order to realise the goal of this research, the following research questions were asked to help achieve the objective of this research.

a) What is the state-of-the-art in regard to trends and practices of e-learning in Universities?
b) What factors are necessary for facilitating effective e-learning in Universities?
c) What factors make up a structure of a model for facilitating effective e-learning in Universities?
d) Are there any significant relationships among the variables in the model?
e) Are there any significant relationships among the factors in the model?
f) Does the data provide the best fit for the model?

1.3 Research Structure

The rest of this report consists of eight chapters, that is to say:

Chapter Two: Background to this research study

Set the stage for identifying research areas related to the literature that was reviewed. The rationale for the research study is discussed here and gives details of the drivers for advocating for effective e-learning within universities.

Chapter Three: Learning and E-learning

Presents a review of literature related to learning, learning theories, learning principles and e-learning. The aim was to identify key theories and models related to promoting effective e-learning in higher education institutions. The chapter also presents a synthesis of factors identified from theories and models.

Chapter Four: Methodology for this Research study

Presents the methodological process followed in conducting the entire research study right from the initial stage of literature review, through to the pilot survey, fieldwork experiments, data analyses and documentation of results / findings.

Chapter Five: Results and Findings to Determine Factors essential for developing the initial model

Presents results and findings following a quantitative and qualitative research study of factors required to facilitate effective e-learning in universities. The results and findings were used to determine the factors relevant for facilitating effective e-learning.

Chapter Six: Initial Model Development

Provides details of the initial model developed based on literature study and exploratory quantitative and qualitative research studies. The initial model was derived from theories, models, and empirical results and findings from the opinions of study participants.

Chapter Seven: Results to Confirm Factors in the initial model

Reports on the results from a fieldwork experiment conducted to confirm factors in the initial model. The aim was to establish the strength of the factors in the initial model.

Chapter Eight: Discussion

Discusses results and findings from the entire research and gives an exposition on the factors that were identified to influence effective e-learning. Reference was also made to the research questions and relevant literature reviewed.

Chapter Nine: Conclusions and Future Work

Draws a conclusive summary of the results and findings of this research study as documented in this thesis. It also provides details of the main contributions that were made and lays out considerations for any possible research work in the future.

Chapter 2 Background to this research study

The book chapter titled 'The Technology-Organization-Environment Framework, describes the Technology Organisation Environment (TOE) Framework in Figure 2.1 and how it has been adopted to different contexts (Baker, 2012).

Generally TOE has been applied to a range of technological, industrial and cultural contexts to help explain the adoption of inter-organizational systems (Baker, 2012). As an organisation level framework, TOE explains that three different elements of a firm's context influence adoption of decisions. These three elements are; technological context, organisation context and environmental context which have an influence on technological innovations. The technology context helps in understanding current technologies in use within an organization; the organisational context involves gaining an understanding of the current characteristics and resources of the organisation while the environment context deals with understanding the role of the environment in influencing decisions about technologies. Some of the environmental factors influencing technological decision making within an organisation may include; competition from other service providers and regulation from governmental bodies (Oliveira and Martins, 2011).

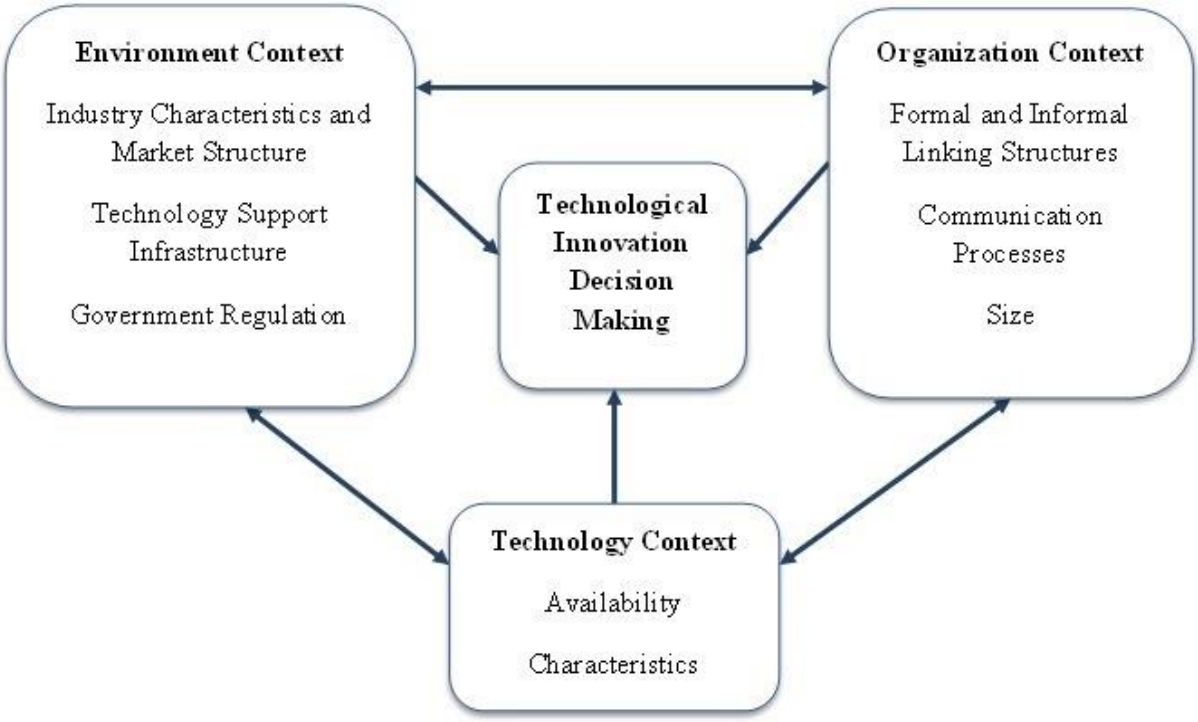


Figure 2.1 The technology-organisation-environment framework; an excerpt from (Baker, 2012)

2.1 TOEP Framework

In an attempt to carry out a comprehensive literature study on the state-of-the-art of e-learning within Universities, TOE framework was extended by introducing a new construct 'P' denoting People as shown in Figure 2.2. People Context was integrated into TOE framework becoming TOEP (Technology - Organization - Environment - People). This was for the sake of understanding how people in universities such as academic staff, support staff, and students influence decisions about e-learning within higher education institutions specifically universities. The chosen route of extension only meant that TOEP framework was used to scope the relevant literature and theoretical components related to how Technology, Organization, Environment and People influence use of e-learning technologies within universities.

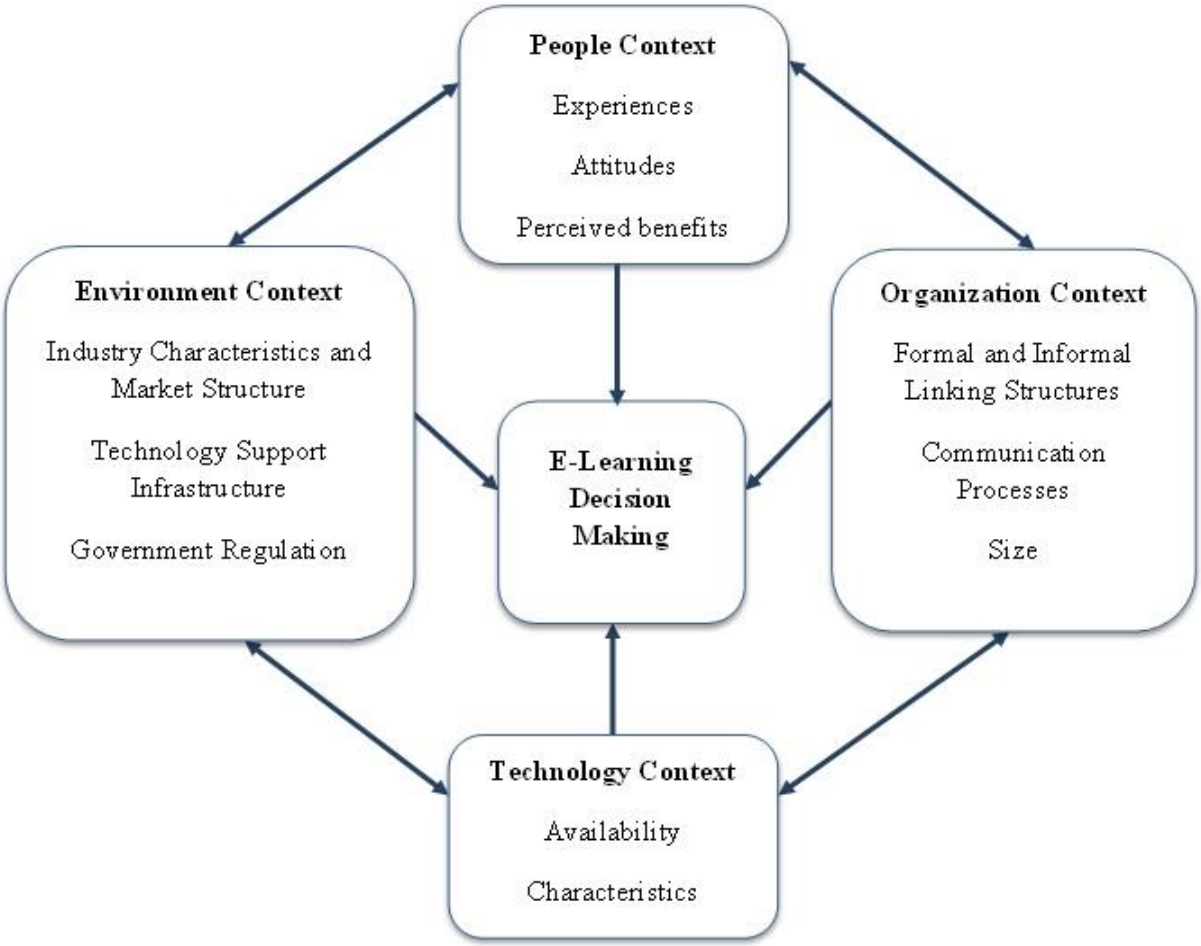


Figure 2.2 The Technology – Organisation - Environment - People (TOEP) Framework

TOEP was used as an underpinning framework to guide the background study. TOEP framework is applied to understand the university organisational context, e-learning technology context, environment context surrounding higher education provision and the role played by people in e-learning decision making within universities.

2.1.1 University Organisational Context

In the wake of the 20th Century, there has been a shift in the education offered by higher education institutions of learning with the emergence of electronic learning (hereafter e-learning). In pedagogy, learning involves acquisition and changes in cognition, namely; knowledge, skills, strategies, beliefs, attitudes and behaviours (Schunk, 2008). In educational practice, learning theories are guiding factors in making educational decisions related to a student's learning process (Schunk, 2008). Some of the learning theories used in educational practice include: Behaviourism (Thorndike, 1911, Skinner, 1938), Cognitivism (Jean Piaget, 1896 – 1980) and Constructivism (Vygotsky, 1978). E-learning has been defined as the use of technology to support and enhance learning practice (Mayes and De Freitas, 2005). TOEP framework in Figure 2.2 was used to help understand the kind of resources related to e-learning available within higher education organisations and their characteristics.

Higher education provision in the university context is offered through a range of degree programmes such as; undergraduate and postgraduate degree programmes delivered as Taught Masters courses, Masters by research, and / or PhD degrees. There are various stakeholders within the University namely: students, learning and curriculum designers, academic staff and administrators, among others (Wagner et al., 2008). Learning at the University level is greatly influenced by factors such as student experiences, learner motivation, learner history or background (Wagner et al., 2008). These attributes are developed as students reach a point of self-actualisation (Bolton, 2008). It has been argued that individual needs of a person include: physiological needs, safety needs, social needs, esteem needs and self-actualisation (Bolton, 2008).

It was therefore imperative to understand the various organisational needs arising within universities in relation to transitioning to new learning systems such as e-learning. The aim was to understand the involvement of university leadership and management in the process of adoption and implementation of e-learning. This context aided the understanding of current practices and policies that influence decision-making about e-learning.

2.1.2 E-learning Technology Context

E-learning has grown to complement traditional classroom-based learning (Arabasz et al., 2003). Educational technology is being used in combination with effective pedagogy and reflective teaching to transform higher education (Snart, 2010). E-learning is also being used as a resource to provide online support, online student management, and provision of formative and summative assessment feedback to the students (Snart, 2010). Universities are

currently engaged in using e-learning technologies to enhance traditional face-to-face classroom teaching mixed with live e-learning, self-paced e-learning facilitated by Virtual Learning Environments (VLEs) (Sharpe et al., 2006, Driscoll, 2002). Such environments include Learning Management Systems (LMS) like Moodle (Rice, 2011) as well as Web 2.0 technologies (Anderson, 2007). These have become enablers for collaborative learning amongst students and lecturers, online discussions and distance e-learning.

Over 80% of Higher Education Institutions (HEIs) in the developed world are actively engaged in the use of e-learning systems to support their teaching and learning. Although 97% of universities in the developed world are reported to be using one or more form of VLEs (Britain and Liber, 2003), universities in developing countries especially sub-Saharan Africa are progressively adopting to these e-learning technologies so as to reap the same benefits harnessed by the developed economies (Ssekakubo et al., 2011). However, education in sub-Saharan Africa is grappling with continuing economic downturn, high demand for higher education in emerging knowledge-driven economies combined with a shortage in skilled teachers (Unesco, 2006).

E-learning technologies are encountered regularly by both teachers and students (Selwyn, 2014a). Traditional learning is often referred to as teacher-centred learning while technology-enhanced learning offers a mix of traditional learning and use of e-learning technologies to enhance student-centred learning (Motteram, 2005). Due to the increased range of e-learning technologies, it is now rare for a course or programme not to be supported by one or more e-learning system (Clark and Mayer, 2003). The term student-centred learning has now caught the attention of universities because their existence is dependent on students who will often be attracted by effective learning and quality in education within the institutions (Gunga and Rickets, 2007).

2.1.3 People context

Research studies show that perceived benefits of using e-learning amongst students and lecturers will influence the effectiveness of e-learning (Omoda-Onyait and Lubega, 2011, Minton, 2000). Such benefits are related to gaining access to student material, academic achievement, improvement in the quality of research and education, improvement of performance of the University (Kirkpartick, 1994, Snart, 2010). Furthermore, for some students especially the mature professional and part-time students, blended learning enables them to combine work and education.

Hogg and Doig (2012) approach the concept of engaging students through VLEs by first understanding adult learners who may either be characterised as workers coming from a variety of industries, or have reached a 'peak' level of their professional career, or have limited time. Most universities are characterised by many students (Clark and Mayer, 2003); and usually run degree programmes in multiple campuses. They would also have single degree programmes offered in multiple time slots such as morning, day, evening and weekends. In light of this, attention must be given to defining and understanding the means of supporting student-centred learning and defining the role of lecturers in implementing and ensuring the effectiveness of e-learning to foster a good student experience (Selwyn, 2014a). Therefore, the people context was a way of gaining knowledge of how people like students, lecturers and administrators can be influenced to harness full benefits of e-learning.

2.1.4 Higher Education Environment Context

E-learning is considered an essential platform for enhancing the competiveness of a university both nationally and globally (Clark and Mayer, 2003). In order to understand the determinants of e-learning adoption and sustained use, the environment context provides the characteristics of external factors that are likely to influence organisational decisions related to adoption of e-learning technologies within organisations.

Oliveira and Martins (2011) reported that environmental concerns related to adoption of information technologies could arise from perceived pressure from competitors. The presence or absence of higher education providers within the locale of a specific university has a great impact on the e-learning decision making process which could influence the level of effectiveness of e-learning within university. Therefore, in understanding effectiveness of e-learning within the Universities, it was necessary to understand how competition from other higher education providers has impacted on the e-learning decision making processes.

Governmental policies and quality assurance regulatory bodies also have an impact on the adoption of technological systems (Baker, 2012). Sometimes Governmental policies and quality assurance agencies may promote or discourage use of specific technologies which may have a beneficial or detrimental to an organisation. In other words Governmental policies and regulatory bodies may influence the effectiveness of e-learning within the university. In view of this, the research study was conducted to understand the role played by governmental policies and regulatory bodies in promoting e-learning within the universities.

In addition, research shows that universities in sub-Saharan Africa are facing a rapid growth in the volume of students enrolling for higher education (Ssekakubo et al., 2011,

Anderson, 2008). In such situations, a high demand for education from the community was likely to influence decisions being made about e-learning in order to reach the multitudes of students. Hence the research study sought to understand the impact of these external factors on e-learning practices within Universities.

2.2 Rationale for this research study

The rationale for advocating for effective e-learning was based on the premise that e-learning technologies are not being fully utilised despite their great implementation within universities. Although e-learning has become a household word amongst many academics in universities from both developed and developing countries, there is still inadequate research focusing on the development of a comprehensive model to define, assess and facilitate effective e-learning. Several researchers have revealed factors that influence the success of any learning intervention as being; student characteristics (Kirkpartick, 1994, Hughes et al., 2006, Gagné et al., 2005, Martínez-Caro, 2011), e-learning benefits awareness (Omoda-Onyait and Lubega, 2011, Minton, 2000), prior e-learning experience (Martínez-Caro, 2011, Hughes et al., 2006, Kirkpartick, 1994), and interactive discussions (Omoda-Onyait and Lubega, 2011, Antonis et al., 2011, Martínez-Caro, 2011, Hassanzadeh et al., 2012). A research study by Oecd (2005) on e-learning systems in HEIs indicated that both intended learning outcomes and institutional effectiveness needed to be streamlined in order for learners to fully benefit from e-learning tools that already exist. However, Hughes et al. (2006) argue that e-learning developers and practitioners are preoccupied with advancing e-learning technologies towards desired quality of e-learning systems rather than providing leverage to the effectiveness of teaching and learning processes.

To address these concerns, this research study focused on establishing ways of developing an holistic model for supporting effective e-learning. The research sought to investigate practices and factors that are appropriate for developing a model to facilitate effective e-learning within universities. In fact the greatest concern was on optimisation of the benefits of e-learning. It was revealed that e-learning can be effective if staff members are given the best approach and support on using virtual learning environments. With e-learning widely used within universities, it was important to propose a model to help universities develop, integrate and sustain e-learning in order to enhance staff and student experiences.

2.2.1 Enhance Student Experiences

Learning experiences are often influenced by learning environments which sometimes offer a blend of learning techniques such as lectures, workshops, self-paced study, online collaboration and communication exercises, simulations and the use of interactive multimedia (Draffan and Rainger, 2006). Whenever students or lecturers are confronted with a new learning environment there may be negative attitudes sometimes due to fear of adopting to new systems (Martínez-Caro, 2011). Such users are likely to experience great difficulties with new learning systems. But experienced students and lecturers tend to be more confident in using e-learning systems (Hughes et al., 2006, Martínez-Caro, 2011, Kirkpartick, 1994). Therefore prior e-learning experience tends to have a positive impact on the effectiveness of e-learning. It is also believed that the learner's age, gender, and level of education will influence the effectiveness of e-learning (Martínez-Caro, 2011, Kirkpartick, 1994, Hughes et al., 2006, Gagné et al., 2005).

Aspden and Helm (2004) found out that students' engagement and experiences could be affected by factors such as skipping lectures. In their study, a student who became disengaged from their lectures because of work commitments felt that they were not on the same footing as their peers. For others, group project tasks could be stalled due to lack of attendance in meetings. These broken connections from the students could have an adverse impact on the student's experience. Other issues arising were linked to neglect of communication especially in situations where e-mails about individual problems had not been responded to, and resources posted within the VLE had not been kept up-to-date. This particularly had a great impact on those students who commute to campus. It seemed that lack of student engagement affected the student's perception of their learning experience. Aspden and Helm (2004) conducted a study in which they investigated how a combination of physical and virtual learning environments could be used to create an effective learning and teaching experience. Their study deduced that students in a blended learning environment had an enhanced sense of engagement and connection to their peers, tutors and institution specifically attributed to the blend. Therefore, one of the sub-focuses of this research study was to understand strategies for promoting the effectiveness of e-learning to help enhance student experiences.

2.2.2 Student Retention

In their study, Palloff and Pratt (1999) and Garrison and Anderson (2003) showed that intellectual development can be achieved through active engagement and interaction with others. In addition, Astin (1993) found out that student engagement with the institution, in

terms of involvement with peers, staff and academic work was an important factor in facilitating retention while Simpson (2002) stated that Open and Distance Learning (ODL) offerings are more likely to garner high student retention because of student support. In other words, students who fail to establish appropriate support networks in ODL environments are more likely to withdraw than those who do (Simpson, 2002). And so it is imperative to offer a model that that supports students to ensure student retention.

2.2.3 Interactive Environment

Aspden and Helm (2004) reported in their study that the physical presence of peers does not necessarily guarantee active interaction. Their findings revealed that some students had acknowledged that participating within a blended learning environment gave them the ability to stay in contact with the University even without physical contact. Thus, life in the institution is maintained and enhanced through communication facilitated by the VLEs. For instance, a discussion board may bridge the gap between the physical and virtual world. A student who might have felt left behind in the physical environment may be unwilling to speak up and engage. However given adequate time and suitable environment like a discussion board, they are able to reflect on the problem at hand and make considerable contributions which would boost their confidence and engagement.

In addition, students are able to interact electronically with their course material especially those who live a considerable distance away from campus because on-campus time would be limited to lecture contact hours. Therefore, with the current e-learning initiatives, all kinds of students can be supported by giving them access to e-learning course material offered as a blend of asynchronous (self-paced) e-learning, synchronous (live virtual) e-learning and face-to-face consultations (Rosenberg, 2006, Snart, 2010) which would benefit all kinds of student namely; full-time, part-time and distance learning students. This enables student engagement, which makes them feel part of the course (Martínez-Caro, 2011). These interactive consultations are offered through live chats, discussion boards, and real-time class face-to-face meetings and whiteboards (Clark and Mayer, 2003, Snart, 2010, Rice, 2011).

Therefore, in order to facilitate successful inclusive e-learning, students need support with using with the e-learning systems and tips on how to relate with staff, peers, and learning materials. In other words, a more holistic approach would be more inclined towards a learning method that embraces the needs of all learners regardless of their language or physical shortcomings (Draffan and Rainger, 2006).

2.2.4 Promote student-centred learning

In a ground-breaking study by Chickering and Gamson (1999b) it emerged that there were seven principles that could be applied to promote effective teaching and improve learning. They concluded that student success is related to effective teaching practices that encourage student-faculty contact, co-operation among students, active learning, prompt feedback, time on task, high expectations, and respect for diverse talents and ways of learning. Young 2002 in (Aspden and Helm, 2004) made an analysis of what constitutes an effective hybrid learning model of education after applying the seven principles of good practice; they deduced that the hybrid approach to learning can actually be used to empower learners through encouraging contact. Hence ensuring the effectiveness of e-learning helps encourage active participation of students in their learning which promotes student-centred learning.

2.3 Summary

In order to scope the relevant literature and theories related to e-learning in Universities, TOE framework was extended to TOEP and applied to the higher education context. TOEP framework now made up of four contexts consists of; Technology Context, Organisation Context, Environment Context and People Context. These four contexts were applied to help understand the state-of-the-art of e-learning and its effectiveness within Universities. Technology context guided in gaining an understanding of e-learning technologies within Universities and knowing an organisation's readiness to support e-learning technologies. The organisation context helped in understanding the organisational processes and systems that influence the adoption and decision-making processes of e-learning and their effect on the effectiveness of e-learning. The environment context assisted in revealing how perceived higher education environmental concerns exerted either negative or positive pressure on the Universities to adopt e-learning and its impact on the effectiveness of e-learning. This pressure was seen to arise from higher education provision competitors and governmental regulatory bodies. And lastly, people context was used to understand how perceived benefits of using e-learning, experiences and characteristics of people influenced their e-learning decision-making processes. There are concerns with promoting the effectiveness of e-learning technologies within an e-learning environment. The greatest concern was related to optimisation of the benefits of e-learning. It is revealed that e-learning can be effective if the staff members are given the best approach and support on how to make use of the learning environment. Therefore, this chapter was a guide to finding the ideal literature on e-learning and investigating the factors necessary for facilitating effective e-learning.

Chapter 3 Learning and E-learning

The previous chapter sets the background to this research by introducing the underpinning framework for evaluating current learning and e-learning interventions. The current era of knowledge-driven economies embodied in societal developments, skills acquisition by students through lifelong education is becoming relevant. Learning being the epitome of education within universities has greatly encouraged development of e-learning systems. Effective e-learning in this context is defined as promotion of a well-balanced mix of effective pedagogy in e-learning course design, apt institutional readiness for e-learning and use of quality e-learning systems to realise the following; academic achievement, cost effectiveness, improved quality of education and research, and student access to learning in universities. This chapter also describes the various modes of e-learning in use within universities and significant theories in learning, e-learning, literature related to learning principles, strategies and evaluation of learning.

3.1 Learning Theories

Learning occurs in diverse patterns linked to the different learning theories. Learning theories are a guide to the educational decision making processes in the students' learning process, dissemination of the learning content and how well the students learn and understand the new content (Schunk, 2008). Learning theorist Schunk (2008) said that learning occurs in various ways described in the various learning theories. These learning theories discussed in the subsequent sections include:

- behaviourism (Thorndike, 1911, Skinner, 1938),
- cognitivism (Jean Piaget, 1896 – 1980),
- constructivism (Vygotsky, 1978), and
- Humanistic theories (Edward Tolman, 1886 – 1959, Carl Rogers, 1902 – 1987, Abraham Maslow, 1908 – 1970).

3.1.1 Behaviourism

Behaviourists believe that learning occurs when a learner responds to their environmental stimuli as opposed to mental thoughts (Whelan, 2005). There are two fundamental concepts that describe behaviourism, namely, connectionism (Edward, L. Thorndike, 1874 - 1949) and operant conditioning (Skinner, 1938). In connectionism, Thorndike's view of learning has it that learning occurs through trial and error, which means that humans and animals learn to

behave in a certain manner by responding to stimuli applied. This notion led Thorndike to develop a view that there are two laws that govern the learning process. These laws are; "The Law of Exercise and The Law of Effect" (Thorndike, 1911). Further to that, Skinner's view of operant conditioning states that learning can be achieved when the desired behaviours from the learning activity are created through repetition and reinforcement of the behaviour. However, it is criticised for being passive and mechanistic (Whelan, 2005).

3.1.2 Cognitivism

Cognitivist theorists believe learning occurs through continuous establishment of associations created through reinforcement and constructive feedback to the learner (Bandura and Walters, 1963). It involves change in the students' cognitive structures as opposed to change in the students' behaviour (Bolton, 2008). Cognitivism draws from the information processing theory that works on the premise that reorganisation of cognitive structures is based on acquisition of new information received by the sensory registers, which is then transferred into short term memory and later stored into long term memory (Mergel, 1998). This theory offers a more learner-driven intervention in the learning process than with behaviourism (Whelan, 2005). Bloom (1956) believed that education should be focused on obtaining mastery of subject content rather than simply focusing on transfer of facts and information recall specifying six levels of mastery in cognitive taxonomy including; knowledge, application, analysis, synthesis and evaluation. In a bid to develop higher forms of thinking, Bloom (1956) developed three overlapping domains including; cognitive (knowledge and intellect), affective (attitude and beliefs) and psychomotor (skills). A three-domain matrix was developed for educationists involved in learning design and evaluation as a platform to promote effective learning amongst the students (Bloom, 1956).

3.1.3 Constructivism

Constructivist theorists believe that learning occurs through learner involvement in knowledge construction and acquisition processes (Mergel, 1998). Although constructivism is mostly associated with promoting active learning, there are several perspectives to the way knowledge is discovered and constructed. According to Schunk (2012), there are three types of constructivism namely; exogenous constructivism, endogenous constructivism and dialectical constructivism. Exogenous constructivism is based on the idea that knowledge acquisition and construction is influenced by structures that exist in the external world. Such influences could come from experiences, exposure to various sources of knowledge and social interactions. In contrast, endogenous constructivism focuses on construction and development

of knowledge through cognitive actions. Mental structures are developed based on already existing cognitive information and not from the external world. On the other hand, dialectical constructivism is based on the notion that knowledge construction is not wholly derived from the external world or from the mental activities of the mind but from arguments and reasoning resulting from interactions from the environment. This makes dialectical constructivism to be closely aligned with social cognitive theory (Bandura, 1977). Although there are varying views related to the three perspectives of constructivism, each of them is useful for research and teaching. In fact, in the social constructivist approach, instructors play the role of facilitators. The facilitators help learners to form and construct their own understanding of the content and knowledge (Schunk, 2012). In other words, learners are encouraged to establish their own version of truth by reasoning to determine specific truths from the knowledge.

Learners control what they are interested in learning through individual experiences and environments (Vygotsky, 1978). Each individual learner has past experiences inspired by social interactions and personal reflections that enable them to enrich their existing knowledge-base thereby allowing them to construct their understanding of ideas and concepts (Whelan, 2005). It is further argued that constructivism learning theory is an appropriate match for e-learning design because it allows students to have active construction of knowledge (Koohang et al., 2009) which conforms to the premise that e-learners are actively engaged in their learning process.

It is recognized that students learn in different ways and have different learning styles (Clark and Mayer, 2003). Students construct their knowledge-base by talking, listening, writing, reading, and reflecting on content, ideas, issues and concerns which foster creativity in students. Student learning is recognized as a dynamic process in which students continually create connections between facts, ideas and processes. Such connections are fostered through dialogue between lecturers and students, and students with their peers making student-centred learning a social initiative that requires constant development of human relationships and communication (Selwyn, 2014b). Students are supported in making sense of their learning through knowledge construction and so continuous constructive feedback is paramount.

3.1.4 Humanistic Approach

In contrast to the above theories that require reinforcement, humanistic learning theory was developed by Edward Tolman (1886 - 1959) who believed that learning did not require reinforcement but rather was inspired by the motivation behind what a learner was trying to learn. In other words, it is believed that people's feelings about a specific task had an impact

on their commitment towards it. A learner who felt empowered to accomplish a task was more likely to undertake a challenge as opposed to a learner who felt anxious. Anxious learners are more likely to resist challenging learning environments such as adapting to new e-learning environments. Carl Rogers (1902 – 1987) and Abraham Maslow (1908 – 1970) continued to develop Tolman's humanistic ideologies further; they stated that there is need for individuals to self-actualise by focusing concern on 'self' and self-fulfilment. Humanistic education was later introduced as an initiative towards adult education with a focus on education of a person as a whole rather than concentrating on individual elements of education (Bolton, 2008).

3.2 Learning Principles

Learning design also known as Instructional Design, is a systematic process of planning and developing effective instructional materials (Alonso et al., 2005, Gagné et al., 2005, Dick et al., 2009). This is advancement to traditional lesson planning with an inclusion of a more detailed outline of activities required to translate general principles of learning and instruction into plans for learning materials. Learning design offers learning content developers with the methods on how to develop subject content that effectively improves the educational needs of the learners through effective transfer of knowledge. At its simplest level, instructional design involves engagement of students in events and activities that facilitate their learning by creating an alignment in the intended learning outcomes (Gagné et al., 2005). At a more advanced level, instructional designers follow systematic guidelines for creating instructional materials intended for curriculum development, course modules, instructional programs, or training sessions through instructional design models (Dick et al., 2009, Gagné et al., 2005).

The principles of learning design are deemed beneficial to textbook writers, curriculum content developers, web-based course designers, and knowledge-management system designers among others (Gagné et al., 2005). The aim of effective learning design is to develop learning objects that meet the learners' expectations. Learning design is not an independent entity, however, it is embedded within the training development cycle as one of the activities to be accomplished including; understanding performance gaps, identification of training needs, task analysis, content specification, selection of instructional frameworks, assessment strategy, media selection, production, evaluation and implementation. While learning technologists are at the helm of key decision-making, this process is greatly influenced by their ability to determine whether what they are designing, developing and implementing is working (Whelan, 2005). Learning technologists and designers recognise the

importance of instructional structures for designing subject matter or content materials (Merrill, 1994). Content is organised into structures namely; learning, procedural, taxonomic and theoretical structures aimed at creating sequence and synthesis between content modules. These structures clearly stipulate student-oriented tasks and steps to be followed to accomplish these tasks and creating links between the concepts of content (Merrill, 1994).

3.2.1 Learning Design Models

Gagné et al. (2005) present two instructional design models namely; ADDIE model (Gagné et al., 2005) and Dick and Carey model (Dick et al., 2009). The ADDIE and Dick and Carey models share common elements for instructional systems design (ISD). ISD phases depict shared elements of; Analyse, Design, Develop, Implement, and Evaluate.

The ADDIE Model follows a systematic approach to **A**nalysis, **D**esign, **D**evelopment, **I**mplementation, and **E**valuation of learning materials and activities. It is an iterative instructional design process, where each phase goes through evaluation resulting in an instructional designer going back to any previous phase to make necessary improvements and modifications. The end product of one phase is the starting product of the next phase. Evaluation is the final stage of the ADDIE model used in instructional design that performs a logical function of determining whether the learning intervention has been successful in reaching its desired goal. There are five types of evaluation and in each case there are two possible types of decisions (Gagné et al., 2005). The five types of evaluation are named as: Materials evaluation, Process evaluation, Learner reactions, Learner Achievement, and Instructional Consequences. The ultimate decision that could be made is categorised as either formative or summative. Formative decisions are based on results from the evaluations aimed at either improving instructional materials, design processes or the development of instructional systems; whereas summative decisions are reached to assess the worthiness, impact or value of the instructional product or activity which is conducted during outcome evaluation. However, either type of decision can be made within any type of evaluation. The types of evaluation are described as;

1. *Material Evaluation:* This is performed by instructional designers in collaboration with experts and students. It consists of reviews performed in order to create and validate instructional products. Feedback is then obtained from the experts and students after reviewing the instructional materials, learning objectives and other documentation. Once a final draft of the instructional material is ready, then a pilot test is conducted alongside a field test evaluation.

2. *Process Evaluation:* This type of evaluation focuses on the instructional system design process with an aim of enhancing quality, management and continuous improvement to the process. Therefore, it is important to examine the project team members' roles, tasks, and procedures to ensure that they meet instructional design requirements. This form of evaluation gives feedback necessary for improving the effectiveness of the overall design process.
3. *Learner Reactions:* This evaluation is adapted from Kirkpatrick's four-level evaluation which presents the four levels of evaluation as being; learner reactions, learner achievement, instructional consequences and organisation benefits. Learner reaction is the first level of outcomes evaluation focused on the students. A self-report survey is conducted about the quality of the instructional material, its logical connectedness with other parts of the material, the clarity of the instruction, the effectiveness of the instructor. The responses to these questions are obtained from one of the five options; strongly agree, agree, neutral, disagree, and strongly disagree.
4. *Learner Achievement:* This is the second level of the outcome evaluations performed by using the tests that were developed and validated during the design and development stages. The tests are used to determine how well the students are achieving the course objectives. In addition, these tests are also used to obtain feedback about the effectiveness of the course as well as determine the passes and failures amongst the learners thereby providing performance feedback to the learners.
5. *Instructional consequences:* This is derived from the third and fourth level of the outcomes evaluation of Kirkpatrick's evaluation model. These are (a) transfer of training to a job or other application environment, and (b) whether there is a measurable organisational benefit from the course of instruction. In evaluating the learning design, the evaluator seeks to determine whether the students are applying what they have learned through cognitive skills development that matches the job requirements. In evaluating organisational benefits, an attempt is made to determine whether there is a measurable improvement in an organisation's performance. Some of the performance indicators include: higher output rate, reduced error rate, increased profitability, and increased student admission.

The Dick and Carey model presents a methodology for instruction design, based on a principle of decomposition of instruction into smaller units. Instruction depends on the skills and knowledge to be imparted onto the learners which are translated into appropriate learning outcomes. It follows activities similar to ADDIE models, which include; Assessment of student needs so as to identify instructional goal(s); Conducting a goal analysis; Identifying

entry behaviours; Analysing learners and contexts; Writing performance objectives; Developing assessment instruments; Developing instructional strategy; Developing instructional materials; Designing and conducting formative Evaluations; Revising instructional materials; and lastly Designing and conducting summative evaluations (Dick et al., 2009).

3.2.2 Learning Outcomes

Designing instructional systems is aimed at achieving intended learning outcomes (Gagné et al., 2005). Gagné et al. (2005) believe that learning outcomes can be classified into learned capabilities that represent the specific learning objectives. These learned capabilities are categorised into five different classes that denote human performances often related to the student competences (Sitthisak et al., 2008) which include; Intellectual skill, Cognitive strategy, Verbal information, Attitude and Motor skills. Intellectual skills are demonstrated with the learner's ability to learn the subject matter by considering facts, concepts, procedures, and principles. Cognitive strategy involves the ability of a student to control the information processing behaviour which is essentially linked to remembering and thinking. Sitthisak et al. (2008) defined competency as the ability to apply knowledge, skills, values, experiences and tools in solving problems when performing activities and / or handling situations hence intellectual skills are measured through observing performance of students.

3.2.3 Learning Evaluation

In assessing students, it is important to determine the quality of educational assessment approaches which could be developed individually, provided by another teacher/instructor and / or provided by a national examination board (Forsyth et al., 2002). Forsyth et al. (2002) presented some considerations that educational practitioners ought to adopt to assess students. Thus in developing any assessment tools or scheme, prior attention should be drawn to the standards that the students are expected to demonstrate. The assessment methods such as exams and tests should be used to make proper judgement of a learner's capability. Some of these standards presented include the ability to demonstrate knowledge in; factual information, applicability, synthesis, attitudes, skills in manipulation and application. Payne (1974) argues that there is need for both learning activities and assessment to be closely related to the syllabus so as to reward understanding. This promotes the need to match assessments, content and resources to learners' current level.

Courses, programs and educational projects are often evaluated for a number of reasons including the need to determine the effectiveness of a program to funding sources or management. There are numerous models of evaluation developed by researchers. Some of these include; Tyler's Evaluation Model (goal-based) (Tyler, 1949), Scriven's Goal-Free Evaluation model (goal-free) (Scriven, 1972), Stufflebeam's CIPP Evaluation Model (decision-making) (Stufflebeam, 1983) and Kirkpatrick's Four-level Evaluation Model (systems analysis) (Kirkpartick, 1994).

3.2.4 Models for Evaluation of Learning

Tyler's evaluation model (Tyler, 1949) works on the premise that program goals are measured against actual performance. Tyler believed that for a program to be planned and consequent improvements to be made, goals and objectives must clearly be stipulated as guidelines for proper selection of learning content, instructional procedures and assessments (Tyler, 1949). Tyler's model presents goal establishment, classification and definition as the initial stages before any data can be collected. Data collection techniques are selected on the basis of process objectives and activities. Performance data is collected and data is compared with the stated objectives. Whilst this model focuses on a comparison of performance to stated objectives, other approaches reject this idea, favouring the identification of needs and basing evaluation on actual effect on those needs.

Scriven's Goal Free Evaluation Model suggests that initial identification of program or activity goals is very important to experts seeking to establish an evaluation (Scriven, 1972). The Goal-Free model focuses on the actual outcomes of a program or activity as opposed to concentrating only on those goals that were identified. This type of model allows evaluation experts the possibility of identifying and noting outcomes that may not have been identified by program developers. This model seeks to gather data in order to form a description of the program, identify processes accurately, and determine their importance to the program (Boulmetis and Dutwin, 2005). While this model focuses on the outcomes regardless of goals, other models focus on the process of decision-making and providing key administrators with deep analysis to make fair and unbiased decisions.

CIPP Model focuses on the collection of four different types of data to inform the decisions of organizational administrators – context (C), input (I), process (P) and product (P) (Stufflebeam, 1983). Context evaluation is similar to problem analysis in that it serves to plan information, identify problems, needs and opportunities in order to develop program objectives. Input evaluation provides information regarding the resources that are available

and needed to achieve identified objectives. Process evaluation evaluates whether changes are needed within an organization's work environment. It also measures whether intended program elements are being implemented. Product evaluation focuses on the outcomes of a program or activity and helps administrators determine whether to continue, terminate, modify or refocus.

Lastly, a systems analysis approach like Kirkpatrick's Four-level Evaluation Model (Kirkpartick, 1994) is suitable for determining the effectiveness of a learning system. The four levels of reaction, learning, behaviour and results all contribute to the overall quality, efficiency and effectiveness of a program or learning intervention (Kirkpartick, 1994). Reaction evaluation is concerned with learner perceptions on a learning intervention or program. This type of evaluation is designed to measure their satisfaction with the learning intervention. Learning evaluation is the process of measuring the knowledge, attitude and skills of learners and how much the set objectives have been effectively accomplished. Behaviour evaluation is the process of observing learners in the job context after completing the program and determining the kind of changes that happened. Results evaluation assesses institutional change as a result of the intervention in areas such as improved productivity, better quality, reduced cost, and improved morale.

3.3 Learning Assessment

Assessment is defined as a deliberate formal attempt to determine or measure students' achievement status with respect to educational variables of interest (Popham, 1999). In the 1950s, testing was a term commonly used to refer to the determination of students' status in relation to knowledge and skills that a teacher was attempting to promote (Popham, 1999). The common tests used included among others; mid-term tests, pop quizzes, end-of-unit tests, and end-of-term exams. The effectiveness of the testing was an indicator of how well a teacher taught (Popham, 1999). According to Popham (1999), the reasons for assessment included: diagnosis of students' strengths and weaknesses, monitoring of students' progress, assignment of term grades, determination of a teacher's own instructional effectiveness, development of positive public perceptions of a school's / institution's educational effectiveness, evaluation of teachers, and clarification of a teacher's instructional intentions. Several decisions could be taken on students on this basis, for instance weak students may be given extra lessons based on the pre-tests results. Satisfactory progress shown after post-tests could be a sign that the teacher is moving towards the desired outcomes. Changes to instructional strategies could be made if results were negative (Popham, 1999).

3.3.1 E-Assessment

E-assessment (electronic assessment) also known as online assessment is defined as the use of electronic media to determine a learner's educational status in relation to the variables of interest or intended learning outcomes (Ridgway et al., 2004). There are a number of e-assessment delivery tools including: computer-marked assignments, online essays, online quizzes and questions, collaborative assignments, portfolios, online exams, experiments, participation in online discussions, publication of student work/presentations, experimental activities, such as role-play, debates, reviews, simulations, journals and reflections (Terence, 2004, Gilbert et al., 2008).

There have been a series of efforts to promote online assessment as a medium of measuring learner achievement of the intended learning outcome (Gilbert et al., 2011). However, quality in online assessment is steadily gaining worldwide attention (Gilbert et al., 2008, Mcloughlin and Luca, 2001). Mcloughlin and Luca (2001) deliberated on the notion of quality in online assessment and deduced that quality in online assessment had not clearly been addressed and defined. Subsequently, they suggested that quality of online assessment could be defined in terms of student satisfaction with assessment process. Quality assessment could be measured in terms of how-well students reuse and apply the knowledge content attained through online learning systems. There was also a growing need to develop new models to explore relationships between role and impact of assessments to learning (Conole and Warburton, 2005).

3.4 Blended learning

Blended learning is defined as a combination of online learning and face-to-face instruction (Rosenberg, 2006). Driscoll (2002) defines the term blended learning using four concepts, namely;

- *Mixing different types of web-based technologies such as collaborative learning, self-paced learning and virtual classroom to achieve educational goals.*
- *Combining pedagogical approaches and learning theories such as cognitivism and constructivism to enhance the learning outcome.*
- *Combining any type of instructional technology e.g. online course material with face-to-face instruction.*
- *Mixing instructional technology with the practical job tasks.*

Blended learning takes the form of technology-enhanced education in which traditional face-to-face learning is supported by either asynchronous or synchronous learning tools. Asynchronous learning is characterised by use of tools such as e-mail and forums while synchronous learning is supported by use of tools like live virtual classrooms (Sharpe et al., 2006). E-learning also known as computer-based training, web-based training, technology-based instruction, online learning, and technology enhanced learning (Clark and Mayer, 2003) presents a platform for supporting blended learning by use of technology to support and enhance learning practice Mayes and De Freitas (2005). E-learning plays an important role in enabling teaching and learning. The latest development in online learning reveals the emergence of Massive Open Online Courses. The term MOOCs acronym for Massive Open Online Courses was coined by George Siemens and Stephen Downes in 2008 after they run a large online course (Masters, 2011, Kennedy, 2014, Gaebel, 2013). MOOCs are designed to support both asynchronous and synchronous learning.

3.4.1 The stages of development of online teaching and learning

It is imperative to understand the stages of online education development. Any institution involved in online learning would be characterised by the virtual environment. Masters (2011) reported that there are four typical stages in the development of online education environments.

In stage 1 the online learning environment is simply a distribution hub for course material on a shared drive (Masters, 2011). The lecturer makes use of the online environment only as an online repository or file server for lecture notes and presentations. Only registered students would have access to the course material. In this stage, the lecturer is in absolute control.

In stage 2 of online learning development, the lecturer uses a VLE or LMS (Masters, 2011). Unlike stage 1, in stage 2 the virtual environment is not only a repository for course material but it also comes embedded with other tools like chat rooms, wikis and discussion forums. These tools are used as channels of interaction amongst the students and between the students and lectures. These interactions have little impact on the course itself as the lecturer is still in control. The course is only accessible to registered students.

In stage 3 the LMS is now more advanced. Web 2.0 tools such as e-portfolios, blogs are now included and contained within the LMS (Masters, 2011). In this stage, student to student interactions and student to lecturer interactions become more prominent. Considering that universities have widened their learner composition by reaching a diversity of students, VLEs in stage 3 are now playing a vital role in enhancing the learning experiences. Students will

normally demand that VLEs or e-learning be used effectively to facilitate their learning (Hogg and Doig, 2012). A typical example of stage 3 online learning development is the Solent Online Learning (SOL) Standard presented in Figure 3.1 (Hogg and Doig, 2012). The SOL standard shows six fundamental e-learning platform components namely; having very clear introduction, clear content, menu of fixed components, support, embedded opportunities for feedback, interactive and knowledge building. The menu tools included are live chats, e-portfolios, and web conferencing among others. It is envisioned that the discussion forums are a way to engage with the students. This is done under the discretion of the lecturer (Hogg and Doig, 2012). In other words, the lecturer becomes a guide on the side with less focus on the LMS content. So many lecturers and institutions are now venturing to upgrade to stage 3 (Masters, 2011).

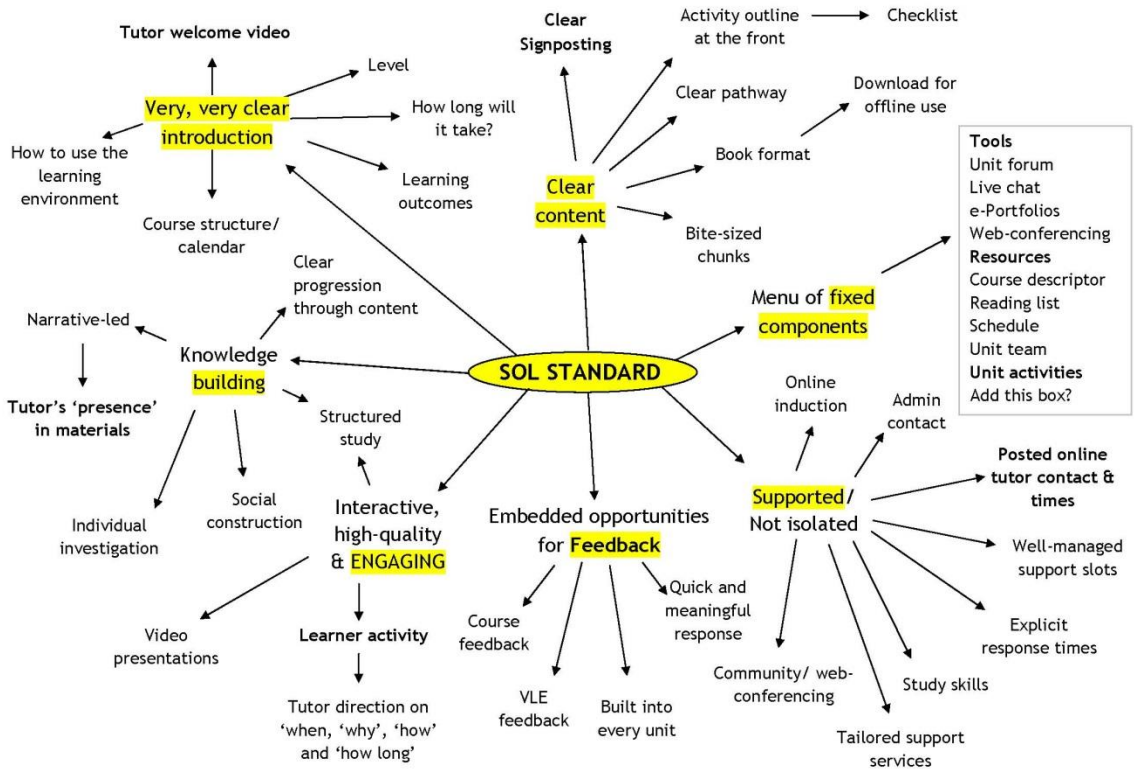


Figure 3.1 Southampton Solent University 'Solent Online Learning Standard' for Online and Blended Learning – used with permission

In stage 4, role of LMS shifts focus from the course content to registration of students and management of discussion forums, typical of MOOCs (Masters, 2011). In stage 4 MOOCs is decentralised and networked in that most of the student activities take place outside of the LMS. Student participation is conducted using tools linked to the LMS such as personal blogs, e-portfolios, websites, and uploads to video hosting sites like You Tube (Masters, 2011) as envisioned in the web 3.0 semantic web. Students simply feed their information into

specified discussion forums. The idea behind MOOCs is that students should construct their knowledge through individual study (Kennedy, 2014, Gaebel, 2013, Masters, 2011). MOOCs benefits institutions for its richness in diversity of ideas coming from multicultural students globally located who may be seeking a formal education or continuous professional development. In the same token, MOOCs is a platform that can be used by the hosting university to publicise their educational provision to a wider community. The course lecturer gives the course syllabus and important course information at the start of the programme and may run live discussions. These live video discussions are accessible offline as the student audience spread worldwide with different time zones. MOOCs may or may not be assessed for credit depending on the participating institution (Gaebel, 2013).

3.4.2 MOOCs - latest development in online teaching and learning

Ever since the initial implementation of MOOCs in the 2007/2008 academic year (Masters, 2011), it has made a steady progress in providing learning opportunities and enhancing learning experiences (Gaebel, 2013). MOOCs is a stereotype of open and distance education which is characterised by open technology, open software, open content, open educational resources, open knowledge sharing, open access, open communication and open curriculum (Kennedy, 2014, Gaebel, 2013). Open also means that it is tuition free with the exception of students who might require credit certification (Gaebel, 2013). MOOCs are also representative of their massive nature that attracts an unlimited number of students per course enrolment (Kennedy, 2014) making it accessible to anyone with real-time or offline access to the course. In other words, participation is open to both students enrolled within the hosting institution and students from the global community. Although participation is without course credits, students may still receive a little feedback from the lecturers. Gaebel (2013) reported that many universities that got involved in running MOOCs were motivated by several reasons such as: providing education to the community at a lower cost; complementing traditional face-to-face teaching and learning. Universities can now reach a diverse range of students; make use of existing resources efficiently and enjoy publicity through MOOCs.

MOOCs are the latest innovation in learning; just like any learning intervention it's anchored on pedagogical frameworks. Gaebel (2013) and Kennedy (2014) disclosed in their reports that there are two models that differentiate the pedagogical approaches used in MOOCs. These two models are named as; cMOOCs and xMOOCs. The cMOOCs model emphasizes on knowledge creation and social network-based learning while xMOOCs model focuses on knowledge duplication and traditional technology-enhanced learning delivered

through video presentations, short quizzes and assessment tests. In other words, cMOOCs is built on distributed networks while xMOOCs is centralised.

As a matter of fact, xMOOCs caught public attention stirring up innovations in higher education institutions (Gaebel, 2013). As a result, in the year 2012 a number of prominent universities in the US entered into partnership with private companies to start delivering free online courses (Gaebel, 2013). This resulted into incubation of companies for partnership provision. The partnership agreements specified that the universities or individual academics would be responsible for content design and course quality whereas the company was to be in charge of technical production and facilitation. Some of the companies and consortia currently active in MOOCs partnership include; Coursera, edX, Udemy and Futurelearn (Gaebel, 2013). Coursera was started by professors in the United States with contracts established with 33 Universities from around the world of which majority are from the United States (Gaebel, 2013). edX is another company based in the United States. edX was established between Harvard and MIT Universities offering Harvardx, MITx and Berkeleyx classes (Gaebel, 2013). edX membership is quite limited to three universities, although universities are now being invited to join on condition that they meet the quality standards. Unlike Coursera and Edx, Udemy does not partner with universities (Gaebel, 2013). Udemy is funded by venture capitalists named as; Insight Venture Partners, MHS Capital, and Lightbank among others. The MOOCs are hosted in a portal and facilitated by the world's top experts and CEOs including Ivy League professors. Some of the courses include; IT, software use and design, and entrepreneurship of which some of the courses may be offered at a fee. Outside of United States, Futurelearn was pioneered as the first xMOOCs initiative in the United Kingdom (Gaebel, 2013). Futurelearn brings together a range of open online courses from leading universities (Russel Group) in the United Kingdom. Established at the end of 2012, Futurelearn was launched in 2013, funded and owned by the Open University in the United Kingdom. Besides funding, the Open University also participates in providing MOOCs courses. Some of the Russel Group participants include University of Bristol, University of Warwick, University of Oxford, Imperial College London, University of Cambridge, among others (Gaebel, 2013).

3.4.3 MOOCs - implications to teaching and learning

Some critics of MOOCs claim that the so-called elite universities who entered into MOOCs partnerships only gained their reputation based on research (Gaebel, 2013). So their academic repute has nothing to do with teaching or ability to teach online courses. These concerns are crucial in advocating for understanding the ways of facilitating effective

e-learning in universities regardless of whether it is xMOOCs or technology-enhanced traditional learning or pure e-learning.

It is worthwhile noting that implementation of MOOCs requires discipline and responsibility from all participants especially the students. Calibration of the mind and understanding is of necessity for any MOOCs undertaking to thrive regardless of the model, cMOOCs or xMOOCs. Both cMOOCs and xMOOCs require a high level of independent learning. Unlike xMOOCs which is an enhancement to traditional learning, cMOOCs are mainly independent with no student follow-ups. It is assumed that the students will be responsible for their own learning (Masters, 2011). However it is a misconception because research shows that students in cMOOCs are more likely to lose track of their learning because of its nature (Kennedy, 2014); although both MOOCs models have high dropout rates. There were more dropouts registered in xMOOCs than in cMOOCs, 85% and 40% respectively (Rodriquez, 2012 in Kennedy, 2014).

In attempt to demystify the mystery behind MOOCs dropouts, Kennedy (2014) conducted a study to understand the obstacles to teaching and learning in MOOCs. Kennedy (2014) documents some of these obstacles as being; lack of readiness to support the students during their learning; lack of technical skills amongst the students to use the various social networking and discussion tools; language barriers especially that English is the predominantly used language in MOOCs; differences in time zones makes it difficult to hold real-time meetings with all registered students across the world; and shortage of time on the part of adult students. To be specific, students enrolled to cMOOCs have to deal with information overload due to the chaotic nature of model. There are multiple sources of information from within the students' learning community likely to create confusion. In addition, cMOOCs requires student engagement in knowledge construction. So students who do not make contributions will have nothing to learn.

3.5 E-learning

E-learning has become an enabler for information exchange and knowledge sharing. E-learning delivery is dependent on applications and processes such as internet technologies, computers, web technologies, social networks and new instructional technologies (Anderson, 2007, Namahn, 2010). E-learning modes of delivery are often categorised as synchronous and / or asynchronous (Clark and Mayer, 2003). Some of these modes of delivery include: internet technologies, interactive multimedia, educational games/simulations and social networks. Sometimes the use of instructor-led group work combines both synchronous and

asynchronous learning events. In (Driscoll, 2002) it is observed that the scope of e-learning covers instructional technologies, instructional design practices and methodologies. It also includes use of social networks to support the social dynamics of culture, relationships and learning (Anderson, 2007).

E-learning has become popular in many institutions of higher education (Sharpe et al., 2006) especially for delivering open and distance education (Rosenberg, 2006, Snart, 2010). Mayes and De Freitas (2005) consider e-learning a tool for making effective assessment of learning outcomes and a cost-effective way to reach distance learning students. It is apparent that e-learning tools enhance the instructional ability of instructors and learning activities of learners which is an improvement to traditional classroom-based learning (Rosenberg, 2006, Snart, 2010).

3.5.1 E-learning modes of delivery

There are two modes of e-learning delivery namely; synchronous and asynchronous e-learning. These two forms of e-learning are offered via virtual learning environments normally facilitated by learning management systems (Britain and Liber, 2003, Sharpe et al., 2006). The learning management systems contain tools for uploading and sharing course material, downloading and reviewing students assignments, engaging in online chats and discussions, conducting surveys, among others (Rice, 2011).

3.5.1.1 Synchronous e-learning

This type of e-learning is based on the premise that students and lecturers are able to engage in real-time online communication and discussions regardless of location (Clark and Mayer, 2003, Snart, 2010). This form of e-learning is beneficial to the students in that they have access to immediate feedback and live online interaction (Snart, 2010). Synchronous e-learning is facilitated by use of tools such as; video conferencing, chat rooms, white boards and audio conferencing (Clark and Mayer, 2003) often offered via learning management systems such as Moodle (Rice, 2011). Synchronous e-learning requires real-time online presence and high quality infrastructure.

3.5.1.2 Asynchronous e-learning

Asynchronous e-learning on the other hand does not require real-time online presence of students and lecturers (Snart, 2010, Gagné et al., 2005). This form of e-learning is self-paced and sporadic in that students are in control of their time and learning (Snart, 2010). However, students are unable to have immediate feedback from the lecturer (s).

3.5.2 Promoting effective e-learning in HEIs

E-learning has transformed higher education through technology-enhanced teaching and learning (Arabasz et al., 2003, Oecd, 2005, Wagner et al., 2008). E-learning is now being used as a means to support students and lecturers, manage student profiles, and provide formative and summative assessment feedback to students. E-learning is a cost effective and efficient way to reach distance learning students both nationally and internationally within the limits of the infrastructure (Curran, 2004, Hjeltnes and Hansson, 2004). E-learning creates opportunities for interaction between and / or among students and lecturers through established discussion forums (Rice, 2011). Use of e-learning also caters for learning differences amongst students for instance those who may be comfortable with self-paced learning (Biggs and Tang, 2011, Snart, 2010).

Despite the development of new and innovative e-learning platforms, there is still limited research about effective e-learning. However there are many research studies about success and quality of e-learning systems. Effective learning is defined as everything that encompasses learning and incorporates engaging students in the planning, monitoring and review of their learning strategies so as to realise the intended learning outcome (Biggs and Tang, 2011, Gagné et al., 2005, Clark and Mayer, 2003). Whelan (2005) observed that the growing technological, cultural, and social needs had triggered a paradigm shift in learning and instruction. Although several technological sceptics overtly raised concerns over the impact of instructional technologies on the learning and classroom practice because of previous technologies in education that became obsolete like the educational television (Whelan, 2005). On this basis, the notion for promoting effective e-learning was formed supported by the definition of effective learning. This also informed the meaning of effective e-learning and guided the investigation into the ways of facilitating effective e-learning.

Traditionally success of programs was measured based on the quantity and / or the number of students registered (Rosenberg, 2006). Berk (2003) emphasizes the importance of qualitative measurements over quantitative measures in gauging the success of learning interventions. Berk (2003) proposed effective performance metrics to measure how-well the students have learned. These performance measures include; instructor performance, courseware quality, facility's conduciveness to learning, quality of online delivery, training's value as an investment in time and money and return on training investment. This is because using qualitative measures of learning shifts the focus from numbers to quality and effectiveness. Recent studies propose the need to focus on how-well the student is learning rather than on how-much has been learned (Berk, 2003, Sean, 2010). As HEIs continue to

embrace e-learning, there is advancing research into the development of frameworks and models for evaluating e-learning (Antonis et al., 2011, Bajcetic et al., 2007).

In fact Hughes et al. (2006) proposed a framework for evaluating e-learning. In his framework, variables were categorised as follows; individual student variables (physical characteristics, learning history, learner attitude, learner motivation, and familiarity with technology), learning environment variables (physical learning environment, institutional environment, and subject environment), contextual variables (socio-economic factors, political context, cultural background and geographic location), technology variables (hardware, software, connectivity, the media, and mode of delivery) and pedagogic variables (level and nature of learner support systems, accessibility issues, methodologies, flexibility, learner autonomy, assessment and examination, accreditation and certification). Olds (2002) also developed an e-learning assessment model to enable educational instructors and educational project managers to assess the success of courses or programs. The assessment matrix was developed with a structure comprising of questions intended to assist faculty members to develop their assessment plans (Olds, 2002). These questions include:

- *Objectives:* What are the overall objectives of the course or program? How do they complement institutional and accreditation expectations?
- *Learning Outcomes:* What are the program's educational outcomes? What should your students know and be able to do?
- *Performance Criteria:* How will you know that the outcomes have been achieved? What level of performance meets each outcome?
- *Implementation Strategies:* How will the outcomes be achieved? What program activities (curricular and co-curricular) help you to meet each outcome?
- *Evaluation Methods:* What assessment methods will you use to collect data? How will you interpret and evaluate the data?
- *Timeline:* When will you measure?
- *Feedback:* Who needs to know the results? How can you convince them the objectives were met? How can you improve your program and your assessment process?

The matrix emphasizes that successful assessment can only be realised by taking time to select appropriate learning objectives and measurable outcomes; deciding on appropriate assessment methods, and productively using the assessment results for continuous improvement of the courses or programs. This concurs with Hassanzadeh et al. (2012) who equally believe that assessment of student learning and institutional effectiveness influence the overall effectiveness of learning. Thus, only programs and services that support the

student's learning are offered. Hjeltnes and Hansson (2004) identified cost effectiveness as one of the factors affecting the effectiveness and efficiency of e-learning. Cost effectiveness either means; less costly and at least as effective; more costly and more effective with an added efficacy; or less effective and less costly, where the additional cost of the alternative is too high for the additional benefits provided. Therefore, cost effectiveness does not have to do with the cheapest alternative but the derived benefits of using e-learning.

An exploration of factors for promoting effective e-learning was scoped around TOEP. The study reviewed people's opinions on e-learning benefits; gave a technological view of e-learning system quality; and organisational and environmental view of e-learning readiness.

3.5.2.1 Benefits of e-learning – people perspective

Research reveals that effective e-learning can be influenced by lecturers' and students' perceptions of the benefits of e-learning (Omoda-Onyait and Lubega, 2011, Minton, 2000). Such perceived benefits may relate to easy access to course resources and enhancement to research and education (Kirkpartick, 1994, Snart, 2010). For mature professional and part-time students, e-learning enables them to combine work and education. E-learning offers a lot more benefits ranging from: self-paced study, any time availability, enhanced communication among the learners and instructors through emails, discussion boards; improved retention and reinforcement of information through self-paced studies, ability to reach diverse learners, among others (Rashty, 2001, Rosenberg, 2006, Snart, 2010).

In addition, the impact of an e-learning intervention can be determined by evaluating its effectiveness in regard to how the students' and institution's needs have been met (Gagné et al., 2005, Kirkpartick, 1994). Giving students flexibility to choose their preferred learning times and location (Snart, 2010, Clark and Mayer, 2003) promotes global access to educational learning opportunities (Curran, 2004). In their empirical investigation, Ozkan and Koseler (2009) sought to validate their methodological framework for evaluating the effectiveness of learning management systems within higher education. They focused on measuring students' perceived satisfaction with NetClass Learning Management System against six dimensions. These six dimensions in the proposed hexagonal e-learning assessment model included; service quality, system quality, content quality, learner perspective, instructor attitude and supportive issues.

Therefore, getting understanding of lecturer and student perceptions of e-learning benefits is a way of gaining knowledge of how to promote effective e-learning in order to harness full benefits of engaging in e-learning.

3.5.2.2 E-learning readiness – organisational and environmental perspective

E-learning readiness covers aspects that deal with an institution's preparedness to implement and sustain e-learning initiatives. Research on e-learning readiness gives an exposition of guidelines, questions, instruments, strategies and models that can be used by managers to assess institutional readiness for e-learning (Aydin and Tasci, 2005, Omoda-Onyait and Lubega, 2011, Psycharis, 2005). For instance, Aydin and Tasci (2005) developed an e-learning readiness assessment instrument comprising four variables technology, innovation, people and self-development to be assessed against three factors; resources, skills and attitudes. According to Aydin and Tasci (2005), each factor variable should be considered during assessment because there are instances where an organisation might have sufficient resources for adopting e-learning but lack the necessary skills for using the resources which may result in failure. Likewise, an organisation may have both resources and skills to implement e-learning interventions and yet have a negative attitude towards technology which will hinder the success of e-learning. Therefore, it is proper for managers to assess an institution's readiness for e-learning by analysing the resources it possesses as well as finding out the level of skills and attitudes of its employees.

Minton (2000) suggests that organisations making plans to embrace e-learning should carefully work out their implementation process. The danger of adopting e-learning without proper planning is that organisations will most likely experience cost overruns and develop unappealing e-learning content which in the long run will lead to failure (Minton, 2000, Clark and Mayer, 2003). Minton (2000) proposed seven fundamental questions that any organisation needs to answer in the planning stage. These questions are categorised into seven factors namely; e-learning benefits awareness, e-learning policies, e-learning human resource, e-learning support, e-learning sustainability costs, e-learning technological infrastructure and learner readiness. Minton (2000) believes that if these questions are answered well then an organisation can identify and allocate e-learning resources effectively. Generally the seven questions are defined as;

(1) Do you understand the changes e-learning will bring to your organisation?

(2) Is e-learning part of your organisation's integrated training strategy?

(3) Is there appropriate leadership throughout the organisation to support e-learning?

(4) Are the organisational support systems in place to sustain the adoption of e-learning?

(5) Is your technology capable of delivering e-learning predictably and effectively?

(6) Are individual learners prepared for distance learning?

(7) Do you have an overall change management plan in place to transition your organisation to e-learning?

In addition, Omoda-Onyait and Lubega (2011) developed an e-learning readiness assessment model. The model contains five factors namely; awareness, culture, technology, pedagogy and content. These factors were informed by the fact that having technological infrastructure alone is not enough to make e-learning successful (Omoda-Onyait and Lubega, 2011). Higher education institutions in developing countries are challenged when assessing their readiness for e-learning due to scarcity of assessment tools (Omoda-Onyait and Lubega, 2011, Keramati et al., 2011). Moreover the quality of e-learning content is still wanting with a low e-learning awareness within the Universities. To address the aforementioned challenges, Omoda-Onyait and Lubega (2011) believe that the five-layered triangle model offers institutions with an approach to assess their readiness for e-learning. Institutions should focus on developing ICT skills and raising e-learning awareness amongst the students and staff. In the long-run this will ease the fear for new technology and soften resistance to change.

It is therefore important to recognise that implicit values, skills, cultural attitudes, and policies may impact on how an institution transitions and sustains new educational systems such as e-learning. Czerniewicz and Brown (2009) noted that e-learning policy is one of the factors that impacts on the successful adoption of e-learning. This is because policy statements stipulated in the e-learning policies normally express the commitment of senior leadership to take-up, uphold and promote e-learning within institutions. Policy refers to the formal structure of allocation of goals, values and resources within organisations (Czerniewicz and Brown, 2009). E-learning policies tend to be embedded within institutional policies. Understanding a university's cultural practices and policies reveals how decisions are made around e-learning. For instance, culture is widely regarded as an instrument used by management to shape and control beliefs, understandings, and behaviours of individuals to help organisations reach specified goals (Fard et al., 2009). Culture in the educational sector is concerned with beliefs, attitudes and societal norms in regard to learning (Edmonds, 2001, Rosenberg, 2008). Therefore, e-learning culture looks at the attitudes and beliefs about using learning technologies within organisations (Edmonds, 2001, Rosenberg, 2008).

The Social Cognitive Theory (SCT) demonstrates how cultural influences on personal, environmental, and behavioural factors impacts on an individual's well-being and competence (Robert and Bandura, 1989). It is also believed that high expectations and self-efficacy are determinants of an individuals' attitudes, decisions, actions, investment efforts, and strategies towards any given situation (Bandura, 1977). Expectations mainly deal with an individual's

belief in achieving a desired outcome when performing a given task while self-efficacy refers to an individual's belief in their own abilities (Bandura, 1977). In support of achieving positive e-learning outcomes, Keramati et al. (2011) suggests three factors namely technical, organisational and social factors. Besides, Psycharis (2005) suggests three criteria, correlated and classified into: Resources, Education and Environment. The resources category examines an organisation's readiness in terms of technological, economic and human resource readiness. Education category examines an organisation's content readiness and educational readiness to organise, analyse, design, implement and evaluate educational courses and programs. Finally, the environment category examines an organisation's entrepreneurial readiness, cultural readiness and leadership readiness.

3.5.2.3 Quality of e-learning systems – technological perspective

There are various e-learning systems in use within universities. Although different in build-up, these e-learning systems offer common services. Some of the services include; learning content management, content delivery, user management and administration all of which have an impact on the learner experience (Gagné et al., 2005). Namahn (2010) presents an architectural view of design and function elements that need to be integrated in any e-learning system. An e-learning system architecture must integrate the following vital functions and services, namely; portal (learning internet and intranet), user management, collaboration (synchronous and asynchronous), event management (calendar / scheduling / reminders), learning content management system, learning management system and assessment tools (test / score / evaluation / surveys) (Namahn, 2010). During system development, teams need to engage adequately in requirements elicitation and analysis in order to identify processes, functionality and interface views for the intended system. System design is a vital aspect of system development with a set of principles to be followed. Namahn (2010) makes a mention of these principles namely; open architecture, scalability, global, integration, flexibility, rapidness and timeliness.

In fact Khan (2010) developed an e-learning framework that encapsulates the principles of system design. The framework is represented by eight dimensions named as; pedagogical, technological, interface design, evaluation, management, institutional, resource support, and ethical shown in Table 3.1. Any e-learning system development process has to follow a pedagogical design depictive of the entire scope of e-learning in order to promote effective learning (Khan, 2010). The e-learning framework is a platform to enhance learner experiences only if completely embraced by higher education institutions. The dimensions provide key information about factors needed for promoting effective e-learning.

Table 3.1 Eight-dimensional e-learning framework

Dimension	Focus on E-learning Environment	Specific factors
Pedagogical	Teaching and learning	• Analysis of content, audiences, goals, media, • Organisation and layout of e-learning systems • Design strategies, methods and approaches
Technological	Technology infrastructure	• Infrastructure planning • Hardware and software
Interface Design	Aesthetics and Design	• Page, site and content design • Navigation, accessibility • Usability testing
Evaluation	Assessment of learning and environment	• Assessment of learners • Evaluation of instruction • Evaluation of learning environment • Evaluation of content development processes • Evaluation of individuals involved in content development • Evaluation of institutional e-learning program
Management	Maintenance of learning environment	• Managing information distribution • Managing e-learning content development • Managing e-learning environment
Resource Support	Technical and human resource support	• Online support • Teaching and learning support • Technical support • Online and offline resources
Ethical	Social, cultural, digital	• Social and political influences • Cultural diversity • Learner diversity, digital divide • Legal issues
Institutional	Administration, academic affairs and student services	• Admissions, finances, payments, • Information technology services, policies • Graduation and grades

On the other hand, Antonis et al. (2011) proposed a learning design methodology focused on design, development and evaluation of distance-learning services. They developed a three-axis evaluation framework after a study of a web-based computer science course offered to adult students. The three axes in the framework were named as: 1) Information and support provided to learners at the beginning of and during their studies; 2) the learner's performance and 3) learner satisfaction. The results showed that the tutor's presence played a significant role in supporting and influencing students to complete the web-based course. Students

judged their satisfaction with the web-based course design on the basis of: support, enjoyment, benefits, content, adequacy and applicability. In this case, the students' perceived performance was high as they had great expectations to acquire knowledge and skills, although they were challenged with maintaining their motivation.

So the quality aspect in e-learning systems can be achieved by following DeLone & McLean IS Model (Delone and Mclean, 2003). The DeLone & McLean IS model is widely used to evaluate information system success. The updated IS model consists of six dimensions: system quality, information quality and service quality, net benefits, intention to use system and user satisfaction (Delone and Mclean, 2003, Dörr et al., 2013, Zaied, 2012). In relation to e-learning, system quality comprises help functions and end-user facilitation; information quality consists of end-user performance enhancement resulting from using system information; and service quality which facilitates the provision of quality support to end-users (Ozkan and Koseler, 2009, Hassanzadeh et al., 2012, Bhuasiri et al., 2012). A study of IS model application to e-learning helped establish that system quality and information quality significantly influence learner satisfaction (Hassanzadeh et al., 2012). Ozkan and Koseler (2009) found out that system quality increased the effectiveness of learning management systems while content quality created value and learner satisfaction.

To ensure the quality of courses, Wright (2004) developed a measurement criteria for educators and course developers to use when evaluating the effectiveness of e-learning courses. In his evaluation criteria, the following metrics were used, namely; accessibility of the course material, organisation of the course content, use of appropriate language for intended audience, layout of course content to facilitate learning, alignment of course goals and objectives, appropriateness of course content for the students' level, effective instructional and learning strategies, accessibility of learning resources, and evaluation of learners (Schunk, 2008, Olds, 2002, Wright, 2004, Gagné et al., 2005, Ozkan and Koseler, 2009).

3.6 Synthesis of factors from existing models

Design and implementation of e-learning is greatly influenced by learning theories, e-learning design models and e-learning readiness models. Reiser (2001) defines instructional design as an initiative towards problem elicitation and analysis, design of solutions, implementation, management, evaluation of instructional processes and resources to improve learning and performance in higher education institutions. The metrics in the different design models provide important information about factors necessary for facilitating effective

e-learning. The synthesized list of factors was decided by examining existing models to see if they concur with the idea of effective e-learning. For instance, if the goal of the model was to determine the effectiveness of an e-learning intervention then success models or systems design or e-learning readiness models were most appropriate.

Consequently, similarities between factors in the various models were identified by examining the different models. These factors were then collated, grouped and tabulated as shown on Table 3.2 and Table 3.3.

Table 3.2 A synthesised list of factors derived from learning design models

Learning Design Factors	Description	Source
Course Planning	• Analyse learner characteristics • Learning tasks and activities to be learned	(Schunk, 2008, Olds, 2002, Wright, 2004, Gagné et al., 2005, Ozkan and Koseler, 2009)
Course Content	• Develop learning objectives • Choose an instructional pedagogical approach	(Dick et al., 2009, Gagné et al., 2005, Clark and Mayer, 2003, Wright, 2004, Mergel, 1998, Mayes and De Freitas, 2005, Driscoll, 2002)
Course Design and Development	• Create instructional learning materials	(Dick et al., 2009, Gagné et al., 2005, Clark and Mayer, 2003, Wright, 2004, Mergel, 1998, Mayes and De Freitas, 2005, Driscoll, 2002, Ozkan and Koseler, 2009, Berk, 2003, Delone and Mclean, 2003)
Course Implementation	• Course delivery and • Distribution of e-learning material	(Dick et al., 2009, Gagné et al., 2005, Clark and Mayer, 2003, Wright, 2004, Mergel, 1998, Mayes and De Freitas, 2005, Driscoll, 2002, Khan, 2010)
Course Evaluation	• Ensure courses meet educational goals • Quality assurance by management and accreditation bodies • Uphold teaching and course content quality	(Gagné et al., 2005, Kirkpartick, 1994, Dick et al., 2009, Biggs and Tang, 2011, Olds, 2002)
Assessment and Feedback	• Evaluation of students' understanding • Provide learning progression feedback	(Mayes and De Freitas, 2005, Biggs and Tang, 2011, Kirkpartick, 1994, Olds, 2002)

Table 3.3 A Synthesized list of factors derived from e-learning readiness models

E-Learning Readiness Factors	Description	Source
E-Learning Awareness	• Raising awareness about the new e-learning technologies • Understanding of benefits of change	(Omoda-Onyait and Lubega, 2011, Minton, 2000)
E-Learning Cultural Readiness	• Organisational culture • Societal perceptions • Stakeholder attitudes and behaviour	(Aydin and Tasci, 2005, Omoda-Onyait and Lubega, 2011, Psycharis, 2005, Minton, 2000, Keramati et al., 2011, Akaslan et al., 2011)
E-Learning Technological Infrastructure	• Hardware • Software • Internet Access • Bandwidth • Laboratory Space	(Psycharis, 2005, Minton, 2000, Aydin and Tasci, 2005, Omoda-Onyait and Lubega, 2011, Akaslan et al., 2011, Keramati et al., 2011)
Content Readiness	• Effective e-learning content • Availability of e-learning content • Presentation of e-learning content in a variety types of media • Knowledge of pedagogical instructional design strategies and models	(Psycharis, 2005, Omoda-Onyait and Lubega, 2011, Akaslan et al., 2011, Rosenberg, 2000, Keramati et al., 2011)
E-Learning Policies	• Allocation of resources • Implementation of e-learning • Government e-learning initiatives	(Minton, 2000, Keramati et al., 2011, Czerniewicz and Brown, 2009)
Learner Readiness	• E-learning experiences • ICT Technology skills • Comfort with web technologies	(Minton, 2000, Omoda-Onyait and Lubega, 2011, Aydin and Tasci, 2005, Rosenberg, 2000, Akaslan et al., 2011)
E-Learning Financial Readiness	• Institutional investment in e-learning • Implementation and sustainability • Cost of developing e-learning content	(Psycharis, 2005, Minton, 2000)
E-Learning Support	• Performance management • Organisation design • Communications planning, execution and feedback	(Psycharis, 2005, Minton, 2000, Aydin and Tasci, 2005)
E-Learning Human Resource	• Staff skills development • ICT training • E-Learning system training	(Psycharis, 2005, Minton, 2000, Aydin and Tasci, 2005)

3.6.1 Description of parameters envisioned for the initial model

A synthesis of factors on Table 3.2 and Table 3.3 led to the identification of 10 factors shown on Table 3.4. The factors identified included: course content, course evaluation, student assessment and feedback, course planning, e-learning policies, e-learning culture, e-learning infrastructure, e-learning costs, e-learning support and quality learning management systems. Each of the factors is described by a list of items shown in Table 3.4.

Table 3.4 A Description of factors for facilitating effective e-learning

Factors	Description
Course Content	• Course module outline • Course module prior knowledge • Course module understandable • Course module progression levels • Course module learning outcomes • Course sequentially organised
Course Evaluation	• Course module alignment • Course module requirements • Course module periodic updates • Course module resources • Course module expectations • Course module difficulty • Course module teaching quality
Student Assessment	• Randomised online assessments • Knowledge of assessment criteria • Constructive feedback • Grading policy
Course Planning	• Student Learning needs analysis • Course resource analysis • Instructional strategies • Course module learning materials • Student enjoyment • Learning media analysis

E-learning Policies	• University vision to integrate e-learning • ICT Policies on e-learning staff representatives • Staff mentoring on e-learning use • E-learning special funds
E-learning Culture	• Beliefs about the value of e-learning • Attitudes towards e-learning • Academic achievement with e-learning • Societal norms on e-learning
E-learning Infrastructure	• Access to computing technologies • Tools for course module development • Up-to-date system platforms for course module delivery • Lecture recording capture system
E-learning Costs	• Cost of development of course module material • Cost of implementing e-learning systems • Cost of maintaining e-learning platforms • Cost of technical and e-learning support
E-learning Support	• E-learning induction training • Course module development support • On-demand support • Staff capacity development on use of e-learning • E-learning staff webinars • ICT training support
Quality Learning Management Systems	• Adaptability of course module platform • Ease of navigation • Consistency of course platform • User-friendliness • Multi-culturally appealing • Accessibility of course content • Event management • User management • Security of user data • Collaborative learning

3.7 Summary

An observation of teaching and learning in higher education reveals the effect of learning theories on learning outcomes. Some of these learning theories include: behaviourism, cognitivism, constructivism and humanistic theories. Behaviourism is guided by the fundamental principle that the learner is situated in a learning environment controlled by the teachers who reinforce the learning activities to which the learners respond. The learners are repeatedly assessed to determine if the learning objectives have been met. If no learning occurs, then repetition of the learning content is made until mastery is achieved. In cognitivism, it is assumed that new information is linked to prior knowledge; thus, students make associations with information, interpret it and create a mental construct of the information. In cognitivism, learners are presented with learning content broken down into smaller course units that are easily processed to aid retrieval. Thus, in assessing students, principles are retrieved from the mental construct and applied to a contextual situation. In contrast to cognitivism, constructivism offers students the freedom of getting involved in their own knowledge acquisition through individual knowledge construction. In assessing a learner, there is an establishment of a two-way interaction between the learner and the instructor, who determines whether the learning outcomes have been met. If not met, the instructor offers guidance in a bid to improve achievement of learning outcomes. However, the humanistic learning theory surpasses all the other theories as it presents the notion of self-actualisation, thus focusing on the entire education of a person, rather than concentrating on individual elements of education. In evaluating students, the emphasis is placed on determining how well the students are physiologically, environmentally, socially, mentally and self-esteem-wise. These learning theories have been adapted across various learning interventions. In fact constructivism theory is seen as an appropriate match for e-learning design because it aids active student participation which enables construction of knowledge.

The design of any e-learning system would go through a series of stages including; problem elicitation and analysis, design of solutions, implementation, management, evaluation of instructional processes and resources. Some of the learning system design models and frameworks that have been developed so far include: ADDIE model, The Dick and Carey model. Evaluation models include: Tyler's evaluation model, which works on the premise that for a program to be planned and consequently improved, programme goals must be measured against actual performance, Scriven's goal-free evaluation model focuses on the actual outcomes of a program or activity as opposed to concentrating only on those goals that were identified. This type of model enables the identification of outcomes that may not have

been identified by program developers. Stufflebeam's CIPP evaluation model focuses on the collection of four different types of data to inform the decisions of organizational administrators: context, input, process and product; Kirkpatrick's four-level evaluation model is suitable for determining the effectiveness of an intervention.

E-learning has grown to be adopted within HEIs because of the leverage it offers traditional classroom-based learning. E-learning involves the use of technologies such as computers, the web, internet, and instructional technologies to aid development and dissemination of learning content between instructors and learners. E-learning is beneficial because it offers a platform for on demand course content delivery, lifelong learning, social and intellectual collaboration between students, instructors and content developers. E-learning may be delivered as synchronous e-learning or asynchronous e-learning which may be in form of small chunks of content or massive open online courses (MOOCs). To be specific there are two MOOCs models in use namely; cMOOCs and xMOOCs. But it is xMOOCs that is widely used in Universities that are implementing MOOCs within their institutions.

Effective e-learning may be determined by evaluating effectiveness in regard to how satisfactorily students are engaged in planning, monitoring and review of their learning strategies. SCT presents the ideology that an individual is compelled to perform a specific task based on the expected outcome and self-efficacy. On the other hand, the Information Systems Success Model by DeLone and McLean presents six main dimensions for evaluating the success of information systems and these include: system quality, information quality, service quality, net benefits, and intention to use system and user satisfaction. In addition, the assessment matrix was developed comprising questions intended to assist faculty members to develop their assessment plans by answering those questions. The matrix emphasizes that successful assessment can be realised by taking time to select appropriate learning objectives and measurable outcomes; deciding on appropriate assessment methods, and productively using the assessment results for continuous improvement of the courses or programs. The hexagonal e-learning assessment framework proposes use of six dimensions, namely; service quality, system quality, content quality, student perspective, instructor attitude and supportive issues. After critically analysing existing learning design models, e-learning success models and e-learning readiness models, a list of factors that conform to the notion of effective e-learning were identified. As a result, a synthesized list of factors were identified including: course content, course evaluation, student assessment and feedback, course planning, e-learning policies, e-learning culture, e-learning infrastructure, e-learning costs, e-learning support and quality learning management systems.

Chapter 4 Methodology for this research study

The previous chapter describes models and frameworks related to learning design and success of e-learning systems. The outcome of the literature review led to the formulation of a set of parameters envisioned for the development of the initial model. The anticipated model parameters were further examined through pilot and fieldwork studies. This chapter describes the methodological process followed in conducting both pilot and fieldwork experiments. Quantitative and qualitative research methods were used. The pilot study explored the views and opinions of study participants regarding factors that are necessary for facilitating effective e-learning while the fieldwork experiment was carried out to confirm the factors essential for ensuring the effectiveness of e-learning. However before embarking on the studies, an understanding of the research ethics was sought as described herein. This chapter also describes how the various study participants were selected and the statistical tests that were performed on the data obtained.

4.1 Overview of the methodology

This research study was intended to elicit information on how to facilitate effective e-learning within universities. Johnson (1994) recommends an approach to conducting research based on completing a set of predefined activities. The activities include; establishing the focus of the study, identifying the specific objectives of the study, selecting the research method, obtaining research approval, developing the research instrument, collecting the data, analysing the data, write-up and dissemination of results / findings. Johnson's approach was chosen because it is grounded on principles and methods for conducting educational research. This approach was adapted as diagrammatically represented in Figure 4.1. This figure is an illustration of the entire research study. The activities involved thorough review of relevant literature, identification of research gaps, objectives and questions; systematic collation of ideas from existing theories; pilot and fieldwork studies which culminated to findings and results which aided development of the model. Both qualitative and quantitative data was collected and analysed. Some of the analyses included: descriptive statistics, tests of statistical significance and factor analysis. For quantitative research, both online surveys and paper-based questionnaires were used. The study participants were required to rate the questionnaire items. This was done to explore the approaches appropriate for facilitating effective e-learning. As for the qualitative research, interviews were arranged with participants actively engaged in e-learning within their universities.

4.2 Schematic view of the research methodology

The schema diagram in Figure 4.1 depicts the research workflow. The schema details out the research techniques, research objectives, research outcomes and data analyses performed. A detailed description of the schema is given in the sub-sections below.

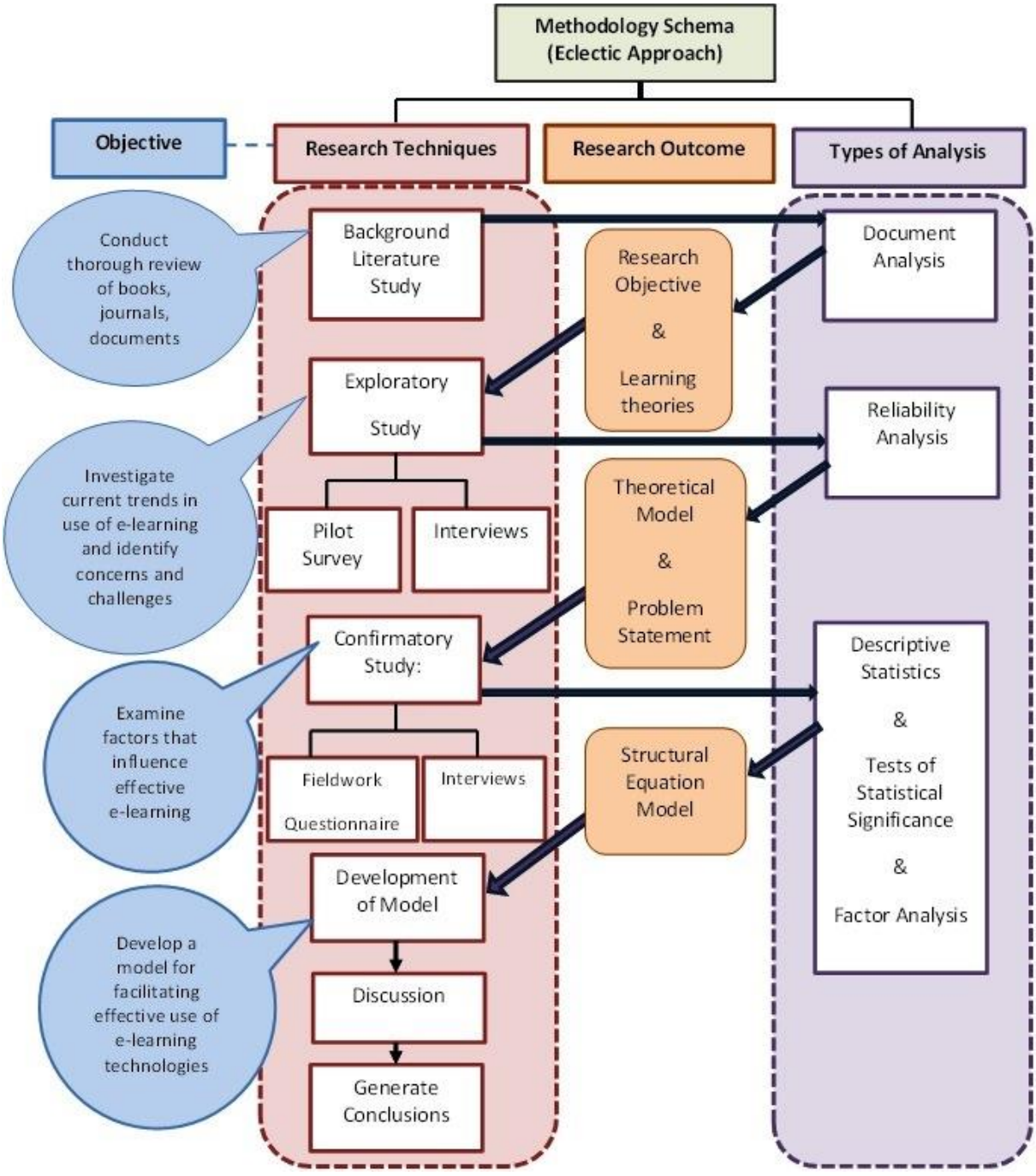


Figure 4.1 Schematic Representation of the research methodological approach

4.2.1 Background literature study

A literature study was done at the initial stage of the research. The aim was to find literature relevant in addressing the first research question in section 1.2 stated as; **'What is the state-of-the-art in regard to trends and practices of e-learning in Universities?'** This first research technique involved extensive review of journal articles and books with an aim of finding gaps in the current practices of e-learning within HEIs. The document analysis led to the identification of existing problems, learning theories and e-learning models. A synthesis of factors in section 3.6 was developed as an output from this stage. The research outcomes from this stage became input for the pilot study - the next stage of the research methodology.

4.2.2 Exploratory pilot study

This stage of the research methodology involved conducting a pilot survey coupled with interviews. The aim was to address research question in section 1.2 stated as; **'What factors are necessary for facilitating effective e-learning in universities?'** The events in this stage were informed by a predefined list of factors identified in section 3.6. The factors presumed to be potentially relevant for facilitating effective e-learning were used to develop the pilot study instruments in Appendix B (Pilot Survey) and Appendix C (Interview Guide). The quantitative responses were obtained from participants actively engaged in e-learning within universities while qualitative data from interviews helped in understanding the ways of facilitating effective e-learning. Overall, the results and findings from this stage were used in designing the initial model.

4.2.3 Development of the initial model

This stage describes the process of developing the initial theoretical and conceptual model. The initial model was developed based on information from learning theories, e-learning models, findings and results from the pilot study. The aim was to answer research question in section 1.2 stated as; '**What factors make up a structure of a model for fac1.1ilitating effective e-learning in universities?'**

4.2.4 Confirmatory study

The fieldwork experiment was conducted to confirm the parameters in the initial model. To serve this purpose, a questionnaire instrument in Appendix D was designed based on the theoretical model. The aim was to obtain data responses to help answer research questions in section 1.2 stated as; '**Are there any significant relationships among the variables in the**

model?', 'Are there any significant relationships among the factors in the model?' and 'Does the data provide the best fit for the model?' The quantitative data was subjected to the following statistical tests, namely; descriptive statistics, tests of statistical significance, Multivariate Multiple Regression Analysis, which led to confirmation of the strength of factors in the model. The hypotheses were also tested.

4.2.5 Discussion

This is the stage where a position on the research goal was drawn based on the study findings and results. Both positive and negative criticism on the findings and results is presented while making reference to the literature. Thereafter conclusions were drawn.

4.2.6 Conclusions

In reference to the discussion, conclusions were generated also linked to the research questions in section 1.2. These conclusions were drawn to depict final thoughts and remarks about the completed research study.

4.3 Research Objective

In reference to section 1.1, the main objective of this research study was to learn ways of facilitating effective e-learning in universities and thereafter present an appropriate model.

4.4 Research Questions

In an attempt to accomplish the objective of this research study, answers to following research questions were sought in reference to 1.2. These research questions include;

a) What is the state-of-the-art in regard to trends and practices of e-learning in Universities?
b) What factors are necessary for facilitating effective e-learning in Universities?
c) What factors make up a structure of a model for facilitating effective e-learning in Universities?
d) Are there any significant relationships among the variables in the model?
e) Are there any significant relationships among the factors in the model?
f) Does the data provide the best fit for the model?

4.5 Quantitative and Qualitative Research Methods

Both quantitative and qualitative research methods were used to gather data from study participants. Quantitative and qualitative data was obtained using two instruments namely; semi-structured interviews and questionnaires (Bell, 2005, Denscombe, 2010). Questionnaires and interview guides were developed as instruments of measurement as evidenced in Appendix B, Appendix C and Appendix D. These instruments were used for conducting the pilot and fieldwork studies as a means to investigate and confirm factors required for facilitating effective e-learning within Universities. Responses obtained from questionnaires were analysed using SPSS (Field, 2009) while interview responses were qualitatively analysed (Litchman, 2009) using NVIVO (Bazeley, 2007) software tool.

4.5.1 Quantitative Research

Quantitative research usually involves use of questionnaires, structured interviews, observation and document review to obtain quantitative data (Denscombe, 2010). Bell (2005) states that quantitative research involves the collection of facts and the study of relationships between sets of facts using research techniques that most likely produce quantified and if possible generalizable conclusions. Online questionnaires were used in both pilot and fieldwork studies while hard copy questionnaires were only used in the fieldwork experiment.

4.5.1.1 Pilot survey instrument

The online survey was used to reach study participants who were geographically spread across the continents of Africa, Asia and Europe. The online-based questionnaire was generated using isurvey (a survey generation and research tool for distributing online questionnaires) available to members of staff and students of University of Southampton. The online survey was made up of mandatory questions (Rudestam and Newton, 2007) to be answered by participants.

The participants were asked to rate the importance of each factor-item in enabling effective e-learning within universities. The response options were based on a four-point scale, thus; an item with score "1= Not Important" means it is subject to exclusion as that item does not affect the measure of effectiveness of e-learning. Contrary to that, if an item is rated as a "4 = Very Important" then the exclusion of that item would be detrimental to the measure of effective e-learning. An item with a rating of "2 = Somewhat Important" and "3 = Quite Important" may need a revision in terms of wording or reorganization to make it more relevant to describing effective e-learning within universities.

An exemplar question is shown in Table 4.1 which generally asks how important this item is in describing an institution's readiness to support e-learning. In this particular case, the item is labelled as *18: E-Learning Course Module Development Support: Staff are offered technical support and advice needed to develop course content.* The respondents had to choose one of the scores on the scale depending on how much they were in agreement with the importance of the items as in appendix B.

Table 4.1 An exemplar item for e-learning support in the pilot survey

Potential Items		**Not Important**	**Somewhat Important**	**Quite Important**	**Very Important**
18	***E-Learning Course Module Development Support:*** *Staff are offered technical support and advice needed to develop*				

4.5.1.2 Questionnaire for the fieldwork experiment

Both online and hard copy questionnaires were used in the fieldwork experiment to reach respondents in and out of my sphere of influence. The online survey was distributed via email while hard copy questionnaires were handed to respondents representing universities in Africa, Asia and Europe. Paper-based questionnaires would usually contain a set of questions which all participants are asked to complete (Rudestam and Newton, 2007).

The response options were based on a five-point scale format, thus; If an item is deemed as a "1= Strongly Disagree" then the exclusion of that item does not affect the measure of effective e-learning. Contrary to that, if an item is rated as a "5 = Strongly Agree" then the exclusion of that item would be detrimental to the measure of effective e-learning. An item with a rating of "2 = Disagree" may be disregarded as a measure of effective e-learning and "4 = Agree" means the items may be considered as a factor for facilitating effective e-learning while item with a rating of "3 = Neutral" may be ignored as it does not make a significant contribution to the result. An exemplar question on the factor of e-learning support is given in Table 4.2.

Respondents were asked to rate how much they agreed or disagreed with the items in the questionnaire based on the e-learning experiences within their universities. In general, the item 25 in Table 4.2 states; *we are given all necessary support and advice on developing e-learning course content.* The respondents had to choose one of the scores on the scale depending on how much they were in agreement with the items as in appendix D.

Table 4.2 An Exemplar Item on e-learning support in the fieldwork experiment

Potential Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
25	***E-Learning Support:*** *We are given all necessary support and advice on developing e-learning course content.*					

4.5.1.3 Benefits of quantitative data analysis

Using quantitative analysis has many benefits such as provision of answers to closed-ended questions in questionnaires (Denscombe, 2010). In addition, quantitative analysis allows for the application of various forms of statistical methods of analysis derived from principles of mathematics and probability. Quantitative analysis also helps raise the level of confidence on the research of interest by running statistical tests of significance to support the credibility of the researcher‘s data interpretations and findings (Field, 2009). This is the foundation for authentic measurement, description and analysis of data quantities which can be checked by anyone (Field, 2009) and allows analyses to be performed quickly on large amounts of data (Denscombe, 2010).

4.5.2 Qualitative Research

Bell (2005) argues that researchers adopting a qualitative approach are more interested in understanding an individual’s out-look of the world, therefore a qualitative researcher looks for insights instead of statistical perceptions of the world. Interviews are recommended for gaining insights into things such as people’s emotion, views, feelings and experiences (Denscombe, 2010, Litchman, 2009). According to Bell (2005), it is the duty of the researcher to ensure that the participants are made aware of the purpose of the interview before hand, as well as obtaining informed consent in line with ethical standards.

4.5.2.1 Semi-structured interviews for the exploratory and confirmatory studies

As follow-up to the quantitative research study, face-to-face interviews were set up with some of the study participants. The interviews were guided by an interview guide shown in appendix C. The responses were coded and analysed using a qualitatively analysed using NVIVO software tool (Bazeley, 2007).

4.5.2.2 Benefits of qualitative data analysis

According to Denscombe (2010) qualitative analysis is beneficial because it allows for the acceptance of vagueness and oppositions as well as allowing for the researcher to use their

interpretative skills as there is the possibility of more than one explanation being obtained. However, qualitative research requires a large amount of the investigator's time during the interviews, transcribing and coding of the data.

4.6 Selection of study participants

For both pilot and fieldwork studies the participants were recruited using convenience sampling. The participants were identified using convenience sampling, a technique of non-probability sampling. This was done after identifying universities engaged in e-learning with appropriate study characteristics. The study participants were then selected because they could easily be contacted and reached. Although the selection was non-probabilistic, the participants contacted were randomly selected based on convenience. The participants consisted of two groups: one drawn from e-learning educationalists including lecturers, senior lecturers and PhD students while the other group was made up of e-learning technologists comprising learning designers and e-learning system developers. The participants were identified from the following Universities: University of Southampton, Southampton Solent University, Kyambogo University, Open University in South Africa, Makerere University, University of Cape Town, University of Indonesia, University of Thailand, University of Malay, Cape Peninsula University of Technology and University of Surabaya.

An instrument was designed for the purpose of conducting the fieldwork experiment. The questionnaire instrument was developed based on the theoretical model consisting of factors and variables. The factors included; E-learning Policies, E-learning Readiness, Quality of Course Design, Quality of E-learning Systems, Effective E-learning, Prior Experience in E-learning, E-learning Benefits Awareness and Interactive Discussions while the variables included; course content, student assessment, course delivery, course evaluation, e-learning support, e-learning culture, e-learning infrastructure, e-learning costs, quality of LMS and quality of service delivery. Based on these factors and variables, multiple questions were developed as shown in the questionnaire instrument in Appendix D.

The instrument was pilot-tested with an aim of establishing the length of time taken by respondents to complete the questions. During this time, observation was made on any questions that seemed difficult to understand or had multiple meanings. Two academic staff, two e-learning educationalists and two e-learning technologists were contacted for the purpose of checking if the questions were understandable. The two academic staff identified belonged to the faculties of Information Systems and Information Technology respectively. To be specific, one academic was a Professor of Information Systems while the other was a

Lecturer in the Faculty of Information Technology. On the other hand, the e-learning educationalists were identified from amongst the postgraduate researchers engaged in e-learning systems design while the e-learning technologists were members of staff in the centres of e-learning instructional design and development. Feedback about the instrument was obtained from participants in form of responses about how they understood each question and their choice of response. After pilot-testing the instrument, the patterns in the feedback were used to revise the instrument, which helped minimise the measurement error in the fieldwork experiment.

For both pilot and fieldwork studies, an invitation email soliciting participation of respondents was sent out at least two weeks before the actual start of the study. This gave the participants enough time to respond to the request. The invitation described the purpose of the study, reason for selecting the study participants and how they would contribute to the study including a brief description of the instrument as per the invitation email in Appendix A.

As for qualitative research, face-to-face meetings were arranged with the interview participants. These meetings were arranged via email and telephone. One of the key concerns was on how many participants was enough for doing qualitative research. In qualitative research the term ‘saturation’ is used to refer to a point where having additional interview participants does not yield new insights (Guest et al., 2006). In fact it was shown that saturation often occurs after about 12 interviews. Guest et al. (2006) recommend recruiting between 12 and 15 interview participants to ensure saturation is reached.

4.7 Ethical Considerations

Before embarking on any fact finding mission, it is important to ensure that all ethical standards, consents and approvals are obtained at every stage (Cousin, 2009). Cousin (2009) noted that there were at least two good reasons for having a strong ethical framework for a research project. Firstly, it is a protective function for the researcher and for what was being researched and secondly it is facilitative as it acts as an ethical orientation that supports the thoughtful conduct of the research process as well as the eventual credibility of the research report.

Consideration was given towards achieving the research focus, aim and objectives while paying attention to doing no harm and being open, honest and careful, virtues that describe a good researcher (Cousin, 2009). Cousin (2009) cites considerations to be embraced by researchers engaged in the process of conducting research. These include:- reflectivity, trustworthiness, intellectual ability, corroboration and social responsibility.

Reflectivity is recognition that data obtained is likely to be influenced by the setting of the questions, methods and research tools adopted and derived interpretations. Cousin (2009) advises researchers to reflect on issues in order to recognize the researcher‘s position. Therefore it is preferable to present the data in passive form normally associated with scientific research i.e., the third person. Trustworthiness deals with how interviews and focus group discussions are considered. Credibility of findings must be double checked to ensure inaccurate assumptions are eliminated to reduce the possibility of misrepresenting the evidence provided. The researcher is expected to be intellectually informed by developing strong and convincing arguments with adequate literature to underpin the theoretical claims made. This was achieved through thorough review of literature at the beginning and throughout the research. Corroboration is about sharing research findings and results with research subjects and/or other researchers in academia as well as industry through conferences, poster competitions, seminars and journal papers. As concerns social responsibility, the researcher upheld issues of equity, quality, academic freedom and respect for other scholars by safeguarding the rights, dignity and confidentiality of the participants.

The researcher consented to these virtues by completing and signing the University of Southampton ethics form and an ethics reference number was issued as shown in appendix A.

4.8 Data Analysis and Interpretation of Results

After collecting the data, quantitative and qualitative analyses were performed using SPSS statistical data analysis software (Field, 2009) and NVIVO software (Bazeley, 2007) respectively. Some of the statistical tests performed are described herein.

4.8.1 Descriptive statistics

Descriptive statistics of the items in the survey instruments were computed to establish frequencies, cross-tabs, means and standard deviations of the items that were rated. Descriptive statistics were calculated using the ‘Analyse’ menu using either the Descriptive or Frequencies command under Descriptive Statistics (Field, 2009). Computing descriptive tests for more complex designs involving more than one independent variable requires the use of Means/ Compare Means or the Descriptive Statistics/ Crosstabs command as it captures descriptive statistics of subgroups. Normally, data which falls in the category of either continuous or categorical data detects what sort of descriptive statistical tests to be run. For instance, continuous or measurement data will typically be used to compute measures of central tendency and measures of variability while categorical data (i.e., nominal data) will be

used to report on the frequency of each value (Field, 2009). Although frequencies are not typically computed for categorical data, it is often useful to observe the frequency distributions or histograms of continuous distributions to determine their central tendency whether it is normal or skewed.

4.8.2 Power Analysis and Sample Size Computation

Power is defined as the probability that a statistical test will find a statistically significant difference when such a difference actually exists (Cohen, 1988, Mayr et al., 2007). Thus, it is the probability of rejecting the null hypothesis to avoid committing a Type II error (Field, 2009). Type II error is the possibility of not finding a difference when it actually exists, i.e. incorrectly retaining the null hypothesis (H_0) when it's actually false. On the other hand, Type I error (α) refers to a possibility of finding a difference which does not exist, i.e. incorrectly rejecting the null hypothesis (H_0) when it's actually true. Power (1 – β) therefore looks at the possibility of correctly rejecting the null hypothesis (H_0) when it's actually false. The Power theory seeks answers to four fundamental questions before performing any computation including; *What type of statistical tests are to be run; the alpha (α) value to be used; the expected effect size and the sample size to be used* (Mayr et al., 2007). A Power value of 0.8 or greater gives a good chance of detecting an actual difference in the null hypothesis (Mayr et al., 2007).

In the pilot study, A Priori Power Analysis (Mayr et al., 2007) was calculated while both A Priori and Post-hoc analyses (Mayr et al., 2007) were computed in the fieldwork study. A Priori analysis is done before the study begins because it provides a way of controlling both Type I and Type II errors. In other words, it is used to determine the necessary sample size (N) given a desired level of alpha (α), power level (1 – β) and size of the effect to be detected. The effect size is a measure of the difference between the null and alternate hypotheses.

On the other hand, Post-hoc analysis is normally performed after the study has been conducted and usually the sample size (N) would already be known. So given the sample size value, alpha value and specified effect size, the power level (1 – β) or actual power (β) is computed with an aim of reaching a desired sample size that will generate a greater power. After entering the already existing values, a power value ranging between 0 and 1 is generated. If the power (1 – β) is less than 0.8 then you would have to increase the sample size. For the fieldwork experiment, the ideal sample size (N) was reached after generating the desired power (1 – β) greater than 0.8 shown in Table 4.4.

4.8.2.1 Pilot Survey: A Priori Power Computation

After running the A Priori power test, a sample size of sixteen was generated as shown on Table 4.3. The required sample size for the pilot survey was determined to be sixteen. However a total of twenty-five participants were contacted from Universities in Africa, Asia and Europe. At the end of the survey there were exactly sixteen respondents who fully completed the survey.

Table 4.3 A Priori Power Sample Size Calculation

T tests – Means: Difference between two independent means (two groups)		
Analysis	**Post hoc: Compute required sample size**	
Input	Tails	Two
	Effect size d	2.0000000
	α err probability	0.05
	Power (1-β err prob)	0.95
	Df	14
Output	Sample Size group 1	8
	Sample Size group 2	8
	Total sample size	**16**
	Actual power	0.9602208

4.8.2.2 Fieldwork experiment: A Priori and Post-Hoc Power Computation

A good rule of thumb for selecting an appropriate sample size for factor analysis states that a study should have at least 10 to 15 participants per factor (Field, 2009, Hair et al., 2010). In order to have a large dataset, 10 participants per factor were initially considered to estimate A Priori sample size. With the theoretical model made up of eleven factors, estimates of A Priori sample size resulted to 110 participants. However due to research limitations the target of 110 responses could not be reached. A Post-Hoc power computation was performed as a remedy and a sample size of 80 was generated as shown in Table 4.4.

Post-Hoc power computation was performed in order to find the right sample size that would give a power greater than 0.8 for performing the tests of significance. After applying the Post-Hoc power computation, a sample size of 80 corresponding to a power of 0.84 was generated as shown in Table 4.4. A smaller sample size is deemed sufficient if results have several variables with factors loading above 0.80 (Field, 2009, Hair et al., 2010).

Table 4.4 Post-Hoc Power Sample size Computation

F tests – ANOVA: Fixed effects, main effects and interactions		
Analysis	**Post hoc: Compute achieved power**	
Input	Effect size f	0.50
	α err probability	0.05
	Total sample size	**80**
	Numerator df	10
	Number of groups	3
	Number of covariates	1
Output	Noncentrality parameter λ	20.0000000
	Critical F	1.9577115
	Denominator df	76
	Power (1-β err prob)	**0.8428888**

4.8.3 Tests of Statistical Significance and Effect Size

Tests of statistical significance are usually performed to establish whether there is a relationship between variables. The relationship between variables can be determined by running Correlations (Field, 2009) and Regression Analysis (Field, 2009). Two questions normally arise in hypothesis testing; (1) What is the probability that there exists a relationship between the variables and (2) If it does, how strong is the relationship. The strength of the difference or relationship is measured by the effect size. In other words, tests of statistical significance also known as inferential statistics specific to this research included; Independent T-test Means, Independent T-test Correlations and Analysis of Variance (ANOVA F-test) (Field, 2009).

4.8.3.1 Independent Means T-test

Firstly, the Independent Means t-test was computed to produce the t-statistic used to establish whether there were any differences in responses in order to either reject or accept the null hypothesis (Field, 2009). The aim was to find out whether there were any significant differences in the opinions of the two categories of respondents, e-learning educationalists and e-learning technologists. T-test analysis was performed to find out whether there were differences in the group means of e-learning educationalists and e-learning technologists.

4.8.3.2 Reliability Analysis

Reliability Analysis is performed to determine whether there are any relationships between factor variables (Field, 2009). The reliability of the items in the questionnaire were computed to determine the internal consistency of factor variables in representing the opinions of the participants (Field, 2009). To do this, Cronbach's alpha (α) (Field, 2009) was computed for each of the factors and the total item-correlation computed.

The computations of Cronbach's alpha (α) helped in understanding a number of things including; (i) structure of the set of variables (ii) variables to be included in the questionnaire for the fieldwork experiment and (iii) what variables can be combined into groups to measure one underlying collinear factors. A technique of factor analysis known as principal component analysis was used to identify groups of variables to be included in the final questionnaire instrument for conducting the fieldwork experiment.

4.8.3.3 Independent ANOVA (F-test)

And lastly the ANOVA F-test (Hair et al., 2010, Field, 2009) was run to determine whether similarities or differences existed in any three or more means. Therefore the independent ANOVA tests produced the F-test statistic. The F-test statistic was used as an indicator of similarity or difference in the mean responses. For any effect identified, computations of the effect size were made to measure the difference between the null and alternate hypotheses. The size of an effect is commonly measured using the correlation coefficient, thus; values of ± 0.1 represent a small effect, values of ± 0.3 represent is a medium effect while values of ± 0.5 represent a large effect. Overall the entire experimental data was subjected to ANOVA tests.

4.8.4 Multiple Regression Analysis

Multiple regression analysis was also used to test the hypotheses ($H_1 - H_8$) to establish the structure of the variables and their relationships to each other (Hair et al., 2010, Schumacker and Lomax, 2010). Development of models follows a systematic approach of model specification, identification, estimation, testing and modification (Hair et al., 2010, Schumacker and Lomax, 2010). The strengths and structure of variables is viewed through path diagrams (Hair et al., 2010) and structural models (Hair et al., 2010, Schumacker and Lomax, 2010) which are generated using structural modelling software such as LISREL and SPSS AMOS cited in (Schumacker and Lomax, 2010).

The relationships between factor variables were tested using measures of Correlation Coefficient and Covariance. A standardised measure of Covariance produces the Pearson's Correlation / Regression Coefficient (r) which tests the contribution of each variable to the factor. It is always expected that the Correlation coefficient (r) lies between (-1) and (+1). A correlation coefficient of (+1) is an indicator of a perfect positive relationship, a correlation coefficient of (-1) is an indicator of a perfect negative relationship and a correlation coefficient of (0) is an indicator of no linear relationship.

Mathematically a factor can be represented in form of an equation (Field, 2009) shown;

$$F_{i=1} = \sum_{i=1}^{n} b_{i=1} \cdot X_{i=1} + \cdots + b_{i=n} \cdot X_{i=n} \ + \varepsilon_i$$

The symbol F in the equation represents the Factor, *b* represents Factor Load, *x* represents the variable, *i* represents the number of variables while ε_i is the probability error.

$X_1 \cdot X_2$ denotes the Correlation Coefficient which signifies the relationship between variables while Pearson Correlation / Regression Coefficient is denoted by $F_i \cdot X_i$ that is the contribution of a variable to a factor.

A factor loading (*b)* is calculated for variables along their classification axis that is the underlying factor (Field, 2009). A factor loading is the correlation between a factor and variable. Interpretation of factor analysis is facilitated by rotation. Orthogonal rotation (Field, 2009) is used when the underlying factors are assumed to be independent while oblique rotation is used in situations where the underlying factors are assumed to be related or dependent on each other.

4.9 Summary

The methodological process reveals six research techniques that were used during the research study. This process involved doing a background literature study, exploratory pilot study, confirmatory fieldwork study, statistical analysis, discussion of findings and drawing conclusions. The outcome of these processes led to the generation of research questions, research objectives and development of the initial theoretical model. As part of the study, both quantitative and qualitative research methods were used to gather factual and insightful data from study participants. The study participants were recruited from the university fraternity and categorised as either e-learning educationalists or e-learning technologists. Selection of participants was dependent on knowledge held about their experiences in e-learning. So participants recruited were representing universities operating in technology-enhanced

learning environments in Africa, Asia and Europe. The instruments used during the study included; online surveys, questionnaires and semi-structured interviews. The questionnaire instrument was designed based on the theoretical model consisting of the following factors; course content, course evaluation, student assessment, course delivery, e-learning policies, e-learning infrastructure, e-learning support, and quality of LMS, quality of service delivery, e-learning benefits awareness, interactive discussions, student characteristics and prior e-learning experience. After the data was collected, a number of statistical tests were run using SPSS statistical analysis package and NVIVO qualitative data analysis software. Some of these tests included; descriptive statistical tests and tests of statistical significance namely; independent means T-test, independent ANOVA F-test, multiple regression analysis and reliability analysis with Cronbach alpha (α) calculation and regression analysis.

Chapter 5 Results and Findings to determine the factors necessary for developing the initial model

The previous chapter describes the methodological process that formed the structure for conducting the entire research study. As part of the methodology, an exploratory study was conducted through the pilot survey and interviews. The data collected from the pilot survey was analysed and evidence of results presented in the demographics, reliability tests and hypothesis tests while the findings from the interviews were coded into unique views and opinions from study participants.

This chapter presents results and findings from the exploratory study. The results discussed in the sub-sections below are based on data obtained from 16 respondents. The G-power sample size computation on Table 4.3 gave a measure of the ideal sample size for the pilot survey to be 16 as discussed in section 4.8.2.1. However, a total of 25 respondents were contacted via email with the survey link. Out of these exactly 16 participants responded.

5.1 Demographics

Demographic information was captured in the first section of the survey questionnaire. Participants responded to the following questions on demographic information;

- Level of education
- Current designation
- How long e-learning technologies have been used

5.1.1 Level of education

The results showed that participants were mostly doctoral degree holders or doctoral students accounting for 50% of the total number of respondents as shown in Table 5.1.

Table 5.1 E-learning study participants' level of education

Level of education	Frequency	Valid Percent	Cumulative Percent
Bachelor's Degree	2	12.5	12.5
Postgraduate Diploma	1	6.3	18.8
Master's Degree	5	31.3	50.0
Doctoral Degree	8	50.0	100.0
Total	16	100.0	

5.1.2 Current designation

Most of the participants revealed to be holding positions as lecturers and e-learning designers within the Universities totalling to 75% of respondents as shown in Table 5.2.

Table 5.2 Current designation of study participants

Current Designation	Frequency	Valid Percent	Cumulative Percent
Assistant Lecturer	1	6.3	6.3
Lecturer	6	37.5	43.8
E-Learning Designer	5	31.3	75.0
E-Learning System Developer	3	18.8	93.8
Senior Lecturer	1	6.3	100.0
Total	16	100.0	

5.1.3 Categorisation of study participants

Having obtained the data about participants' designations, they were categorised as either e-learning educationalists or e-learning technologists as shown in Table 5.3. Out of the sixteen responses, there were eight e-learning educationalists and eight e-learning technologists.

Table 5.3 Category of study participants

Current Designation	Category of Study Participants		Total
	E-learning Educationalists	E-learning Technologists	
Assistant Lecturer	1	0	1
Lecturer	6	0	6
E-Learning Designer	0	5	5
E-Learning System Developer	0	3	3
Senior Lecturer	1	0	1
Total	8	8	16

5.1.4 Cross-tabulation of how long e-learning technologies had been used against the category of study participants

From Table 5.4 it is shown that seven participants had over fifteen years' experience in the use of e-learning technologies of which one was an e-learning technologist and the rest were e-learning educationalists. On the other hand, there were a total of six e-learning technologists who had 6 to 10 years' experience in using e-learning technologies.

Table 5.4 How long e-learning technologies have been used against participant category

		How long E-Learning Technologies have been used				Total
		1 to 5 years	6 to 10 years	11 to 15 years	Over 15 years	
Category of Study Participants	E-learning Educationalists	0	0	2	6	8
	E-learning Technologists	1	6	0	1	8
	Total	1	6	2	7	16

5.2 Category of study participants and their choice of factors for facilitating effective e-learning

Based on the demographic data obtained, it was imperative to run an independent t-test to establish whether there were any differences in views of the two categories of study participants and whether these differences could have impacted on their choices of factors for facilitating effective e-learning. On average, the e-learning educationalists rated more items as being very important for facilitating effective e-learning (M=3.5287, SE=0.16121) than the e-learning technologists (M=3.1086, SE=0.05644) as shown in Table 5.5. The results of Levene's test in Table 5.6 is non-significant because $p = 0.217$ is greater than 0.05 hence equal variances are assumed. The differences in item ratings by e-learning educationalists and e-learning technologists are not significant $t(14) = 2.459$, $p>0.05$. This means that there is a similarity in opinion of e-learning educationalists and e-learning technologists.

Table 5.5 Statistics on category of study participants and choice of factors for facilitating effective e-learning

	Category of Study Participants	N	Mean	Std. Deviation	Std. Error Mean
Factors for Effective E-learning	E-learning Educationalists	8	3.5287	.45597	.16121
	E-learning Technologists	8	3.1086	.15965	.05644

Table 5.6 Independent test on factors influencing effective e-learning

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Dif.	Std. Error Dif.	95% Confidence Interval of the Difference (Dif.)	
									Lower	Upper
Factors for Effective E-learning	Equal variances assumed	1.669	.217	2.459	14	.028	.42008	.17081	.05374	.78643
	Equal variances not assumed			2.459	8.691	.037	.42008	.17081	.03158	.80858

5.3 Reliability analysis

This section presents reliability test results depicting the internal consistency of 10 factors as described in section 3.6.1 and displayed in Table 3.4. The correlation of items within each factor (item-to-item), the corrected item-to-total correlations (item-to-scale) and the effects on Cronbach's alpha (α) were used to examine the ratings for each factor.

5.3.1 Internal consistency for course content

The results for the first factor displayed in Table 5.7 show a high reliability for course content, Cronbach's α = 0.858. This alpha value indicates good internal consistency for factor reliability. Detailed results of this factor are shown in Table 5.8 with all corrected item-total correlations greater than 0.3 also indicating good item correlations to the total factor score.

Table 5.7 Total reliability for course content

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.858	.858	7

Table 5.8 Item-total reliability for course content

Items	*Scale Mean if Item Deleted*	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Course Outline	20.38	8.517	.742	.918	.820
2. Course Prior Knowledge	20.50	8.667	.700	.899	.826
3. Course Scope	20.63	9.050	.625	.940	.838
4. Course Understandability	20.56	10.263	.391	.831	.867
5. Course Progression Levels	20.25	10.467	.351	.755	.871
6. Course Learning Outcomes	20.38	9.317	.837	.930	.818
7.Course Sequentially Organised	20.94	7.929	.783	.922	.812

5.3.2 Internal consistency for course evaluation

Table 5.9 shows a Cronbach alpha value, α = 0.720 for course evaluation factor. This value is an indicator of a good degree of internal consistency reliability. However, in Table 5.10 *item4: course resources and item 6: course difficulty* have a very low corrected item-total correlations below 0.3, thus 0.212 and 0.010 respectively which subsequently increase Cronbach's alpha when deleted.

Table 5.9 Total reliability for course evaluation

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.720	.688	6

Table 5.10 Items-total reliability for course evaluation

Items	*Scale Mean if Item Deleted*	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Course Alignment	16.31	3.963	.666	.656	.628
2. Course Requirements	16.69	3.429	.711	.965	.592
3. Course Updates	16.63	2.517	.859	.895	.505
4. Course Resources	**16.25**	**4.867**	**.212**	**.854**	**.741**
5. Course Expectations	16.44	4.529	.363	.922	.706
6. Course Difficulty	**17.06**	**5.263**	**.010**	**.818**	**.790**

5.3.3 Internal consistency for student assessment

Table 5.11 shows that student assessment factor has Cronbach α = 0.592 indicating an acceptable level reliability. However, in Table 5.12, *item3: timely* feedback has a very low corrected item-total correlations below 0.3, thus 0.077 which subsequently increases Cronbach's alpha when deleted to 0.769.

Table 5.11 Total reliability for student assessment

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.592	.565	4

Table 5.12 Items-total reliability for student assessment

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Randomised Online Assessment Strategies	10.75	1.400	.500	.481	.438
2. Constructive assessment feedback	10.50	1.200	.653	.464	.302
3. Timely feedback	**10.31**	**2.096**	**-.077**	**.124**	**.769**
4. Knowledge of assessment grading criteria	10.63	.917	.538	.370	.368

5.3.4 Internal consistency for course planning

Table 5.13 shows that course planning factor has Cronbach α = 0.833 indicating a high internal consistency reliability. However, in Table 5.14 *item6: learner media analysis* had a corrected item-total correlation of 0.099 less than 0.3, which subsequently increases Cronbach's alpha when deleted to 0.833.

Table 5.13 Total reliability for course planning

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.833	.834	6

Table 5.14 Item-total reliability for course planning

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Student Learning Needs Analysis	20.13	4.783	.692	.939	.730
2. Course Resource Analysis	20.00	4.933	.585	.961	.756
3. Instructional Strategies	20.13	5.850	.586	.600	.761
4. Course Learning Materials	19.81	6.163	.351	.941	.795
5. Student Enjoyment	20.19	4.429	.892	.948	.682
6. Learning Media Analysis	**20.38**	**6.783**	**.099**	**.750**	**.833**
7. Course Teaching Quality	19.63	5.983	.518	.818	.770

5.3.5 Internal consistency for e-learning policies

E-learning policies had a Cronbach alpha value (α) of 0.822 indicating a high internal consistency as shown in Table 5.15. Otherwise all the items had a corrected item-total correlation of more than 0.3, which was an indicator of good correlation to total reliability as shown in Table 5.15.

The values of *Cronbach's Alpha if Item Deleted* indicate that none of the items would increase the reliability.

Table 5.15 Total reliability for e-learning policies

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.822	.824	4

Table 5.16 Item-total reliability for e-learning policies

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. University Vision to Integrate E-learning	9.50	5.467	.601	.375	.796
2.ICT Policies on E-learning Staff representatives	10.00	4.933	.678	.460	.760
3. E-Learning Staff Mentors	9.50	4.933	.678	.460	.760
4. E-Learning Special Funds	9.63	4.650	.634	.413	.785

5.3.6 Internal consistency for e-learning culture

Table 5.17 shows a high reliability for e-learning culture at Cronbach alpha (α) = 0.846 while Table 5.18 shows all items had a corrected item-total correlation of more than 0.3 reflecting a good item correlation to the total reliability. The values of *Cronbach's Alpha if Item Deleted* indicate that none of the first three (3) items would increase the reliability if they were deleted because all values are less than the overall reliability of 0.846 except for *item 4 societal norms on e-learning* which increases the total reliability to 0.852 if deleted.

Table 5.17 Total reliability for e-learning culture

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.846	.850	4

Table 5.18 Item-total reliability for e-learning culture

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Beliefs about the value of e-learning	9.56	3.196	.698	.540	.798
2. Attitudes towards e-learning	9.50	3.467	.694	.709	.804
3. Academic achievement with e-learning	9.75	3.000	.776	.724	.763
4. Societal Norms on e-learning	9.81	3.229	.586	.502	.852

5.3.7 Internal consistency for e-learning infrastructure

Table 5.19 showed that e-learning infrastructure factor had a good reliability, Cronbach alpha (α) = 0.737. On the other hand, Table 5.20 shows that all items have a corrected item-total correlation of more than 0.3 which was a reflection that all items had a good

correlation to the total reliability. However the value of *Cronbach's Alpha if Item Deleted* for *item 4: Lecture recording capture system would* increase the reliability to 0.788.

Table 5.19 Total reliability for e-learning infrastructure

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.737	.746	4

Table 5.20 Item-total reliability for e-learning infrastructure

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Access to Computing Technologies	10.38	2.917	.492	.553	.699
2. Tools for Course Module Development	10.56	1.996	.838	.711	.457
3. Up-to-date System Platforms for Course Module Delivery	10.50	3.333	.535	.359	.694
4. Lecture Recording Capture System	10.75	3.000	.352	.469	.788

5.3.8 Internal consistency for e-learning costs

Table 5.21 shows a high reliability for e-learning costs factor with a Cronbach alpha value (α) of 0.884. Besides Table 5.22 shows that all the items had corrected item-total correlations of more than 0.3, which meant all items had a good correlation to the total reliability. However, the value of *Cronbach's Alpha if Item Deleted* for *item 4: Cost of technical e-learning support would* increase the reliability to 0.897.

Table 5.21 Total reliability for e-learning costs

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.884	.889	4

Table 5.22 Item-total reliability for e-learning costs

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Cost of Developing Course Material	9.31	4.229	.794	.650	.833
2. Cost of Implementing E-learning Systems	9.50	4.267	.898	.869	.800
3. Cost of Maintaining E-learning Platforms	9.44	3.996	.721	.821	.870
4. Cost of Technical E-learning Support	9.63	4.917	.618	.615	.897

5.3.9 Internal consistency for e-learning support

The results on Table 5.23 show a high factor reliability for e-learning support with Cronbach alpha (α) = 0.867 while Table 5.24 shows that all items had corrected item-total correlations of more than 0.3. These values are indicative of good correlation for all items against the total reliability. However the value of *Cronbach's Alpha if Item Deleted* for *item 5: E-learning staff webinars* increases the reliability to .905 over the total reliability. However this item was not deleted because its *Corrected Item-Total Correlation* was greater than 0.3.

Table 5.23 Total reliability for e-learning support

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.867	.880	6

Table 5.24 Item-total reliability for e-learning support

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. E-learning Induction Training	16.25	9.533	.720	.935	.836
2. E-learning Course Module Development Support	16.19	8.696	.817	.852	.816
3. On-demand Support	16.56	10.663	.451	.568	.878
4. Staff Capacity Development for E-Learning Use	16.56	8.796	.934	.902	.799
5. E-Learning Staff Webinars	16.50	9.867	.400	.734	.905
6. ICT Training Support	16.38	9.317	.810	.864	.822

5.3.10 Internal consistency for quality learning management systems

Table 5.25 shows that quality learning management system factor had a high reliability, Cronbach alpha (α) = 0.863. On the other hand, results in Table 5.26 showed that all items had *corrected item-total correlations of* more than 0.3 except for *item 9: security of user data whose Corrected item-total correlation value was 0.079 below 0.3.* The *Cronbach Alpha if Item Deleted* for item 9 would increase the reliability to 0.885.

Table 5.25 Total reliability for quality learning management system

Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.863	.853	10

Table 5.26 Item-total reliability for quality learning management system

	Scale Mean if Item Deleted	*Scale Variance if Item Deleted*	*Corrected Item-Total Correlation*	*Squared Multiple Correlation*	*Cronbach's Alpha if Item Deleted*
1. Adaptability of Course Platform	29.81	16.829	.820	.769	.828
2. Ease of Navigation	29.88	17.983	.721	.601	.839
3. Consistency of Course Platform	30.38	16.383	.787	.910	.829
4. User-friendliness	30.19	17.763	.539	.759	.854
5. Multi-Culturally Appealing	30.63	17.850	.681	.651	.841
6. Accessibility of Course Content	30.00	18.000	.612	.817	.846
7. Event Management	30.13	17.317	.589	.718	.849
8. User Management	30.00	19.333	.606	.871	.850
9. Security of User Data	**29.63**	**22.383**	**-.079**	**.624**	**.885**
10. Collaborative Learning	29.75	19.133	.413	.795	.863

5.3.11 Overall reliability of factors for facilitating effective e-learning

After running reliability tests, the Cronbach alpha value ratings for most of the factors were good except for student assessment which was rated acceptable. The Cronbach alpha values are usually graded as excellent, good, acceptable, poor or unacceptable. The Cronbach alpha (α) grades are categorised as follows; $\alpha \geq 0.9$ is excellent; $0.7 \leq \alpha < 0.9$ is good; $0.6 \leq \alpha < 0.7$ is acceptable; $0.5 \leq \alpha < 0.6$ is poor; and $\alpha < 0.5$ is unacceptable (Field, 2009).

The factors displayed on Table 3.4 were rated by the study participants as being important as shown on Table 5.27. These factors were then considered for developing the initial model.

Table 5.27 Overall reliability of factors for facilitating effective e-learning

Factors	**Number of Items**	**Cronbach Alpha Value**	**Cronbach Alpha Value Descriptor**
Course Content	7	0.86	Good
Course Evaluation	6	0.72	Good
Student Assessment	4	0.60	Acceptable
Course Planning	6	0.83	Good
E-learning Policies	4	0.82	Good
E-learning Culture	4	0.85	Good
E-learning Infrastructure	4	0.74	Good
E-learning Costs	4	0.88	Good
E-learning Support	6	0.87	Good
Quality learning management systems	10	0.86	Good

5.4 Findings of an investigation into ways of promoting effective e-learning in universities

The findings describe the opinions of interviewees selected from universities in Africa, Europe and Asia as shown in Table 5.28. The principle of saturation discussed in section 4.6 was used to determine the appropriate number of interview participants. Consequently, a total of 15 participants were selected as the ideal sample size in section 4.6. Although this sample size almost corresponds to sample size 16 for the pilot survey in Section 4.8.2.1, there was no link whatsoever between the participants for qualitative research and pilot survey. The interview participants were particularly selected because they held key positions related to e-learning within their universities. Some of the participants were heads of educational technology centres while others were coordinators of e-learning initiatives. The participants were knowledgeable about the trends of e-learning within the universities. So the interviewees had knowledge and experience in university affairs pertaining to e-learning. This chapter therefore presents findings on the state-of-affairs regarding e-learning within universities.

Table 5.28 Interview participants

#	Name of University	Interviewee Code	Continent
1	University of Cape Town, South Africa	*Interviewee 1*	Africa
2	Makerere University, Uganda	*Interviewee 5*	
3	Kyambogo University, Uganda	*Interviewee 15*	
4	Canadian International College, Cairo Campus of Cape Breton University, Egypt	*Interviewee 12*	
5	University of Surabaya, Indonesia	*Interviewee 3*	Asia
6	Ibri College of Technology, Oman	*Interviewee 6*	
7	Institute of Teacher Education, Pakistan	*Interviewee 8*	
8	King Khalid University, Saudi Arabia	*Interviewee 7*	
9	University of Indonesia, Indonesia	*Interviewee 4*	
10	Maihidonl University of Thailand, Thailand	*Interviewee 10*	
11	University of Malaya, Malaysia	*Interviewee 11*	
12	University of Southampton, United Kingdom	*Interviewee 2*	Europe
13	Microsoft College of Online Learning, United Kingdom	*Interviewee 9*	
14	Patras University, Greece	*Interviewee 13*	
15	Southampton Solent University, United Kingdom	*Interviewee 14*	

5.4.1 The coding process

The interview data was recorded, transcribed, and initially coded into concepts and themes in conformance to the semi-structured interview guide in appendix C. In other words, sub-sections were created in order to categorically organise similar qualitative data with common characteristics. Subsequently, ideas for codes were identified from the excerpts of the interview transcripts by identifying patterns and similarities. As a result, descriptive codes were identified as discussed in the sub-sections below.

5.4.2 Current state-of-affairs of e-learning within universities

The interview participants were probed for views on the trends in e-learning. The interviewees also discussed the practices for promoting effective e-learning in universities.

5.4.2.1 University of Cape Town, South Africa

A Professor from Department of Information Systems at University of Cape Town revealed that over the years the university had used several learning management systems. But six years ago, the university acquired Sakai an open source software currently being used for academic collaboration. After the acquisition of Sakai, it was customised and renamed to Vula. In the past the university acquired Moodle and WebCT but these were not actively used.

> *Interviewee 1:"I think the rate of use of the current learning management system has been great, this was acquired about five or six years ago. We had another system before but that system was not actively used...I didn't use it much...but now the new system is being used by everybody…it is an open source system called Sakai[1]. Actually the University invested lots of money into this system[2]. In addition, there is a lecture capture system being used[3]. There are venues (lecture theatres) with cameras already setup. So the academics just have to liaise with the Educational Technology Centre to plan when to begin recording[4]. In other words, the academic gives details of the course they teach, the lecture venue and time. So at that time the camera starts recording automatically…"*
>
> ***Descriptive codes identified:***
>
> 1 **FREE SOFTWARE SYSTEMS**
>
> 2 **FINANCIAL SUPPORT TO MAINTAIN E-LEARNING**
>
> 3 **UP-TO-DATE AND ADVANCED E-LEARNING TOOLS**
>
> 4 **SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**

5.4.2.2 University of Southampton, United Kingdom

The University of Southampton is currently using Blackboard LMS according to a Senior Learning Designer from the Centre for Information Technology for Education. There is also a lecture capture system which is being used together with Blackboard.

> *Interviewee 2: "I helped to introduce the lecture capture system[1], a lecture recording system. It is both hardware and software based which means that you can have it everywhere. So now in any lecture theatre in the university, any teaching room that has a computer can record a session. The lecturer's voice can be recorded and made available through blackboard[2]…"*
>
> ***Descriptive codes identified:***
>
> **1 UP-TO-DATE AND ADVANCED E-LEARNING TOOLS**
>
> **2 SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**

5.4.2.3 University of Surabaya, Indonesia

A Senior E-learning Developer from Faculty of Engineering at University of Surabaya stated that Moodle was once used but the university later acquired a proprietary LMS from Microsoft. This LMS was acquired at no cost because of an existing partnership for provision of Microsoft certifications within the university.

> *Interviewee 3: "…when we used Moodle, we were happy with it. Now with Microsoft learning management system, there are more features because it is proprietary and developed professionally. But if we had to pay for it then we wouldn't be using it. We use Microsoft LMS because it is free[1] otherwise Moodle is good[2]…"*
>
> ***Descriptive codes identified:***
>
> **1 FREE SOFTWARE SYSTEMS**
>
> **2 AWARENESS OF BENEFITS OF E-LEARNING**

5.4.2.4 University of Indonesia, Indonesia

The University of Indonesia has been using Moodle-based LMS since 2006. A Senior E-learning Designer from the university claims that Moodle was acquired to encourage student-centred learning. However this was not properly achieved. Moodle was also introduced to enable resource sharing between lecturers and students. Through Moodle lecturers are able to upload course material easily accessible by students. The uploaded material is not limited to lecture slides, but links to relevant learning resources are uploaded.

Interviewee 4: "So this e-learning system based on Moodle seems to be good as a repository[1]. But when we talk about the aim to encourage student-centred learning, it has not really been successful. From the lecturer's point of view, I guess it's not about laziness, but not so many lecturers would like to spend time to encourage students to have active discussions on this e-learning system[2]. The idea is that lecturers should book certain time slots when to discuss with students using forums on Moodle but then lecturers like to have it done in the classroom or occasionally using Moodle and not regularly. Lecturers would be very happy to have discussions with students in the classroom orally but when it has to do with online, they are rather reluctant to do it[2]....I think it has something to do with the culture…[3]"

Descriptive codes identified:

1	**AWARENESS OF BENEFITS OF E-LEARNING**
2	**NEED MOTIVATION TO USE E-LEARNING SYTEMS**
3	**CULTURAL ATTITUDES TOWARDS E-LEARNING**

5.4.2.5 Makerere University, Uganda

An E-learning Educationalist from the Department of Physics at Makerere University said that the university has used three different learning management systems in the past decade. The first one was Blackboard, which was welcomed by staff but only used to upload e-learning course material without active student engagement. Staff members were supported to develop and upload e-learning course material; even then there was no success. Later the university acquired Kewl LMS, open source software acquired as remedy to the high licence costs of maintaining Blackboard. However this too was not successful. The latest LMS acquisition, Moodle open source software was customised and renamed to Makerere University E-Learning Environment (MUELE). According to the academic, though the e-learning platform has been set up, there is still less participation from staff members.

Interviewee 5:"…the latest acquisition was Moodle an open source[1]. Just a few of us are using the e-learning platform, the rest of my colleagues seem not interested[2]…"

Descriptive codes identified:

1	**FREE SOFTWARE SYSTEMS**
2	**NEED MOTIVATION TO USE E-LEARNING SYSTEMS**

5.4.2.6 Ibri College of Technology, Oman

An E-learning Practitioner from Centre of Educational Technology at Ibri College of Technology said that Moodle LMS was acquired about two years ago. However since its acquisition, staff and student participation has been futile. This was mainly because of authentication problems especially with setting up usernames and passwords. Besides, most of the academic staff did not have an understanding of the vision and benefits of using e-learning. There was also no collaboration between the technical and teaching staff.

> *Interviewee 6: "…we are using Moodle but it's not very actively used[1] because it's all dependent on the administration. If they would encourage the staff to use it[1] then it will be used. However there are other reasons why e-learning is not actively used. For example at the beginning students need to be given usernames and passwords to access the system but this process is always slow and problematic. Then staff members can decide to use or not use Moodle[2] and most of them will not use it because they are very busy with their traditional teaching routine and e-learning is considered an extra load. I also think that staff members do not understand the benefits of using Moodle[3] and there is no proper vision for supporting use of e-learning[2] within the institute. There is also no technical support with course design[4] and no structured way of supporting staff to develop and deliver the course content. So there is need for staff to be informed about the benefits of using e-learning and offer necessary support[3] …"*
>
> ***Descriptive codes identified:***
>
> **1 NEED MOTIVATION TO USE E-LEARNING SYSTEMS**
>
> **2 UNIVERSITY POLICY TO SUPPORT E-LEARNING**
>
> **3 AWARENESS OF BENEFITS OF E-LEARNING**
>
> **4 SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**

5.4.2.7 King Khalid University, Saudi Arabia

King Khalid University is a well-known university in Saudi Arabia with state-of-the-art infrastructure, facilities and e-learning systems. An E-learning Technologist from King Khalid University stated that the university is engaged in three levels of e-learning. Firstly, technology-enhanced teaching and learning used to facilitate normal face-to-face teaching. Secondly, blended learning used to combine distance learning with traditional face-to-face teaching. Lastly, online learning delivered as pure e-learning. The university is involved in all three levels of e-learning and has successfully implemented e-learning because of well-established policies. There is also an established E-Learning and Distance Learning

Centre which is linked to the Government. However there are some concerns with using e-learning. Developing e-learning content requires a lot of time. Besides, responding to vast email communications from students is very demanding, which requires apt technical skills. Financial resources are required to maintain and support the implementation of e-learning. Staff capacity building is necessary to raise awareness about latest technologies.

> *Interviewee 7: "... the first level of e-learning is the technology-enhanced learning normally used to facilitate traditional face-to-face lectures[1]. This one is used across the university by all staff and students. On the other hand, blended learning helps in delivering lectures to mature and part-time students[1]. The normal students usually attend face-to-face lectures and lecturers are more motivated to use the blended learning approach because they are so engaged in their jobs[2]..."*
>
> ***Descriptive codes identified:***
>
> 1 **AWARENESS OF BENEFITS OF E-LEARNING**
>
> 2 **MOTIVATED TO USE E-LEARNING**

5.4.2.8 Institute of Teacher Education, Pakistan

It was revealed that the university is using e-learning to enhance traditional face-to-face teaching. The E-learning Educationalist said that the Higher Education Commission was responsible for implementing and maintaining e-learning infrastructure across higher education institutions. It was noted that the institution is using tools like PowerPoint presentations to facilitate traditional face-to-face teaching and learning. However, there are challenges with using these tools because some of the staff members lack the skills and training in using e-learning. Therefore extra effort is required to promote effective e-learning.

> *Interviewee 8: "... the major challenge is that there are inadequate resources within the university especially computers and internet connectivity because of the limited funding budget[1]. Some of the teachers do not have the skills and training to use e-learning[2]...So the first excuse a public university would have is that they don't have money to roll-out technologies across university which is a leadership and administrative problem."*
>
> ***Descriptive codes identified:***
>
> 1 **FINANCIAL SUPPORT TO MAINTAIN E-LEARNING**
>
> 2 **E-LEARNING SKILLS TRAINING**

5.4.2.9 Microsoft College of Online Learning, United Kingdom

An E-learning Educationalist from Microsoft College of Online Learning said that two types of learners must be recognised, namely; visual or audio learners and physical learners. Both need encouragement to participate in e-learning. It was noted that use of e-learning facilitates development of soft-skills amongst the students. Students are able to collaborate and work in teams when doing project assignments. It is imperative that lecturers understand the differences in student personalities. This means having the right content coverage is of essence to ensure student engagement and better support.

> *Interviewee 9: "…e-learning is good but the problem with e-learning is that it's not one-size fits all. My course is purely distance online learning and it's very difficult to break the ice and quickly get to understand the students. But I always try to meet them online[1] in small groups of about five students to enable me connect and understand each of them…"*
>
> ***Descriptive codes identified:***
>
> **1 INTERACTIVE DISCUSSIONS**

5.4.2.10 Maihidonl University of Thailand, Thailand

An E-learning Developer from the university said that they have been using a customised version of Moodle open source LMS for over five years. It is said that e-learning is well accepted by staff and students because they are aware of the benefits of e-learning. There is also an established ICT centre to manage, and run seminars to raise awareness about e-learning. However, the ICT centre is only knowledgeable about the technical aspects of e-learning and lack pedagogical understanding to develop quality e-learning course material.

> *Interviewee 10: "Usually at the beginning of the semester, there are tutorials given to enable staff develop e-learning course material[1]. In our faculty we think that it's our responsibility to improve student learning and this motivates us to use e-learning[2]…"*
>
> ***Descriptive codes identified:***
>
> **1 SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**
>
> **2 MOTIVATED TO USE E-LEARNING**

5.4.2.11 University of Malaya, Malaysia

The University of Malaya is rated the best University in Malaysia. A Professor from the Faculty of Computer Science and Information Technology revealed that implementation and maintenance of e-learning is supported by the government and university management. The

university has been using the same learning management system called 'SPECTRUM' since 2004. SPECTRUM is a customized version of Moodle learning environment. The university also has an established centre called ADeC (Academic Development Centre) set up to control and implement policies for teaching, delivery and learning using SPECTRUM. ADeC is responsible for training lecturers and students on how to use SPECTRUM and ICTs. Staff members who make effort to use SPECTRUM are recognised as part of KPI reward system. This motivates staff across the university and in turn enhances effective teaching and learning.

> *Interviewee 11: "…since the introduction of ICT in 2002, the Government of Malaysia has been very committed towards the implementation of ICT mainly in Education[1]. Particularly in the University of Malaya, top management supports the use of ICT in teaching[2]. And in terms of blended learning, it's being implemented across the university at least for the last ten years…the staff are required to use SPECTRUM e-learning platform to facilitate their regular lectures[3]…. "*
>
> ***Descriptive codes identified:***
>
> | | |
> |---|---|
> | 1 | **FINANCIAL SUPPORT TO IMPLEMENT E-LEARNING** |
> | 2 | **UNIVERSITY POLICY TO SUPPORT E-LEARNING** |
> | 3 | **AWARENESS OF BENEFITS OF E-LEARNING** |

5.4.2.12 Canadian International College, Cairo Campus of Cape Breton University, Egypt

An E-learning Technologist from Canadian International College based in Cairo acknowledged that using e-learning is good but there is a concern with security. The university has been keen on using learning technologies. They are currently using a customised version of Moodle as a course management system. This system is being used across the university for uploading course material, submitting assignments, and for communicating with the students.

> *Interviewee 12: "…there is concern with identity management[1] to ensure that the student logged onto the system is the true student and also that the student attempting an assessment is the right student…so at least for the final exams these must be written examinations…there is need to think about how to ensure that the actual student is sitting the exam[1]… e-learning is good besides regular lectures[2]…"*
>
> ***Descriptive codes identified:***
>
> | | |
> |---|---|
> | 1 | **AUTHENTIC STUDENT LEARNING ASSESSMENT** |
> | 2 | **AWARENESS OF BENEFITS OF E-LEARNING** |

5.4.2.13 Patras University, Greece

Patras University is regarded the pioneer of e-learning all over Greece. It offers IT and Pedagogy degree programmes. The fundamental principle used within the institution is 'Educators MUST be given a VISION'. E-learning has been in existence in the university for a very long time and it's regarded the rock of learning.

> *Interviewee 13: "…ORAMA is a Greek word for VISION. This is what motivates any educator[1]. Give your staff vision then they will be motivated to work even for free…The university policy stipulates that all educational material must be online[2] to enhance traditional face-to-face teaching and learning[3]. The University also has ready help to support both students and staff[4] …"*
>
> ***Descriptive codes identified:***
>
> 1 **MOTIVATED TO USE E-LEARNING**
>
> 2 **UNIVERSITY POLICY TO SUPPORT E-LEARNING**
>
> 3 **AWARENESS OF BENEFITS OF E-LEARNING**
>
> 4 **READY HELP AND SUPPORT WITH E-LEARNING**

5.4.2.14 Southampton Solent University, United Kingdom

A Senior Learning Technology Developer at Southampton Solent University revealed that there has been a rise in the university's provision of courses targeting part-time, mature, and professional learners. These courses are offered as either blended or distance learning programmes via Moodle-based VLE branded MyCourse / Solent Online. The university has a long history of providing Technology Enhanced Learning (TEL) which dates back to 1990s. Over the years TEL has been embraced across the university and it's been embedded within the teaching and learning strategy stipulated in the university's policy Academic Handbook.

> *Interviewee 14: "…There is a growing understanding of the importance of effective online course delivery[1]. In this university use of VLE is predominantly seen as a supplement to classroom-based teaching[2]. So it's often used as a repository where student information is uploaded and sometimes used as a space to engage in learning activity but in my opinion not nearly enough…"*
>
> ***Descriptive codes identified:***
>
> 1 **ENCOURAGING EFFECTIVE E-LEARNING**
>
> 2 **AWARENESS OF BENEFITS OF E-LEARNING**

5.4.2.15 Kyambogo University, Uganda

The Open, Distance and e-Learning (ODeL) Centre was launched in Kyambogo University in 2008. The centre is one of the eight that have been setup in universities across Africa. Other centres have been established in the following universities; University of Zimbabwe, University of Zambia, Universite Cheikh Anta Diop in Senegal, Jimma University in Ethiopia, University of Nairobi, Universidade Pedagogica in Mozambique and Open University of Tanzania. According to the Director of ODeL, the centre was setup to serve as a training facility for staff in need of ICT capacity development as well as a delivery point for the distance learning Bachelor of Education degree programme. This degree programme is delivered through a blended learning approach using both face-to-face and e-learning. The programme is administered and managed by the ODeL centre.

> *Interviewee 15: "…Since they started offering the degree, there has been a good reception from both staff and students with a notable increase in the enrolment of students into the Bachelor of Education degree programme. In the beginning, academic staff members were trained on how to use Moodle[1] learning management system. Overall, the staff liked the e-learning platform and initiative…"*
>
> ***Descriptive codes identified:***
>
> **1 E-LEARNING SKILLS TRAINING**

5.4.3 Drivers for adopting e-learning in universities

There were several views collected about what motivated universities to implement e-learning. Some of the opinions are discussed in the sub-sections below.

5.4.3.1 Reach more students

The interview participants concurred with the fact that rising university admissions had motivated the adoption of e-learning. E-learning was a means of diversifying resource sharing and information dissemination. The mature part-time and distance learning students particularly benefited from e-learning provision because of flexibility in lecture times. Some lectures are given in the evenings, or weekends or even online.

> *Interviewee 3: "Unlike the regular students, the mature and part-time students can be reached through the distance learning and online learning programs[1]. So, this is a good way of reaching the mature and part-time students[2]…"*

Interviewee 7: "…blended learning is quite useful for reaching the in-service teachers and professionals. The teachers are more motivated to use[3] blended learning because they are already fully engaged in their job and wouldn't enrol to a full-time degree…"

Interviewee 8: "…technology has become mandatory and it's a way of reaching more students[2] and keeping up with the rest of the world which enhances university rankings and increases student intakes…"

Interviewee 10: "…some lecture theatres are overcrowded, and the infrastructure and equipment is limited, this makes e-learning useful for resource sharing[4]…"

Descriptive codes identified:

1	**FLEXIBILITY IN E-LEARNING**
2	**REACH MORE STUDENTS**
3	**MOTIVATED TO USE E-LEARNING**
4	**AWARENESS OF BENEFITS OF E-LEARNING**

5.4.3.2 Promote student-centred learning

It is said that student-centred learning is synonymous with e-learning. Student-centred learning fosters development of team-work and communication skills through discussion forums in learning management systems. These interviewees said the following in that regard;

Interviewee 4: "Our mission to encourage student-centred learning has not really been successful. From the lecturer's point of view, I guess, it's not about laziness, but not many lecturers like to spend time to encourage students to have active discussions on the e-learning system[1]. The idea is that lecturers book certain time slots when they can discuss with students using forums on Moodle[2] but lecturers like to have it done in the classroom or occasionally in Moodle but the students demand for attention…"

Interviewee 10: "…using e-learning helps to promote student-centred learning[3] but the teachers should first be motivated[1]…"

Interviewee 11: "…students can interact with the facilitator[2] and are also able to assess their learning progress through online assessment quizzes[4]…"

Interviewee 4: "…there are things missing amongst our graduates, things like; team-work and communication skills[5]. This could be developed in the learning process especially through discussion forums in learning management systems…"

Interviewee 2: "… e-learning is really good for supporting all the stuff down here (below the waterline) in reference to the model of learning in Figure 5.1. For

example, for uploading the material needed for doing assignment[6], or there might be a communication channel here that might be used to address questions[2] such as 'how do I do this? They could post their messages seeking for help. So they could help each other. You know they actually go out and look for extra stuff to learn especially those interested in the subject and may be heading towards a PhD. So they grab stuff to read which extends their loads all the time."

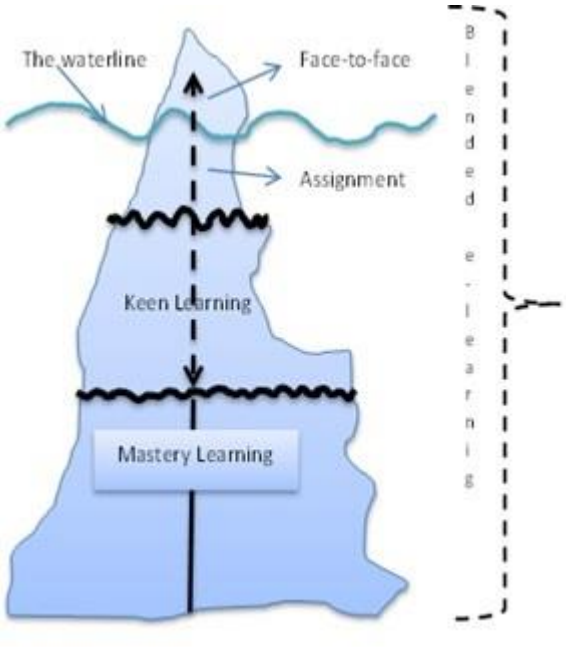


Figure 5.1 Model of learning

<u>Descriptive codes identified:</u>

1	**NEED MOTIVATION TO USE E-LEARNING SYSTEMS**
2	**INTERACTIVE DISCUSSIONS**
3	**SUPPORT STUDENT-CENTERED LEARNING**
4	**AUTHENTIC STUDENT LEARNING ASSESSMENT**
5	**TEAM-WORK AND COLLABORATION**
6	**SUPPORT STUDENTS' LEARNING**

5.4.3.3 Enhancement of quality of courses and systems

Use of e-learning enables easy access to the archives of course material. The quality assurance team is able to quickly access a repository of e-learning content whenever and wherever. The following quotes were taken from three participants in this regard;

Interviewee 1: "Course evaluation is done by inspecting things like; course content, support available, lecturer knowledge[1], and punctuality. The departmental head then takes the results and calls for a meeting to discuss issues raised in the evaluation report. The issues raised are used to gauge staff performance and make recommendations for promotion and improvements to be made to the courses[1]…"

Interviewee 4: "Every couple of years, Ministry of Education checks the quality of programs in the university[1], so having these stored on Moodle system helps the management and quality assurance team to easily access the course material."

Interviewee 8: "…it is expected that the quality of education will be improved with the use of fully-fledged ICT technologies[2] with diversity in teaching…"

Descriptive codes identified:

1 **ENHANCE COURSE AND PROGRAMME QUALITY**

2 **QUALITY IN EDUCATIONAL PROGRAMMES**

5.4.4 Promoting effective e-learning

Descriptive codes that represent the key elements believed to be necessary for promoting effective e-learning were identified as discussed in the sub-sections below.

5.4.4.1 Student engagement

Distance and blended learning students usually want an e-learning platform that gives them a sense of belonging to the online learning community. Creating such a learning experience requires that the students feel engaged.

Interviewee 15: "…every unit has a news forum and a discussion forum[1], the news forum is probably used more because that is where the academics put out announcements and dates and changes to schedule, things like that. The student discussion forums are used at the discretion of the academic because the academic again has to give an instruction[1]…the learners will not go spontaneously and start using it… Some of the academics will post twitter feeds via the VLE[2] but the tools in the VLE itself are not used enough for the traditional teaching except for the blended and distance learning…"

Descriptive codes identified:

1 **INTERACTIVE AND ENGAGING**

2 **UP-TO-DATE AND ADVANCED E-LEARNING TOOLS**

5.4.4.2 Authentic students' learning progress

Online assessments can be used to support students' learning through online-tests and self-assessments. Once marked, the feedback is provided to the students. It is a technique that facilitates the monitoring of student learning progress and it also curbs on plagiarism. E-assessment is a faster way of assessing students especially when dealing with large student classes. Furthermore, this form of assessment is used to ensure academic integrity amongst the students. However, administering and preparing the online assessment questions and

feedback is a tedious activity that requires a great input from the lecturers. Here are some quotes taken from interviewees;

Interviewee 3: "…with online assessment you can control cheating[1] because it is done online and the questions are generated randomly for each student."

Interviewee 4: "Lecturers use the e-learning platforms to guide students, give constructive feedback[2] and engage in discussions about course work assignments[3]."

Interviewee 2: "With the learning management system, I can put 1000 questions. For every exam, I set fifty questions randomly selected by the e-learning system. Some lecturers prefer this kind of exams especially if they have many students and classes[4].

Interviewee 4: "E-learning management systems help to guard against plagiarism amongst the students[1] especially when doing project assignments."

Interviewee 1: "…constructive feedback for example, it's important for me to do it[2] but sometimes it's so much work. Sometimes I prefer not do it because it takes time and a lot of effort is required[5]…"

Descriptive codes identified:

1	**AUTHENTIC STUDENTS' LEARNING ASSESSMENT**
2	**TIMELY CONSTRUCTIVE FEEDBACK**
3	**INTERACTIVE DISCUSSIONS**
4	**AWARENESS OF BENEFITS OF ONLINE ASSESSMENTS**
5	**NEED MOTIVATION TO USE E-LEARNING**

5.4.4.3 Support with e-learning content development

The interview participants all agreed that support should be given to academic staff planning to develop e-learning course material. The study findings revealed that it is imperative to hire staff with appropriate qualifications in education, psychology and computer science to assist with designing and developing e-learning course material. This enhances the quality of courses because educational goals and intended learning outcomes would be met. There should also be financial support to meet the costs of developing pedagogically sound course material. Quotes were taken from two interviewees in this respect;

Interviewee 4: "…we normally hire someone with a degree or background in education[1] and someone with computer science degree to help lecturers to develop and update their course content material[2]. These support staff normally liaise with the staff members to develop the course material."

Interviewee 3: "Usually there is a team of lecturers who engage in the development of online course material[2]. We are required to develop our own course material…"

Descriptive codes identified:

1	**UNDERSTANDING OF PEDAGOGICAL COURSE DESIGN**
2	**SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**

5.4.4.4 Financial support to implement and maintain e-learning systems

The interview participants agreed that e-learning initiatives can be successful and effective if well maintained. The university must set aside a budget to maintain and advance e-learning technologies to accommodate the vast majority of students participating in e-learning. Quotes from some of the interviewees affirmed this notion;

Interviewee 3: "…you know e-learning cannot work if there is no budget. There is need for support from the Government[1] because the biggest problem is not configuration but maintenance. That is how the lecturers update their course material and improve quality[2]. We can maintain because we always pay our lecturers[3]. I am sure without funding, no lecturers will do e-learning. We as management spend some budget to support the online consultation[3].There is a budget set aside to support the lecturers in terms of bandwidth costs and reward for their time[3] for holding online consultations and discussions with students. Normally the university pays for consecutive two hours spend on discussions with students. So this system has been liked by the students and the university is also earning and retaining more students[4]."

Interviewee 2: "With the lecture recordings, this would require a high bandwidth[1] to watch videos. You know in this country a lot of people watch YouTube videos all the time. It's become normal whereas in Africa the infrastructure is not as good..."

Interviewee 4: "There should be a budget to sustain e-learning[1] implementation..."

Interviewee 1: "We have technological infrastructure[5] already set up, which makes it easier to develop and deliver online courses[5]…"

Descriptive codes identified:

1	**FINANCIAL SUPPORT TO IMPLEMENT AND MAINTAIN E-LEARNING SYSTEMS**
2	**UP-TO-DATE E-LEARNING COURSE CONTENT**
3	**MOTIVATED TO USE E-LEARNING**
4	**REACH MORE STUDENTS**
5	**UP-TO-DATE AND ADVANCED E-LEARNING TOOLS**

5.4.4.5 Quality assurance in courses, e-learning systems and services

The quality of teaching and learning can be improved through peer-review mechanisms, staff excellence awards and course evaluation administered through established quality assurance centres. The quality assurance team is responsible for reviewing and recommending areas for course improvement. E-learning can be effective if there is an established centre for managing services such as: updating e-learning systems, training system users, and improving the quality of course content. Sharpe et al. (2006) conducted a study on undergraduate experiences with blended e-learning. The study findings revealed that despite there being difficulties in establishing strategies for institutional level monitoring and evaluation, there were still a number of effective evaluation practices like regular content evaluation that fosters effective course design. This is substantiated by the interview participants who agreed that constant monitoring and evaluation helps to improve the quality of courses and teaching. All the interviewees assented to the fact that having a functional quality assurance and e-learning centre is important. Four interviewees particularly said the following;

Interviewee 2: "Quality assurance is managed[1] by the central student services…"

Interviewee 3: "…there is support for the e-learning lab which houses the support team[2] in charge of e-learning systems, training[3] and support in course development[4]."

Interviewee 4: "Every couple of years, Ministry of Education would like to check the quality of programs in the University[1], so having these stored on Moodle system helps management and quality assurance team to easily access the course material and because we need to maintain our programs from undergraduate to PhD level…"

Interviewee 1: "Almost every year within the semester, somebody comes to sit in your class when you're teaching. They just listen and make commendations and perhaps suggest ways in which the academic can improve their teaching[1]. This is peer-review mechanism…"

Descriptive codes identified:

1	**ENHANCED COURSE AND SYSTEM QUALITY**
2	**UNIVERSITY POLICY TO SUPPORT E-LEARNING**
3	**E-LEARNING SKILLS TRAINING**
4	**SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**

5.4.4.6 University policy to support e-learning

For e-learning initiatives to thrive, staff members need to be engaged in the formulation of policies to describe roles and responsibilities for establishing and sustaining e-learning. It is evident that policies play a vital role in successful adoption of e-learning in institutions (Czerniewicz and Brown, 2009). Therefore, effective e-learning requires commitment directly from the institution's management team. Two interviewees made the following statements in that respect;

> *Interviewee 1: "…focus should be made on the formulation of ICT and e-learning policies[1]. Once the policy is in place, how it should be implemented[2] …"*
>
> *Interviewee 4: "…we have an e-learning unit as part of the university policy on e-learning[1] and this e-learning unit gives support to any lecturer intending to use the university e-learning system[3] …"*
>
> ***Descriptive codes identified:***
>
> **1 UNIVERSITY POLICY TO SUPPORT E-LEARNING**
>
> **2 ESTABLISHED E-LEARNING POLICIES**
>
> **3 SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT**

5.4.4.7 Cultural attitudes towards e-learning

Fard et al. (2009) said that there are some cultural traits that promote or hinder an organisation's participation in e-learning. Cultural attitudes towards e-learning could dictate on the preferred learning and teaching styles of students and lecturers. Cultural attitudes of organisations or society have an impact on adoption of learning technologies. Therefore, the e-learning culture needs to be open and positive. The study findings affirmed this claim and one interviewee particularly said;

> *Interviewee 4: "...culture is very important because different universities have different cultures which affect how lecturers respond to e-learning[1] …lecturers would be very happy to have discussions with students in the classroom orally but when it has to do with online, they are rather reluctant to do it, I think lazy is not right term… I think it has to do with the culture"*
>
> ***Descriptive codes identified:***
>
> **1 CULTURAL ATTITUDES TOWARDS E-LEARNING**

5.4.4.8 Ready help and support with e-learning

It was noted that having ready help and support is crucial for facilitating effective e-learning. This support may be in form of e-learning induction training, discussion forums, on-demand calls and online consultations aimed to help staff and students using e-learning technologies. There should also be support readily available to assist with e-learning content development. Several quotes were taken from interviewees in that respect;

> *Interviewee 1: "…we have a wonderful team that can be phoned when you are stuck and they will come to your office to help[1]. You can apply for money from the university to develop course material. They actually give you time off within a semester to develop e-learning course content and you are supported throughout the process[2] …"*
>
> *Interviewee 2: "There are several kinds of lightweight technologies you could use to allow students to have a conversation[3]. Things like twitter and Facebook could be used to create Facebook groups. The e-learning support staff must generally be from education[4].*
>
> *Interviewee 3: "You know e-learning is not effective if there is no direct contact between the students and lecturers[5]. We have a budget to support a team of lecturers who facilitate online consultations to answer student questions[6]."*
>
> *Interviewee 4: "A team of lecturers get some money to develop e-learning content[2] and part of this grant is used to encourage lecturers to have online discussions with students[7]."*
>
> ***Descriptive codes identified:***
>
> | | |
> |---|---|
> | 1 | **READY HELP AND SUPPORT WITH E-LEARNING** |
> | 2 | **SUPPORT WITH E-LEARNING CONTENT DEVELOPMENT** |
> | 3 | **UP-TO-DATE AND ADVANCED E-LEARNING TOOLS** |
> | 4 | **UNDERSTANDING OF PEDAGOGICAL COURSE DESIGN** |
> | 5 | **INTERACTIVE DISCUSSIONS** |
> | 6 | **SUPPORT STUDENTS' LEARNING** |
> | 7 | **MOTIVATED TO USE E-LEARNING** |

5.4.5 Outline of descriptive codes

Table 5.29 shows a total of 28 descriptive codes that were identified from the interview transcripts organised into sub-sections themed according to interview guide in Appendix C. These descriptive codes were envisioned to be categorised into factors and streamlined with

factors discussed in section 3.6.1 as displayed on Table 3.4. Some unique descriptive codes were used to formulate new factors that were later included in the initial model developed.

Table 5.29 Outline of descriptive codes with corresponding number of opinions

#	Descriptive codes	Corresponding number of opinions
1	Financial support to maintain e-learning	3
2	Up-to-date and advanced e-learning tools	5
3	Support with e-learning content development	8
4	Awareness of benefits of e-learning	9
5	Need motivation to use e-learning systems	5
6	Cultural attitudes towards e-learning	2
7	University policy to support e-learning	5
8	Motivated to use e-learning	5
9	E-learning skills training	3
10	Interactive discussions	4
11	Financial support to implement e-learning	2
12	Authentic students' learning assessment	3
13	Ready help and support with e-learning	2
14	Encouraging effective e-learning	1
15	Flexibility in e-learning	2
16	Reach more students	2
17	Support student-centred learning	1
18	Team-work collaborations	1
19	Support students' learning	2
20	Enhanced course quality	1
21	Quality in educational programmes	1
22	Interactive and engaging	1
23	Timely constructive feedback	1
24	Awareness of benefits of online assessments	1
25	Understanding of pedagogical course design	2
26	Up-to-date e-learning course content	1
27	Enhanced course and system quality	1
28	Established e-learning policies	1

5.5 Summary

An exploratory study was conducted to investigate factors important for facilitating effective e-learning within universities. An online survey was designed to measure the factors deemed important for achieving effective e-learning. The survey comprised a total of sixty-one (61) questions, generated from ten (10) factors, namely; e-learning costs, e-learning support, quality learning management system, course content, e-learning culture, course planning, e-learning policies, e-learning infrastructure, course evaluation, and student assessment. The responses obtained from sixteen (16) respondents show in chronological order, that the first seven factors named above had a high Cronbach's alpha (α) greater than 0.80, suggesting that all respondents agreed that these seven factors were important for promoting effective e-learning. Overall, the results indicated that the ten factors identified from theories and models were important for influencing effective e-learning. On average, the e-learning educationalists rated more factors as being very important than the e-learning technologists. However, there were no significant differences in the choice of factor ratings between e-learning educationalists and e-learning technologists.

In exploring the current state-of-the-affairs of e-learning in the universities, the interview participants revealed that their universities had used several learning management systems. Most universities had used or were currently using Moodle, Blackboard, WebCT. The change in the learning management system was mostly attributed to lack of support from the university to sustain e-learning. E-learning and web technologies were being used to enable provision of higher education to students namely; full-time and part-time distance students.

The empirical findings revealed 28 opinions about what would constitute and influence effective e-learning. Some of these opinions included; Financial support to maintain and implement e-learning, up-to-date and advanced e-learning tools, up-to-date e-learning course content, support with e-learning content development, motivation to use e-learning systems, university policy to support e-learning, e-learning skills training, interactive discussions, authentic students' learning assessment, help and support with e-learning, enhanced quality of educational programmes, enhanced course quality, and understanding of pedagogical course design. In addition, all the interviewees agreed that e-learning would be more effective if there were observable benefits such as; supporting student-centred learning, reaching more students, giving timely constructive feedback, team-work and collaboration. The findings reveal that giving staff support in developing e-learning content and raising awareness of the benefits of e-learning are fundamentally important for facilitating effective e-learning.

Chapter 6 Initial Model Development

The initial model was developed following a triangulation of literature review, qualitative research and quantitative research. E-learning practitioners from universities helped to inform decisions about factors to be considered in the model. First of all, relevant literature was reviewed which led to the selection of theories and models that aided the identification of factors envisioned for developing the model. An exploratory study was then conducted to further explore the factors necessary for promoting effective e-learning. Consequently, results and findings from the pilot survey and interviews respectively discussed in Chapter 5 enabled the development of the initial model. The results are displayed in Table 5.27 that summarises the reliability of factors considered to be important for facilitating effective e-learning while Table 5.29 outlines descriptive codes identified from the empirical findings. These descriptive codes reveal key issues regarded important for promoting effective e-learning according to the e-learning practitioners.

6.1 The process of developing the initial model

Factors and descriptive codes on Table 5.27 and Table 5.29 respectively were streamlined with theory models then used to develop the initial model in Figure 6.1 as discussed below.

6.1.1 Categorisation of envisioned factors in alignment with theory models

The factors displayed on Table 5.27 were categorised and streamlined with theory models as shown on Table 6.1. Ten factors were originally identified and envisioned to be parameters for the initial model. These factors have been categorised and aligned with theory models.

Table 6.1 Categorisation and alignment of envisioned factors with theory models

Factors envisioned for developing the initial model		
#	**Theory Models**	**Model Parameters Envisioned**
A	Quality of Course Design	1. Course Content 2. Course Evaluation 3. Student Assessment 4. Course Planning
B	E-learning Readiness	1. E-learning Policies 2. E-learning Culture 3. E-learning Infrastructure 4. E-learning Costs 5. E-learning Support
C	Quality of E-learning Systems	1. Quality learning management systems

6.1.2 Categorisation of descriptive codes in alignment with theory models

Descriptive codes displayed on Table 5.29 were categorised and streamlined with theory models. A total of 28 descriptive codes were identified from the empirical findings. These descriptive codes were envisioned as parameters for developing the initial model. These descriptive codes were categorised and aligned with theory models as shown on Table 6.2.

Table 6.2 Categorisation and alignment of descriptive codes with theory models

Factors envisioned for developing the initial model			
#	**Theory Models**	**Model Parameters Envisioned**	**Descriptive Codes**
A	Quality of Course Design	1. Student Assessment	1. Authentic students' learning assessment 2. Timely constructive feedback
		2. Course Content	1. Enhanced course quality 2. Up-to-date e-learning course content 3. Understanding of pedagogical course design
		3. Course Evaluation	1. Quality in educational programmes 2. Enhanced course and system quality
B	E-learning Readiness	1. E-learning Costs	1. Financial support to maintain e-learning 2. Financial support to implement e-learning
		2. E-learning Support	1. Support with e-learning content development 2. Ready help and support with e-learning
		3. E-learning Policies	1. Need motivation to use e-learning systems 2. University policy to support e-learning 3. Established e-learning policies
		4. E-learning Culture	1. Cultural attitudes towards e-learning
C	Quality of E-learning Systems	1. Quality of Service Delivery	1. Support student-centred learning 2. Support students' learning

#	Theory Models	Model Parameters Envisioned	Descriptive Codes
C	Quality of E-learning Systems	2. Quality of LMS	1. Up-to-date and advanced e-learning tools 2. Flexibility on e-learning
D*	Effective E-learning	1. Interactive Discussions	1. Interactive discussions 2. Team-work collaborations 3. Interactive and engaging
		2. E-learning Benefits Awareness	1. Awareness of benefits of e-learning 2. Awareness of benefits of online assessments 3. Reach more students
		3. Prior E-learning Experience	1. E-learning skills training 2. Motivated to use e-learning 3. Encouraging effective e-learning

* ***New parameters identified from the empirical findings***

6.1.3 Theories that influenced development of the initial model

Factors shown on Table 6.1 and Table 6.2 evidently reveal a relationship between the empirical findings and theories displayed on Table 6.3. Although this relationship generally exists, it is nevertheless contingent upon moderating factors like interactive discussions, prior e-learning experience and e-learning benefits awareness identified from the empirical findings (Martínez-Caro, 2011, Omoda-Onyait and Lubega, 2011, Hughes et al., 2006). A moderating variable is one that has a strong contingent effect on the independent-dependent variable relationship (Hair et al., 2010). The presence of a moderating variable modifies the original relationship between the independent and the dependent variables. This means that university's preparedness would promote effective e-learning. An institution's readiness to implement and sustain e-learning has to do with their ability to incur costs related to designing and developing course material, acquiring necessary infrastructure, offering support to students and staff, designing policies to promote e-learning and fostering a culture that supports e-learning initiatives (Ozkan and Koseler, 2009, Hassanzadeh et al., 2012, Bhuasiri et al., 2012).

Theories and models presented in Table 6.3 are systematic principles for designing and developing quality courses by following a systematic approach of analysis, design, development, implementation and evaluation (Merrill, 1994). This design approach influences the quality of course design and e-learning systems.

Table 6.3 Theories and models influencing the development of a theoretical model for facilitating effective e-learning

Evaluation Criteria	Theories / Models of Evaluation of Learning and E-Learning Interventions										
	Khan's 8-dimensional e-learning framework(Khan, 2010)	Kirkpatrick's four- level evaluation model (Kirkpartick, 1994)	ADDIE Model (Gagné et al., 2005)	Dick & Carey Model (Dick et al., 2009)	Merrill's Instructional Design Theory (Merrill, 1994)	E-learning Readiness Assessment Model (Omoda-Onyait and Lubega, 2011)	DeLone & McLean IS Model (Delone and Mclean, 2003)	Instructional Model for blended e-learning (Alonso et al., 2005)	Hexagonal E-learning Assessment Model (Ozkan and Koseler, 2009)	MELSS Model for e-learning success (Hassanzadeh et al., 2012)	Model for facilitating effective e-learning
Course planning	■	■	■	■	■		■	■	■	■	■
Course evaluation	■	■	■	■	■		■	■	■	■	■
Course content	■	■	■	■			■	■	■	■	■
Student Assessment	■	■	■	■	■	■		■	■		■
E-learning support	■	■				■	■		■	■	■
E-learning policies	■					■			■		■
E-learning culture	■					■			■		■
E-learning cost	■	■				■			■		■
E-learning infrastructure	■	■				■			■		■
Quality of service delivery	■	■				■	■		■	■	■
Quality of LMS	■	■				■	■		■	■	■
Student characteristics								■	■	■	
E-Learning benefits awareness						■		■	■	■	
Prior e-learning experience								■	■	■	
Interactive discussions			■	■				■	■	■	

Key:

■ - Represents specific factors drawn from existing theories and models

It is believed that the quality of e-learning systems depends on the quality of learning management systems and quality of services (Berk, 2003, Ozkan and Koseler, 2009, Shee and Wang, 2008, Gagné et al., 2005, Dick et al., 2009, Rosenberg, 2006, Snart, 2010, Anderson, 2007, Namahn, 2010, Delone and Mclean, 2003). The impact of any learning interventions can be assessed through its benefits to individuals, organisations, industry and community (Kirkpartick, 1994). Such benefits include; academic achievement, improvement of education and research, and student access to learning (Snart, 2010, Rosenberg, 2006, Kirkpartick, 1994) .

6.2 Theoretical model

The theoretical model in Figure 6.1 was developed after synthesis of factors in Table 6.1 and descriptive codes Table 6.2. A synthesised list of factors and variables is described in Table 6.4. These factors were considered important for promoting effective e-learning. The parameters displayed on Table 6.4 are organised into factors and variables (dependent and moderating variables). As per Table 6.4, three moderating variables were identified which included; e-learning benefits awareness (Omoda-Onyait and Lubega, 2011, Minton, 2000), prior e-learning experience (Martínez-Caro, 2011, Hughes et al., 2006, Kirkpartick, 1994), and interactive discussions (Omoda-Onyait and Lubega, 2011, Antonis et al., 2011, Martínez-Caro, 2011, Hassanzadeh et al., 2012). On the other hand, there were four dependent variables identified namely; Quality of course design, E-learning readiness, Quality e-learning systems and Effective e-learning.

A questionnaire instrument for the fieldwork experiment was developed based on the parameters listed on Table 6.4. A total of 78 multiple measurable variables were formulated based on the factors and variables in the theoretical model in Figure 6.1. So the theoretical model was applied to cases sampled from e-learning practitioners in universities including; academic staff, e-learning technologists, and postgraduate researchers. In reference to theoretical model in Figure 6.1, a total of 11 factors and 7 variables were identified as shown on Table 6.4. The factors include; E-learning Policies, E-learning Support, E-learning Culture, E-learning Infrastructure, E-learning Costs, Quality LMS, Quality of Service Delivery, Course Content, Course Evaluation, Student Assessment, Course Delivery while the variables include; Interactive Discussions, Prior Experience in E-learning, E-learning Benefits Awareness, Quality of Course Design, E-learning Readiness, Quality of E-learning Systems and Effective E-learning.

Table 6.4 Description of parameters for facilitating effective e-learning in universities

Variables	Factors	Description
Quality of course design	Course content	This covers well-written course outline, outcomes and sequentially organised.
	Course evaluation	This involves evaluation of the course content to ensure that it meets the objectives.
	Course delivery	The development of e-course content goes through the instructional design phases considering the pedagogy factors.
	Student Assessment	This involves assessment of student's understanding of course content.
E-Learning Readiness	E-Learning support	Support provided by the institution to staff and students in terms of training and covering costs of developing course material.
	E-Learning culture	University beliefs and attitudes towards use of e-learning as well as staff and students' self-efficacy on academic achievement and performance with e-learning.
	E-Learning infrastructure	The University provides computing and software facilities with quality internet that is dependable, accessible to allow for reliable access to course content.
	E-Learning costs	This is cost of implementing and sustaining e-learning platforms as well as cost of training staff and students, developing course material.
	E-Learning policies	The university policy on implementing and maintenance of e-learning systems which ensures e-learning readiness.
Quality of E-learning Systems	Quality of LMS	This relates to the degree in which the e-learning systems are adaptable, consistent, reliable, accessible and highly secure.
	Quality of service delivery	This relates to the administration of the students learning progress and support towards students' learning.
Effective E-learning		Promoting and encouraging effective e-learning.
E-learning Benefits Awareness		The perceived benefits of e-learning to students and staff. Ability to reach many students' via e-learning.
Interactive Discussions		Engagement in collaborative discussions among/between students and lecturers.
Prior Experience in E-learning		Previous experiences with ICT and web technologies which foster the ability of lecturers and students to use e-learning.

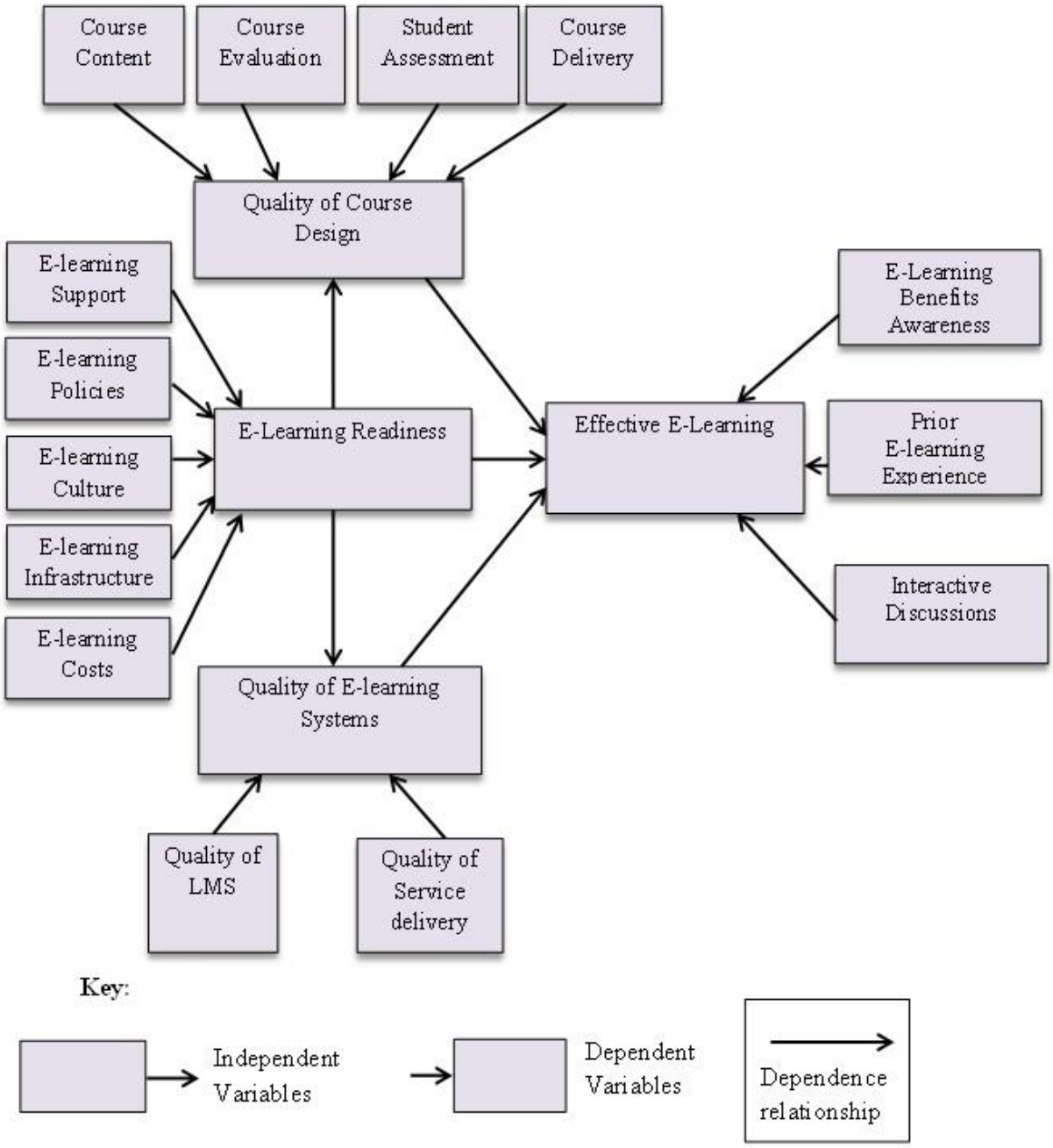


Figure 6.1 Theoretical model for facilitating effective e-learning in universities

6.2.1 Description of parameters for facilitating effective e-learning

A total of 11 factors and 7 variables were identified and subsequently used to develop the questionnaire instrument in Appendix D. These factors and variables are described below;

Quality of Course Design examines the participants' level agreement to the current practices of course design within institutions and confirms the factors for facilitating effective e-learning. The factors stated in the variable of quality of course design are described herein;

1) **Course Content**: This relates to having well-defined course goals, objectives, scope, and organisation of the course.

2) **Course Evaluation**: This is related to constantly reviewing and monitoring courses.
3) **Student Assessment**: This factor supports selection of assessment strategies, giving constructive and timely feedback to students.
4) **Course Delivery:** This is about analysis of learner needs and choice of instructional media.

E-Learning Readiness investigates views on how four factors of institutional readiness are enablers for effective e-learning in universities. These factors are described as follows;

1) **E-Learning Culture:** This factor supports the assertion that student/instructor experiences, attitudes, beliefs and societal norms influence effective e-learning.
2) **E-Learning Infrastructure:** This factor supports the assertion that effective e-learning depends on fully-fledged system platforms.
3) **E-Learning Costs:** This related to costs incurred in developing e-learning material and maintaining e-learning platforms.
4) **E-Learning Support:** This describes the support offered to staff and students in form training and mentorship.
5) **E-Learning Policies:** This factor supports the assertion that higher education policies and ICT policies promote effective e-learning within universities.

Quality of E-learning Systems examines perceptions on how the quality of e-learning systems facilitates effective e-learning using two factors described as;

1) **Quality of LMS:** This factor relates to the design of learning management systems.
2) **Quality of service delivery:** This factor describes the services offered to students in terms of managing their learning processes.

Effective E-Learning variable examines study participants' level of agreement to what constitutes effective e-learning.

E-learning benefits awareness: This variable assesses opinions of how e-learning benefits awareness impacts on effective e-learning in the university.

Prior e-learning experience: This variable obtains views on previous experiences with e-learning and how this fosters effective e-learning.

Interactive discussions: Engagement in collaborative discussions among / between students and lecturer and how this influences effective e-learning.

6.2.2 Formulation of the research hypotheses

The research hypotheses were formulated backed by the empirical results and findings. A total of 8 hypotheses (H) were formulated based on 7 variables depicted in the theoretical model in Figure 6.1. The aim was to confirm the model for facilitating effective e-learning.

i. *H_1: If understanding of pedagogical course design is increased, the quality of e-learning courses will improve and promote effective e-learning;*
ii. *H_2: If services and features of learning management systems are improved, then the quality of e-learning systems will increase and facilitate effective e-learning;*
iii. *H_3: If universities prepare for e-learning, their readiness for e-learning will cater for the costs of implementing, maintaining, and acquiring up-to-date e-learning systems which will influence effective e-learning;*
iv. *H_4: If universities are ready for e-learning, their readiness for e-learning will cater for the costs of developing and updating courses designed to improve the quality of courses which will promote effective e-learning;*
v. *H_5: If universities are ready for e-learning, having the right policies and support in place will foster e-learning readiness to facilitate effective e-learning;*
vi. *H_6: If the awareness of e-learning benefits is raised, then staff and students will positively engage in e-learning which will facilitate effective e-learning;*
vii. *H_7: If e-learning is delivered in an interactive environment, the students will feel engaged with the online community which will facilitate effective e-learning;*
viii. *H_8: If users of e-learning systems are given e-learning skills training, this will enhance their experiences and attitudes towards e-learning which will promote effective e-learning.*

6.3 Summary

The empirical results and findings were used to determine the factors to be included in the initial model. The results and findings revealed that effective e-learning could be facilitated by 11 factors and 7 variables. The factors included; E-learning Policies, E-learning Support, E-learning Culture, E-learning Infrastructure, E-learning Costs, Quality LMS, Quality of Service Delivery, Course Content, Course Evaluation, Student Assessment, Course Delivery while the variables included; Interactive Discussions, Prior Experience in E-learning, E-learning Benefits Awareness, Quality of Course Design, E-learning Readiness, Quality of E-learning Systems and Effective E-learning. The initial model was then used to develop a questionnaire instrument used to conduct the fieldwork experiment to confirm the model.

Chapter 7 Results to confirm the initial model

This chapter presents results of data analysed to confirm the initial model. The data was collected using an instrument developed in reference to the theoretical model in Figure 6.1. A total of 120 responses were expected as per the A Priori sample size estimates discussed in Section 4.8.2.2. However the target could not be reached and only 80 responses were obtained. So a Post-Hoc power computation was performed to find the right sample size that would generate a power greater than 0.8 for the tests of significance. Based on results in Table 4.4, sample size 80 was returned as the ideal sample size.

7.1 Demographic Information

Demographic information was collected to gain an understanding about the gender, age, level of education, current designation, departments or faculties, country of origin and e-learning experience of the study participants. The demographic data is shown on Table 7.1.

7.1.1 Gender

A total of 80 responses were obtained from both online surveys and hard copy questionnaires. From the data, the ratio of male to female respondents was 1:1 as shown on Table 7.1 with 40 female (50%) and 40 male (50%) respondents.

7.1.2 Age

As per the data on Table 7.1 there more respondents in the age group 31 - 40 with a total of 39 respondents (48.8%) followed by the age group 41 - 50 with 18 respondents (22.5%) then age group 21 - 30 with 17 respondents (21.3%). The age of 51 and over had the least number of respondents 6 (7.5%).

7.1.3 Education Level

As regards the educational level of the study participants, results shown on Table 7.1 indicate that the highest number of respondents 47 (58.8%) were master's degree holders followed by 28 (35.0%) doctoral degree holders. From the results, there were few bachelor's or diploma holders with a total number of 5 (6.3%). The results also indicate that a total of 30 (37.5%) respondents were Lecturers, followed by Assistant Lecturers at 16.3%, then 11 (13.8%) were Professors and the rest were with e-learning developers. Out of these

respondents, 67 (83.8%) belonged to Faculties of Computing and Engineering while the rest 13 (16.2%) belonged to faculties using Educational Technologies as shown on Table 7.1.

7.1.4 Country

The respondents were sampled from countries categorised into three continents. According to the results on Table 7.1, 23 (28.7%) respondents were sampled from Africa, 30 (37.5%) from Asia and 27 (33.8%) from Europe.

Table 7.1 Study Participants Demographic Information

Variable Name			Frequency	Percentage
1	Gender	Male	40	50.0%
		Female	40	50.0%
2	Age	21-30	17	21.3%
		31-40	39	48.8%
		41-50	18	22.5%
		51 or older	6	7.5%
3	Level of Education	Doctorate degree	28	35.0%
		Master's degree	47	58.8%
		Postgraduate diploma	2	2.5%
		Bachelor's degree	3	3.8%
4	Current Designation	Teaching Assistant	9	11.3%
		Assistant Lecturer	13	16.3%
		E-learning Educationalist / Support	3	3.8%
		E-learning Technologist / Developer	8	10.0%
		Lecturer	30	37.5%
		Senior Lecturer	6	7.5%
		Professor	11	13.8%
5	Faculty Category	Computing and Engineering Technology	67	83.8%
		Educational Technology	13	16.2%
6	University Location	Africa	23	28.7%
		Asia	30	37.5%
		Europe	27	33.8%

7.2 E-Learning Experience

It was imperative to obtain data about the e-learning experiences of the respondents. According to the data obtained, over 50% of the respondents who participated in the experiment had an experience in using e-learning technologies as shown in Figure 7.1. A

percentage of 37.5% of the respondents had an intermediate experience in using e-learning technologies. Based on the data, majority of the respondents were regarded experienced with e-learning with only 11.3% novice respondents. In addition, 35% of these experienced respondents reported to have had experience in using ICTs spanning 11 to 15 years, 27.5% of the remaining experienced respondents had 6 to 10 years of using ICT technologies while 22.5% had over 15 years period of using ICT tools. The remaining 15.0% of the respondents had experience of using of ICT of 1 to 5 years as shown in Figure 7.1.

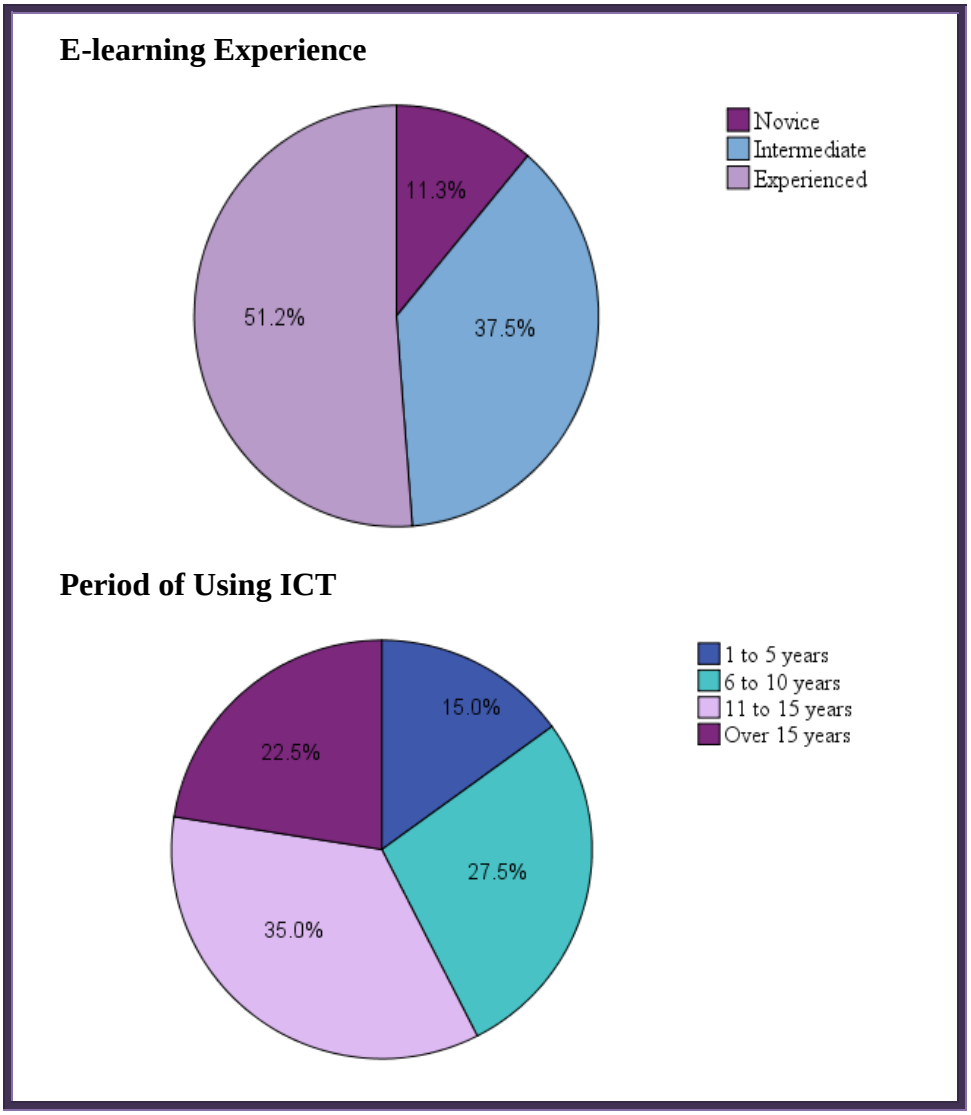


Figure 7.1 Experience in e-learning and using ICT

7.2.1 E-learning and ICT experience by faculty

Most of the respondents belonging to Faculties of Computing and Engineering Technology were reported to be very experienced in using e-learning. Of the 67 respondents from Faculty of Computing and Engineering Technology, 32 were very experienced in e-learning, 28 had intermediate experience in e-learning and only 7 acknowledged to be novice as shown in

Table 7.2. On the other hand, of the 13 respondents from Faculties using Educational Technology, 9 of them were very experienced with e-learning, 2 had intermediate experience while 2 were novice users of e-learning as indicated in Table 7.2.

Table 7.2 Crosstabs of E-Learning and ICT Use Experience

Variable Name			E-learning Experience Crosstab Counts		
			Novice	Intermediate	Experienced
	Faculty Category	Computing and Engineering Technology	7	28	32
		Educational Technology	2	2	9
	University Continent	Africa	2	12	9
		Asia	4	11	15
		Europe	3	7	17

Variable Name			ICT Use Experience Crosstab Counts			
			1 to 5 years	6 to 10 years	11 to 15 years	Over 15 years
	Faculty Category	Computing and Engineering Technology	11	22	22	12
		Educational Technology	1	0	6	6
	University Continent	Africa	7	5	7	4
		Asia	5	13	6	6
		Europe	0	4	15	8

The respondents also reported to have been using ICTs for a long time. Of the 67 respondents from Faculties of Computing and Engineering Technology, 22 of them had used ICTs for a period of 6 to 10 years, 22 had experience with ICT for a period of 11 to 15 years, 12 had an ICT experience of over 15 years while 11 had ICT experience of 1 to 5 years as

shown on Table 7.2. As for the respondents belonging to Faculties of Educational Technology, 6 of them had used ICTs for over 15 years, 6 others had used ICTs for a period of 11 to 15 years while only 1 had used ICT tools for a period of 1 to 5 years. The results were an indication that most respondents had a good experience with e-learning and ICT.

7.2.2 E-learning and ICT experience by continents

The results on Table 7.2 show that out of the 27 respondents from Europe, 17 of these were very experienced in using e-learning, 11 reported to have an intermediate experience with e-learning while only 3 were novice e-learning users. On the other hand, 8 respondents from Europe had used ICTs for over 15 years, 15 of them had used ICT tools for 11 to 15 years while 4 stated to have used ICTs for 6 to 10 years. As for the respondents from Asia, 15 of them stated to be experienced with e-learning, 11 declared to have an intermediate experience with e-learning while only 4 were novice e-learning users. In addition, 6 of the respondents from Asia reported to have used ICTs for over 15 years, another 6 declared to have used ICTs for 11 to 15 years, 3 indicated to have been using ICTs for 6 to 10 years while 5 of them had used ICTs for a period of 1 to 5 years. Respondents from Africa indicated that they had good experience in using e-learning with 9 of them experienced, 12 had intermediate experience in e-learning while only 2 were novice e-learning users. Moreover 4 of the respondents from Africa indicated to have used ICTs for over 15 years, 7 others reported to have used ICTs for 11 to 15 years, 5 indicated to have used ICTs for 6 to 10 years while 7 of the respondents stated that they had been using ICTs for a period of 1 to 5 years as shown in Table 7.2.

7.3 Initial analysis and assessment of the data

Before any statistical tests were performed, some of the variables were recoded to ensure that all responses were uniformly scored. There being multiple variables, multivariate data analysis was selected as the preferred statistical technique to run multiple regressions.

7.3.1 Assumptions

As is the case with any statistical test, a number of assumptions must be met. For the case of performing multivariate data analysis there are specific assumptions that must be met including the following: the data is normally distributed, homogeneity of variance, interval data, no specification error and sufficient sample size (Field, 2009). It is also important to examine the number of missing values. The missing values in the data were eliminated from onset.

7.3.1.1 The data is normally distributed

A basic assumption of any multivariate data analysis is that the data must be normally distributed. An initial data analysis of frequency distributions of the scores is performed to assess their characteristics. Here the normality is tested by looking at the values of skew and kurtosis which quantify aspects of a distribution (Field, 2009). If a distribution is skewed or kurtoses, it may mean that the data is not normally distributed.

7.3.1.2 Homogeneity of variance

This assumption addresses the fact the variances should be the same across the sample data. This should also apply to sample data obtained from several groups of participants, hence this means the data should come from populations with the same variance. This means that the variance of one variable should be stable at all levels of the other variables (Field, 2009).

7.3.1.3 Interval data

The data should be measured across interval levels, for instance a Likert type data. This assumption is met as the variable scores across the cases have been measured using a 5-point Likert Scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree). The data type was represented as numeric and the data measurement was defined as interval scale (Field, 2009).

7.3.1.4 No Specification error

This assumption ensures that no relevant variables are excluded from the analysis and irrelevant variables are included in the analysis (Field, 2009).

7.3.1.5 Sufficient Sample size

To perform the required analysis, there should be sufficient sample size to provide enough information upon which to base the analyses (Hair et al., 2010).

7.3.2 Reverse coding variables in the questionnaire

The questionnaire contained both positively worded and negatively worded questions as in Appendix D. However, the Likert Scale (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree) was used for answering both the positively worded and negatively questions. For example, in Table 7.3 the respondents were asked to rate how much they agreed or disagreed with the negatively worded items 21, 37 and 73 in the questionnaire. They had to choose one of the scores on the scale depending on how much they agreed with these items.

Table 7.3 Exemplar variable items negatively worded in the questionnaire

Potential Items		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
21	***Course Delivery:*** *I do not believe that engaging students in their learning through online forums and discussions is important*					
37	***E-Learning Culture:*** *I think e-learning is not accepted by society as a means to support educational attainment*					
73	***Interactive Discussions:*** *I do not feel comfortable with online discussions*					

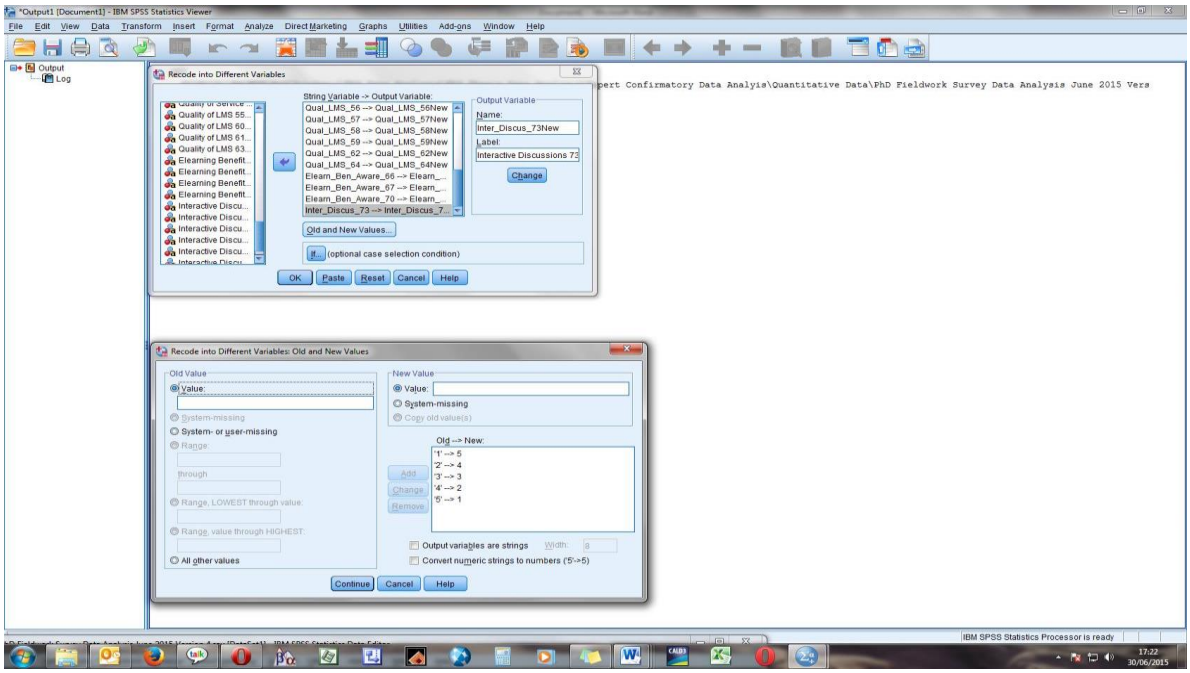
The scores for the variable items in questionnaire have been reverse scored before running the statistical tests as shown in Table 7.4. The aim of reversing the scores was to ensure that all questionnaire items (both negatively worded and positively worded) were consistent.

Table 7.4 Reverse Scores for the variable items negatively worded in the questionnaire

Potential Items		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
21	***Course Delivery:*** *I do not believe that engaging students in their learning through online forums and discussions is important*					
37	***E-Learning Culture:*** *I think e-learning is not accepted by society as a means to support educational attainment*					
73	***Interactive Discussions:*** *I do not feel comfortable with online discussions*					

The reverse score are captured in SPSS data editor by using menu item Recode to change the values of one variable into other values. This is done by selecting Transform → Recode → Into Different Variables. Recoding into different variable allows the flexibility of accessing original scores. The scores have been reversed for all the 25 variable items that were negatively worded in the questionnaire scale as shown in Table 7.5.

Table 7.5 Recoding of negatively worded variables in SPSS



7.4 Reliability Analysis

Running a reliability analysis helps identify the effect of the questionnaire items. The effect of the items is measured by looking at Cronbach Alpha values of the items and their corrected item-total correlation and Cronbach's Alpha if Item deleted. According to Field (2009) the reliability of the variables depends on the alpha value and the Corrected Item-Total Correlation. A Cronbach Alpha (α) value should range from 0.7 to 0.8. An alpha (α) value of 0.8 is an indicator of a good reliability of the data although an alpha (α) value slightly less than 0.7 is also acceptable if the variable has so many items. However some items could be excluded from the model if their value for *Cronbach's Alpha if item is deleted* increases the reliability of the variable. Besides, the value of the *Corrected Item-Total Correlation* should be above 0.3 for it to be good. A reliable variable or factor should have all items correlating with the overall total Cronbach value. So items that do not correlate should be dropped if their values are far less than 0.3 (Field, 2009). The reliability analysis performed on all the 11 factors and 7 variables depicted in the theoretical model in Figure 6.1. The factors include; E-learning Policies, E-learning Support, E-learning Culture, E-learning Infrastructure, E-learning Costs, Quality LMS, Quality of Service Delivery, Course Content, Course Evaluation, Student Assessment, Course Delivery while the variables included; Interactive Discussions, Prior Experience in E-learning, E-learning Benefits Awareness, Quality of Course Design, E-learning Readiness, Quality of E-learning Systems and Effective E-learning.

7.4.1 Quality of Course Design

This variable contains four factors namely: Course Content, Course Evaluation, Student Assessment, and Course Delivery. The variables items are displayed on Table 7.6.

Table 7.6 Quality of Course Design Variable Items with corresponding questions

Variable – Factors	Variable Item	Corresponding Item Question
Course Content	Course Content Layout 1	I believe in giving students a general overview of e-learning course expectations with clearly stated goals, objectives.
	Course Content Layout 2	It is important to state the knowledge requirements, scope and material for the students before they start the course.
	Course Content Layout 3	I think it's important to provide students with e-learning material specific to their learning.
	Course Content Layout 4	It is necessary to have well-written and understandable e-learning course content.
	Course Content Layout 5	Having a coherent layout of the e-learning course progression is not important.
	Course Content Layout 6	I think it's important to give students small chunks of e-learning material in time.
	Course Content Layout 7	It isn't necessary to keep the e-learning material up-to-date.
Course Evaluation	Course Evaluation 9	Having clearly stated course requirements, in line with the course goals and scope isn't important.
	Course Evaluation 10	It's important for experts to regularly evaluate the e-learning
	Course Evaluation 12	I think it's important to give students an outline of tasks / activities to be carried out.
Student Assessment	Student Assessment 14	Students are made aware of their level of mastery of course
	Student Assessment 15	It isn't necessary to advise students of the marking criteria for online assessments.
	Student Assessment 17	I give students the opportunity to readily prepare for the next course level through the feedback.
Course Delivery	Course Delivery 18	We engage students with a number of pieces of coursework to enable them gain mastery of the course content.
	Course Delivery 20	I do not give students course tools such as courseware.
	Course Delivery 22	It is not necessary to give students varying learning media such as; case studies, simulations, research, visuals, graphics,

7.4.1.1 Course Content

The course content factor comprises seven items namely; Course Content Layout 1, Course Content Layout 2, Course Content Layout 3, Course Content Layout 4, Course Content Layout 5, Course Content Layout 6 and Course Content Layout 7 as shown in Table 7.7. The reliability analysis test result returned a Cronbach Alpha of 0.61 for seven items. The alpha value is below 0.7 which is an indicator of poor reliability. The results in Table 7.7 also show that two items Course Content Layout 3 and Course Content Layout 6 had a corrected item-total correlation far less than 0.3 and deleting these items also increases the reliability.

Table 7.7 Summary of Reliability Analysis of Course Content

[Course Content] **Factor Items**		**Item-Total Statistics**		
		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Course Content Layout 1		0.39	0.43	0.56
Course Content Layout 2		0.53	0.44	0.53
Course Content Layout 3		0.21	0.16	0.61
Course Content Layout 4		0.61	0.47	0.47
Course Content Layout 5		0.26	0.20	0.60
Course Content Layout 6		0.04	0.27	0.65
Course Content Layout 7		0.40	0.22	0.55
Cronbach's Alpha		**Number of Items**		
0.61		7		

7.4.1.2 Course Delivery

The course delivery factor comprises three items namely; Course Delivery 18, Course Delivery 20 and Course Delivery 22. The reliability analysis test result in Table 7.8 returned a very low Cronbach Alpha value of 0.37 for the three items which shows a poor reliability of the scale.

Table 7.8 Summary of Reliability Analysis of Course Delivery

[Course Delivery] **Factor Items**		**Item-Total Statistics**		
		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Course Delivery 18		0.19	0.04	0.34
Course Delivery 20		0.22	0.05	0.27
Course Delivery 22		0.26	0.07	0.20
Cronbach's Alpha		**Number of Items**		
0.37		3		

7.4.1.3 Course Evaluation

The course evaluation factor comprises three items namely; Course Evaluation 9, Course Evaluation 10 and Course Evaluation 12. The reliability analysis test result returned a Cronbach Alpha of 0.53 for three items. According to the results shown in Table 7.9, all the items have a corrected item-total correlation close to 0.3 except for item Course Evaluation 10. For a good reliability, Cronbach Alpha value needs to be close to 0.7 or 0.8.

Table 7.9 Summary of Reliability Analysis of Course Evaluation

[Course Evaluation] **Factor Items**		**Item-Total Statistics**		
		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Course Evaluation 9		0.39	0.20	0.36
Course Evaluation 10		0.22	0.05	0.59
Course Evaluation 12		0.46	0.22	0.25
Cronbach's Alpha		**Number of Items**		
0.53		3		

7.4.1.4 Student Assessment

The student assessment factor comprises three items namely; Student Assessment 14, Student Assessment 15 and Student Assessment 17. The reliability analysis test result returned a Cronbach Alpha of 0.64 for three items. From the results in Table 7.10 it is evident that the Cronbach Alpha value is less than 0.7 but this factor was further examined to establish whether it is a good measure of the model.

Table 7.10 Summary of Reliability Analysis of Student Assessment

[Student Assessment] **Factor Items**		**Item-Total Statistics**		
		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Student Assessment 14		0.54	0.34	0.43
Student Assessment 15		0.35	0.13	0.71
Student Assessment 17		0.49	0.31	0.49
Cronbach's Alpha		**Number of Items**		
0.64		3		

7.4.2 E-learning Readiness

The factors corresponding to E-learning Readiness include: E-learning Support, E-learning Policies, E-learning Culture, E-learning Infrastructure and E-learning Costs. The variable items and questions are displayed on Table 7.11 in reference to questionnaire in Appendix D.

Table 7.11 E-learning Readiness Variable Items with corresponding questions

Variable - Factors	Variable Item	Corresponding Item Question
E-learning Support	E-learning Support 24	We participate in e-learning staff webinars to promote knowledge sharing and discussions.
	E-learning Support 25	We are given all necessary support and advice on developing e-learning course content.
	E-learning Support 27	There is staff capacity development training available for me to improve my e-learning skills.
	E-learning Support 29	We get e-learning induction trainings.
	E-learning Support 30	We receive all the necessary ICT literacy training.
E-learning Policies	E-learning Policies 31	It is important to have an ICT policy stipulating roles and responsibilities for staff in charge of e-learning.
	E-learning Policies 33	It is important to appoint a member of staff to encourage the use of e-learning systems.
	E-learning Policies 34	I believe that having a special fund helps to support maintenance of e-learning systems.
E-learning Culture	E-learning Culture 35	I believe that using e-learning systems requires a lot of effort and time.
	E-learning Culture 36	I feel confident using e-learning systems.
	E-learning Culture 37	I think e-learning is not accepted by society as a means to support educational attainment.
	E-learning Culture 38	I think the University's culture readily supports e-learning.
E-learning Costs	E-learning Costs 45	The University cannot cover the cost of developing instructional material.
	E-learning Costs 46	The University is willing to incur cost of e-learning system implementation.
	E-learning Costs 47	The University has a special budget towards meeting cost of maintaining e-learning platforms.
	E-learning Costs 48	The University has inadequate funds to cover the cost of hiring technical teams
E-learning Infrastructure	E-learning Infra 39	The e-learning system supports uploading and downloading of e-learning resources.
	E-learning Infra 40	We have access to ICT technologies to prepare and deliver e-learning services**.**
	E-learning Infra 41	There are tools for developing e-learning instructional materials.
	E-learning Infra 42	There are lecture recording equipment and tools to support both face-to-face and e-learning.
	E-learning Infra 43	The internet bandwidth and speed is not sufficient to support e-learning.
	E-learning Infra 44	There are dedicated rooms with adequate computing resources to support e-learning.

7.4.2.1 E-learning Support

The e-learning support factor comprises five items namely; E-learning Support 24, E-learning Support 25, E-learning Support 27, E-learning Support 29 and E-learning Support 30. As per the results in Table 7.12, the Cronbach Alpha was 0.76 with a corrected item-total correlation for all the items above 0.3 which is an indicator a good internal consistency.

Table 7.12 Summary of Reliability Analysis for E-learning Support

[E-learning Support] **Factor Items**		**Item-Total Statistics**		
		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
E-learning Support 24		0.38	0.35	0.77
E-learning Support 25		0.65	0.48	0.67
E-learning Support 27		0.56	0.45	0.71
E-learning Support 29		0.56	0.44	0.71
E-learning Support 30		0.53	0.34	0.72
Cronbach's Alpha		**Number of Items**		
0.76		5		

7.4.2.2 E-learning Policies

The e-learning policy factor comprises four items namely; E-learning Policies 31, E-learning Policies 33 and E-learning Policies 34. The reliability analysis test result returned a Cronbach Alpha of 0.63 for three items as shown in Table 7.13. The results in Table 7.13 indicate that all values for corrected item-total correlation are above 0.3 and the alpha value is close to 0.7 which an indicator of a good internal consistency.

Table 7.13 Summary of Reliability Analysis for E-learning Policies

[E-learning Policies] **Factor Items**		**Item-Total Statistics**		
		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
E-learning Policies 31		0.38	0.16	0.61
E-learning Policies 33		0.43	0.20	0.54
E-learning Policies 34		0.53	0.28	0.39
Cronbach's Alpha		**Number of Items**		
0.63		3		

7.4.2.3 E-learning Culture

The e-learning culture factor was made up of four items namely; E-learning Culture 35, E-learning Culture 36, E-learning Culture 37 and E-learning Culture 38. This factor had a low reliability value with Cronbach alpha value of 0.10 for four items as shown in Table 7.14. Based on these results, both the alpha value and corrected item-total correlation indicate poor

internal consistency within the items and so this factor was considered for elimination from the theoretical model as shown in the refined theoretical model Figure 7.2.

Table 7.14 Summary of Reliability Analysis for E-learning Culture

[E-learning Culture] Factor Items	Item-Total Statistics		
	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
E-learning Culture 35	-0.00	0.11	0.21
E-learning Culture 36	0.21	0.11	0.15
E-learning Culture 37	-0.05	0.14	0.22
E-learning Culture 38	0.09	0.05	0.04

Cronbach's Alpha	Number of Items
0.10	4

7.4.2.4 E-learning Infrastructure

The e-learning infrastructure factor is made up of six items namely E-learning Infrastructure 39, E-learning Infrastructure 40, E-learning Infrastructure 41, E-learning Infrastructure 42, E-learning Infrastructure 43 and E-learning Infrastructure 44. The results in Table 7.15 show that this factor had a good reliability with Cronbach Alpha value of 0.74 measured against six items. The results also show that all the items had a corrected item-total correlation close to 0.3 which is an indicator of good reliability.

Table 7.15 Summary of Reliability Analysis for E-learning Infrastructure

[E-learning Infrastructure] Factor Items	Item-Total Statistics		
	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
E-learning Infra 39	0.44	0.30	0.72
E-learning Infra 40	0.64	0.54	0.67
E-learning Infra 41	0.60	0.52	0.68
E-learning Infra 42	0.62	0.46	0.66
E-learning Infra 43	0.30	0.16	0.76
E-learning Infra 44	0.40	0.25	0.73

Cronbach's Alpha	Number of Items
0.74	6

7.4.2.5 E-learning Costs

The e-learning costs factor was made up of four items namely; E-learning Costs 45, E-learning Costs 46, E-learning Costs 47 and E-learning Costs 48. The results in Table 7.16 show that this factor had a poor reliability with Cronbach Alpha Value of 0.37 measured against four items. The results also show that all the items had a corrected item-total correlation less than 0.3 which is an indicator of a bad internal consistency within the items. Based on these results, this factor was considered for elimination from the theoretical model.

Table 7.16 Summary of Reliability Analysis for E-learning Costs

[E-learning Costs] **Factor Items**	**Item-Total Statistics**		
	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
E-learning Costs 45	0.16	0.12	0.37
E-learning Costs 46	0.16	0.16	0.34
E-learning Costs 47	0.19	0.01	0.32
E-learning Costs 48	0.29	0.14	0.19

Cronbach's Alpha	**Number of Items**
0.37	4

7.4.2.6 Reliability for E-learning Readiness

The two factors E-learning Culture and E-learning Costs with very low alpha values discussed in sections 7.4.2.3 and 7.4.2.5 respectively have been eliminated from reliability test of e-learning readiness. Only three factors namely; E-learning Support, E-learning Policies and E-learning Infrastructure have been tested for internal consistency. Table 7.17 gives a Cronbach Alpha value of 0.47. The results show that E-learning Policies had a corrected item-total correlation far less than 0.3 which is an indicator of poor internal consistency. Therefore this factor has been excluded from this variable.

Table 7.17 Summary of Reliability Analysis for E-learning Readiness

[E-learning Readiness] **Variables - Factors**	**Item-Total Statistics**		
	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
E-learning Support	0.39	0.18	0.16
E-learning Policies	0.11	0.01	0.59
E-learning Infrastructure	0.41	0.18	0.11

Cronbach's Alpha	**Number of Items**
0.47	3

Table 7.18 Non-parametric correlations within the E-learning Readiness Variable

Variable – Factors	Spearman's Correlation Coefficient (r_s)	*p-value* (Sig)
E-learning Support	0.58	0.00
E-learning Policies	0.18	0.05
E-learning Infrastructure	0.56	0.00

The results in Table 7.18 show that two of the three factors have a high positive correlation within the E-learning Readiness variable. The third factor E-learning Policies had a low positive correlation with E-learning Readiness. It is also less significant with *p-value* not less than 0.05, $p = 0.05$. The result confirms E-learning Policies as an independent factor.

7.4.3 Quality of E-learning Systems

The Quality of E-learning Systems variable comprises two factors namely; Quality of Service Delivery and Quality of LMS. The reliability for the two factors has been tested. The items and questions are displayed on Table 7.19 in reference to questionnaire in Appendix D.

Table 7.19 Quality of E-learning Systems Variable Items with corresponding Questions

Variable - Factors	Variable Item	Corresponding Item Question
Quality of LMS	Quality of LMS 56	The e-learning system is difficult to navigate.
	Quality of LMS 57	The e-learning system is sometimes unreliable in providing anytime access.
	Quality of LMS 58	The e-learning system is inconsistent in the use of graphics, text styles.
	Quality of LMS 59	The e-learning system platform is not user-friendly.
	Quality of LMS 61	The e-learning system is very secure in protecting personal data.
	Quality of LMS 63	The e-learning system supports collaborative learning.
Quality of Service Delivery	Quality of Service Delivery 51	I think the available e-learning service supports interaction between e-learning system developers and users.
	Quality of Service Delivery 52	The current e-learning system does not support online consultations.
	Quality of Service Delivery 53	I think the technical support available is inadequate for all e-learning users.
	Quality of Service Delivery 54	The e-learning system service is not periodically updated and improved.

7.4.3.1 Quality of LMS

The reliability of quality of LMS factor scored Cronbach alpha value of 0.72 based on 6 items namely; Quality of LMS 56, Quality of LMS 57, Quality of LMS 58, Quality of LMS 59, Quality of LMS 60, Quality of LMS 61 and Quality of LMS 63. Based on the results in Table 7.20, the values of the corrected item-total correlation for all the 6 items are above 0.3 which is an indicator good internal consistency.

Table 7.20 Summary of Reliability Analysis for Quality of LMS

[Quality of LMS] **Factor Items**	**Item-Total Statistics**		
	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Quality of LMS 56	0.61	0.56	0.64
Quality of LMS 57	0.49	0.47	0.67
Quality of LMS 58	0.46	0.63	0.68
Quality of LMS 59	0.64	0.66	0.62
Quality of LMS 61	0.30	0.20	0.72
Quality of LMS 63	0.23	0.41	0.74

Cronbach's Alpha	**Number of Items**
0.72	6

7.4.3.2 Quality of Service Delivery

The reliability test for quality of service delivery shows a Cronbach Alpha value of 0.77 for the four items namely; Quality of Service Delivery 51, Quality of Service Delivery 52, Quality of Service Delivery 53 and Quality of Service Delivery 54. The results presented in Table 7.21 show that Quality of Service Delivery has a very good reliability with Cronbach Alpha Value of 0.77. There is also a very good internal consistency within the items with all their corrected item-total correlations greater than 0.3.

Table 7.21 Summary of Reliability Analysis for Quality of Service Delivery

[Quality of Service Delivery] **Factor Items**	**Item-Total Statistics**		
	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Quality of Service Delivery 51	0.36	0.24	0.81
Quality of Service Delivery 52	0.58	0.50	0.71
Quality of Service Delivery 53	0.67	0.56	0.66
Quality of Service Delivery 54	0.68	0.48	0.65

Cronbach's Alpha	**Number of Items**
0.77	4

7.4.3.3 Reliability for Quality of E-learning Systems

The Quality of E-learning Systems variable consists of two factors namely; Quality of Service Delivery and Quality of LMS. The reliability test gives an alpha value of 0.71 shown in Table 7.22. The results also show that there is a good internal consistency within the factors with all their corrected item-total correlations greater than 0.3. The two factors are also significant in measuring the variable quality of e-learning systems with their *p-value* less than 0.05; p = 0.00 as shown in Table 7.23.

Table 7.22 Summary of Reliability Analysis for Quality of E-learning Systems

[Quality of E-learning Systems]		**Item-Total Statistics**		
Variable Factors		Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's alpha if item Deleted
Quality of Service Delivery		0.59	0.35	…
Quality of LMS		0.59	0.35	…
Cronbach's Alpha		**Number of Items**		
0.71		2		

Table 7.23 Non-parametric correlations within the Quality of E-learning Systems

Variable - Factors		Spearman's Correlation Coefficient (r_s)	*p-value* (Sig)
Quality of Service Delivery		0.44	0.00
Quality of LMS		0.64	0.00

7.4.4 Effective E-learning

There were seven variables associated with the variable that measures Effective E-learning namely; e-learning readiness, quality of e-learning systems, quality of course design, e-learning benefits awareness, prior e-learning experience, interactive discussions and effective e-learning. Their corresponding questions are displayed in Table 7.24.

Table 7.24 Effective E-learning Variable Items with corresponding Questions

Variables		**Variable Items**	**Corresponding Item Question**
E-learning Readiness		E-learning Readiness 26	There is on-demand support readily available for me whilst interacting with the e-learning systems.
		E-learning Readiness 32	The University has a clear vision and commitment to integrate e-learning
		E-learning Readiness 38	I think the University's culture readily supports e-learning.
		E-learning Readiness 40	We have access to ICT technologies to prepare and deliver e-learning services**.**

		E-learning Readiness 46	The University is willing to incur cost of e-learning system implementation.
Quality of E-learning Systems		Quality Systems 49	I think it is necessary to have reward system/incentives to motivate staff.
		Quality Systems 50	I believe it is important to have an e-learning support service to provide online assistance.
		Quality Systems 55	The e-learning system enables personalised information presentation, thus allowing you to add content, activities and assessments.
		Quality Systems 60	The e-learning system provides interactive features between users and the system such as announcements.
		Quality Systems 62	The e-learning system offers limited access to various learning content media.
		Quality Systems 64	I think the e-learning system does not adequately keep up-to-date information
Quality of Course Design		Quality of Design 8	I believe in having e-learning materials, learning outcomes, activities, assessments well-aligned with quality standards.
		Quality of Design 13	The e-learning course is designed with consideration of appropriate level of difficulty as a benchmark for progression.
		Quality of Design 19	We use instructional strategies that promote diversity in learning such as self-paced learning.
		Quality of Design 23	I think that having well-organised teaching and learning activities such as lectures, seminars, labs and coursework is necessary.
E-learning Benefits Awareness		Benefits Awareness 65	I believe using e-learning helps me improve my job performance.
		Benefits Awareness 66	Using e-learning does not necessarily enhance a University's competitiveness.
		Benefits Awareness 67	I am less creative and innovative when using e-learning.
		Benefits Awareness 69	E-learning helps Universities to increase their return on investment
		Benefits Awareness 70	I think using e-learning does not impact on the students' academic grades.
		Benefits Awareness 71	I think use of e-learning promotes access to education and learning.
Interactive Discussions		Interactive Discussions 72	I am open to participating in online discussions.
		Interactive Discussions 73	I do not feel comfortable with online discussions.
		Interactive Discussions 77	I feel using online discussions is convenient.
		Interactive Discussions 78	I feel confident using online communication tools.

Effective E-learning		Effective e-learning 11	I believe in providing students with a list of recommended study resources such as textbooks and online resources.
		Effective e-learning 16	I do not use online tests, quizzes, and exercises as a form of assessment.
		Effective e-learning 28	I get time to practice how to use e-learning systems.
		Effective e-learning 74	Participating in online discussions requires a lot of time and effort.
		Effective e-learning 75	I believe it's important to have a staff to facilitate online discussions.
		Effective e-learning 76	Our online discussions are sometimes interrupted.

7.5 Refinement of theoretical model

Based on the results of reliability analysis, consideration was made to revise the theoretical model in Figure 6.1. Some of the factors were found to be internally inconsistent as presented in sections 7.4.2.3, 7.4.2.5, 7.4.2.6, 7.4.2.3, 7.4.2.5 and 7.4.2.6. Reference is made to section 6.2.1 that discusses the eleven factors namely; E-learning Policies, E-learning Support, E-learning Culture, E-learning Infrastructure, E-learning Costs, Quality LMS, Quality of Service Delivery, Course Content, Course Evaluation, Student Assessment, and Course Delivery.

7.5.1 Refinement of Quality of Course Design

As per section 6.2.1 Quality of Course Design is seen to be measured by four factors; Course Content, Course Evaluation, Course Delivery and Student Assessment. Reliability tests were performed for the four factors and their Cronbach Alpha values were close to 0.7. Thus, Cronbach Alpha value for Course Content was 0.61 as discussed in section 7.4.1.1, Cronbach Alpha value for Course Evaluation was 0.53 as in section 7.4.1.3, Cronbach Alpha value for Student Assessment was 0.64 in section 7.4.1.4 and Cronbach Alpha value for Course Delivery was 0.37 discussed in section 7.4.1.2. These results show that the Cronbach Alpha scores for Course Delivery was below 0.7, which is an indicator of poor reliability. Considering this, the factor was eliminated because it did not contribute to this variable.

7.5.2 Refinement of E-learning Readiness

In reference to section 6.2.1, E-learning Readiness variable was discussed as having five factors namely; E-learning Support, E-learning Policies, E-learning Culture, E-learning Infrastructure and E-learning Costs. The reliability test results for the five factors revealed

that three of the five factors had a good reliability test performance with Cronbach Alpha value close to 0.7. The Cronbach Alpha value for E-learning Support was 0.76 in section 0, Cronbach Alpha Value for E-learning Policies was 0.63 as discussed in section 7.4.2.2, Cronbach Alpha Value for E-learning Culture was 0.10 as seen in section 7.4.2.3, Cronbach Alpha Value for E-learning Infrastructure was 0.74 as discussed in section 7.4.2.4 and Cronbach Alpha value for E-learning Costs was 0.37 as presented in section 7.4.2.5. Based on these results, two factors E-learning Culture and E-learning Costs had very low alpha values which indicated very poor reliability. Therefore, these two factors were eliminated from the list of factors for measuring the E-learning Readiness. The remaining three variables, E-learning Support, E-learning Policies and E-learning Infrastructure were tested for reliability and results presented in section 7.4.2.6 show that there was a good internal consistency between E-learning Support and E-learning Infrastructure in which both had a corrected item-total correlation above 0.3 except for E-learning Policies which scored way below 0.3 as shown in Table 7.17. Therefore, a decision was made to keep E-learning Support and E-learning Infrastructure as the only two factors for measuring E-learning Readiness and then E-learning Policies was made an independent factor variable.

7.5.3 Quality of E-learning Systems

In reference to section 6.2.1, a description of Quality of E-learning Systems presents two factors namely; Quality of LMS and Quality of Service Delivery. The reliability test results for these two factors returned Cronbach Alpha values greater than 0.7 as discussed in sections 7.4.3.1and 7.4.3.2 respectively. These two factors had a corrected item-total correlation greater than 0.3 which showed a good internal consistency in measuring Quality of E-learning Systems. So both factors have been maintained in the theoretical model.

7.5.4 Refinement of the theoretical model

The reliability analysis tests were performed on 11 factors and 7 variables. The factors included; E-learning Policies, E-learning Support, E-learning Culture, E-learning Infrastructure, E-learning Costs, Quality LMS, Quality of Service Delivery, Course Content, Course Evaluation, Student Assessment, Course Delivery while the variables included; Interactive Discussions, Prior Experience in E-learning, E-learning Benefits Awareness, Quality of Course Design, E-learning Readiness, Quality of E-learning Systems and Effective E-learning. After refinement, the theoretical model now contains 8 variables and 8 factors. Two factors were eliminated; e-learning costs and e-learning culture as depicted in the refined model in Figure 7.2. E-learning Policies has also now become a moderating factor variable.

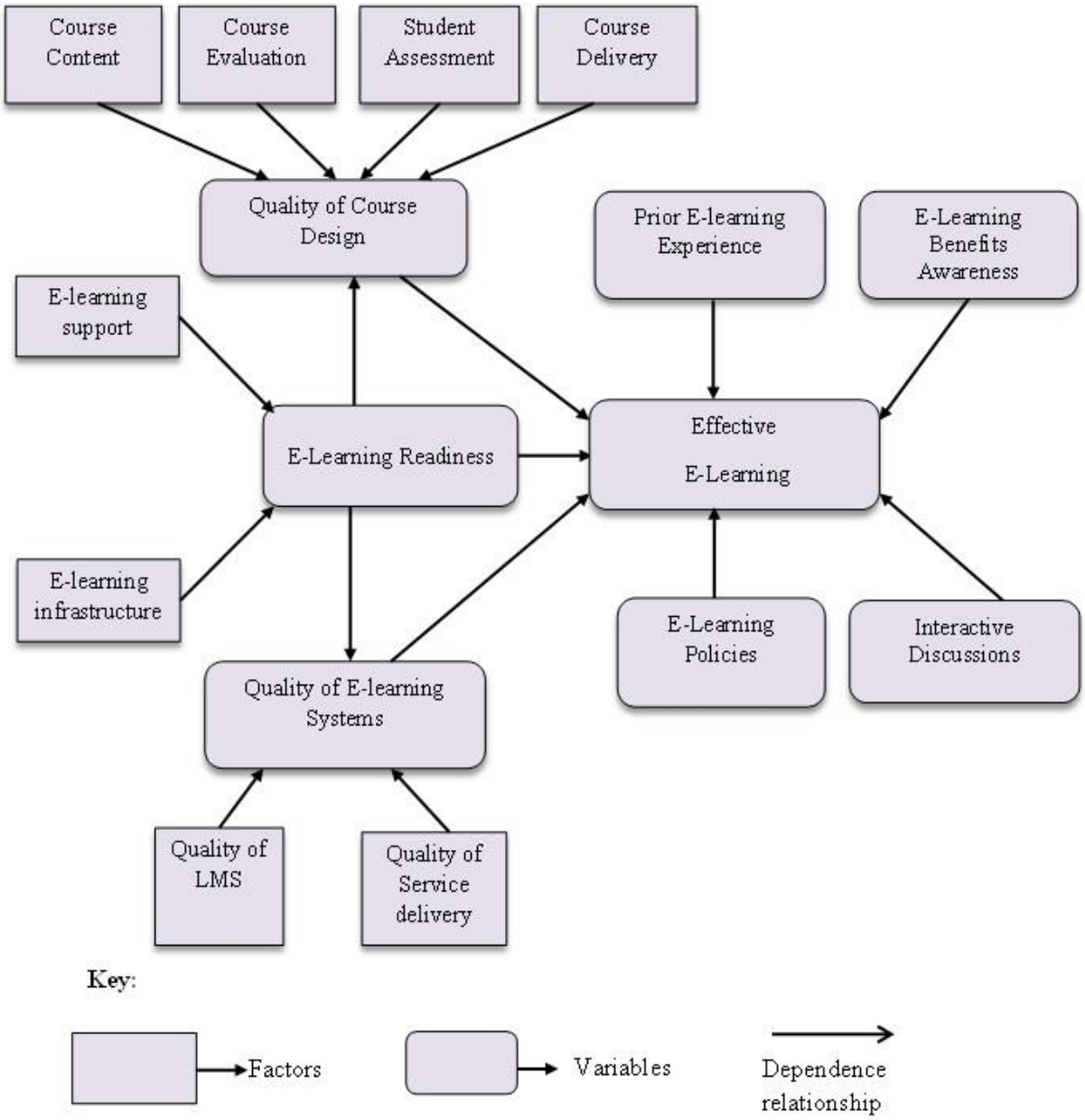


Figure 7.2 Refined Theoretical Model for Facilitating Effective E-learning

7.6 Model Evaluation

To assess the fitness of the model, the regression models and ANOVA tables are used from SPSS (Field, 2009). Regression models may be linear or multiple depending on whether there are several predictor variables for a single outcome variable (dependent variable). Thus, a multiple regression model is composed of several factors. Regression analysis is a method used to predict the outcome of the dependent variables based on the predictor variables (independent variables). Regression analysis is aimed at fitting a model to the data and using it to predict values of the dependent variable from several predictor variables.

7.6.1 Model statistical specification

The theoretical model in Figure 7.2 has been represented by several statistical models shown in Equation 7.2, Equation 7.3, Equation 7.4, Equation 7.5 and Equation 7.6. These equations are derived using the statistical equation represented in the model equations (Field, 2009) in Equation 7.1.

$$Y_i = (\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ \ldots + \beta_n X_{ni}) + \varepsilon_i$$

Equation 7.1 Model Equation

Here; Y_i denotes the outcome that is to be predicted i.e. the dependent variable or factor, β_0 denotes the intercept of that line, β_1 denotes the gradient of the line fitted to the data, both β_0 and $\beta_1$are known as regression coefficients, X_i is the value of the predictor variable also known as the variable (independent variable) for the i^{th} respondent and ε_i is known as the residual. These statistical equations are used to test to assess the goodness of fit of the model and assessing the model parameters.

$$\textbf{Quality of Course Design}_i = (\beta_0 + \beta_1 \text{Course Content}_i + \beta_2 \text{Course Evaluation}_i + \beta_3 \text{Student Assessment}_i + \beta_4 \text{Course Delivery}_i) + \varepsilon_i$$

Equation 7.2 Regression model for Quality of Course Design

Equation 7.2 represents a linear relationship between four factors associated with Quality of Course Design i.e. course content, course evaluation, student assessment, and course delivery.

$$\textbf{E-learning Readiness}_i = (\beta_0 + \beta_1 \text{E-learning Policies}_i + \beta_2 \text{E-learning Support}_i + \beta_3 \text{E-learning Infrastructure}_i) + \varepsilon_i$$

Equation 7.3 Regression model for E-learning Readiness

Equation 7.3 represents a linear relationship between three factors associated with e-learning readiness namely; e-learning policies, e-learning support and e-learning infrastructure.

$$\textbf{Quality of E-learning Systems}_i = (\beta_0 + \beta_1 \text{Quality of LMS}_i + \beta_2 \text{Quality of Service Delivery}_i) + \varepsilon_i$$

Equation 7.4 Regression model for Quality of E-learning Systems

Equation 7.4 depicts a linear relationship between two factors associated with measuring quality of e-learning systems, namely; quality of LMS and quality of service delivery.

$$\textbf{Effective E-learning}_i = \left(\beta_0 + \beta_1 \text{Quality of Course Design}_i + \beta_2 \text{Quality of E-learning Systems}_i + \beta_3 \text{E-learning Readiness}_i\right) + \varepsilon_i$$

Equation 7.5 Regression Model for Effective E-learning

Equation 7.5 represents a linear relationship of the three independent variables associated with the dependent variable effective e-learning. These three variables associated with effective e-learning include: quality of course design, quality of e-learning systems and e-learning readiness.

$$\textbf{Effective Use of E-learning}_i = \left(\beta_0 + \beta_1 \text{Quality of E-learning Systems}_i + \beta_2 \text{Quality of Course Design}_i + \beta_3 \text{E-learning Readiness}_i + \beta_4 \text{Prior Experience in E-learning}_i + \beta_5 \text{E-learning Benefits Awareness}_i + \beta_6 \text{Interactive Discussions}_i\right) + \varepsilon_i$$

Equation 7.6 Regression Model for Effective E-learning with three moderating factors

Lastly, Equation 7.6 represents an overall linear relationship between three independent variables and three moderating factor variables associated with effective e-learning. Hence the three moderating factors are introduced to help determine their influence on the model.

7.6.2 Overall fit of the model

Assessing the goodness of fit is based on the Sum of Squares R and R^2 (Field, 2009). Multiple R is the correlation between the observed values of Y and the values of Y predicted by the multiple regression models. A multiple R of 1 is an indicator that the model perfectly predicts the observed data. In other words, the aim is to assess model parameters and the overall fit of the model. Establishing the goodness of fit of the model depends on an established line of best fit that describes the sample data (Field, 2009).

According to Field (2009) the fit of the regression model is evaluated by looking at the summary of results of the Model, ANOVA and Regression coefficients. Firstly, the Model results of R^2 give information about the proportion of variance as explained in the model (Field, 2009). The predictor variables are introduced into the regression model in a hierarchy and so the values of R reveal the level of improvement for the model. As each predictor is

introduced into the model, the change in R and its significance is observed by looking out for values of less than 0.05 in the column labelled *Sig. F Change*. Secondly, the ANOVA results are an indicator of how the data fits the model by observing if the column values labelled *Sig.* are less than 0.05 (Field, 2009). And lastly, the beta (β) values reveal the type of relationship existing between the factors (dependent variables) and the predictor variables (independent variables) (Field, 2009). A positive β value indicates a positive relationship exists between the factors and the predictor variables. The β values also tell the degree to which each predictor affects the dependent variables if the effects of all other predictors (independent variables) are held constant.

Results from each of the statistical models are an estimate of the overall goodness-of-fit and estimation of the model. In reference to section 7.5.4 and theoretical model in Figure 7.2, the regression models are defined in terms of several statistical equations derived from Equation 7.1. Therefore, the regression models are a representation of the theoretical model which that has been tested to determine the goodness-of-fit between the theoretical model and the data collected. There are 6 regression models represented by the equations and these have been tested for the overall fit of the model. The model that measures Effective E-learning is a complex model that is built on several factors and variables.

7.6.2.1 Overall Fit of the Quality of Course Design Regression Model

The multiple regression analysis output results in Table 7.25 were used to examine the relationship between the Quality of Course Design and four predictors of the model.

Table 7.25 Summary of Quality of Course Design Regression Model

Model	**Model Summary**				**ANOVA**		**Regression Coefficients**			
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*				
	0.79	0.62	0.62	0.00	30.12	0.00				
Regression Coefficients for Predictor Variables							***β***	***SEβ***	***t***	***Sig.***
Constant							4.96	1.26	3.93	0.00
Course Content							0.10	0.09	0.86	0.39
Course Evaluation							0.14	0.11	0.31	0.19
Student Assessment							0.54	0.11	5.14	0.00
Course Delivery							0.12	0.10	1.40	0.17

Key:

a. Dependent Variable: Quality of Course Design

b. Predictors: (Constant), Course Content, Course Evaluation, Student Assessment, Course Delivery

The Model Summary section in Table 7.25 reveals information about the fitness of the model by values of R, R^2, R^2 Change and Sig. F Change. The multiple regression model with all the four predictor variables produced $R^2 = 0.62$, F (4, 75) = 30.12, $p<.001$. The results in Table 7.25 show that Student Assessment significantly made a contribution in measuring Quality of Course Design ($\beta = 0.54$, $t(75) = 5.14$, $p<.001$). The results indicate that Course Content, Course Evaluation and Course Delivery did not make significant contribution to the model.

7.6.2.2 Overall Fit of the E-learning Readiness Regression Model

The multiple regression analysis output in Table 7.26 resulted from an examination of the relationship between the Quality of Course Design and three predictors of the model namely; E-learning Policies, E-learning Support and E-learning Infrastructure. The Model Summary section in Table 7.26 reveals information about the fitness of the model by values of R, R^2, R^2 Change and Sig. F Change. The multiple regression model with three predictor variables produced $R^2 = 0.47$, F (3, 76) = 22.24, $p<.001$. The results in Table 7.26 show that only two predictor variables made a significant contribution to the model except E-learning Policies. E-learning Support made the greatest contribution in measuring E-learning Readiness ($\beta = 0.41$, $t(76) = 4.41$, $p<.001$) while E-learning Infrastructure measured ($\beta = 0.36$, $t(76) = 3.91$, $p<.001$). E-learning Policies was not significant measured at ($\beta = 0.16$, $t(76) = 1.89$, $p>0.05$).

Table 7.26 Summary of E-learning Readiness Regression Model

Model	**Model Summary**				**ANOVA**		**Regression Coefficients**			
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*				
	0.68	0.47	0.47	0.00	22.24	0.00				
Regression Coefficients for Predictor Variables							***β***	***SEβ***	***t***	***Sig.***
Constant							9.40	2.35	4.00	0.00
E-learning Policies							0.16	0.14	1.89	0.06
E-learning Support							0.41	0.07	4.41	0.00
E-learning Infrastructure							0.36	0.08	3.91	0.00

Key:

a. Dependent Variable: E-learning Readiness

b. Predictors: (Constant), E-learning Policies, E-learning Support, E-learning Infrastructure

7.6.2.3 Overall Fit of the Quality of E-learning Systems Regression Model

The relationship between the Quality of E-learning Systems and two predictors is presented in Table 7.27 after performing a multiple regression analysis. There are two predictors of the regression model namely; Quality of Service Delivery and Quality of LMS.

The Model Summary section in Table 7.27 reveals information about the fitness of the model by values of R, R^2, R^2 Change and Sig. F Change. The multiple regression model of the two predictor variables produced $R^2 = 0.29$, F (2, 77) = 15.84, $p<.001$. The results in Table 7.27 also show one of the variables made a significant contribution to the model. Quality of LMS had the highest contribution (β = 0.48, t(77) = 4.01, p<.001) while Quality of Service Delivery had a low contribution (β = 0.10, t(77) = 0.83, p = n.s).

Table 7.27 Summary of Quality of E-learning Systems Regression Model

Model	Model Summary				ANOVA		Regression Coefficients
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*	
	0.54	0.29	0.29	0.00	15.84	0.00	

Regression Coefficients for Predictor Variables	*β*	*SEβ*	*t*	*Sig.*
Constant	15.78	1.59	9.93	0.00
Quality of Service Delivery	0.10	0.10	0.83	0.41
Quality of LMS	0.48	0.07	4.01	0.00

Key:

a. Dependent Variable: Quality of E-learning Systems

b. Predictors: (Constant), Quality of Service Delivery, Quality of LMS

7.6.2.4 Overall Fit of Effective E-learning Model

Effective E-learning is a complex model comprising of three variables and three moderating factors. The results in Table 7.28 was based on the examination of the relationship between effective e-learning and three variables in the model namely; e-learning readiness, quality of course design and quality of e-learning Systems.

Table 7.28 Summary of Effective E-learning Model

Model	Model Summary				ANOVA		Regression Coefficients
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*	
	0.26	0.07	0.07	0.14	1.90	0.14	

Regression Coefficients for Predictor Variables	*β*	*SEβ*	*t*	*Sig.*
Constant	16.78	3.02	5.55	0.00
E-learning Readiness	0.06	0.10	0.43	0.68
Quality of Course Design	0.26	0.13	2.25	0.03
Quality of E-learning Systems	-0.05	0.11	-0.35	0.72

Key:

a. Dependent Variable: Effective E-learning

b. Predictors: (Constant), E-learning Readiness, Quality of Course Design, Quality of E-learning Systems

This same model is further examined based on three moderating factors shown in Table 7.29. The Model Summary in Table 7.28 reveals the initial information regarding the fitness of the model by values of R, R^2, R^2 Change and Sig. F Change related to the three factors.

The initial multiple regression model based on the three factors produced $R^2 = 0.07$, F (3, 76) = 1.90, *p* =n.s. Although the data does not properly fit this initial model, the results in Table 7.28 still show that there was one factor that made a significant contribution to the model. Quality of Course Design made the greatest contribution in measuring Effective E-learning (β = 0.26, t(76) = 2.25, p<.05). However, The effect of E-learning Readiness (β = 0.06, t(76) = 0.43, p = n.s) and Quality of E-learning Systems (β = -0.05, t(76) = -0.35, *p* = n.s) did not make a significant contribution.

Secondly, the new model in Table 7.29 was aimed at establishing the relationship between the three factors and the three moderating factors. The three moderating factors; E-learning Benefits Awareness, Interactive Discussions and Prior E-learning Experience are introduced into the model to determine their contribution to the model as shown in Table 7.29. The Model Summary in Table 7.29 reveals that the multiple $R^2 = 0.33$, F (6, 73) = 1.52, *p* = n.s.

Table 7.29 Summary of Effective E-learning Regression Model

Model	**Model Summary**				**ANOVA**		**Regression Coefficients**
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*	
	0.33	0.11	0.11	0.19	1.52	0.19	

Regression Coefficients for Predictor Variables	***β***	***SEβ***	***t***	***Sig.***
Constant	17.39	3.09	5.64	0.00
Quality of Course Design	0.34	0.15	2.68	0.01
E-learning Readiness	0.08	0.10	0.57	0.57
Quality of E-learning Systems	0.02	0.12	0.11	0.91
E-learning Benefits Awareness	-0.06	0.09	-0.43	0.67
Interactive Discussions	-0.20	0.12	-1.28	0.21
Prior E-learning Experience	-0.01	0.40	-0.06	0.96

Key:

a. Dependent Variable: Effective E-learning

b. Predictors: (Constant), E-learning Benefits Awareness, Interactive Discussions, Prior E-learning Experience

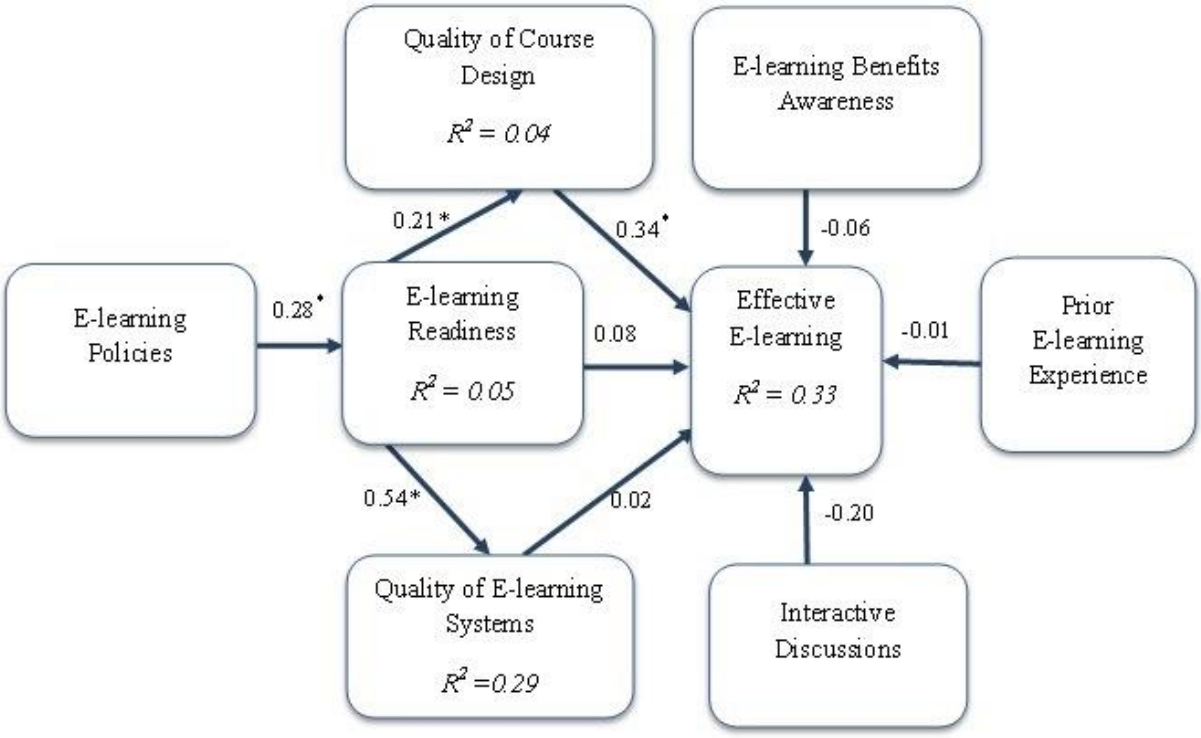
The new model's F-value is lower and also not significant. Although the new model is not significant in measuring the Effective E-learning, one of the factors is seen to make a significant contribution to the model, thus; Quality of Course Design significantly contributed to measuring Effective E-learning (β = 0.34, t(73) = 2.68, p<.05). However, the effect of

E-learning Readiness is not significant (β = 0.08, t(73) = 0.57, *p* = n.s), the effect of Quality of E-learning Systems is not significant (β = 0.02, t(73) = 0.11, *p* = n.s), the effect of E-learning Benefits Awareness is not significant (β = -0.06, t(73) = -0.43, *p* = n.s), the effect of Interactive Discussions is not significant (β = -0.20, t(73) = -1.28, *p* = n.s) and Prior E-learning Experience (β = -0.01, t(73) = -0.06, *p* = n.s). The observation of the results is an indicator that the data did not fit the model.

7.6.3 Model strength measurement

The results of the overall model discussed in 7.6.2.4 give the estimates of the regression coefficients which provide an insight into the tests of the hypotheses. The strength and relationships of each of the 7 variables influencing Effective E-learning is examined as shown in Table 7.29, Table 7.30, Table 7.31 and Table 7.32.

A pictorial representation of the results of the model is presented Figure 7.3 showing how the data fitted the model.



Note: R^2 show the proportion of the variations of the variables causing the influence *$p < 0.05$

Figure 7.3 Model Strength for facilitating Effective E-learning

The model depicted in Figure 7.3 as tested to determine the strength of the eight variables namely; E-learning Policies, E-learning Readiness, Quality of Course Design, Quality of E-learning Systems, Effective E-learning, E-learning Benefits Awareness, Prior Experience in E-learning, and Interactive Discussions. The strength of the model is evaluated based on the

significance of the Beta parameters. Firstly, E-learning Policies, as hypothesized, has significant positive effects on E-learning Readiness (β = 0.28, p <0.05) presented in Table 7.30, thereby supporting H_1. On the other hand, E-learning Readiness, as hypothesized, has a significant positive effect on the Quality of E-learning Systems (β = 0.54, p < 0.001) shown in Table 7.31, thereby supporting H_{16}, however, E-learning Readiness is seen to have non-significant effect on the Quality of Course Design (β = 0.21, p = n.s) as per the Table 7.32 hence not supporting H_{13}.

Table 7.30 Summary of E-learning Readiness Regression Model

Model	**Model Summary**				**ANOVA**		**Regression Coefficients**			
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*				
	0.23	0.05	0.05	0.04	4.29	0.04				
Regression Coefficients for Predictor Variables							***β***	***SEβ***	***t***	***Sig.***
Constant							20.32	2.40	8.46	0.00
E-learning Policies							0.23	0.19	2.07	0.04

Dependent Variable: E-learning Readiness;

Independent Variable: E-learning Policies

Table 7.31 Summary of Quality of Course Design Regression Model

Model	**Model Summary**				**ANOVA**		**Regression Coefficients**			
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*				
	0.21	0.04	0.04	0.07	3.47	0.07				
Regression Coefficients for Predictor Variables							***β***	***SEβ***	***t***	***Sig.***
Constant							13.57	1.83	7.40	0.00
E-learning Readiness							0.21	0.07	1.86	0.07

Dependent Variable: Quality of Course Design;

Independent Variable: E-learning Readiness

In addition, Quality of Course Design has a significantly positive mediating effect on Effective E-learning (β = 0.34, p < 0.05), supporting H_{14}. However, E-learning Readiness does not have a significant effect on Effective E-learning (β = 0.08, p = n.s), which is not in support of H_{15}. The same applies to Quality of E-learning Systems which does not have a significant effect on Effective E-learning (β = 0.02, p = n.s), hence not supporting H_{17}. Furthermore, the moderating factors E-learning Benefits Awareness (β = -0.06, p = n.s), Prior Experience in E-learning (β = -0.01, p = n.s) and Interactive Discussions (β = -0.20, p = n.s) have a negative effect on Effective E-learning which is an indicator that these hypotheses should be rejected.

Table 7.32 Summary of Quality of E-learning Systems Regression Model

Model	Model Summary				ANOVA		Regression Coefficients			
	R	R^2	R^2 *Change*	*Sig. F Change*	*F*	*Sig.*				
	0.54	0.29	0.29	0.00	32.00	0.00				
Regression Coefficients for Predictor Variables							***β***	***SEβ***	***t***	***Sig.***
Constant							12.64	2.13	5.93	0.00
E-learning Readiness							0.54	0.08	5.66	0.00

Dependent Variable: Quality of E-learning Systems;

Independent Variable: E-learning Readiness

7.6.4 Significance effects of hypotheses tested

The results on Table 7.33 show that only two of the eight hypotheses tested were accepted while the rest were rejected as per the tests of significance.

Table 7.33 A Tabular Presentation of Hypotheses Significance Test Outcomes

Hypothesis Tested		
#	**Hypothesis**	**Decision to Accept or Reject**
H_1	*If understanding of pedagogical course design is increased, the quality of e-learning courses will improve and promote effective e-learning.*	Accepted
H_2	*If services and features of learning management systems are improved, then the quality of e-learning systems will increase and facilitate effective e-learning.*	Accepted
H_3	*If universities prepare for e-learning, their readiness for e-learning will cater for the costs of implementing, maintaining, and acquiring up-to-date e-learning systems which will influence effective e-learning.*	Rejected
H_4	*If universities are ready for e-learning, their readiness for e-learning will cater for the costs of developing and updating courses designed to improve the quality of courses which will promote effective e-learning.*	Accepted
H_5	*If universities are ready for e-learning, having the right policies and support in place will foster e-learning readiness to facilitate effective e-learning.*	Rejected
H_6	*If the awareness of e-learning benefits is raised, then staff and students will positively engage in e-learning which will facilitate effective e-learning.*	Rejected
H_7	*If e-learning is delivered in an interactive environment, the students will feel engaged with the online community which will facilitate effective e-learning.*	Rejected
H_8	*If system users are given e-learning skills training, this will enhance their experiences attitudes towards e-learning which will promote effective e-learning.*	Rejected

7.7 Factor analysis to validate the initial model

This section presents results on factor analysis performed to further validate the results and findings of the initial model. In other words the factor analysis provides a side view of the factors in the initial model with focus on understanding the relationships between factors and variables in the questionnaire. The aim is to identify the variables and factors that have similar grouping in order to confirm the factor. Running a factor analysis depends on the suitability of the sample size. Hair et al. (2010) recommends a sample size of 10 to 15 participants per factor as a rule of thumb for factor analysis. After refining the theoretical model as shown in Figure 7.2, the total number of factors was reduced to 8. This was a direct match with the 80 respondents obtained as discussed in section 7.1.1. Besides, the suitability of the data used for performing a factor analysis can also be determined by looking at the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Field, 2009). Kaiser-Meyer-Olkin measure of sampling adequacy is obtained by looking at the strength of inter-correlations among variables by observing the Kaiser-Meyer-Olkin values. A value of Kaiser-Meyer-Olkin measure would range from 0 to 1. Values greater than 0.7 are an indication of the suitability of factor analysis. Factor analysis is performed by running a factor extraction.

7.7.1 Factor Extraction

Factor extraction basically involves identifying cluster groupings within variables with an inherent high interrelationship (Field, 2009). Factors can be extracted using a range of different methods such as Principal Component Analysis (PCA), maximum likelihood factoring and principal axis factoring (Field, 2009). The factor extraction method chosen is dependent on the aims of running the factor analysis. For instance, the aim of performing factor analysis in this research study is to help confirm the factors identified in the initial as being internally relevant for predicting the model. So the principal component analysis is suitable choice in determining how the factors contribute to the overall model. Besides knowing the method of extraction, it is also important to know how many factors are extracted. To determine the number of factors extracted, eigenvalues (Kaiser's criterion) and scree plot are used to reveal information about the factors extracted (Field, 2009). To know which factors are extracted, eigenvalues greater than 1 are identified. In addition, observing the scree plot is helpful by looking out for the point in the plot where the curve begins to change direction and becomes straight. It is at this point that we select the factors above to be retained.

7.7.2 Results of Factor Extraction

This section presents the results of factor analysis from factors for measuring effective e-learning. The results of the factor analysis are represented by Table 7.34 and Figure 7.4. According to the results of the factor extraction shown in Table 7.34, there are five factors which have eigenvalues greater than one denoted by the eigenvalues (total) column. The next item labelled (% of variance) shows cumulative variance of the factor and the previous factors. To be specific, the first five factors with eigenvalues greater than 1 make a high contribution to the variance. The results in Table 7.34 indicate that the Factor 1 accounts for 32.588% of the variance; Factor 2 contributes 17.024% of the variance, Factor 3 accounts for 10.038% of the variance, Factor 4 contributes 6.779% and least contribution of variance is made by Factor 5 with 6.311%. All the remaining factors did not make a significant contribution. In this research study, total variance explained by having five factors retained is equal to 72.740%.

Table 7.34 Eigenvalues and Total Variance Explained

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	5.540	32.588	32.588
2	2.894	17.024	49.612
3	1.706	10.038	59.650
4	1.152	6.779	66.429
5	1.073	6.311	72.740
6	.890	5.235	77.975
7	.744	4.379	82.354
8	.521	3.064	85.418
9	.505	2.968	88.386
10	.435	2.560	90.946
11	.346	2.033	92.979
12	.290	1.707	94.686
13	.273	1.604	96.290
14	.202	1.187	97.477
15	.189	1.111	98.588
16	.135	.792	99.380
17	.105	.620	100.000

On the other hand, the scree plot in Figure 7.4 is a graph of the eigenvalues against all the factors. Using the scree plot is another way to determine how many factors to retain. The aim is looking for the point where the curve starts to become straight. According to Figure 7.4 it can be seen that the curve beings to flatten between factors 5 and 6. However, factor 6 has an eigenvalue of less than 1, so only five factors have been retained.

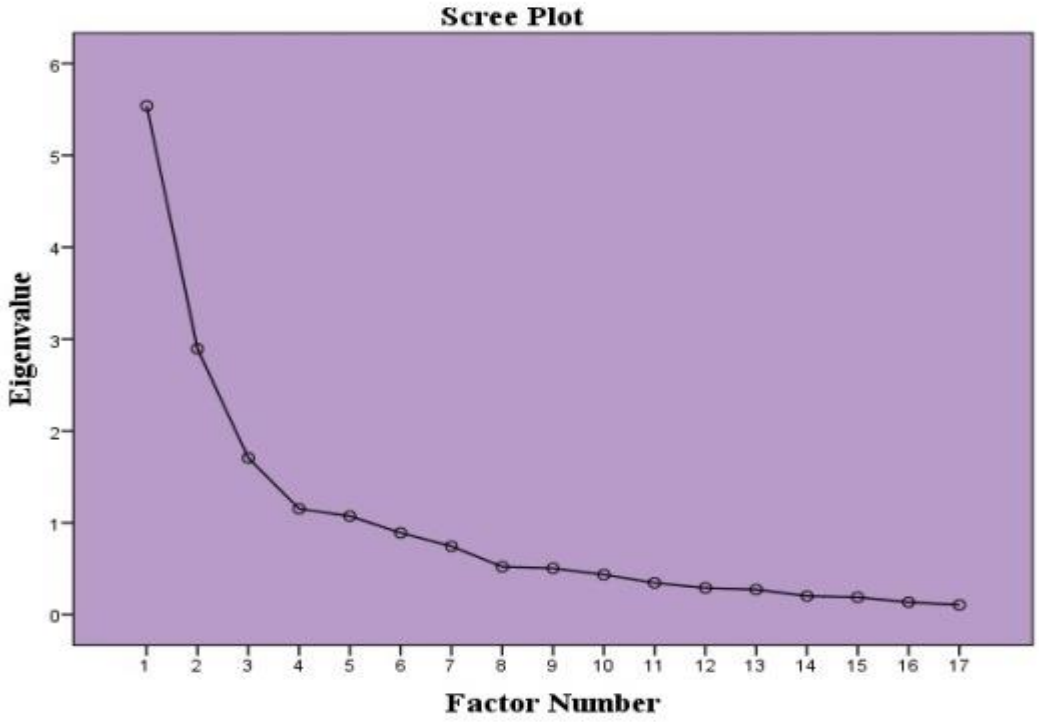


Figure 7.4 Scree Plot of Eigenvalues against all factors

7.7.3 Results of Factor Rotation

The idea behind factor rotation is to help interpret the factors that have been retained after the extraction. Factor rotation does not actually change anything but helps to interpret the factors that are loaded into the variable (Field, 2009). Table 7.35 shows the loadings of the eight factors from theoretical model in Figure 7.2. The higher the value of loading, the more the factor contributes to the variable (Field, 2009). The table represents loadings for variables greater than 0.5.

Variable 1: E-learning Readiness and Quality of E-learning Systems

A looking at Table 7.35 reveals that there were five factors that loaded onto Variable 1. The five factors have been categorised into their similar characteristics to represent two main variables namely; E-learning Readiness and Quality of E-learning Systems. That is, e-learning support had a loading of 0.70; e-learning culture had a loading of 0.68 and e-learning infrastructure loaded 0.64. These three factors perfectly loaded onto E-learning Readiness. In

addition, two more factors with a loading of 0.72 for quality of LMS and a loading of 0.61 for quality of service delivery loaded on Quality of E-learning Systems.

Table 7.35 Rotated Factor Matrix

	Factors				
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**
Course Content		.876			
Course Evaluation		.851			
Student Assessment		.833			
Course Delivery		.511			
E-learning Support	.704				
E-learning Culture	.676				
E-learning Costs					.797
E-learning Infrastructure	.642				
E-learning Policies			.770		
Quality of LMS	.722				
Quality of Service Delivery	.610				
Effective E-learning				.846	

Variable 2: Quality of Course Design

Table 7.35 shows that four variables loaded on Variable 2. These factors had good factor loadings; with course content loading highest at 0.88, followed by course evaluation with a loading of 0.85, then student assessment loaded 0.83 and lastly course delivery had a factor loading of 0.51. Similarly, these four factors characterise Quality of Course Design factor.

Factor 3: E-learning Policies

The results in Table 7.35 show that Factor 3 had only one factor variable loading highly with 0.77 for e-learning policies. Therefore, the result confirms E-learning Policies as a factor.

Variable 4: Effective E-learning

Finally, variable 4 had just one variable which loaded 0.85 for effective e-learning. This also confirms Effective E-learning.

7.8 Summary

The results and findings confirm the composition of the initial model. To begin with, the results show that majority of the participants sampled from the universities in Africa, Asia and Europe had a good experience in e-learning. This means that the respondents were knowledgeable about the current practices of e-learning in their universities. A reliability analysis was performed to help expose variables and factors that exhibited a level of internal inconsistency. The reliability test results revealed that two of the eleven factors in the theoretical model had a low score for the Cronbach alpha. These two factors; e-learning costs and e-learning culture were eliminated and the theoretical model refined accordingly. The initial model was then evaluated to determine the overall fitness of the model to predict effective e-learning. The results from the evaluation indicate that the data did not perfectly fit the model. However, there were some significant relationships seen between the factors in the model. There was a significant relationship found between e-learning readiness and quality of course design. This means that the quality of course design is dependent on the readiness of the university to support academic staff in designing and developing their e-learning course content and material. Thirdly, there was a notable relationship seen between e-learning readiness and quality of e-learning systems factors. This relationship signifies that the quality of the current e-learning systems is influenced by the readiness of the university to meet the financial costs and provide all necessary resources for keeping the systems up-to-date. Further on, an observation was made on how the three variables; quality of course design, e-learning readiness and quality of e-learning systems impact on effective e-learning. The results revealed that the data did not support the relationship of all the three variables except quality of course design. These results simply mean that institutions need to do more to readily prepare to use and support use of e-learning as well as improve the service delivery, a measure of the quality of e-learning systems. Lastly, the three moderating factors; e-learning benefits awareness, interactive discussions and prior e-learning experience were introduced into the existing relationship of effective e-learning. The results show that the three moderating factors did not make a positive impact in the performance of the model. However, the relevance of these moderating factors is substantiated by the qualitative data. Overall, there were significant relationships in the model and instances of insignificant relationships were covered by the qualitative data. A total of 8 hypotheses were formulated. The aim of the results and findings was to give indication of which hypotheses to accept and / or reject. Based on the results, it is clear that some hypotheses statistically qualify for rejection.

Chapter 8 Discussion

This chapter is a discussion of the results and findings following a research study establish the factors that are necessary for facilitating effective e-learning within universities. The research study findings and results suggest that facilitating effective e-learning is greatly influenced by eight variables namely; E-learning Policies, Quality of Course Design, E-learning Readiness, Quality of E-learning Systems, E-learning Benefits Awareness, Prior Experience in E-learning, Interactive Discussions and Effective E-learning.

To address the main objective of the research, answers to the following research questions were sought; and the responses were discussed in the subsequent sections.

a) What is the state-of-the-art in regard to trends and practices of e-learning in Universities?
b) What factors are necessary for facilitating effective e-learning in Universities?
c) What factors make up a structure of a model for facilitating effective e-learning in Universities?
d) Are there any significant relationships among the variables in the model?
e) Are there any significant relationships among the factors in the model?
f) Does the data provide the best fit for the model?

8.1 Challenges related to promoting effective e-learning

According to the study participants there are six major gaps identified in section 5.4.2 within the existing e-learning infrastructures in the universities. These include: limited technical resources; inadequate skills in e-learning; insufficient strategies in e-course design; deficient awareness of the benefits of e-learning; less motivation to use e-learning systems; and inadequate focus on student-centred learning. Generally, these major gaps are controlled by availability of funds. Thus, an institutions readiness to effectively sustain the use of e-learning partly depends on its capacity to fund all the e-learning activities (Omoda-Onyait and Lubega, 2011). Overall, technical resources such computing and internet connectivity facilities are crucial enablers for sustained use of e-learning within the institutions although their acquisition depends on the availability of funds. In addition, when staff and students are incapable of using e-learning systems, this makes e-learning ineffective. Therefore, adequate training is necessary to raise e-learning skills. Having an awareness of the benefits of e-learning makes e-learning effective. The findings show that most staff members were not motivated to use e-learning for facilitating their daily teaching routines which rendered

e-learning ineffective. When the academics are less motivated to use e-learning platforms this is greatly attributed to lack of awareness of the benefits of using e-learning. So if the academics are informed of the benefits of e-learning then effective e-learning will be achieved.

Anderson (2008) and Ssekakubo et al. (2011) conducted studies in which they investigated the issues regarding adoption and use of e-learning within developing countries. Their results revealed that there was limited ICT infrastructure to accommodate the high volume of students as well as poor ICT support in using e-learning see section 2.1.1. In addition to their being inadequate resources, researchers also found out that some of the staff and students had inadequate skills and training in the use of e-learning (Omoda-Onyait and Lubega, 2011). Aydin and Tasci (2005) reached a conclusion that although institutions may sometimes have sufficient resources for implementing e-learning, e-learning systems may still fail due to lack of necessary skills for using the resources.

Hence there is need to provide training and skills to enable the staff and students to effectively use e-learning platforms. Once skills in ICT and e-learning are acquired through training then e-learning is likely to be used effectively. Further to that, there is a vast amount of literature documenting that academic staff lack proper skills to develop quality e-learning content within institutions. Olds (2002) recommends that success of e-learning systems requires institutions to apply appropriate systems design models to enable them select appropriate learning objectives and measurable outcomes as well as decide on appropriate assessment methods. So the challenge with institutions especially in developing countries is that they are unsure of which parameters to consider while assessing their readiness for e-learning (Omoda-Onyait and Lubega, 2011, Keramati et al., 2011). According to the study participants, there is inadequate focus on student-centred learning however if e-learning platforms are effectively used then it would foster the development of team-work and communication skills amongst the students. Moreover, there is insufficient support to foster and raise awareness on e-learning within the universities. Most importantly, the university leadership and administration responsible for the acquisition and sustainability of e-learning systems are sometimes financially constrained and less motivated to promote use of these systems within the institution.

These research findings suggest that although most of the universities have well established e-learning systems, these systems are not being utilised effectively because there is less motivation to use them due to a deficiency in the awareness of the benefits of e-learning. In addition, the limited technical resources and lack of training, skills and support

in development of e-course material are hindrances to effective e-learning. Several studies suggest that it is important to assess an institution's readiness for e-learning by analysing the resources it possesses as well as finding out the level of skills and attitudes of its employees in order to make e-learning more effective (Aydin and Tasci, 2005). In view of the challenges identified associated with e-learning, the results of this study support the notion that universities should raise the awareness of e-learning benefits amongst the staff and students as well as improve their readiness to support e-learning which greatly influences the quality of course design and quality of e-learning systems.

8.2 Current trends of e-learning in universities

This research study addressed the first research question; *what is the state-of-the-art in the trend and practices of e-learning within Universities?* The study findings documented in section 5.4.2 revealed the current practices of e-learning within universities as told by interviewees from Africa, Asia and Europe. Most of the interview participants mentioned in Table 5.28 shared similar sentiments on how e-learning had been adopted in their universities.

The findings reveal that effective e-learning was largely influenced by three moderating variables namely; E-learning Benefits Awareness, E-learning Policies and E-learning Readiness. Sustained use of e-learning was associated with how much academic staffs were aware of the benefits of using e-learning in addition to existence of established University policies on e-learning. Overall, the study findings confirmed that e-learning would be more effective if the institution readily supported e-learning.

Most importantly, the research findings showed that most of the academics were not fully engaged with e-learning platforms because of either non-existent or not-well established e-learning policies in section 5.4.2. On the other hand, research findings revealed that e-learning policies were seen as vital ingredients for e-learning to be effective. As stated in section 5.4.4.6 policies can be used to affect the quality of course design, delivery and implementation of e-learning systems (Czerniewicz and Brown, 2009). There is a substantial amount of research in section 0 documenting that successful and effective e-learning is dependent on stakeholders' understanding of the changes and benefits attributed to using e-learning (Omoda-Onyait and Lubega, 2011). In addition, having appropriate support from both management and IT department would sustain the adoption of e-learning (Aydin and Tasci, 2005).

Even though majority of the interview participants acknowledged that the efficacy of e-learning is greatly attributed to e-learning policies and readiness of institutions, it was noted

that there was still reluctance to engage in e-learning because it was demanding in terms of time and cumbersome. Therefore it is necessary to have financial support and incentives to motivate academic staff as said in section 5.4.2. It is evident that support and sustainability costs are fundamental aspects for achieving effective e-learning (Omoda-Onyait and Lubega, 2011). Some interviewees expressed fears of breach of privacy and security especially where lectures were recorded. In view of these concerns associated with using e-learning, the results of this study support that e-learning readiness and e-learning policies would play a vital role in averting the fears.

Although both qualitative and quantitative research methods were used to collect data, the perceptions on e-learning were based on only staff opinions. And so, students' perceptions were not obtained due to the limitation of time and resources.

Future research would help to understand students' perceptions on e-learning and how to make it more effective from the students' view. Conducting a further investigation with students involved would create effective strategies of encouraging student-centred learning.

8.3 Model for facilitating effective e-learning

The main objective of this study was to discover the factors that influence how to use e-learning effectively and then develop an appropriate model. The research questions in section 4.4 were formulated to address this research objective. In a bid to resolve the research questions and realise the research objective, a triangulation approach was followed. Firstly, an extensive literature review was performed to explore the models previously developed to foster successful adoption of e-learning in higher education institutions in Section 3.4. Based on the relevant literature a list of factors was identified as being theoretically essential in facilitating effective e-learning. Following this, a pilot study was conducted to explore factors which would constitute the composition of the theoretical model described in Chapter 4, Chapter 5, and Chapter 6. Lastly, a final experiment was performed to establish whether the data fits the model as in Chapter 6 by exploring the strengths in the variable and factor relationships. The theoretical model was used as the basis of conducting the experiment. The data was obtained from e-learning practitioners including; teaching assistants, lecturers, e-learning developers and professors. After learning about the challenges and current practices of e-learning in universities, it was of necessity to define a model that would help make e-learning effective.

After performing a regression analysis in section 7.6 on the data gathered. The data fit to the model was presented and results discussed in section 7.6. The proposed model is

discussed in reference to the identified relationships between the factors and variables in the theoretical model in Figure 7.2 in correspondence to research questions below;

a) What is the state-of-the-art in regard to trends and practices of e-learning in Universities?
b) What factors are necessary for facilitating effective e-learning in Universities?
c) What factors make up a structure of a model for facilitating effective e-learning in Universities?
d) Are there any significant relationships among the variables in the model?
e) Are there any significant relationships among the factors in the model?
f) Does the data provide the best fit for the model?

The following four research questions are addressed in the discussion; *what factors are necessary for facilitating effective e-learning in Universities? What factors make up a structure of a model for facilitating effective e-learning in Universities? And are there any significant relationships among the factors within the model? And does the data provide the best fit for the data?*

8.3.1 The relationship between e-learning policies and e-learning readiness

An analysis of the relationship between *E-learning Policies and E-learning Readiness* reveals that there is a positive correlation in Figure 7.3 based on results in Table 7.30 which means that having well established e-learning policies creates a level of institutional readiness to implement and sustain use of e-learning. Overall, the results of this research study confirm that a university's readiness to support e-learning is greatly controlled by having e-learning policies.

The empirical findings revealed that it is necessary for institutions to incorporate e-learning policies within institutional policies. The study participants echoed that success of e-learning necessitates that staff members to be incorporated into the e-learning implementation process by clearly stating their roles and responsibilities as stated in section 5.4.3. A research conducted by Czerniewicz and Brown (2009) revealed that an institutions' readiness to adopt and sustain e-learning depends on how prepared they are with their e-learning policies. E-learning policy statements generally stipulate the expectations and level of commitment of senior leadership towards upholding and promoting e-learning within their institutions (Czerniewicz and Brown, 2009). Research studies provide evidence that policies play a vital role in the successful adoption of e-learning within institutions (Czerniewicz and Brown, 2009).

From the findings and results, it is important to note that institutions are likely to benefit from having e-learning policies in place. Staff and students especially are more likely to benefit from having policies that encourage creation of e-learning centres within the university to support both students and staff. Having such centres as stipulated in the policy promotes an institution's readiness to support and sustain e-learning which suggests that e-learning policies are positively associated with an institution's readiness to support e-learning (Omoda-Onyait and Lubega, 2011, Aydin and Tasci, 2005).

Although, there are clear benefits of having well established e-learning policies, there is still some reluctance within the Universities to implement these policies. This is because there is always conflict of interest across the different managerial levels in the University. Hence attention should be directed towards involving academic and administrative staff in the formulation and implementation of the ICT and e-learning policies.

8.3.2 Relationship of e-learning readiness, quality of e-learning systems and quality of course design with effective e-learning

Generally, the results show that an institution's readiness for e-learning plays a role in influencing the quality of e-learning systems and quality of course design. As reflected in the literature review in Chapter 3, e-learning readiness has a relationship with the quality of e-learning systems and quality of course design. In reference to Table 7.28, the results show that there is a positive relationship between e-learning readiness and the quality of e-learning systems. However, the data did not sufficiently support the relationship between e-learning readiness and quality of course design. Nonetheless, the research findings reveal that an institution's readiness to support academic staff in the course design and development greatly impacts on the quality of course design in section 5.4.4.3. Overall, the results and findings of this study support the role that an institution's readiness for e-learning plays in ensuring the quality of e-leaning systems and quality of course design.

There is substantial amount of research documenting how readiness factors related to e-learning content such as provision of e-learning content, availability of e-learning content, presentation of e-learning content in a variety types of media and knowledge of pedagogical instructional design strategies and models influences the quality of course design (Psycharis, 2005, Omoda-Onyait and Lubega, 2011, Akaslan et al., 2011, Rosenberg, 2000, Keramati et al., 2011). Furthermore, an institution's readiness for e-learning contributes to the ability to maintain, support and sustain e-learning in the universities in section 0. From the findings, interviewees revealed that the quality of e-learning systems can be attributed to an institutions

ability to meet the cost of service delivery as well as incur the cost of updating and maintaining the existing systems.

It is evident that e-learning readiness plays an important role in raising the quality of course design and the quality of e-learning systems thereby impacting on e-learning. The results in Table 7.29 show that the sample data does not support a relationship between the three variables related to effective e-learning. The data reveals that only Quality of Course Design played a role in facilitating effective e-learning. As per the results in Table 7.29 both E-learning Readiness and Quality of E-learning Systems did not significantly support effective e-learning.

Overall, the results in Figure 7.3 and Table 7.29 are inconsistent with prior research indicating that quality of e-learning systems and e-learning readiness positively influences the effective e-learning in section 3.5.2. These three factors were shown to be important for facilitating effective e-learning in Chapter 5. The results provoked an in-depth explanation of the impact of these three variables on effective e-learning. A thorough look into these results reveals that the data obtained from the questionnaire could have been limited by the type of questions in the questionnaire in Appendix D. Although these results shown in Figure 7.3 do not entirely depict a perfect positive relationship. These results in Table 7.29 represent a fundamental truth about the status of institutional readiness for e-learning in reference to the Quality of Course Design and Quality of E-learning Systems. In other words, the results reveal to a greater extent that the universities need to do more to establish a greater level of sustainability of e-learning by increasing their support towards enhancing the quality of e-learning systems and quality of course design. Therefore, universities with a high level of readiness of e-learning and a high quality of course design systems and quality of e-learning systems would contribute to a perfect positive relationship in influencing effective e-learning in section 5.4.4. Furthermore, having another perspective from the student's view would reveal more information about the impact of these three variables. Chickering and Gamson (1999a) discloses the fact that using student-centred learning strategies makes an impact in enhancing the effectiveness of e-learning. And so examining the student's perspectives on the quality of e-learning systems, quality of course design and an institution's readiness for e-learning and how they impact on the effectiveness of e-learning would potentially promote effective e-learning.

Future research efforts are required to incorporate the students' body in assessing the different factors that influence effective e-learning.

8.3.3 Relationship of e-learning benefits awareness, prior experience in e-learning and interactive discussions with effective e-learning

Previous studies conducted by researchers all over the world indicate that e-learning benefits awareness, prior experience in e-learning and interactive discussions affect the effectiveness of e-learning in section 2.1.4. For instance interactive consultations offered via live chats, discussion threads, group-work, and real-time class face-to-face meetings and whiteboards (Clark and Mayer, 2003, Snart, 2010, Rice, 2011) allows students to engage with the course making them to feel part of the course (Martínez-Caro, 2011). The interactive discussions are regarded a means to facilitating effective e-learning in section 2.1.4. From this literature, it is clear that there is a positive relationship between interactive discussions and effective e-learning. However, the results in Table 7.29 reflect a negative relationship exists between interactive discussions factor and effective e-learning. There are several explanations to this result. First of all, the responses could have been affected by questions in the questionnaire. As a result the sample data did not fit the model as a predictor for effective e-learning. At the same time, the negative relationship could also mean that the universities are not currently participating in interactive discussions explained by the negative correlation. Therefore the contradictions in the results may mean that the universities need to revisit their support for interactive discussions. In so doing, it is also important to obtain the views of students regarding their participation in interactive discussions. This would correct the problem of the data not being representative of the entire university community as students were not included. So to improve the output of the results, it is necessary that student's opinions both qualitatively and quantitatively be obtained in addition to the questions in the questionnaire being revised.

Further to that, E-learning Benefits Awareness helps staff and students to understand the new e-learning technologies as well raise awareness about benefits of e-learning (Omoda-Onyait and Lubega, 2011) which in turn positively contributes to the effectiveness of e-learning. However results displayed in Table 7.29 show that there is a negative correlation between e-learning benefits awareness and effective e-learning. These results in Table 7.29 are indicative of failure of the sample data to predict the established relationship between the two moderating factors. This could possibly imply that the negative result is attributed to lack of an awareness amongst the staff about the benefits of e-learning negatively impacting on the strength of the correlation. Although the result of e-learning benefits awareness did not positively contribute to the model, still the findings from the interviews reveal that e-learning benefits awareness is a fundamental factor in facilitating effective e-learning in section 5.4.1.

So there are variations about the significance of these factors in comparison to the results and findings. Nonetheless, atleast there is a level of significance of the factors in the predefined relationships in the model in Figure 7.2.

Prior experience in e-learning is considered to be positively related to the effective e-learning because it is believed that previous exposure to e-learning and ICT tools will influence the effectiveness of e-learning (Martínez-Caro, 2011, Kirkpartick, 1994, Hughes et al., 2006, Gagné et al., 2005). Exposure to a new learning environment might require participants to adjust. However sometimes there might be fear of adopting to new systems (Martínez-Caro, 2011) which leads to e-learning users experiencing great difficulties with new learning environments. Therefore the greater the e-learning experience, the greater the confidence in using e-learning which would promote effective e-learning (Hughes et al., 2006, Martínez-Caro, 2011, Kirkpartick, 1994). Despite previous studies inferring that prior experience in e-learning is strategic in facilitating effective e-learning, the results in Table 7.29 show that prior experience in e-learning negatively impacts on effective e-learning. This is a contradiction considering how the literature in section 2.2.1 supports the notion that prior experience in e-learning is a moderating factor for effective e-learning. However to explain this contradiction, it is imperative to note that the data did not support the relationship between prior experience in e-learning and effective e-learning. Nonetheless, a discussion presented in section 7.2.1 confirms that most university staff had a good experience with e-learning.

In summary, an in-depth reflection on the results reveals that the objective of the research has been achieved with reference to these research questions; *what factors are necessary for facilitating effective e-learning within universities? Are there any significant relationships among the variables within the model?* Firstly, an examination of factors necessary for promoting effective e-learning tells that all the eight factors depicted in Figure 7.2 are important as per the discussion. These factors were derived after a thorough examination of theories and models in Table 6.3 depicted in the theoretical model presented in Figure 6.1. In reference to relationships shown in Figure 7.2, results presented in section 7.4 confirm that there are some significant relationships among the variables in the refined theoretical model in Figure 7.2. To be specific, E-learning Readiness consisted of three factors, namely; e-learning support, e-learning policies and e-learning infrastructure. A correlation analysis in section 7.4.2 shows that all the three factors significantly correlated well with e-learning readiness; $p < 0.05$ presented in Table 7.18. On the other hand, quality of course design consisted of four factors namely; course content, student assessment, course delivery and course evaluation.

Based on the reliability results in section 7.4.1, all these factors variables were reliable in measuring quality of course design. In addition, two factors; quality of LMS and quality of service delivery are discussed in section 7.4.3 as being measures of quality of e-learning systems. The results in Table 7.23 show that there was a positive correlation between these two factors with quality of e-learning systems, $p < 0.05$. Overall, the results and findings have provided supporting evidence for the factors proposed for promoting effective e-learning.

Chapter 9 Conclusions and Future Work

This chapter provides an overview of the research study by providing the conclusions about the research study findings and results in reference to the research questions. The main contributions that have been made in the research are presented; considerations for future work were identified. The main objective of the research was to investigate factors for facilitating effective e-learning within Universities and then develop a model of best fit.

In order to accomplish the objective of this research study, answers to following research questions were sought, these included;

1. What is the state of the art in regard to trends and practices of e-learning in Universities?
2. What factors are necessary for facilitating effective e-learning in Universities?
3. What factors make up a structure of a model for facilitating effective e-learning in Universities?
4. Are there any significant relationships among the variables in the model?
5. Are there any significant relationships among the factors in the model?
6. Does the data provide the best fit for the model?

9.1 Conclusions

E-learning has changed the process of knowledge acquisition and dissemination within the higher education sector. Students and staff have had the opportunity to share information across a range of e-learning platforms. Sustainability and effective e-learning is not merely dependent on the technical infrastructure. Other factors significantly affect how well e-learning is adopted within the Universities. Therefore, identifying and proposing a range of factors that influence effective e-learning was the backbone of this research. Generally, although some institutions have up-to-date e-learning platforms, Universities are still faced with a number of challenges such as limited technical resources; some staff and students lack adequate skills in using e-learning; lack of the ability and strategies to design e-course material; lack of an awareness of the benefits of e-learning and no motivation to use e-learning systems. In addition, some of the Universities are financially constrained. Therefore, it was necessary to explore ways of resolving these challenges.

Effective e-learning is basically important as it relates to maximising, utilising and sustaining use of e-learning within the Universities. Nonetheless, many assumptions have

been made regarding the adoption and sustainability of e-learning. However, it is not obvious that availability of up-to-date e-learning platforms necessarily promotes their use due to the challenges and gaps described herein. A range of research studies have been conducted on how to make e-learning successful. Most of these studies have been limited in that the focus is on the adoption and acceptance of these e-learning technologies. Now it was important to direct attention on how to promote sustainability and effective e-learning. These theories and models were reviewed and important aspects identified.

Subsequently, a theoretical model in Figure 6.1 was developed in reference to the list of factors established in Table 6.4 as being important for promoting effective e-learning. Essentially, this initial phase of factor identification was based on an extensive literature review. Following this, a pilot survey and interviews were used to explore each of the factors to establish whether these factors were indeed important for promoting effective e-learning. The results from the pilot survey showed that most of the factors were important for facilitating effective e-learning.

Following the pilot survey, an extensive fieldwork experiment was conducted in a bid to confirm the factors represented in the theoretical model in Figure 6.1 by addressing the rest of the research questions namely; *Are there any significant relationships among the variables within the model? Are there any significant relationships among the factors within the model? Does the model provide the best fit to the data?* The questionnaire used in the fieldwork experiment was developed based on the theoretical model in Figure 6.1. The questionnaires were disseminated online and hard copies delivered to participants who were within reach. The study participants were sampled from universities in Africa, Asia and Europe. Generally, the questionnaire captured demographic information such as gender, age, education level, designation, faculty and location of University. The participants were then required to share their views about how much they agreed or disagreed on the items listed in the questionnaire on a Likert Scale of 1 to 5 (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree). The questionnaire was itemized based on the variables and factors reflected in the theoretical model in Figure 6.1. The results and findings are documented in Chapter 6. The data collected from the questionnaires was first analysed for reliability. A multivariate regression analysis was then performed to confirm if the factors were suitable predictors of effective e-learning. The strength of the relationships between the factors was measured using regression modelling. Generally, the results and findings showed that the model was to a greater extent a representation of factors necessary for facilitating effective e-learning.

9.2 Contributions

As a result of the research, there are three key contributions that have been made, thus; identification of factors necessary for promoting effective e-learning, development of a model for facilitating effective e-learning and presentation of new instruments for assessing the effectiveness of e-learning in a University.

Firstly, the researcher delved into the vast amount of research documents discussing success and adoption of e-learning in higher education institutions. This process yielded a range of factors considered to be related to success, acceptance and adoption of e-learning in higher education institutions. From existing theories and models as in Table 6.3, factors considered by independent researchers were integrated into a set of important factors necessary for facilitating effective e-learning. The factors identified in the initial document analysis were further assessed to determine their importance and relevance for promoting effective e-learning. The pilot study revealed that the factors identified were indeed important. In other words, factors presented by the different researchers which addressed single aspects of e-learning were combined to form a comprehensive list of factors necessary for facilitating effective e-learning.

Secondly, the model was developed with an aim of helping University stakeholders make e-learning effective. The model was evaluated using the triangulation method. The data was gathered and analysed using multivariate data analysis with multiple regression modelling. The data showed that although data did not fit the model, overall there were significant relationships between the variables and the factors. Therefore, the model is a generic representation of what is required to facilitate effective e-learning.

And finally, the third contribution was made in introducing new instruments to help institutions measure their ability to deliver effective e-learning. The advantage with the instruments is that they apply to various learning contexts and continents.

9.3 Limitations

The qualitative and quantitative data was collected mainly e-learning practitioners within the university fraternity. The overseas study participants were given time to fill the online questionnaire and a great percentage managed to fully complete the questionnaire although there were still cases of incomplete questionnaires. As a remedy, a Post-hoc power computation was performed to find the right sample size for running the tests of statistical significance.

9.4 Future Work

Considering that the research did not include students, a future research would be appropriate to help obtain student opinions. Research could be conducted to examine student perspectives on institutional readiness to promote effective e-learning. Doing this would help to obtain a different perspective on the parameters necessary for facilitating effective e-learning. Therefore, future research efforts are required to incorporate the students' body in assessing the different factors that influence effective e-learning.

The research methods could also be extended by incorporating focus groups. A further research could be aimed at running focus groups with university staff and students. This would help obtain a wide range of opinions which would be representative of a group or institution as a whole.

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Appendices

Appendix A: Sample invitation email to the participants

I would like to invite you to take part in a survey that I am conducting to assess the factors that influence the effectiveness of blended e-learning within Universities. You have been selected to take part in this survey because of your experience in using e-learning systems, expertise in e-learning implementation and / or development of course contents / programmes in higher education institutions.

You would be asked to fill out an online questionnaire to rate the importance of each of the factor-items identified. This should take approximately 20 minutes of your time. The completed questionnaire will remain anonymous. The data can only be accessed by the researcher and supervisor.

To take this survey, simply click on the survey link provided. This link is uniquely tied to this survey and your email address. Please do not forward this message.

This study has been approved by School of Electronics and Computer Science Ethics Committee, **Ethics Reference Number: ba3g11/01/4992**.

If you have any further questions about this study please feel free to contact; Postgraduate Researcher, Beatrice Aguti (ba3g11@soton.ac.uk) and / or Supervisor, Dr Gary Wills (gbw@ecs.soton.ac.uk). You may also contact the Chair, Ethics Committee by email (ethics-chair@ecs.soton.ac.uk).

Appendix B: Pilot survey instrument

Demographic Information

1. *What is your current education level?*
   - ⃝ Doctoral Degree
   - ⃝ Master's Degree
   - ⃝ Postgraduate Diploma
   - ⃝ Bachelor's Degree

2. *What is your current designation?*
   - ⃝ Assistant Lecturer
   - ⃝ Lecturer
   - ⃝ E-Learning Expert
   - ⃝ E-Learning System Developer
   - ⃝ Senior Lecturer
   - ⃝ Professor

3. *How long have you been using e-learning technologies?*
   - ⃝ 1 to 5 years
   - ⃝ 6 to 10 years
   - ⃝ 11 to 15 years
   - ⃝ Over 15 years

4. *How frequently do you access the web from the following places?*

	Never	Daily	Weekly	Monthly
From home	⃝	⃝	⃝	⃝
From the University	⃝	⃝	⃝	⃝
From a public terminal (e.g. library, cybercafé)	⃝	⃝	⃝	⃝
From a phone	⃝	⃝	⃝	⃝

Instructions

Please rate each item on an importance scale of 1 to 4, shown at the top of each page.

Criteria:

Rating	Definition
1 = "Not Important"	The item is not important for effective blended e-learning and can be excluded. Its absence would not affect measure of effective blended e-learning.
2 = "Somewhat Important"	The item is somewhat important but not critical for effective blended e-learning. Although its absence would diminish the measure of effective blended e-learning, the item needs major revision to be relevant.
3 = "Quite Important"	The item is quite important for effective blended e-learning. Although its absence would diminish the measure of effective blended e-learning, the item needs minor revision to be relevant.
4 = "Very Important"	The item is very important and essential for effective blended e-learning. It must be included and its absence would significantly impede the measure of effective blended e-learning.

How important are these items of course design relevant for promoting effective e-learning?

Potential Items	Not Important	Somewhat Important	Quite Important	Very important
Course Content				
1: Course outline A general overview of the course expectations, with clearly stated goals, objectives, learning outcomes, organisation of teaching, assignments, reading, and assessment.				
2: Course prior knowledge Clearly stated course module knowledge required by the student before undertaking module				
3: Course scope General knowledge of the topics, including amount of material to be covered.				
4: Course understandable Module well –written in an understandable language and good use of examples to explain concepts				
5: Course progression levels A coherent progression of the module from beginning to the end				
6: Course learning outcomes Clearly stated learning outcomes				
7: Course sequentially organised A clear, complete course overview and syllabus are chronologically organised into units and lessons allowing for assessing students' mastery of content				
Course Evaluation				
8: Course Alignment Course module content, learning outcomes, activities and assessment are all aligned with institutional quality standards				
9: Course requirements Clearly stated course requirements are consistent with the course goals and are representative of the course scope				
10: Course periodic updates Course is evaluated regularly by experts and students to ensure objectives of the course are met by using criteria such as student completion rates, student performance, satisfaction surveys, and course content design, etc.				
11: Course resources A list of prerequisite and recommended resources including textbooks, courseware, and online resources are identified and provided to the students				
12: Course expectations What the student are expected to do during module participation is clear				
13: Course difficulty The level of course difficulty is appropriate for the course coverage				
Assessment and Feedback				
14: Randomised Online Assessment Strategies The students are made aware of his/her level of progress and mastery of course content beyond the grades through summative feedback				
15: Constructive assessment feedback Frequent and detailed assessment feedback is provided to students to help students readily prepare for the next course level through formative feedback				
16: Timely feedback Students are provided with timely feedback to help them prepare for the next learning progression level				
17: Knowledge of assessment and grading criteria The assessment, marking and grading policy is known to the students				

Course planning				
18 : Student Learning needs analysis Course is designed with a clear understanding of student needs, incorporating various ways of learning and multiple levels of mastery of the curriculum. The lecturer is able to adapt different learning activities to accommodate students' needs.				
19: Course resource analysis The course resources are designed to enable students to learn skills and concepts that can be retained over time, providing students with multiple learning paths to master the content based on student needs such as alternative assignments and assessments				
20: Instructional strategies Strategies that consider different student learning styles are used. The course instruction includes activities that engage students in active learning, considering students who might require additional learning resources, self-paced learning, online discussions				
21: Course module materials The materials and tools such as hand-outs, webpages, etc. required to support learning are readily available				
22: Student Enjoyment The students are engaged in their learning through involvement in e-learning activities and forums				
23: Learning media analysis Learning activities may be varied to include; case studies, simulations, research, visuals, graphics, discussions and labs, podcasts, streaming video				
24: Course module teaching quality Teaching and learning activities such as lectures, seminars, labs and coursework are well organised				

How important are each of these items in describing an institution's readiness to promote effective e-learning?

Potential Items	**Not Important**	**Somewhat Important**	**Quite Important**	**Very important**
E-Learning Policies				
1: Vision for e-learning integration in higher education institutions The vision of the University incorporates the integration of e-learning for delivery of learning				
2: ICT Policies on e-learning staff roles, responsibilities, representation The ICT policies spell out creation of roles and responsibilities for staff in charge of e-learning implementation and management				
3: Staff mentoring on e-learning use There are staff whose role is mentoring other staff and students into using e-learning systems for the teaching and learning processes				
4: E-learning special funds The University creates a special fund for the implementation of e-learning system infrastructure				
E-Learning Culture				
5: Beliefs about value of e-learning The student and lecturer beliefs about using e-learning systems are considered				
6: Attitudes towards e-learning The student and lecturer attitudes towards using e-learning systems are taken into consideration				
7: Academic Achievement The perception of students on educational attainment while using e-learning system is put into consideration				

8: Societal norms on e-learning The course considers multicultural educational backgrounds and is accurate and free of bias				
E-learning Infrastructure				
9: Access to computing technologies Students' ease of access to computing technologies				
10: Tools for course module development Lecturers are offered the tools to facilitate the design and development of instructional materials for e-learning				
11: Up-to-date system platforms for course module delivery: Lecturers are offered the platforms and media necessary for delivering e-learning resources				
12: **Lecture Recording Capture Systems**: Available recording equipment and tools to support both face to face and online learning				
E-learning Sustainability Costs				
13: Cost of development of course module material The University can afford the cost of developing instructional materials for e-learning				
14: Cost of implementing e-learning systems The University is ready and can afford the costs for implementing e-learning hardware and software platforms				
15: Cost of maintaining e-learning platforms The cost of maintaining e-leaning platforms is incorporated into the University budget				
16: Cost of technical and e-learning support The costs of hiring technical e-learning support is considered by the University				
E-Learning Support				
17: E-learning induction training The course provider offers orientation training to both lecturers and students using the e-learning systems				
18: E-Learning Course Module development Support Staff are offered technical support and advice needed to develop course content				
19: On-demand support There is readily available support to students and staff whilst interacting with the system				
20: Staff capacity development Trainings in skills necessary for blended e-learning and methodologies				
21: E-learning staff webinars Promote knowledge sharing and discussions on blended e-learning				
22: ICT training support Staff and students are offered ICT literacy trainings whenever needed				

How important are these items in defining the quality of e-learning systems that promote effective e-learning?

Potential Items	**Not Important**	**Somewhat Important**	**Quite Important**	**Very important**
E-learning Management System				
1: Adaptability of Course Platform The course platform allows lecturers to add content, activities and assessments to achieve learning opportunities				
2: Ease of Navigation The course is easy is to navigate thus allows students to easily move between the sections of the course				
3: Consistency of course platform The sections of the course marked with specific colours, graphics, icons and text styles are consistent throughout the course				
4: User-friendliness				

The course describes what skills and knowledge the students are expected to know in terms of internet and software applications				
5: Multi-culturally appealing: The colours and designs used for the course content are appealing to the students and multicultural acceptable by institutions				
6: Accessibility of course content The course makes use of a variety of content media resources so that content is available in numerous formats such as video, CDs, podcasts available online and can be accessed anywhere at anytime				
7: Event management The e-learning system offers up-to-date calendars and time schedules for each of the courses for which students are enrolled				
8: User management The system allows registration of students and lecturers thus providing login credentials to allow participants access the systems whenever required hence ensuring interaction and collaboration between and / or amongst students and lecturers				
9: Security of User Data The student and lecturer login credentials are protected and encrypted at all times while interacting via internet				
10:Collaborative learning The system provides opportunities for lecturer-student or student-student interactions to enable mastery of course content through emails, discussion forums, synchronous chats, webinars, lab activities and other group projects by use web 2.0 tools				
11: Interactive learning The system allows students to locate students and people of similar interests outside of their module, course, and year of study or institution.				
12: Student tracking Student attendance is captured and logged whenever the course is running using tools that allow automatic student registration				
13: Time Management The system allows students to plan, organise and manage the individual work according to their time and learning style				
14: Learning tracking The systems allows the students to monitor their personal learning activities and gauge their level of achievement				
15: Use of e-portfolios The system records student achievement using e-portfolios				

Appendix C: Semi-Structured Interview Guide

Introduction:

Thank you so much for taking time to complete the questionnaire. Otherwise, I would really appreciate following up with an interview as this would give an opportunity to clarify some of items included in the questionnaire. Given your current position and valuable experiences in e-learning, I would also like to get insights into the current state-of-affairs of e-learning implementation in the University. A number of questions are listed below that form the basis of our discussion during the interview. Kindly, do examine these beforehand. All responses will be treated as anonymous, and in no case will the individual information be identified.

Theme A: Blended Learning

A1 - Terminology of 'blended learning'

1. How do you define 'blended learning'?
2. What features describe blending learning?
3. Why are these features important in your definition of blended learning?
4. Are there any other terms that could be used to describe blended learning?
5. Is the term blended learning used within your University?

A2 - University policy on e-learning

1. What is your University's motivation for adopting e-learning?
2. What are the expected outcomes of e-learning in the University?
3. What incentives/funds are being used to achieve these outcomes?
4. What are the key drivers for the University adopting blended e-learning?
5. What indicators are being used to measure University e-learning success?
6. Do you think these approaches would work in other Universities?
7. Are any of these approaches specific to your University?
8. Does your University policy and vision support blended e-learning?
9. What ICT policies exist to support blended e-learning in your University?
10. Does the University offer staff mentoring to support e-learning?

A3 - Monitoring and evaluation of e-learning

1. Who is responsible for ensuring that e-learning is sustained?
2. What roles and responsibilities exist in terms of e-learning administration?
3. How do you monitor implementation of your e-learning strategies?

4. Are e-learning reviews made regularly in terms of both e-learning course content and delivery modes? In what ways are these reviews administered?
5. Who is responsible for implementing recommendations arising from reviews?

Theme B: Development of e-learning course content

1. What are your concerns during course/module development?
2. Is the course designed considering e-learning pedagogical framework?
3. Do you apply instructional system design models during development of course/module content?
4. What procedures exist for ensuring the quality of e-learning course/modules?
5. Is there an established quality assurance team?
6. How is the quality of e-learning courses improved?

Theme C - Effectiveness of e-learning

1. Have you experienced any problems while delivering e-learning?
2. Have you identified any long term e-learning support challenges and requirements?
3. What factors are being used to assess the effectiveness of blended e-learning in your University?
4. What are the e-learning management systems being used by the University?
5. How do you describe your e-learning system; student-centred or teacher-centred?
6. Do you think web 2.0/3.0 (Social media/networking) technologies are appropriate for promoting the effectiveness of blended e-learning?
7. Are you able to gauge overall student satisfaction with the current e-learning management systems in place relative to e-learning content, e-delivery methods?
8. Does blended e-learning have an impact on the student academic achievement?
9. Does the system support students from diverse cultural backgrounds and different learning styles?

Appendix D: Final Survey Instrument

Demographic Information

5. What is your Gender?

- Male
- Female

6. What is your age?

- 21 – 30
- 31 – 40
- 41 – 50
- 51 or older

7. What is your current level of education?

- Doctorate Degree
- Master Degree
- Postgraduate Diploma
- Bachelor Degree
- Other……

8. What is your current designation?

- Teaching Assistant
- Assistant Lecturer
- E-Learning Educationalist
- E-Learning Technologist
- Lecturer
- Senior Lecturer
- Reader
- Assistant Professor
- Associate Professor
- Full Professor

9. What Faculty / Department do you belong?

- Computing and Information Technology
- Arts and Education
- Management and Business Administration
- Physical Sciences / Engineering
- Library and Information Science
- Economics and Applied Statistics
- Other……

10. In which country is your University?

- Uganda

- Kenya
- Tanzania
- South Africa
- Nigeria
- Thailand
- Sri Lanka
- Indonesia
- Oman
- Pakistan
- Saudi Arabia
- United Kingdom

11. How do you rate your experience with e-learning?

- Novice
- Intermediate
- Experienced

12. How long have you been using ICTs?

- 1 to 5 years
- 6 to 10 years
- 11 to 20 years
- 21 years or more

13. How frequently do you access the web from the following places?

	Daily	Weekly	Monthly	Never
From home				
From the University				
From a public terminal (e.g. library)				
From your phone/tablet				

Instructions:

Based on your valuable experience in using e-learning, read the following statements about e-learning and its use within your University and indicate how much you agree/disagree.

	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1: I believe in giving students a general overview of e-learning course expectations with clearly stated goals, objectives.					
	2: It is important to state the knowledge requirements, scope and material for the students before they start the course.					
	3: I think it's important to provide students with e-learning material specific to their learning.					
	4: It is necessary to have well-written and understandable e-learning course content.					
	5: Having a coherent layout of the e-learning course progression is not important.					
	6: I think it's important to give students small chunks of e-learning material in time.					
	7: It isn't necessary to keep the e-learning material up-to-date.					
	8: I believe in having e-learning materials, learning outcomes, activities, assessments well-aligned with institutional quality standards.					
	9: Having clearly stated course requirements, in line with the course goals and scope isn't important.					
	10: It's important for experts to regularly evaluate the e-learning course to ensure its objectives are upheld.					
	11: I believe in providing students with a list of recommended study resources such as textbooks and online resources.					
	12: I think it's important to give students an outline of tasks / activities to be carried out.					
	13: The e-learning course is designed with consideration of appropriate level of difficulty as a benchmark for progression.					
	14: Students are made aware of their level of mastery of course with details of essential areas in the feedback.					

	15: It isn't necessary to advise students of the marking criteria for online assessments.					
	16: I do not use online tests, quizzes, and exercises as a form of assessment.					
	17: I give students the opportunity to readily prepare for the next course level through the feedback.					
	18: We engage students with a number of pieces of coursework to enable them gain mastery of the course content.					
	19: We use instructional strategies that promote diversity in learning such as self-paced learning.					
	20: I do not give students course tools such as courseware.					
	21: I do not believe that engaging students in their learning through online forums and discussions is important.					
	22: It is not necessary to give students varying learning media such as; case studies, simulations, research, visuals, graphics, discussions, labs, podcasts.					
	23: I think that having well-organised teaching and learning activities such as lectures, seminars, labs and coursework is necessary.					
	24: We participate in e-learning staff webinars to promote knowledge sharing and discussions on e-learning.					
	25: We are given all necessary support and advice on developing e-learning course content.					
	26: There is on-demand support readily available for me whilst interacting with the e-learning systems.					
	27: There is staff capacity development training available for me to improve my e-learning skills and knowledge.					
	28: I get time to practice how to use e-learning systems.					
	29: We get e-learning induction trainings.					
	30: We receive all the necessary ICT literacy training whenever required.					
	31: It is important to have an ICT policy stipulating roles and responsibilities for staff in charge of e-learning implementation and					

	management.					
	32: The University has a clear vision and commitment to integrate e-learning for delivery of blended learning.					
	33: It is important to appoint a member of staff to mentor and encourage the use of e-learning systems.					
	34: I believe that having a special fund helps to support the implementation and maintenance of e-learning systems.					
	35: I believe that using e-learning systems requires a lot of effort and time.					
	36: I feel confident using e-learning systems.					
	37: I think e-learning is not accepted by society as a means to support educational attainment.					
	38: I think the University's culture readily supports e-learning.					
	39: The e-learning system supports uploading and downloading of e-learning resources.					
	40: We have access to ICT technologies to prepare and deliver e-learning services**.**					
	41: There are tools for developing e-learning instructional materials.					
	42: There are lecture recording equipment and tools to support both face-to-face and e-learning.					
	43: The internet bandwidth and speed is not sufficient to support e-learning.					
	44: There are dedicated rooms with adequate computing resources to support e-learning.					
	45: The University cannot cover the cost of developing instructional material.					
	46: The University is willing to incur cost of e-learning system implementation.					
	47: The University has a special budget towards meeting cost of maintaining e-learning platforms.					
	48: The University has inadequate funds to cover the cost of hiring technical teams to support e-learning.					
	49: I think it is necessary to have reward system/incentives to motivate staff to continue using e-learning.					
	50: I believe it is important to have an e-learning support service to provide online assistance.					

	51: I think the available e-learning service supports interaction between e-learning system developers and users.					
	52: The current e-learning system does not support online consultations.					
	53: I think the technical support available is inadequate for all e-learning users.					
	54: The e-learning system service is not periodically updated and improved.					
	55: The e-learning system enables personalised information presentation, thus allowing you to add content, activities and assessments.					
	56: The e-learning system is difficult to navigate.					
	57: The e-learning system is sometimes unreliable in providing anytime access.					
	58: The e-learning system is inconsistent in the use of graphics, text styles.					
	59: The e-learning system platform is not user-friendly.					
	60: The e-learning system provides interactive features between users and the system such as announcements.					
	61: The e-learning system is very secure in protecting personal data.					
	62: The e-learning system offers limited access to various learning content media.					
	63: The e-learning system supports collaborative learning.					
	64: I think the e-learning system does not adequately keep up-to-date information via calendars.					
	65: I believe using e-learning helps me improve my job performance.					
	66: Using e-learning does not necessarily enhance a University's competitiveness.					
	67: I am less creative and innovative when using e-learning.					
	68: I think using e-learning is very costly to the University.					
	69: E-learning helps Universities to increase their return on investment.					
	70: I think using e-learning does not impact on the students' academic grades.					
	71: I think use of e-learning promotes access to education and learning.					
	72: I am open to participating in online discussions.					

	73: I do not feel comfortable with online discussions.					
	74: Participating in online discussions requires a lot of time and effort.					
	75: I believe it's important to have a staff to facilitate online discussions.					
	76: Our online discussions are sometimes interrupted.					
	77: I feel using online discussions is convenient.					
	78: I feel confident using online communication tools.					