UNIVERSITY OF GHANA

DETERMINANTS OF E-LEARNING ADOPTION IN UNIVERSITIES: EVIDENCE FROM A DEVELOPING COUNTRY

BY

ERIC ANSONG

10244419

A THESIS SUBMITTED TO THE DEPARTMENT OF OPERATIONS AND MANAGEMENT INFORMATION SYSTEMS, UNIVERSITY OF GHANA BUSINESS SCHOOL, UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF AN MPHIL IN MANAGEMENT INFORMATION SYSTEMS DEGREE

AUGUST, 2015

DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in this work have been fully acknowledged.

I therefore bear responsibility for any shortcomings.

_____ _____

Eric Ansong (10244419) Date

CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

_____ _____

Dr. Richard Boateng (Supervisor) Date

_____ _____

Dr. John Effah (Co-Supervisor) Date

DEDICATION

To my Dear Dad (Richard Boakye Yiadom), Lovely Mum (Gladys Anomwaa), Siblings (Lydia, George, Georgina and Emelia) and sweet nieces (Christine and Jacklyn)

ACKNOWLEDGMENT

Praise be unto the name of the most high God, who has been my provider and guardian.

Though only my name appears on the cover of this thesis, many people have contributed to its production. I owe my gratitude to all those people who have made this thesis possible and because of whom my graduate experience has been one that I will cherish forever.

Foremost, I would like to express my sincere gratitude to my supervisor Dr. Richard Boateng for the continuous support of my study and research, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my MPhil study. I am also thankful to Dr. John Effah, my co-supervisor.

I express my warm thanks to Mr. Frank Ansong who ensured this dream saw daylight. Your invaluable support both financially and spiritually will linger in my heart always. I'm really grateful.

Many friends have helped me stay sane through these difficult years. Their support and care helped me overcome setbacks and stay focused on my study. I am grateful to Mr. & Mrs. Entsua-Mensah and family, Agya Owusu, Prof. A. Alemna, Dr. Adams, Henry N. Tabiri, Salimata, Linda Owusu, members of Christ's Church of Universal Light-Nkawkaw, and my cousins. I am thankful for your aspiring guidance, invaluable constructive criticism and friendly advice.

I thank my fellow MPhil MIS course mates: Nii Barnor, Augustus, Commodore, Hammond, Alfred, Hubei and Dzifa for the stimulating discussions, for the sleepless nights we were working together before deadlines, and for all the fun we have had in the period. My profound gratitude also goes to Daniel Opoku for helping me with the data analysis and insightful suggestions to this thesis.

Last but not the least, words cannot express how grateful I am to my father, my mother, and my siblings for all of the sacrifices that they've made on my behalf. Your prayers for me were what sustained me thus far.

I say a big thanks to you all, your contributions were not in vain.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVATIONS

CD–ROM	Compact Disc Read-Only
CMS	Course management systems
DVD	Digital Versatile Disc
E-learning	Electronic Learning
HTML	HyperText Markup Language
ICT	Information and Communication Technology
IS	Information System
IT	Information Technology
LMS	Learning Management Systems
MP3	Moving Picture Experts Group (MPEG -3)
PDA	Personal Digital Assistant
SaaS	Software as a Service
TV	Television
RFID	Radio-Frequency Identification
RSS	Rich Site Summary
UG	University of Ghana

ABSTRACT

Electronic Learning (e-learning) – the use of ICT to support learning – has become paramount in the growth of universities worldwide. Universities are now including e-learning modules in their curricula to support and in some cases replace the face-to-face educational methods. This has spurred a lot of studies into e-learning adoption in higher learning institutions. However, studies looking at e-learning adoption from a multi-stakeholder perspective are quite missing in literature, especially in developing countries. Previous studies tend to focus on one of the three major categories of e-learning stakeholders: students, instructors and administrators. Again, the studies sometimes tend to have a singular focus on e-learning adoption determinants: technological, organisational and environmental.

This study, therefore, sought to explore the technological, organisational and environmental determinants of e-learning adoption in University of Ghana using a multi-stakeholder approach. Another construct (Nature of the course) was added to the traditional constructs of the Technology-Organisation-Environment (TOE) framework to underpin the study. Eight factors were identified after the review of e-learning literature: IT infrastructure, perceived ease of use, organisational compatibility, expected benefits, educational partners, competitive advantage, content of the e-learning course and e-learning curriculum. Using a quantitative survey research method, a total of 417 e-learning stakeholders in the University of Ghana responded to the questionnaire. The data was analysed by means of factor analysis, correlation and multiple regression.

The findings established that IT infrastructure, organisational compatibility, expected benefits, competitive pressure, educational partners, content of the e-learning course and e-learning curriculum influence students' adoption of e-learning. Also, perceived ease of use, educational

partners and e-learning curriculum influence instructors to adopt e-learning. On the other hand, IT infrastructure, organisational compatibility and expected benefits are adoption determinant factors for the e-learning administrators. The analysis further revealed that e-learning was yet to receive a university-wide adoption and again, a more complex organisational compatibility leads to e-learning being less adopted in the institution.

The findings from the study contributes to the body of knowledge by extending the Technology, Organisation and Environment framework in an e-learning study to include a fourth factor which is the Nature of the course. Again, the findings provide a multi-stakeholder perspective to the study of e-learning adoption.

The originality of the study lies in the multi-stakeholder (student, instructors and e-learning Administrators) perspective with a multi-dimensional framework (Technology, Organisation, Environment and Nature of Course) approaches to the study of e-learning adoption in a developing country. The study therefore recommends that university authorities take into consideration the adoption determinant factors when introducing e-learning systems. Future studies can consider researching into mobile enabled learning (m-learning) since it is an emerging trend in the educational sector.

CHAPTER ONE

INTRODUCTION

1.1 Research Background

> *"Responsive design will become a critical aspect of online education in the very near future. Those institutions willing to engage with learners in the online environment they are most comfortable in are sure to have the effort reflected in increased satisfaction and retention"* (Schmitz, 2014).

The convention of face-to-face interaction has prevailed ever since communities adopted the model of schools and classes to facilitate education. The most common practice has always been a classroom with one or more teachers and students, with both groups meeting physically and in real time. With the arrival of computer technology and the internet, the traditional setup of learning is evolving into a form mostly referred to as "Electronic Learning (e-learning)". Clark and Mayer (2011) define e-learning as "instruction delivered on a digital device such as a computer or mobile device that is intended to support learning". Hogan and Kedrayate (2010) also see e-learning as a blended approach that combines online and face-to-face training. There are different technologies that instructors use as tools for e-learning. These include; Internet, intranet, extranet, satellite broadcast, audio/video tape, interactive TV, CD–ROM and many others (SØrebØ, Halvari, Gulli & Kristiansen, 2009). Rouse (2005) further categorized e-learning technologies into: voice-centred technology, such as CD or MP3 recordings or webcasts; video technology, such as instructional videos, DVDs, and interactive video conferencing and Computer-centred technology delivered over the Internet or corporate intranet. E-learning may or may not be in real time. Students interact with teachers, and feedback is provided in a timely and appropriate manner.

With the spread of internet usage, e-learning has become vastly widespread and many universities are using it to support teaching and learning (Kanuka & Anderson, 2007). Deng

and Tavares (2013) also confirm this assertion that the latest development of Internet technologies has led to a lot of universities investing considerable resources in e-learning systems to support teaching and learning. According to the Giga Information Group, nearly 75 percent of the 129 top US universities use e-learning systems (Wang & Wang, 2009). This innovation that started in developed countries is rapidly becoming global. E-learning has recently become more popular in many developing countries (Alkhalaf, Drew, AlGhamdi & Alfarraj, 2012). Tagoe (2012) also asserts that though the up-scale of e-learning in developing countries, especially in Africa, is slow compared to the situation in western countries, the last decade has witnessed some intensive efforts on the part of university administrators to implement e-learning strategies in order to catch up with their counterparts in the developed countries.

Universities and other higher learning institutions adopt and implement e-learning systems because of the numerous benefits they derive from it. E-learning offers new possibilities for learning and leads to drastic changes in educational practice (Jia *et al.*, 2011). For instance, the concept of traditional education does not fit well with the new world of lifelong learning in which the roles of teachers, students and curriculum are changing (Marold, Larsen & Moreno, 2000). E-learning becomes mostly useful in situations where there is no alternative for learning (Horn & Staker, 2011). For instance, in small, rural and urban schools which are unable to offer a broad set of courses with highly qualified teachers in certain subject areas; in the advanced courses that many schools struggle to offer on their campuses; in remedial courses for students who need to recover grades to graduate; and with home-schooled and homebound students. Again, teaching in the traditional classroom is instructor-centric where the instructor mainly controls class content including topic, course material, progress and discussions (Baloian, Pino & Hoppe, 2000). But the role of communication and interaction in the learning process is a

critical success factor in contemporary educational paradigms (Brown, 2013). It is within this context that e-learning can and should contribute to the quality of Education.

The application of information and communication technologies (ICTs) such as the Internet to education offers opportunities for educational institutions to expand their reach to learners anytime and anywhere. In addition to accessibility, e-learning has the potential of increasing interactivity, collaboration and delivery of content which contribute to increasing learner satisfaction and reducing attrition rate in educational institutions (Wilson & Beatty, 2001). There is therefore, the need for stakeholders in the educational sector of universities in Developing countries, particularly in Ghana, to strive to adopt e-learning to complement and supplement teaching and learning.

1.2 Research Problem

E-learning has generated a lot of interest in information systems research and valuable studies have been conducted in this regard. The very high adoption rate of e-learning in universities (Alkhalaf, Drew & Alhussain, 2012) has led to a sustained research into e-learning adoption in universities over the years.

E-learning is a practice which encompasses different actors: students, faculty and administrators (Persico, Manca & Pozzi, 2014). Research into e-learning should therefore be conducted from these perspectives. However, e-learning literature reviewed seem to focus mostly on only one of these stakeholders. For instance, Lee, Yoon and Lee (2009) analysed learners' acceptance of e-learning services from the students' perspective in South Korea. They pointed out the perceived usefulness as the greatest predictor of intention to use e-learning. Tagoe (2012) also studied students' perceptions on incorporating e-learning into teaching and

learning at the University of Ghana where it was discovered that e-learning depended on three critical factors and the first of these factors was the ownership of computers. Similarly, Duan *et al.* (2010) also conducted a study on students' e-learning take-up intentions in China and suggested that only perceived compatibility had significant positive influence on the likelihood of students' e-learning take-up. From the instructor's perspective, Motaghian *et al*. (2013) also looked at factors that influence e-learning adoption and identified perceived usefulness, perceived ease of use and system quality as adoption determinant factors. These single stakeholder approaches tend to provide only one sided view of e-learning adoption determinants. Bhuasiri *et al*. (2012), on the other hand focused, on two groups of stakeholders in developing countries; Information Communication Technology experts and faculty, and also identified perceived ease of use and organisational compatibility as factors that influence e-learning adoption. On the other hand, these studies failed to look at the universities from an institutional perspective taking into consideration are the stakeholders involved in e-learning adoption. There is, therefore, the need for studies which will look at e-learning from a multi-stakeholder perspective which will provide a more general viewpoint to the factors that determine e-learning adoption in higher learning institutions. Again, the different stakeholders may exhibit different tendencies in terms of the factors that influence their adoption of e-learning systems and these will provide interesting insights which will be worth studying.

An organisation functions along three dimensions of Technology, Organisation, and Environment which influence the organisation's ability to adopt or reject new technology (Lee, Wang, Lim & Peng, 2009). Researchers of the e-learning literature reviewed tend to look at the determinants of e-learning adoption mostly from a single factor approach. For instance, Czerniewicz and Brown (2009) saw organisational factors such as policy and culture as the determining factors for the adoption of e-learning in universities. They postulated that, there is

indeed a crucial relationship between policy and use, but organisational culture is fundamental to mediating how that relationship is played out. Duan *et al.* (2010) also sought to examine, from an innovation adoption perspective, Chinese undergraduate students' intention to adopt e-learning degree programs for their postgraduate study. They suggested that only perceived compatibility has significant positive influences on the likelihood of students' e-learning take-up. But their study fell short of the need to explore the possible influence of other factors, such as government policies, language issues, and the cultural experience of studying online. In another breath, Motaghian *et al.* (2013) considering the technological factors asserted that perceived usefulness is one of the factors for e-learning adoption. According to Motaghian *et al.* (2013), subjective norm and information quality had a positive effect on perceived usefulness. Also, self-efficacy, service quality, subjective norm and information quality had an influence on perceived ease of use. In addition, perceived usefulness, perceived ease of use and system quality all increased instructors' intension to use e-learning systems; however, perceived usefulness was the most important influencing factor on instructors' intension and their actual use of the systems (adoption). Other e-learning papers (Palacios-Marqués *et al.*, 2013; Chen, 2014; Schmitz, 2014) looked at e-leaning from the technical perspective, such as e-learning interface design, data centre management, security, performance, and service management. On the other hand, Bhuasiri *et al*. (2012) tend to extend the study on e-learning to find out other critical success factors that influence the acceptance of e-learning systems. They discovered that, the most important factors influencing e-learning success was related to increasing technology awareness and an attitude toward e-learning, enhancing basic technology knowledge and skills, improving learning content, requiring computer training, motivating users to utilize e-learning systems, and requiring a high level of support from the university. Hence, there is the need for a multi-facet perspective in identifying the determinants of e-learning.

Nonetheless, e-learning adoption in universities in developing countries has had a fair share of research. For instance, Motaghian *et al.* (2013) identified perceived usefulness, perceived ease of use and system quality as factors that increase instructors' intention to use e-learning systems in Iran. In Kenya, Barker *et al.* (2013) suggested that resources should be sustainable, for example CDROMs and DVDs which are not dependant on internet access for full acceptance of e-learning systems. On the other hand, these authors proposed the need to replicate their studies in other countries to find other factors that influence e-learning adoption in universities.

From the on-going discussion, there is the need to research into practical ways of integrating e-learning into universities in developing countries from a holistic point of view by taking into consideration all the categories of factors that influence the adoption of e-learning from a multi-dimensional perspective. Similar to the work of Raouf, Naser and Jassim (2012), in their study on finding determinants of e-learning implementation success used the Technology Organisation and Environment (TOE) framework which was deemed fit to cover all the issues relating to the adoption of e-learning systems in the higher education sector. They discovered that, information systems (IS) expertise and expected benefits are key determinants of e-learning implementation success. Thus, a study from the perspective of all stakeholders and using a comprehensive framework will give more understanding to factors that determine the adoption of e-learning among universities in developing countries.

1.3 Research Purpose

The main purpose of this research is to explore the technological, organisational and environmental determinants of e-learning adoption in universities in developing countries. The study focuses on the University of Ghana.

1.4 Research objectives

In relation to the purpose, this research seeks to:

1. Describe the nature of e-learning adoption in Ghanaian universities.
2. Explore the determinants of e-learning adoption in Ghanaian universities.

1.5 Research questions

1. What is the nature of e-learning adoption in Ghanaian universities?
2. What are the determinants of e-learning adoption in Ghanaian universities?

1.6 Significance of research

First, this research contributes to, arguably, the limited literature in the area of e-learning adoption of a multi-facet and multi-dimensional perspective from a developing country. Thus, serving as a stepping stone for subsequent studies in this field.

Second, the findings of this study maps out the e-learning adoption and implementation strategies not only in the University of Ghana but also universities in Africa and other universities in developing countries in general.

Again, the findings of this study can inform e-learning systems' designers, instructors, administrators and students of the best practices to apply in the adoption and implementation of e-learning in their activities. For the systems administrator and designer, the study identifies some of the challenges or weaknesses in the e-learning systems that require improvement or redesigning. Furthermore, the study can inform instructors and students of the best practices in the use of e-learning systems to maximize productivity.

Finally, the study findings can also inform the policy making bodies, how best to improve the deployment and management of e-learning systems at the university level and at the National and international levels.

1.7 Chapter outline

The thesis is arranged in seven (7) different chapters, which correspond to the steps taken in the study.

*Chapter one: Introduction***;** This chapter gives an outline of the research and it covers the background of the research, research problem, research purpose, objectives of the study, research questions, significance of the research and the organisation of the research.

Chapter two: Literature Review; Literature relevant to the study is reviewed in this chapter. Theories and models that form the foundation of e-learning adoption in universities are identified, their possible linkages explored, and study propositions advanced.

Chapter three: research framework; This chapter explores the research framework used for the study, which guided the research design, data collection methods, instruments, and served as a yardstick for the data analysis and discussions.

Chapter four: Methodology; The research methodological approach which highlights the research strategy and paradigm and the discussion of sampling techniques and size are utilized. The instrument for data collection and the method used as well as data processing and analysis are expounded in this chapter.

Chapter five: Context of the study: A brief overview of e-learning adoption and implementation strategies in universities in developing countries and the profile of University of Ghana's e-learning programs is captured in this chapter.

Chapter six: Analysis and Discussion: This chapter deals with the data presentation, analysis of findings and discussion.

Chapter seven; Summary; The summary of the research, implications (and recommendations) to research, practice and policy and the future research directions are discussed.
Finally, references and appendices.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

As noted in the previous chapter, the world is gradually moving from the traditional mode of learning to the use of electronic devices to support teaching and learning with the call for research which will focus on the three major actors of the e-learning system using a framework which captures the three dimensions of technology adoption (technology, organization and environment). This chapter therefore reviews contemporary and pertinent literature in the area of e-learning. The chapter begins with an overview of the literature which pertains to the conceptual understanding of learning and e-learning, in terms of its genesis, definitions, actors, characteristics, service types and deployments. Such a presentation provides a basis for understanding e-learning as a concept in modern day education. Furthermore, a rigorous review of e-learning research was conducted to reveal current knowledge gaps and lead-ins for future research, taking into consideration research methodologies, themes, theories and the various perspectives of the research. The chapter ends with a summary and gaps for future research.

2.2 Learning in Universities

The mode of teaching and learning in universities go beyond the impartation of knowledge or skills. Previously, Teachers and lecturers were seen as the most significant source of knowledge and their role was to impart knowledge to the learners. In contrast, teaching and learning during the past few decades, were not focused on the mastery of content per se, but rather on the production of new knowledge. Teachers and lecturers form merely one spectrum of the sources of knowledge and their role is to facilitate learning and to assist learners in producing new

knowledge (Brown, 2003). The different learning methods in universities (Traditional learning, Distance Learning and Blended learning methods) are discussed below.

2.2.1 Traditional Learning

Traditional learning refers to a classroom-based and instructor-led learning. It is also referred to as a face-to-face learning (Hall, 2002). The medium over which instruction is transmitted distinguishes traditional learning from the other types of learning. In the traditional learning situation, the instructor or teacher stands in front of the students and gives instructions. The instructor sends and receives direct feedback from the students (Hamid, 2002). The teachers have a total control over the learning environment in a traditional learning setting– adapting, realigning or changing learning environment whenever necessary.

Arguably, Classroom training or traditional learning provides many advantages for learning. Traditional learning is the main form of learning and it is believed to be strongly engrained in everyone's school experience and will be difficult to dislodge it as an accepted approach to education. It is easy to interact with peers in a face-to-face setting and there is a lower possibility of misinterpreting messages (Tai, 2005).

The traditional learning method provides fast and flexible development and delivery of instruction, real-time application of knowledge to complex situations, immediate student interaction among the instructor and participants. Again, it provides the opportunity for immediate feedback from the instructor.

On the other hand, traditional learning is faced with some challenges (Tai, 2005). In terms of resources, the building infrastructure where learning can take place is an expensive resource to

acquire. In terms of content and learner (student), there is the lack of easy repetition of lessons taught that were not clear to students. There is also a lack of flexibility in terms of sudden postponement or cancellation of class and classes beginning at specific times.

2.2.2 Distance Learning

Distance learning in developing countries has emerged as a way of widening access to education for tertiary applicants who qualify, but could not otherwise gain admission due to the limited space in the existing tertiary institutions (Kwapong, 2009). Distance learning can also be referred to as a mode of delivering education and instruction, often on an individual basis, to students who are not physically present in a traditional setting such as a classroom. Distance learning provides access to learning when the source of information and the learners are separated by time and distance, or both (Honeyman & Miller, 1993).

The first distance education course in the modern sense was provided by Sir Isaac Pitman in the 1840s, whose mode of instruction was through mailing texts transcribed into shorthand on postcards and later receiving transcriptions from his students in return for correction - the element of students' feedback was a crucial innovation of Pitman's system (Tait, 2014). The University of London was the first university to offer distance learning degrees, establishing its External Programs Department in 1858 (Rothblatt, 1988). The University of London was referred to as "People's University" by Charles Dickens (a 19th century English writer and social critic) because it provided access to higher education to students from less wealthy backgrounds. In 1858, Queen Victoria commissioned the External Programs Department, making the University of London the first to offer distance learning degrees to students (University of London International Programs, 2014).

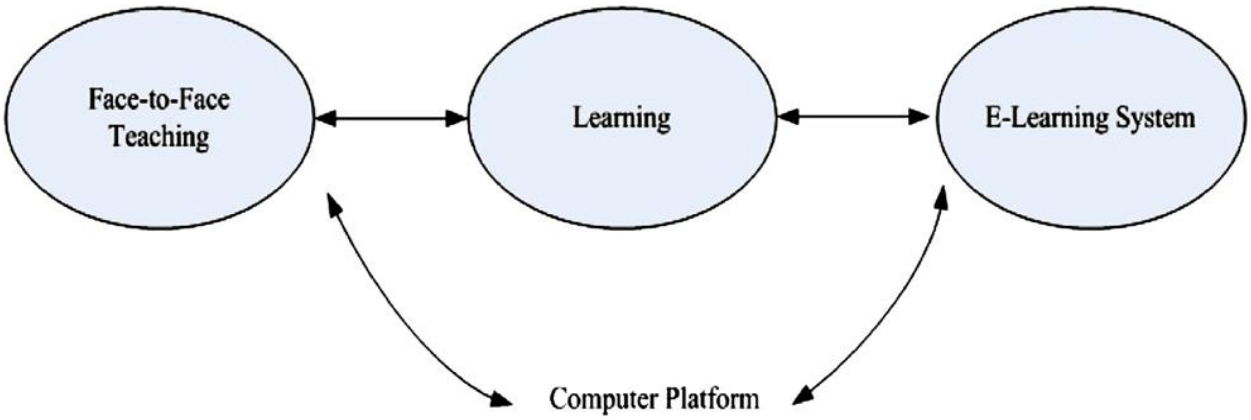
Other universities around the world began to use correspondence or distance courses in the first half of the 20th century, especially to reach rural students. According to White (1982), Australia with its vast distances was especially active in this regard; the University of Queensland established its Department of Correspondence Studies in 1911. Universities in Africa were not left out. The University of South Africa, formerly an examining and certification body, started to present distance education tuition in 1946.

At this point, it is imperative to draw the distinction between distance learning and e-learning since at some point they do overlap or are used interchangeably in some cases but are not identical. The use of ICT in education clearly distinguishes distance learning from e-learning. Distance learning can occur in a traditional classroom without the use of ICT, but implementation of e-learning is impossible without ICT integration. For example, sending books/course content to the students through mail. Sometimes these educational terms can be merged to create an educational scenario, but technically they are different (Asabere & Mends-Brew, 2012). The growth of distance education has evolved over a period of four generations: printed instruction, early technology in broadcasting systems, online instruction, and web-based teleconferencing (Morabito, Sack & Bhate, 1999). The early adopters of distance learning programs used purely paper based tools to send and receive educational materials to their students. Later, these printed materials were supplemented with technological tools such as CD-ROMs, DVDs and other electronic media. The growth of the internet has also promoted the use of the online as a medium for sending and receiving educational materials and instructions between students and their tutors. Finally, students and their tutors are able to communicate using the teleconferencing technology where instructors and their students discuss issues and others online by telecommuting.

2.2.3 Blended Learning

Blended learning is sometimes referred to as hybrid learning or flipping the classroom. Blended learning is a formal education program in which a student learns at least in part through delivery of content and instruction via digital and online media with some element of student control over time, place, and path or pace (TeachThought, 2013). Blended learning combines classroom and online education. While education experts continue to debate the efficacy of blended learning, its very existence has challenged them to re-evaluate not just technology's place in (and out of) the classroom, but also how to reach and teach students more effectively. The figure below outlines the plan of a typical blended learning system as postulated by Lin and Wang (2012).

Figure 2. 1: Blended learning plan



Source: Lin & Wang (2012)

The quest for a blended learning method started as a result of students and learners reporting on the lack of a sense of belonging or community during online learning which prevents the development of shared feelings and emotions between learners and instructors. Researchers have found that these variables are some of the most important factors influencing learner satisfaction and learning transfer effectiveness (Sergiovanni, 1994). Delivering vivid learning experiences to online learners require creating a sense of presence, a feeling of immediacy, and

a broad awareness of the real and vivid learning environment (Lim, Morris & Kupritz, 2014). Blended learning, therefore, becomes the best option in this regard. The blended learning instruction integrates the advantages of e-learning methods with aspects of the traditional face-to-face teaching approach (Lin & Wang, 2012).

2.3 Defining E-learning

Higher learning institutions all over the world are adopting e-learning as the best means of delivering quality education to their students. It is becoming more popular as the most effective method of teaching and learning, disseminating information and knowledge in institutions of higher learning and organisations (Noh, Isa, Samah & Isa, 2012). However, there is still not a standard definition of what e-learning entails, as both academics and industry players are making significant strides to bring to bear a standard definition. Pailing (2002) asks very interesting questions: "Is e-learning all about the use of Internet or CD-ROM? Does it mean synchronous or asynchronous tutoring using videoconferencing, teleconferencing or something else?" Activities related to the supporting of the education process by ICT (i.e. e-support) are not supposed to be defined as e-learning as some authors postulate (Lowenthal, Wilson & Parrish, 2009). Zounek (2009) also claims the relatively set of phrases such as Computer-Based Training (CBT), Internet-Based Training (IBT) or Web-Based Training (WBT) should not be used to denote e-learning as cited in Klement and Dostál (2014). As a result of this, a consensus was reached in Europe upon the use of a unified definition for e-learning, which was understood as the application of new multimedia technologies and the Internet in education, in order to improve its quality by enhancing access to resources, services, the exchange of information and cooperation (Šimonová, 2010).

Arguably, e-learning consists of a complexity of elements which makes researchers and practitioners suggest different definitions with respect to the technologies involved, their extent of integration into learning processes and how learning occurs among participants in terms of time. This complexity has led to different authors and researchers viewing e-learning with varied lenses. For instance, Gotschall (2000) and Hall (2002) refer to e-learning as online learning, web-based learning, distance learning and technology-based learning. On the other hand, Liebowitz and Frank (2011) see e-learning to be a subset of distance education that was common since the middle of the 1980s. It is, therefore, worthy to note that no matter the angle an author takes, e-learning encompasses all the various teaching and learning activities carried out using electronic medium. An e-learning approach can take advantage of coaching and facilitated learning by building online knowledge repositories, such as lessons learned and best practice systems.

Deducing from the above, in this study e-learning which is also known as online learning, Open and distance learning (ODL) or web-based learning describes electronic learning that utilizes electronic communication for teaching and learning (Oztekin, Delen, Turkyilmaz & Zaim, 2013).

2.3.1 E-learning Characteristics

E-learning can be looked at from many different ways and these differences need to be more consistently known, deliberated, and valued. While dissertations might include thick descriptions of the context and type of online learning, journal articles (possibly due to restrictive word limits) often lack this type of rich and extremely important detail (Lowenthal, Wilson, & Parrish 2009). The authors further contend that when online learning is taken "out of context," problems arise among researchers, practitioners, and students. The lack of

specificity when talking about e-learning makes it problematic. The following are some of the distinguishing features of e-learning: Synchronous and Asynchronous, instructor-led and learner-led, the Harasim's Topology and the models of Sharma and Mishra (2007). These elaborations of e-learning will bring out the various features which will provide a better understanding of the various components of the e-learning technology.

2.3.1.1 Synchronous and Asynchronous

Possibly, the earliest distinction made about e-learning was between synchronous forms and asynchronous forms of online learning (Mackay & Stockport, 2006; Hrastinski, 2008). Synchronous e-learning is where communication occurs at the same time between students and instructors and where information is accessed instantaneously. In simple terms, synchronous learning involves the instructor and the learner being online at the same time to communicate and engage instructional activities. On the other hand, asynchronous learning allows instructors and learners to be online at different times, or proceed in an entirely self-paced mode with no instructor presence (Horton, 2006 as cited in Lowenthal, Wilson and Parrish, 2009). Persico, Manca and Pozzi (2014) outlined brainstorming, group problem solving and others as synchronous activities that go on during e-learning whilst collective writing is seen to be an asynchronous activity.

This distinction was especially useful with the rise of email, bulletin boards, and threaded discussion tools – contrasted with broadcast forms of delivery. Most online learning these days are mediated by Learning Management Systems (LMSs), which now come standard with both synchronous and asynchronous communication tools. Increasingly, online courses include a mix of synchronous and asynchronous activities. Even when an instructor does not include any synchronous learning activities per se, he or she might use a chat tool to hold set office hours.

Thus, it may be unproductive to characterize a course as simply being either synchronous or asynchronous, when in fact a mix of elements is used (Lowenthal, Wilson & Parrish, 2009).

2.3.1.2 Instructor-led and Learner-led

Horton (2006) asserts that instructor-led and learner-led categorization are also one of the commonly used criteria for differentiating e-learning. Brandon (2007) also categorizes it as group paced and self-paced. However, e-learning is classified as instructor-led when courses are facilitated solely by an instructor. This is often self-designed and produced with a group of students forming a class. Such courses which are instructor-led typically fall on a traditional semester schedule in an asynchronous environment (Lowenthal, Wilson & Parrish, 2009). In instructor-led courses, the students are expected to complete the course according to the instructor's predefined guidelines which typically include set deadlines.

Learner-led e-learning on the other hand, refers to the situation where the learner can proceed at his or her own pace (Horton, 2006). This method of e-learning mostly takes place in the working environment rather than the higher learning institutions.

2.3.1.3 The Harasim's Typology

A famous researcher in online education, Harasim (2006) has developed a typology which is seen to be one of the early descriptions of the diversity that exists across the e-learning landscape. In her paper titled, “A history of e-learning: Shift happened”, she differentiates between three types of e-learning. These include- *Online collaborative learning*, *Online distance education* and *Online computer-based training.*

Most universities use this online collaborative learning method of e-learning. It involves using the asynchronous, synchronous, or a combination of the two forms of communication to bring a group of students and a teacher together.

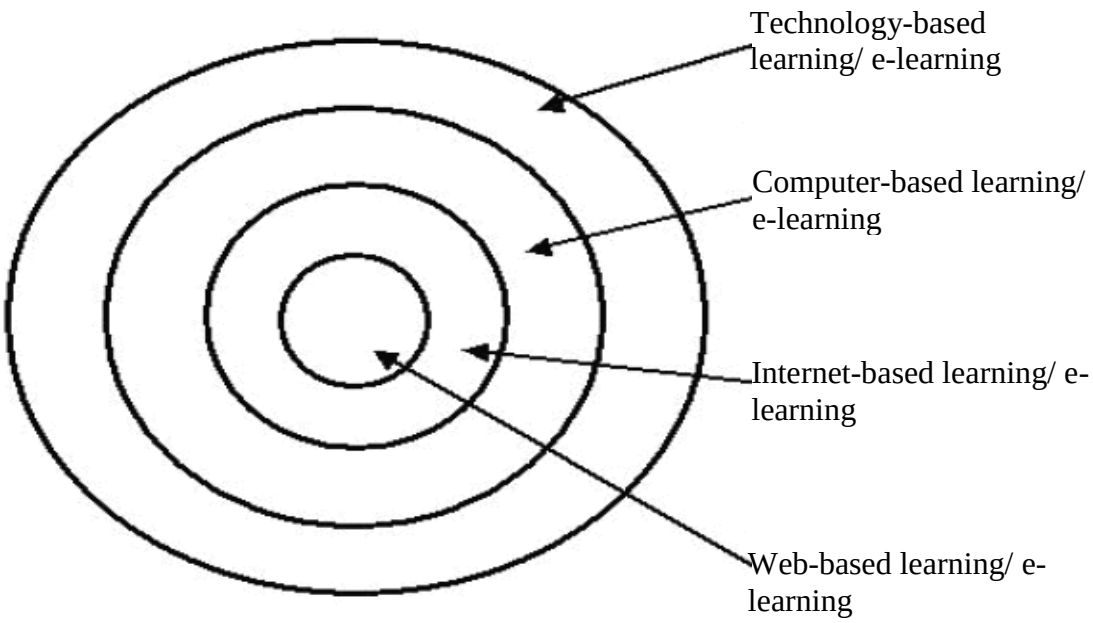
Again, online distance education method too is essentially a correspondence or independent study course that uses technology (example; email) for students to access course materials and turn in assignments. This type of online learning is used by K-12 (a term for the sum of primary and secondary education) and post-secondary institutions. It is essentially a one-to-one or one-to-many model (Lowenthal, Wilson & Parrish, 2009).

According to Harasim (2006), online computer-based training refers to the use of the web for access to online courseware or individualized learning modules. She further states that, there is typically neither peer collaboration nor communication with an instructor or tutor in this model. This is often the preferred method of online learning in corporate and workplace spaces, adding to the flexibility needed for on-the-job and just-in-time learning.

2.3.1.4 Sharma and Mishra model

Sharma and Mishra (2007) have postulated a model to put e-learning into 4 major categories. The figure below illustrates these categorizations.

Figure 2. 2: The Sharma and Mishra model



Source: Adapted from Sharma and Mishra (2007)

Web-based learning in the first place refers to all types of media, including audio and video in digital form delivered and used over the web; both synchronous and asynchronous interaction. The advent and widespread of information technology (IT) and the Internet or world wide web means that opportunities have been identified for developing e-learning systems or online learning (Deng & Tavares, 2013). A lecturer may use a class website as a supplement to their face-to-face delivered classes. Internet-based learning also involves all types of media, including audio and video in digital form delivered and used over the internet mostly in asynchronous interaction. Computer-based learning deals with all types of media, including audio and video in digital form used on stand-alone machines or computers including those not connected to the Internet. Learning may occur with the use of CD-ROMs and diskettes. The entire website for a particular study can be copied onto a CD-ROM for the students with slow and unreliable or no Internet access.

Technology-based learning includes the integration of all types of media including traditional TV and radio into learning processes. For instance, through technology, courses can be delivered exclusively online or through radio to students in remote locations and supplementary materials mailed out to them.

2.3.2 Types of E-learning systems

E-learning systems can be categorized into Course Management Systems and Learning Management Systems. Again, e-learning systems may be grouped into Open Source Systems and Commercial Systems.

2.3.2.1 Learning Management System

Learning Management Systems (LMS) are software programs for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs (Ellis, 2009). LMSs range from systems for managing training and educational records to software for distributing online or blended/hybrid college courses over the Internet with features for online collaboration. Learning management systems are the framework that handles all aspects of the learning process. They are the infrastructure that distributes and manages instructional content, identifies and assesses individual and organisational learning or training goals, tracks the progress towards meeting those goals, collects and presents data for supervising the learning process of the organisation as a whole (Szabo & Flesher, 2002).

Learning management systems are used for various purposes; Colleges and universities use LMSs to deliver online courses and supplement on-campus courses; business training

departments use LMSs to deliver online training, as well as to automate recordkeeping and employee registration.

There are now dozens of different types of learning management systems used by organisations to manage e-learning and deliver course materials to employees (Mindflash, 2015). The editors of CampusComputing (2013) have outlined the market share of the various learning management systems as of Fall 2013 with Blackboard the leading provider with a 41 percent market share, Moodle (23 percent), Desire2Learn (11 percent) and Instructure being the next three largest providers.

LMSs possess online course launching and tracking capabilities. That is, the ability to manage courses which mix online and classroom instruction. Also, communication and collaboration (Web 2.0) tools have been included as part of LMSs. These tools provide social learning and networking. LMSs also have the ability to produce tests and assessments both as part of the courses and separately. Many vendors are beginning to add mobile learning functionality to their LMSs so learning can be accessed on smartphones and other small mobile devices. Along with mobile learning, social learning (offering tools like Facebook) is an important new offering, which LMS providers are rushing to include. Again, some learning management systems are offered as software that is installed internally in the institution ("behind the firewall"). Some are offered as hosted or SaaS (Software as a Service) solutions which are also referred to as Cloud Computing and "on-demand" services (McIntosh, 2015).

2.3.2.2 Course Management System

Course management systems (CMS) may be referred to as Content management systems. CMSs have been available since the late 1990s. Janssen (2015) defines a course management system as a set of tools that allow the instructor to create online course materials and post it on

the web without having to handle HTML or other programming languages. An integral part of higher education in recent times is course management systems. The administrative component, of course management systems may include class rosters and the ability to record students' grades. However, the teaching component of CMS could include learning objects, quizzes, class exercises and tests. The course management system may also comprise of tools for real-time chat, or asynchronous bulletin board type communications. The CMS tool also looks at all aspects of teaching, learning and teacher-student interaction (Technopedia, 2015).

WebCT and Blackboard are some of the major types of CMS. Again, some U.S institutions have developed projects such as CourseWorks, CHEF and Stellar. Some colleges also develop their own small-scale course management systems (Technopedia, 2015).

2.3.2.3 Open Source Systems

Open source software is a general term that refers to practices in production and development of software where the source code is made publicly available (Conole & Oliver, 2007). The open source movement has had a significant impact on industries where online services are part of the core business. Linux, for example, is used as the operating system for 29 percent of web servers, while Apache is the clear market leader in web server software. MySQL and its more scalable counterpart Postgres are robust database systems, while PHP is an increasingly used scripting language enabling the easy integration of data from these databases within web pages (Abel, 2005).

Higher education has been as quick to implement these technologies as many other industries. For instance, Kwame Nkrumah University of Science and Technology in Ghana introduced “Moodle”- an open-source and course management e-learning system in the second semester

of the 2005-2006 academic year (Serbe Marfo & Okine, 2011). There are now also educational open source products available that appear to provide real alternatives to commercial systems. Prominent in this arena is Moodle, the most widespread open source virtual learning environment, recently adopted by the British Open University amongst other big players. Another initiative, SAKAI, led by several top-ranking US institutions, is developing a suite of e-learning tools and the associated architecture. Efforts have also been successful in linking U-Portal, an open source portal, with both SAKAI and Moodle (Conole & Oliver, 2007).

Some researchers have raised objections to open source systems claiming they are usually poorly documented and relatively anarchic in their development and therefore subject to 'feature creep' in a way that their commercial counterparts are not. There is no doubt that open source development culture is very different from what university systems departments are used to. They need to develop better ways of engaging with the open source communities if they are to influence the products. Far from being chaotic, though successful, open source projects are run by exceptional leaders who combine technical skills with organisational and communications abilities and 'manage' their dispersed communities effectively (Woods & Giuliani, 2005).

2.3.2.4 Commercial System

Commercial systems are designed for sale to serve a commercial need. Commercial software is usually proprietary software, but in some cases it may be public-domain software. Proprietary systems refer to any computer software that has restrictions on any combination of the usage, revision, copying or distributing modified versions of the software (Webopedia, 2015). Proprietary software usually can be distributed at no cost or for a fee. Proprietary software may also be referred to as closed-source software.

In the late 1990s, a lot of commercial electronic learning systems were produced in the race to make profit from the budding online and blended learning environment market. In the United Kingdom, for instance, several universities developed their own in-house e-learning systems to later create commercial versions of such systems. The blackboard learning system is one of the most popular commercial systems which originated from the University of British Columbia in Canada and in 2006 merged with WebCT; another leading e-learning system (Littlejohn & Pegler, 2007).

Many universities find it difficult in deciding on the type of e-learning systems to implement. Using an open system instead of a commercial system means the institution can possibly avoid "vendor lock-in", where the company sets the tone and development priorities of the system. On the other hand, implementing commercial systems means the institutions do not have to employ software developers (Littlejohn & Pegler, 2007).

2.4 Review of E-learning Research

A review is a legitimate and important method of conducting a research (Sofiadin, 2014). Sumranwong (2011) posits that, an effective literature review analyses and synthesizes quality literature, provides a strong basis for a research topic, helps to justify the choice of research approach and provides an explanation of the new ideas in the proposed research. A literature review gives the researcher a better understanding of the existing body of knowledge, helps the researcher to identify new research that is needed, provides a solid theoretical basis for the proposed research, verifies the existence of the research problem, demonstrates how the proposed research will contribute something new and assists with the structuring of a valid research approach, methodologies, objectives and research questions.

Similar to the work of Boateng, Molla and Heeks (2009), this review was conducted in four phases namely; literature classification, review methodology, presentation of findings and a summary of the findings. The classification scheme adopted in this review process is discussed in the literature classification phase. The details of the review on e-learning issues and conceptual approaches are found in the presentation of findings and evidence section. Finally, the review presents conceptual approaches in e-learning research and also research gaps and future research directions. It must be emphasized that, with the research objectives in mind, the classification of e-learning literature was done to expound the nature of e-learning adoption in universities and also find out the determinants of e-learning adoption in universities. Therefore, to satisfy this purpose, the review focused on e-learning adoption. Adoption in the context of this study refers to as taking up and using e-learning systems for academic and educational purposes.

The e-learning literature on adoption was taken into consideration looking at factors that influenced the success and adoption of e-learning. These factors were categorized into three major groups (technological, environmental and organisational factors) to better understand the nature of e-learning adoption and also the determinants of adoption of e-learning in universities. Table 2.1 summarizes the different categorization of research papers into the factors that influence adoption, theories used and the issues discovered. Later, these papers were categorized based on the stakeholder perspective.

Table 2.1: Article Distributions by Issues

Article	Theory	Sample & Methodology	Adoption Determinants
Motaghian, Hassanzadeh & Moghadam (2013)	Technology Acceptance Model and IS success model	Survey of 115 university instructors Structural Equation modelling	• Perceived usefulness • Perceived ease of use • System quality.
Islam (2013)	The basic Technology Acceptance Model	Longitudinal survey of 249 university students Partial least squares (PLS) approach	• Perceived usefulness • Perceived ease of use • Purpose of usage • Perceived learning assistance • Perceived community building assistance
Amirkhanpour, Kaufmann & Garcia-Gallego (2014)	Conceptual framework	Online questionnaire distributed to all the public and private Universities.	• Integration of social learning elements such as various social media tools.
Persico, Manca & Pozzi (2014)	Technology Acceptance Model Grounded theory	Questionnaires and interviews selected Students and teachers	• A mixture of top-down and bottom-up approach to adoption
Hassanzadeh, Kanaani & Elahi (2012)	Delone and McLean Model Measuring e-learning Systems Success (MELSS) model	Questionnaires completed by 369 instructors, Students and alumni of 5 Universities Structural Equation modelling	• Technical system quality • Educational system quality • Content and information quality • Service quality • User satisfaction • Intention to use • User loyalty to system • Benefits of usage • Goal achievement
Raouf, Naser & Jassim (2012)	TOE Framework	Questionnaires completed by 120 faculty members. Structural Equation modelling	• IS expertise • Expected Benefits • IT infrastructure • Competitive Pressure • Educational partners
Namisiko, Munialo & Nyongesa, (2014)	TAM and TOE	Online Questionnaires submitted to a total of 500 participants which included Instructors, Students and Administrators	• Availability of ICT infrastructure • E-learning Curriculum • Instructors' competencies

		Both descriptive and inferential statistics	• Performance Expectancy • Perceived Usefulness • Perceived Ease of Use • Competitive Pressure
Baumann-Birkbeck *et al.* (2014)	Conceptual framework	Two academic cohorts were used for the study Observed Learning Outcome (SOLO)	• Content of E-learning course • E-learning curriculum
Sánchez, Hueros & Ordaz (2013)	Technology Acceptance Model	226 students at the University of Huelva completed a survey questionnaire Structural Equation modelling	• Technical Support • Computer Self-Efficacy • Perceived Ease of Use • Perceived Usefulness • Attitude • System Usage

Source: Author's construction

2.4.1 Discussion of issues and evidence

The studies as outlined in table 2.1 above, have varying propositions on the factors that support or inhibit the adoption of e-learning in higher learning institutions or universities. These propositions are grouped into the three main determinants of adoption (technology, organisation and environment) and an additional factor which is referred to as the Nature of the course to be offered on the e-learning platform. Each category has received a fair share of research attention as shown in table 2.2 below.

Table 2 2: Categorized issues

Factor Examined	Technology	Organisation	Environment	Nature of course
• Perceived ease of use	✓			
• Educational system quality				✓
• E-learning curriculum				✓
• System quality	✓			
• IT infrastructure	✓			
• Content of E-learning course				✓
• Educational Partners			✓	
• Expected Benefits		✓		
• Size of the institution		✓		
• Instructors' competencies		✓		
• Perceived Usefulness		✓		
• Human and financial resources		✓		
• Competitive Pressure			✓	
• E-learning experts	✓			

Source: Author's construction

2.4.1.1 Technological Factors

The technological factors are made up of the internal and external technologies that are relevant to the organisation as postulated by Tornatzky and Fleischer (1990). Technologies may include both equipment as well as processes which may promote or inhibit the adoption of e-learning systems. Technology in this case does not only refer to the actual software and hardware features of the platform, but also how well technology is adapted to the best practices of

teaching and learning (Sharma & Pandit, 2011). In the review of e-learning literature, a number of issues were raised and these issues under the technological factors are grouped into *Perceived ease of use* (Bhuasiri *et al.*, 2012; Namisiko, Munialo & Nyongesa, 2014; Motaghian, Hassanzadeh & Moghadam, 2013; Islam, 2013; Tseng, Lin & Chen, 2011), *IT infrastructure* (Raouf, Naser & Jassim, 2012; Hassanzadeh, Kanaani & Elahi, 2012; Namisiko, Munialo & Nyongesa, 2014; Sharma & Pandit, 2011) *and e-learning experts* (Palacios-Marqués, Cortés-Grao & Carral, 2013; Raouf, Naser & Jassim, 2012). These issues are elaborated below.

2.4.1.1.1 Perceived ease of use

Davis (1989) asserts that, perceived ease of use refers to as the degree to which the prospective user expects an e-learning system to be free of effort. Users of the e-learning system should be comfortable using it with little or no effort or assistance. If they find it easy to use, they tend to adopt it. Transforming "learning" into "e-learning" is not just about developing online courses, rather they should be useful and easy to use e-learning tools (Frimpon, 2012). Tseng, Lin and Chen (2011) in their study on evaluating the effectiveness of e-learning systems using some universities in Taiwan discovered that, the most significant measures of e-learning effectiveness was the use of enhanced multimedia features that can attract the learners' attention and may eventually increase learners' attractiveness. Again, reducing the waiting time for learning materials to load may improve the quality of the system. Lee, Yoon and Lee (2009) see design of learning contents as being positively related to the perceived ease of use of the system. Furthermore, the management should actively maintain and improve the responsiveness of instructors to learner inquiries. In this way, the users of the system will find the system easier to use. Other researchers (Bhuasiri *et al.*, 2012; Namisiko, Munialo & Nyongesa, 2014; Motaghian, Hassanzadeh & Moghadam, 2013; Islam, 2013) using various

technology adoption models have postulated that one key technological determinant of e-learning adoption is perceived ease of using the system.

2.4.1.1.2 IT infrastructure

Studies by Lin and Lin (2007) and Mitsweni and Biermann (2008) have revealed that institutions that have advanced IT infrastructure will have more chance to an extent in implementation success regarding web applications such as e-learning. This goes to affirm Namisiko, Munialo and Nyongesa's (2014) assertion that the availability of ICT infrastructure in the university is a major determinant of user's adoption of e-learning. E-learning depends on three critical factors and the first of these factors is the ownership of computers (Tagoe, 2012). E-learning as the name implies thrives on the availability of IT infrastructure which include internet, intranet, extranet, satellite broadcast, audio or video tape, interactive TV, CD–ROM and many others (SØrebØ, Halvari, Gulli & Kristiansen, 2009). Rouse (2005) further categorized e-learning technologies into: Voice-centred technology, such as CD or MP3 recordings or webcasts; video technology, such as instructional videos, DVDs, and interactive videoconferencing and computer-centred technology delivered over the internet or corporate intranet. A study by Sharma and Pandit (2011) has confirmed the assertion that the availability of ICT infrastructure supports e-learning adoption. In the study, the authors discovered that users do not have an interest in the e-learning programs at centres which are not sufficiently equipped for the training of learners and resource persons, although they (the learners and resource persons) are ICT savvy. Such centres lacked regular electricity supply, sufficient facilities and other consumables.

2.4.1.1.3 E-learning experts

Professional, technical and instructional design support are significant factors in the success of every e-learning system (Csete & Evans, 2013). The more information systems (IS) expertise related to e-learning which exists in the institution means the more the likelihood of successful implementation of e-learning (Raouf, Naser & Jassim, 2012). The universities should have the necessary IS experts who have good knowledge about the e-learning Applications (including the open source and the proprietary applications) and the technologies needed to implement them. Also, the institutions should hire highly specialized persons in e-learning Applications and technologies. Again, the universities should give their experts the necessary training in these technologies in order to increase the chance of a successful implementation of e-learning. The availability of e-learning experts provides the necessary support and assistance to the users. In a study on the outstanding knowledge, competencies and web 2.0 practices for developing a successful e-learning project management, it was discovered that, the factors that influence the use and success of e-learning programs were the technical expertise of the project managers (Palacios-Marqués, Cortés-Grao & Carral, 2013). The ability of the ICT experts to provide the needed assistance to the users of the systems promote the adoption of the system. Perceived learning assistance is the most critical factor for achieving better academic performance in an e-learning environment. This assistance comes from the ICT experts who provide the needed support to the users of the e-learning system (Islam, 2013).

2.4.1.2 Organisational Factors

Some of the e-learning determining factors are influenced by the organisation. These are the supportive or inhibiting factors generated as a result of the characteristics and resources of the institution, including the institution's size, degree of centralization, degree of formalization, managerial structure, human resources, the amount of slack resources, and linkages among

employees. These are the internal social mechanisms of the institution. E-learning papers reviewed had organisational factors which were grouped into *Organisational compatibility* (Duan *et al*., 2010; Raouf, Naser, & Jassim, 2012; Bhuasiri *et al.*, 2012), *Expected benefits/ Perceived usefulness* (Liaw & Huang, 2013; Islam, 2013; Motaghian, Hassanzadeh & Moghadam, 2013), *Size of the institution* (Persico, Manca & Pozzi, 2014), *human and financial resources* (Raouf, Naser & Jassim, 2012; Persico, Manca & Pozzi, 2014).

2.4.1.2.1 Organisational compatibility

The greater the compatibility between the applications of e-learning with the practical applications of the institution that had adopted it in terms of beliefs, values and past experiences, needs, priorities and policies, the better the influence on the success of the implementation of e-learning (Raouf, Naser & Jassim, 2012). This is because, compatibility will lead to an easier dealing between the e-learning applications and the practical ordinarily applications. Technology awareness, motivation, and changing learners' behaviour were prerequisites for successful e-learning implementations in a study by Bhuasiri *et al.* (2012). The university as a whole should be ready to accept the use of the e-learning systems to support teaching and learning. Organisational support significantly predicts learners' intention to adopt further e-learning (Sawang, Newton & Jamieson, 2013).

2.4.1.2.2 Expected benefits/Perceived usefulness

Perceived benefits refers to the belief that new technologies provide more benefits than old ones (Raouf, Naser & Jassim, 2012). One of the determinants of adoption in the literature reviewed was the expected benefits the stakeholders derived from using the system. This assertion is confirmed by Motaghian *et al*. (2013) in their research using an integrated model to assess the influence of IS-oriented, psychological and behavioural factors on instructors'

adoption of web-based learning systems. Survey data collected from 115 university instructors were analysed using structural equation modelling to examine the theoretical model and concluded that perceived usefulness was the most important factor affecting intention and actual use of e-learning systems. Other researchers who hold similar views include Liaw and Huang (2013) and Islam (2013) who conducted their studies using a conceptual model and the basic Technology Adoption model (TAM) respectively. Liaw and Huang (2013) postulated that perceived usefulness can be influenced by interactive learning environments, perceived self-efficacy and perceived satisfaction. Tagoe (2012) also posits that there is a significant relationship between perceived usefulness and the frequency at which one uses e-learning systems.

2.4.1.2.3 Human and financial resources

Introducing technology per se is not sufficient to produce changes, at least in educational settings (Persico, Manca and Pozzi, 2014). Rather, larger investments are needed, encompassing not only the provision of new tools and platforms, but also investments in terms of human resources (through training and guided, contextual reflective practice) and time, that is, recognition of the time commitment of the innovators, long-term investments for gradual change. The human resources to manage and use the system should be well developed to be able to use it. Also, human and financial resources readiness has a significant influence on the adoption of e-learning systems (Raouf, Naser & Jassim, 2012). Financial resources should be available to acquire ICT tools and equipment. The human resources should also be ready to accept and use the systems. A study by Tagoe (2012) on students' perceptions on incorporating e-learning into teaching and learning at the University of Ghana discovered that, computer skills are critical to the introduction of e-learning in any university. Hence, all the various stakeholders should possess the requisite expertise to use the e-learning system.

2.4.1.3 Environmental Factors

The environmental context includes the size and structure of the industry, the firm's competitors, the macroeconomic context, and the regulatory environment (Tornatzky & Fleischer, 1990). In this context, the environment of a university includes other competing universities, agencies such as Non-Governmental Organisations (NGO's), Governments, local authorities and ministries. All these entities have an influence in one way or the other on the affairs of the university. E-learning adoption in this sense is not an exception. Environmental issues identified in the e-learning adoption literature reviewed include *Educational Partners* (Islam, 2013; Hassanzadeh, Kanaani & Elahi, 2012; Raouf, Naser & Jassim, 2012), *Competitive Pressure* (Raouf, Naser & Jassim, 2012; Amirkhanpour, Kaufmann & Garcia-Gallego, 2014).

2.4.1.3.1 Educational Partners

Educational partner readiness has a significant influence on the external diffusion of e-learning (Raouf, Naser & Jassim, 2012). Educational partners such as Non-Governmental organisations (NGOs) and multi-national agencies are indispensable contributors to the successful implementation of projects in developing countries mostly in African countries. In a UNESCO funded project, Bates (2001) postulated that governments have to play a very crucial role in the implementation of e-learning projects in Africa. In the report, governments should provide the necessary infrastructure such as internet connectivity to support e-learning projects in African countries. NGOs contribution to the e-learning adoption is highlighted in the e-learning literature reviewed on developing countries. For instance, in Malawi, Microsoft is training teachers through the Malawi Learning Partnership network (Gondwe, 2012).

Governments play active roles in the implementation of e-learning systems in higher educational institutions. Governments provide support in the form of grants and subventions to the various universities in their countries. For instance, the active role of the Korean government has contributed to the introduction of e-learning into Korean colleges and universities (Uzunboylu, 2006). The author further postulates that, there was evidence that the European Commission (EC) has positively affected the European countries that have introduced e-learning systems in their higher educational institutions. This assistance includes: providing necessary infrastructure and equipment, implementing teacher training, delivering useful content and services, encouraging cooperation and networking, promoting digital literacy and launching European virtual campuses. In a study on finding the determinant factors of information communication technology (ICT) adoption by government-owned universities in Nigeria (Eze *et al*., 2013), government supports in the forms of legal protections, tax laws, and outright funding are necessary requirements for the diffusion and adoption of ICT's among colleges in the country.

2.4.1.3.2 Competitive Pressure

Universities are virtually in a competition for dominance, prestige, popularity and even for students. Technological innovations in one university are viewed as threats to another university. For instance, the implementation of e-learning in other universities has encouraged i-Learn Centre (iLeC) of Universiti Teknologi MARA (a public university in Malaysia) to move forward to also adopt e-learning (Noh *et al.*, 2012). E-learning has been used in formal and also in informal education by several Malaysian universities. For instance, University Tun Abdul Razak and Open University Malaysia (OUM) offered all their degree programs by blended or hybrid mode. One of the most significant e-learning systems is the development of I-Learn portal which is the e-learning platform of the Open University of Malaysia (OUM).

This knowledge, therefore, served as a boost of motivation for iLeC to implement even a better e-learning platform. Again, they inspired iLec to develop their own e-learning platform.

Universities who adopt e-learning are recognized as being better in the functions of the higher education. This opens new opportunities in the fields of teaching and transferring knowledge to the students, the exchanging of the expertise between the teachers and students and to spread the good reputation of the institution which adopts and implements it (Raouf, Naser & Jassim, 2012). Again, the institution is able to increase the number of its students and the leverage of the scientific level of its lectures.

2.4.1.4 The nature of the course

The review of e-learning literature also highlighted other factors which fall outside of the traditional determining factors of e-learning adoption. These factors relate to the nature of the courses offered using the e-learning systems. Issues under the nature of the course include *the content of the course* (Hassanzadeh, Kanaani & Elahi, 2012; Amirkhanpour, Kaufmann & Garcia-Gallego, 2014; Šolc, Legemza & Sütőová, 2012) and *E-learning Curriculum* (Baumann-Birkbeck *et al.*, 2014; Namisiko, Munialo & Nyongesa, 2014; Anderson, Plevin & McKinnon, 2012).

2.4.1.4.1 Course content

The content and information quality has the most direct effect on user satisfaction (Hassanzadeh, Kanaani & Elahi, 2012). Whenever the quality of the content of the e-learning course is high, users are more satisfied with the use of the information system or the e-learning system. Facilities such as forum, chat, collaborative learning tools, possibility of class discussions and others in e-learning systems can result in user satisfaction and hence higher

adoption. Availability of complementary assets, integrated social learning elements such as various social media tools helps to make the e-learning system user friendly (Amirkhanpour, Kaufmann & Garcia-Gallego, 2014). The content of the course should be structured to meet the various needs of the users. The most appreciated benefits of e-learning are the visualization of explained lessons, attractively of learning environment, provision of a platform for individual study and testing, especially for external students, and study programs with higher number of students (Šolc, Legemza & Sütőová, 2012).

2.4.1.4.2 E-learning Curriculum

Some subjects are difficult to teach and learn. Chemotherapeutic pharmacology, for instance, is a traditionally challenging subject (both teaching and learning) (Anderson, Plevin & McKinnon, 2012). E-learning has been proposed to enhance chemotherapeutic education by overcoming some of the challenges presented by traditional teaching methods. Baumann-Birkbeck *et al.* (2014) in their study on the benefits of e-learning in chemotherapy pharmacology education discovered that, students adopt e-learning systems because of the nature of the course offered on the e-learning platform. The combination of words and pictures presented simultaneously in the e-learning system and complemented with animation and narration provides better illustrations in the course. The students are, therefore, able to better understand the course.

The absence of a proper e-learning curriculum is a major obstruction to effective deployment and adoption of e-learning in universities. For an effective e-learning strategy, a proper e-learning curriculum that is not pulled directly from books and classroom courses should be designed (Namisiko, Munialo, & Nyongesa, 2014). Course syllabus which requires the use of a lot of resources and demonstrations tend to be highly adapted to be used for e-learning

platforms than other course curriculum (Bhuasiri, *et al*, 2012). Evidence is provided by Frehywot *et al*. (2013) in their study on e-learning in medical education where it was discovered that although the reasons for investing in e-learning varied, expanded access to education was at the core of e-learning implementation in the medical subjects which included providing supplementary tools to support faculty in their teaching, expanding the pool of faculty by connecting to partner and/or community teaching sites, and sharing of digital resources for use by students. Hence, making physician training, nursing, pharmacy and dentistry training courses highly adopted on e-learning systems.

2.4.2 Stakeholder Perspectives of E-learning Literature

E-learning is a concept which encompasses different components which include students, faculty and e-learning managers (Persico, Manca & Pozzi, 2014). E-learning literature reviewed tend to focus mostly on a single stakeholder perspective. For instance, students' perspective (Barker *et al.*, 2013; Chokri, 2012; Klement & Dostál, 2014). On the other hand, some researchers combined two of the stakeholders in their research. For instance, students and faculty (Šolc, Legemza & Sütőová, 2012), faculty and experts (Bhuasiri *et al.*, 2012). Finally, Persico, Manca & Pozzi (2014) was arguably the only paper that combined the three stakeholders. Table 2.3 outlines some e-learning research works and their perspectives.

Table 2.3: E-learning papers and perspectives

Research Paper	Country	Perspective
'Moving with the times' taking a glocal approach: A qualitative study of African student nurse views of e-learning (Barker *et al.*, 2013).	Nairobi, Kenya	**Students**
Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty (Bhuasiri *et al.*, 2012).	Asia, the Middle East, South America, Africa, and Europe	**ICT experts and faculty**
Factors influencing the adoption of the e-learning technology in teaching and learning by students of a university class (Chokri, 2012).	Kingdom of Saudi Arabia (KSA)	**Students**
Students and e-learning: a longitudinal research study into university students` opinions on e-learning (Klement & Dostál, 2014).	Czech Republic	**Students**
Towards an Optimization Framework for e-learning in Developing Countries: A Case of Private Universities in Kenya (Namisiko *et al*, 2014).	Kenya	**Students**
A model for measuring e-learning systems success in universities (Hassanzadeh, Kanaani & Elahi, 2012).	Iran	**ICT experts**
Adapting the Technology Acceptance Model to evaluate the innovative potential of e-learning systems (Persico, Manca & Pozzi, 2014).	Italy	**students, faculty and e-learning managers**
Experiences with utilizing e-learning in education process in university environment (Šolc, Legemza & Sütőová, 2012).	Slovakia	**students and Instructors**

Students' perceptions on incorporating e-learning into teaching and learning at the University of Ghana (Tagoe, 2012).	Ghana	**students**

Source: Author's construction

2.4.3 Conceptual Approaches in E-learning Research

Technology Adoption Model (TAM), Grounded Theory, Delone and McLean Model, Technology Adoption Model 3 (TAM3), IS success model are a few of the prominent adoption frameworks used in the studies reviewed. These frameworks were used at different levels of e-learning adoption such as the micro level adoption- the individual adoption and the meso level adoption- the organisational adoption.

The following subsection discusses some of the research frameworks used in the literature to pave way for the selection of an appropriate research framework for the study and subsequent development of the conceptual model.

2.4.3.1 Technology Adoption Model (TAM)

There are many theories used in IS research (Wade & Hulland, 2004). The Technology Adoption model is one such framework which cannot be left out in a study on the adoption of technology such as e-learning (Namisiko, Munialo & Nyongesa, 2014; Sánchez, Hueros & Ordaz, 2013; Persico, Manca & Pozzi, 2014). TAM, which was developed by Davis (1989), is an adaptation of the Theory of Reasoned Action (TRA) to the field of IS as postulated by Venkatesh, Morris, Davis and Davis (2003). Venkatesh *et al.* (2003) continued that TAM posits perceived usefulness and perceived ease of use to determine an individual's intention to use a system with the intention to use serving as a mediator of actual system use. Perceived usefulness is also seen as being directly impacted by perceived ease of use.

In other words, the Technology Acceptance Model tries to explain how users come to accept and use a technology. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, namely: Perceived Usefulness (PU) and Perceived Ease of use (PEOU) (Legris, Ingham & Collerette, 2003). The TAM has subsequently been extended and adapted by various authors. For example, TAM2 (Venkatesh & Davis, 2000) includes ‘‘subjective norm determinants’’, that is, indicators of ‘‘the person’s perception that most people who are important to him think he should or should not perform the behaviour in question” (Fishbein & Ajzen, 1975). Another well-known extension is UTAUT (Venkatesh, Morris, Davis & Davis, 2003), aiming to synthesize previous TAM versions in an effort to relate technology use to performance expectancy, effort expectancy and social influence. As demonstrated by Lee, Hsieh and Hsu (2011), the TAM can also be effectively combined with Rogers’ Diffusion Innovation Theory (Rogers, 2003), to investigate innovation processes.

It should, however, be noted that, the TAM assesses users’ acceptance of a technological innovation from the micro level (personal level). Again, the model does not take into consideration the technological, organisational and environmental factors that influence the adoption of technological innovations. Hence, making it fall short of the institutional adoption of technology in terms of e-learning adoption in universities.

2.4.3.2 Delone and McLean IS Success Model

One useful research model which is used to examine information systems (IS) success is the Delone and McLean (D&M) model, which was developed by Delone and McLean in 1992. The model has been used in over 300 research papers (Delone & McLean, 2003). The model

seeks to provide a comprehensive understanding of IS success by identifying, describing, and explaining the relationships among six of the most critical dimensions of success along which information systems are commonly evaluated. The D&M model includes six dimensions: (1) information quality, (2) system quality, (3) service quality, (4) use or intention to use, (5) user satisfaction and (6) net benefits (DeLone & McLean, 2003). The D&M model is one of the most widely used models of information systems success and has been used for various information systems research (Hassanzadeh, Kanaani & Elahi, 2012).

Hassanzadeh, Kanaani and Elahi (2012) used the D&M model to generate a model for measuring e-learning Systems Success (MELSS). The D&M model is also an individual level model which falls short of the requirements of this current study which involves e-learning adoption in universities. Again, the model does not take into consideration the technological, organisational and environmental factors that influence the adoption of technological innovations.

2.4.3.3 Technology Organisation and Environment (TOE) Framework

The Technology Organisation Environment (TOE) framework is a fundamental approach to investigating an institutional context that influences the process by which it adopts, implements, and diffuses technological innovations (Raouf, Naser & Jassim, 2012). The TOE framework identifies three aspects to explain firm decision making behaviour in relation to technological innovations: Technology, Organisation, and Environment. The technological context includes both the internal and external technologies used by the firm. Meanwhile, organisational context refers to descriptive characteristics of the organisation, including firm size and scope, complexity of firm managerial structure, quality, and degree of its human resources. Finally, environmental context refers to the university and its dealings with

educational partners, competitors and government. As postulated by Lin and Lin (2007) the TOE framework has consistent empirical support in the Information Systems (IS) domain. The framework has been used extensively in the information systems research to investigate a number of technology innovations such as e-learning (Raouf, Naser & Jassim, 2012; Namisiko, Munialo & Nyongesa, 2014), e-business (Thong, 1999; Zhu, Kraemer & Sean Xu, 2003) and cloud computing (Angeles, 2013).

To this end, the TOE framework is deemed fit to achieve the purpose of this study. This is because the TOE framework covers every aspect of the adoption of e-learning from a very holistic point of view by taking into consideration the technological, environmental and organisational factors of the institution to study the adoption of technological innovation such as e-learning. Further, elaboration on the TOE framework is provided in Chapter three of the study and the justification for selecting the TOE framework.

2.4.4 Research Gaps and Future Research Directions

The findings from the issues examined under e-learning literature pointed out that there is still a need for a continuous research on e-learning as it was evident that some areas such as legislation, trust, ethics and cost is still not extensively covered. Also, a wide gap in literature was revealed as most of the studies were conducted from a single stakeholder perspective such as student (Barker et al., 2013; Klement & Dostál, 2014; Tagoe, 2012), and faculty (Hassanzadeh, Kanaani & Elahi, 2012). And the few which tried to combine stakeholders also did not include all the major stakeholders involved in the e-learning adoption and implementation. For instance, Šolc, Legemza and Sütőová (2012) analysed students and instructors' acceptance of e-learning systems. Bhuasiri et al. (2012) also combined faculty and experts in a single study. Finally, Persico, Manca & Pozzi (2014) was arguably the only paper

that combined the three stakeholders (students, instructors and administrators). There is, therefore, the need for studies which combines all three major stakeholders in a single study.

Again, only a handful of the papers reviewed, used the TOE framework (Raouf, Naser & Jassim, 2012; Namisiko, Munialo & Nyongesa, 2014). The TOE framework is about the only framework that combines the three major determining factors that influence the adoption of a technology (Nkhoma & Dang, 2013). TOE framework covers every aspect of the adoption of e-learning from a very holistic point of view by taking into consideration the technological, environmental and organisational factors of the institution to study the adoption of technological innovation such as e-learning. The other theories were deficient in taking into consideration all three adoption determinants (technological, environmental and organisational contexts) in a single study.

In addition, the review of e-learning literature revealed a gap in a comprehensive framework. Technology Acceptance Adoption Model (TAM) and Delone and McLean (D&M) model were two of the commonly used models for the e-learning adoption studies. On the other hand, these models looked at the individual or micro level of technology adoption. For a study on adoption of e-learning in universities, a comprehensive framework is therefore required. This framework will bring out the institutional adoption of e-learning, hence requiring the TOE framework which looks at the institutional adoption of technological innovation as postulated by Nkhoma and Dang (2013). This makes this study opportune and very relevant to fill the theoretical gap of e-learning adoption at the institutional level.

2.5 Summary

This literature review was intended as "a means to an end" (Yin, 2003). The end being an understanding of e-learning. In sum, the review of literature discussed the genesis of e-learning, pertinent definitions, the actors, characteristics of e-learning, and how the literature review was conducted, taking into consideration the adoption issues and conceptual frameworks. The research frameworks and determinants exhibited in the studies reviewed provided direction for research framework selection and hypotheses development in the next chapter. The next chapter presents an overview of the TOE framework and adapts its constructs to the arriving at a research framework for the study.

CHAPTER THREE

RESEARCH FRAMEWORK

3.1 Introduction

This chapter explores the research framework after discussing pertinent and contemporary literature relating to the adoption of e-learning in developing countries in the previous chapter. Technology-Organisation-Environment (TOE) framework which was proposed by Tornatzky and Fleischer (1990) was found to be appropriate to help cover every aspect of the adoption of e-learning from a very holistic point of view. Again, Tornatzky and Fleischer's (1990) TOE framework consists of seemingly wider generic explanatory constructs. Similar to the work of Eze *et al.* (2013), the TOE model is chosen for this work. This is because, it is about the only model that emphasizes more on individual different factors (IDFs) to underpin the distinctive nature of decision making while recognizing the influence of technology development and organisation's conditions involving necessary business and organisational reconfiguration shaped by industry environment. This, therefore, contributes to the theoretical position of this study. As postulated by Nkhoma and Dang (2013), The TOE framework combines the technological, organisational and environmental factors of adoption, which other theories seem to be deficient in. Hence, making it a best fit for the study of adoption of technology.

This chapter begins with an elaborate overview of the TOE framework. This is followed by the Research Model and Hypotheses, Technological Context, Organisational Context, Environmental Context, Nature of the course and finally a summary of the chapter.

3.2 Technology-Organisation-Environment (TOE) framework - An Overview

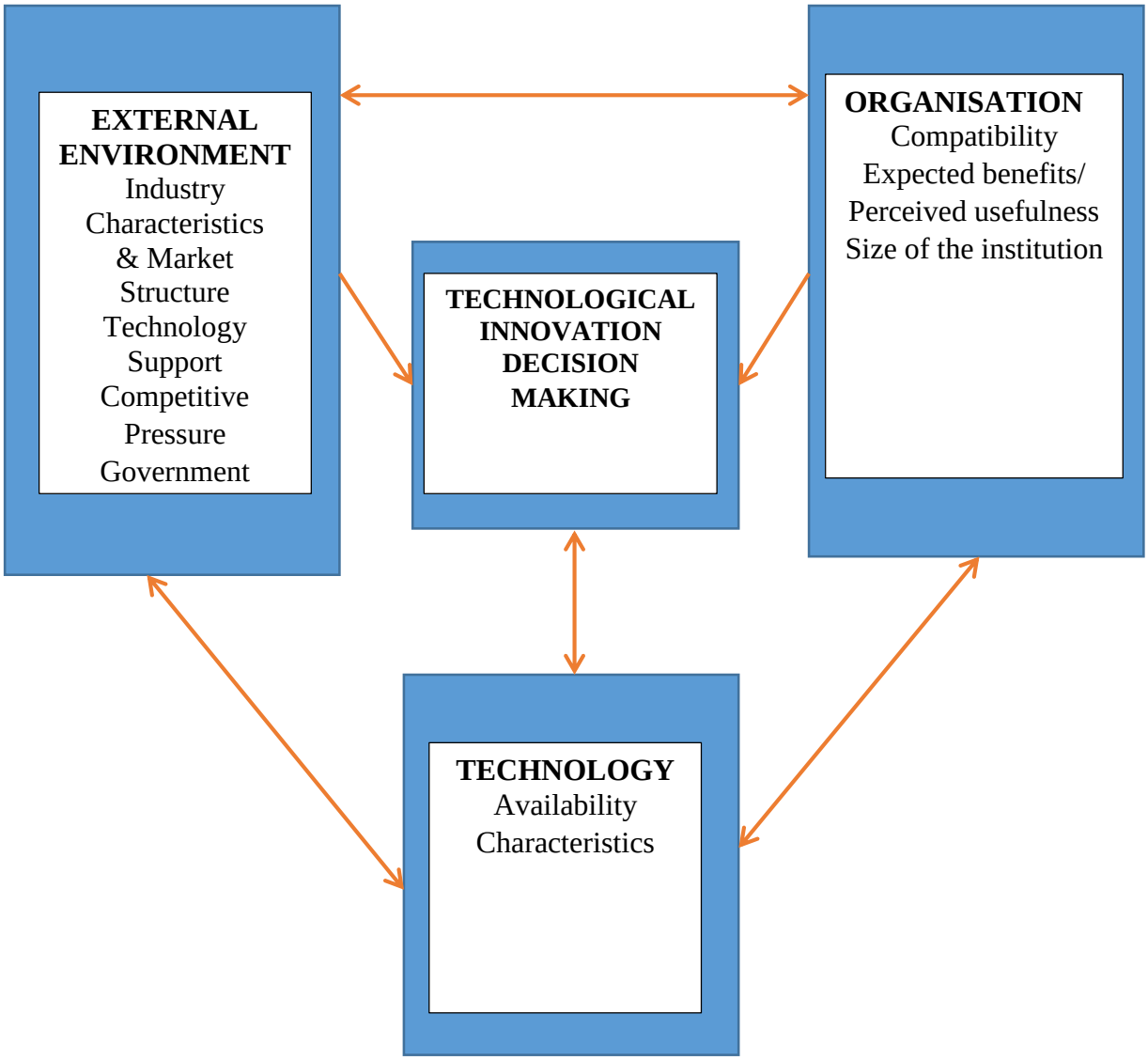
Tornatzky and Fleischer developed the Technology, Organisation and Environment (TOE) framework to investigate an institution's decision to adopt and implement an innovative technology taking into consideration the technological, organisational and environmental contexts (Tornatzky & Fleischer, 1990). According to the authors, the process by which a firm adopts and implements technological innovations is influenced by the technological context, the organisational context, and the environmental context. These three elements present both constraints and opportunities for technological innovation, hence have great influence on how a firm perceives a need, searches for and adopts a new technology. The technological context is made up of the internal and external technologies that are relevant to the firm. Technologies may include both equipment as well as processes. The organisational context also refers to the characteristics and resources of the firm, including the firm's size, degree of centralization, degree of formalization, managerial structure, human resources, the amount of slack resources, and linkages among employees. Lastly, the environmental context includes the size and structure of the industry, the firm's competitors, the macroeconomic context, and the regulatory environment (Tornatzky & Fleischer, 1990).

The TOE framework has been used widely in many information technology adoption studies (Lee & Shim, 2007; Mishra, Konana & Barua, 2007; Pan & Jang, 2008) and have provided a useful analytical basis for these studies. For instance, Raouf, Naser & Jassim (2012) using the TOE framework investigated the determinants of the implementation success of the e-learning in the Ministry of Higher Education in Iraq. Using the structural equation modelling (SEM) approach to analyse data from 120 faculty members, the results revealed that IS expertise and expected benefits are key determinants of e-learning implementation success in terms of internal integration and external diffusion.

Again, in their study to examine the radio frequency identification (RFID) adoption decision process and to put forward a model for predicting the likelihood of adopting RFID within organisations in the healthcare industry, Lee and Shim (2007) proposed an organisational RFID adoption model and it was empirically tested by a survey using a sample of 126 senior executives in US hospitals. The model posits that three categories of factors, technology push, need pull, and presence of champions, determine the likelihood of adopting RFID within organisations. This study also found that the relationships between those three categories and the likelihood of adopting RFID are strengthened or weakened by organisational readiness.

It should, however, be noted that the TOE framework shares some semblance with other information system adoption theories. Roger's Diffusion of Innovation theory is one such theory which shares some features with the TOE framework. Rogers' (1995) theory laid more emphasis on people's (employees) unique features coupled with the institution's internal and external characteristics as the powers behind adoption. However, the TOE framework puts both the individual and the institution's features into the organisational context. Hence, one of the most important components which is environmental context is not treated or looked at. The TOE framework better explains a firm's decision to adopt and implement an innovation (Hsu, Kraemer & Dunkle, 2006). Figure 3.1 shows the components of the TOE framework and how they interact with technological innovations in organisations.

Figure 3.1: Technology, Organisation and Environment Framework



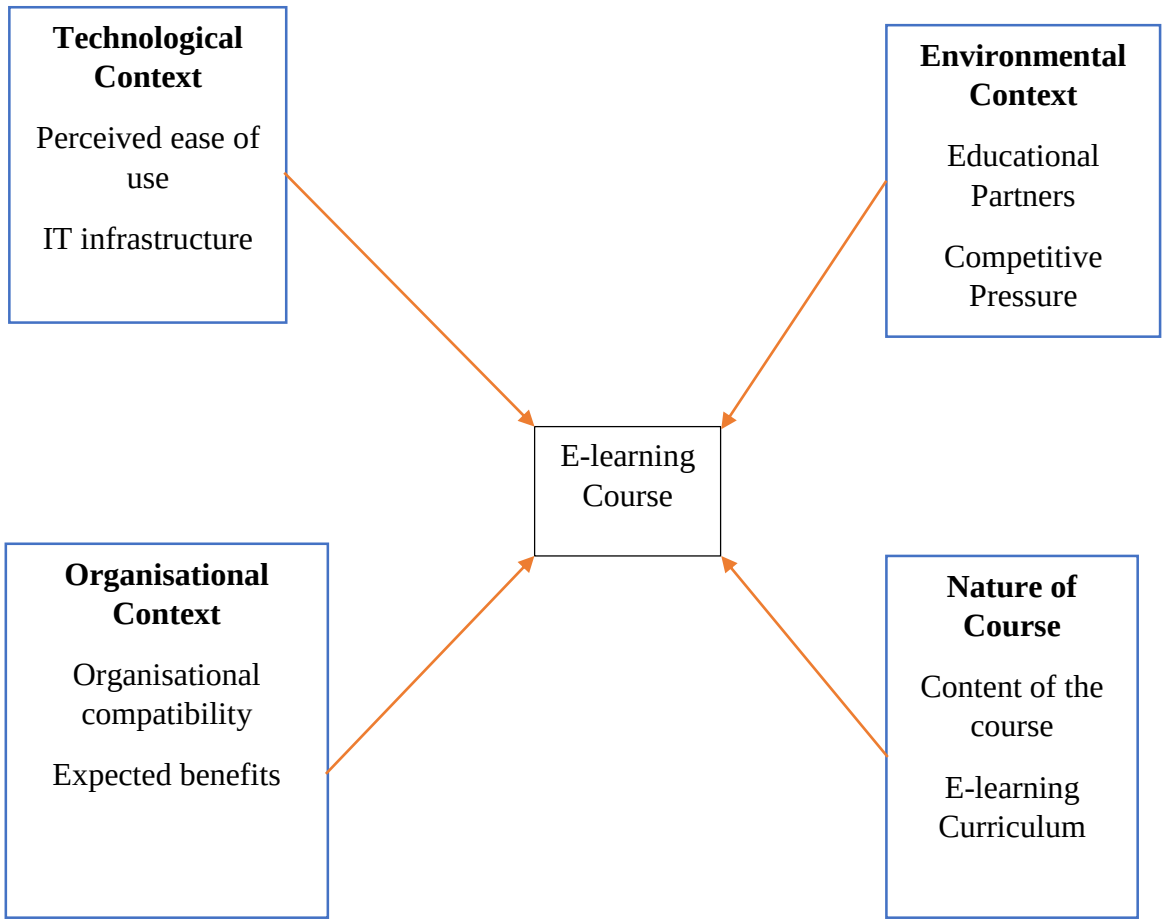
Source: Tornatzky & Fleischer (1990)

3.3 Research Model and Hypotheses

With reference to the objectives of the study, the literature review showed that there are technological, environmental and organisational and the nature of the course factors that influence the adoption of e-learning. The study, therefore conceptualized the TOE framework by including the fourth factor which is the nature of the course. The constructs in the framework are further explained by juxtaposing the concepts to e-learning course adoption in universities.

In this study, the organisation was considered to be the universities in developing countries (students, instructors and administrators), the technology was considered to be the e-learning systems, and the environment was considered to be the developing countries and governments and institutions outside the universities. This framework is further elaborated in figure 3.2 below.

Figure 3.2: Conceptual framework for e-learning adoption



Source: Author's Construction

3.3.1 Technological Context

This refers to both the internal and external technologies relevant to the university. That is, current practices and equipment internal to the institution (Starbuck, 1976), as well as the set of available technologies external to the firm (Thompson, 1967; Hage, 1980). These internal and external technologies of the institution both have attributes such as relative advantage, complexity and compatibility (Rogers, 2003). Technology in this case does not only refer to the actual software and hardware features of the platform, but also how well technology is adapted to the best practices of teaching and learning (Sharma & Pandit, 2011). Some major factors which fall under the technological context are perceived ease of use, IT infrastructure, technical system quality, e-learning experts, IS expertise, perceived reliability and compatibility with existing technologies and skills (Raouf, Naser & Jassim, 2012; Bhuasiri *et al.*, 2012; Namisiko, Munialo & Nyongesa, 2014; Motaghian, Hassanzadeh & Moghadam, 2013; Islam, 2013; Tseng, Lin & Chen, 2011; Hassanzadeh, Kanaani & Elahi, 2012; Sharma & Pandit, 2011; Palacios-Marqués, Cortés-Grao & Carral, 2013).

E-learning technology is therefore not an exception; - possessing attributes that tend to support or militate against its attractiveness and intention to be adopted by universities. Studies by Lin and Lin (2007) and Mitsweni and Biermann (2008) have revealed that institutions that have advanced information technology infrastructure will have more chance to an extent in implementation success regarding web applications like e-learning. The IT infrastructure encompasses all the IT technologies like fast Internet connection, the sufficient up to date computers, and good computer networks. E-learning depends on three critical factors and the first of these factors is the availability of computers (Tagoe, 2012). Also the institutions that have modern and advanced web applications which are related to e-learning, either open source or proprietary, will have an increased chance to a successful implementation of e-learning. Also

the institutions that have a shared database for their applications rather than a separated database for every application will have an increased opportunity for a successful implementation of e-learning (Namisiko, Munialo & Nyongesa, 2014). Hence, this study adopts the IT infrastructure construct for the measure of e-learning adoption from the technological context as depicted in the conceptual model in figure 3.2 above. Therefore the proposition of the hypothesis:

H1: The IT infrastructure has an influence on the adoption of e-learning in universities.

Davis (1989) asserts that, perceived ease of use refers to as the degree to which the prospective user expects an e-learning system to be free of effort. Users of the e-learning system should be comfortable using it with little or no effort or assistance. If they find it easy to use, they tend to adopt it. Transforming "learning" into "E-learning" is not just about developing online courses, but rather there should be useful and easy to use e-learning tools (Frimpon, 2012). Tseng, Lin and Chen (2011) in their study on evaluating the effectiveness of e-learning systems using some universities in Taiwan discovered that, the most significant measures of e-learning effectiveness were the usage of enhanced multimedia features that can attract the learners' attention and may eventually increase learners' attractiveness. Again, reducing the waiting time for learning materials to load may improve the quality of the system. Furthermore, the management of universities should actively maintain and improve the responsiveness of instructors to learner inquiries (Lee, Yoon & Lee, 2009). In this way, the users of the system will find the system easier to use. Other researchers (Bhuasiri *et al.,* 2012; Namisiko, Munialo & Nyongesa, 2014; Motaghian, Hassanzadeh & Moghadam, 2013; Islam, 2013) using various technology adoption models have postulated that one key technological determinant of e-learning adoption is perceived ease of using the system. This leads to another construct which determines the implementation of e-learning in universities. Hence the hypothesis;

H2: Perceived ease of use the system influences the adoption of e-learning in universities.

3.4.2 Organisational Context

The organisational context in this study refers to universities in developing countries. The review of e-learning literature in the previous chapter revealed a number of issues under the organisational context. These include *Organisational compatibility* (Duan *et al.*, 2010; Raouf, Naser & Jassim, 2012; Bhuasiri *et al.* (2012), *Expected benefits/ Perceived usefulness* (Liaw & Huang, 2013; Islam, 2013; Motaghian, Hassanzadeh & Moghadam, 2013), *Size of the institution* (Persico, Manca & Pozzi, 2014), *human and financial resources* (Raouf, Naser & Jassim, 2012; Persico, Manca & Pozzi, 2014). However, the size of the organisation which was also identified in literature to influence e-learning adoption was not included. This is because, the size of the institution in a developing country such as Ghana cannot really influence e-learning adoption; unless the size of the institution leads to the financial and human resources of the institution. This is therefore dropped and would not be included in the hypothesis. Furthermore, a few reliable variables give more meaningful solutions than a large number of less reliable variables (Tabachnick & Fidell, 2007).

The first issue to consider is the compatibility factor in determining the adoption of e-learning in universities. The greater the compatibility between the applications of e-learning with the practical applications of the institution that had adopted it in terms of beliefs, values and past experiences, needs, priorities and policies, the better the influence on the success of the implementation of e-learning. This is because compatibility will lead to the more easily dealing between the e-learning applications and the practical ordinarily applications (Raouf, Naser & Jassim, 2012). The applications of e-learning will change the way of the work, from the paper based work to the electronic based work, which may open ways of re-engineering of the entire

business of the traditional course delivery. So if compatibility was higher, the chances of successful implementation of e-learning will increase and if there is a lack of compatibility between the working methods of e-learning applications with the usual ways of working, it will lead to more difficulty in the implementation of e-learning and its spread. Duan *et al.* (2010) have suggested that only perceived compatibility has significant positive influences on the likelihood of students' e-learning take-up. Hence requiring a more holistic scrutiny from the institutional point of view. Therefore leading to the third hypothesis;

H3: Organisational compatibility influences the adoption of e-learning in universities.

Perceived benefits, refer to the degree to which new technologies provide more benefits than old ones (Raouf, Naser & Jassim, 2012). These expected benefits include the increased ability of the universities to accept more students, providing accurate, quick, and more information about the educational process which can lead to an enhanced decision making, providing better ways for transferring the knowledge to the students (teaching), providing a higher rate of cooperation and exchange programs between the institutions and their affiliates. The lack of awareness about the expected benefits of implementing e-learning is the most significant barrier to the successful implementation of e-learning. Hence this study hypothesizes that higher expected benefits of e-learning are likely to facilitate extensive use of e-learning within the universities.

H4: Expected benefits facilitate e-learning adoption in universities.

3.4.3 Environmental Context

The competitive pressure is the pressure which erupts in the institution when it becomes scared of losing competitive advantages against other institutions which have implemented advanced technologies (Oliveira & Martins, 2011). The implementation of electronic learning in the

universities enables them to be recognized as being better in their functions of the higher education and opens new opportunities in the fields of teaching and transferring knowledge to the students, the exchanging of the expertise between the teachers and students and to spread the good reputation for the institution which adopts and implements it. Again, the institution is able to increase the number of its students and the leverage of the scientific level of its lectures (Raouf, Naser and Jassim, 2012).

Competitive pressure leads to information technology adoption as it may alter the rules of competition and give the organisation new ways to operate to outperform their competitors thereby, changing the level of competitive environment. Institutions which adopt and implement the e-learning earlier gain vast competitive advantages than the institutions which are slow in the adoption and implementation of e-learning. And the latter will suffer a decrease in the scientific level locally and internationally (Porter & Millar, 1985). Thus, the study adopted competitive pressure as a determinant of e-learning adoption. Hence, the hypothesis:

H5: Competitive pressure influences e-learning adoption in universities.

Pan and Jang (2008) have suggested that trading partner pressure is a vital determinant for information technology innovation adoption. The implementation success of e-learning highly depends on or to some extent the educational partners (governments, NGOs and other agencies). These partners induce their educational organisations to implement e-learning. That is, when the surrounding environment of the university (the community, country and the agencies) have good knowledge about the benefits of implementing e-learning and how to use and adopt it, the university will have no other option than to be more concerned about the implementation of e-learning. And when there are enough numbers of experts in e-learning within the surrounding environment, the chances of implementing e-learning will also increase

(Raouf, Naser & Jassim, 2012). Thus, the study adopted educational partners as a determinant of e-learning adoption. Hence, the hypothesis:

H6: Educational partners influence e-learning adoption in universities.

3.4.4 The Nature of the course

The review of e-learning literature in the previous chapter also highlighted other factors which fall outside of the traditional determining factors of e-learning adoption. These factors relate to the nature of the courses offered by the e-learning systems. Issues under the nature of the course include *the content of the course* (Hassanzadeh, Kanaani & Elahi, 2012; Amirkhanpour, Kaufmann & Garcia-Gallego, 2014; Šolc, Legemza & Sütőová, 2012) and *E-learning Curriculum* (Baumann-Birkbeck *et al.*, 2014).

The content and information quality have the most direct effect on user satisfaction (Hassanzadeh, Kanaani & Elahi, 2012). Whenever the quality of the content of the e-learning course is high, users are more satisfied with the use of the information system or the e-learning system. Facilities such as forum, chat, collaborative learning tools, possibility of class discussions and others in e-learning systems can result in user satisfaction and hence higher adoption. Availability of complementary assets, integrated social learning elements such as various social media tools (Amirkhanpour, Kaufmann & Garcia-Gallego, 2014) help to make the e-learning system user friendly. The most appreciated benefit of e-learning are the visualization of explained lessons, attractively of learning environment, provision of a platform for individual study and testing, especially for external students, and study programs with higher number of students (Šolc, Legemza & Sütőová, 2012). Based on these, a hypothesis is established below:

H7: The content of the e-learning course influences e-learning adoption in universities.

The findings of Bhuasiri *et al* (2012) have illustrated the importance of curriculum design for learning performance in an e-learning environment. The combination of words and pictures presented simultaneously in the e-learning system and complemented with animation and narration provides better illustrations in the course. Students are therefore able to better understand the course. Baumann-Birkbeck *et al*. (2014) in their study on the benefits of e-learning in chemotherapy pharmacology education discovered that, students adopt e-learning systems because of the nature of the course. Course syllabus which require a lot of technical expertise and more practical work tend to be less suitable to be offered on e-learning platforms than courses which do not. This study, therefore posits the hypothesis below:

H8: The e-learning curriculum influences the nature of e-learning adoption in universities.

3.4 Measuring the constructs

The proposed model will be measured using a quantitative method approach thus satisfying the research paradigm of the researcher. The Technological, Environmental, Organisational and the nature of the course context will be examined using a quantitative approach per the established hypothesis in the next chapter.

3.5 Summary

The chapter started with a discussion of the selected framework for the study- TOE framework. From this framework, a conceptual model of the study was deduced from the eight hypotheses proposed under each context of the framework. It should however be noted that the TOE framework was selected from the lot of adoption models since, other models such as Technology Acceptance Model (TAM) were inadequate in explaining adoption from different

contexts such as technological, organisational, and environmental. Also, these models considered individual instead of organisational adoption of a technology such as e-learning.

The chapter also showed empirical evidence of the extent to which the TOE framework has been used in prominent studies. Moreover, specific hypotheses were proposed under each context of the framework with the view of satisfying the research questions set out at the beginning of the study: What are the determinants and nature of adoption of e-learning in universities?

The conceptual model in Figure 3.2 was developed to tie in the factors from which the adoption of e-learning is viewed. The technological context considered IT infrastructure and perceived ease of use as determinants of e-learning. The organisational context looked at compatibility and expected benefits as organisational factors that needed attention in the adoption of e-learning. The environmental context considered competitive pressure and educational partners as determinants of e-learning adoption. Finally, the nature of the course factor considered the course content and the e-learning curriculum as the determinants of e-learning adoption.

In conclusion, the adoption of e-learning is influenced by the multifaceted conditions that exist in the Technological, Organisational and Environmental context of the organisation including the nature of the course.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

Understanding the TOE framework and its place in the adoption of information systems in institutions was the focus of the previous chapter. Chapter three expounded the theoretical stance of the study and why the Technology, Environment and Organisation framework best fitted the study in light of other prominent adoption theories. With that background, this chapter focuses on the research methodological position of investigating the adoption of e-learning in universities. The chapter discusses the research paradigm, research method, data collection method, sampling and data analysis technique thereof.

Research methodology is a systematic and scientific approach to solving a research problem through a procedural framework (Saunders, Lewis & Thornhill, 2009). It should, however, be stated that, the success and reliability of every research is dependent upon the research methodology employed (Creswell & Clark, 2010; Golafshani, 2003). However, selecting an appropriate research methodology is a challenging task as the nature of research projects varies (Kothari, 2008) and the presence of numerous methods and techniques for undertaking a research also heighten the problem. From a host of methodologies such as case study, experience, experiment, interview, mathematical models, survey and observations, a researcher has the audacious task to choose a particular method to undertake the research (Chen & Hirschheim, 2004).

4.2 Research Paradigm

Research is founded on philosophical assumptions, which are related to the researcher's view or perception of what reality is (Turyasingura, 2011). Sarantakos (1998) defines research methodology as "a model which entails theoretical principles as well as a framework that provides guidelines about how research is done in the context of a particular paradigm". Paradigm is, therefore, a "set of beliefs, values and techniques which is shared by members of a scientific community, and which acts as a guide or map, dictating the kinds of problems scientists should address and the types of explanations that are acceptable to them" (Kuhn, 1970). Paradigm forms the fundamental philosophical assumptions which define what 'valid' research is and the appropriate methods that can be applied in that research (Myers & Avison, 2002).

Distinctions between paradigms are made clear by the set of taxonomies that come together to formulate the paradigms (Creswell, 2009). Ontology, Epistemology, and Methodology are the three fundamental elements that characterize the underlying distinctions of these philosophical assumptions that form the paradigms (Lincoln, Lynham & Guba, 2011). Ontological assumptions refer to the nature of and form of reality and determine what constitute 'legitimate' researchable questions (Guba and Lincoln, 1994). The ontological dimension of a research paradigm also looks at the nature of a phenomenon and determines if it is objective and distinct from the researcher or is created by the action of the researcher. Epistemology deals with the nature of knowledge and what counts as knowledge (Ritchie & Lewis, 2003). On the other hand, the methodological dimension of a research paradigm refers to the procedures researchers use to investigate what they believe can be known, and the rationales behind these procedures which include quantitative, qualitative or mixed methods (Lincoln, Lynham & Guba, 2011).

As different taxonomies exist to distinguish paradigms, there also exist various and diverse paradigms. The most common paradigms that reflect the major theoretical directions in social science research are the positivist, the interpretive and the critical paradigms (Mingers, 2004; Myers & Avison, 2002). The three major paradigms have their respective views of issue and dictates how social phenomena can be studied but "in the practice of social research, their distinctions are not always clear cut" (Myers & Avison, 2002).

Interpretive paradigm is characteristically inductive, emergent and the methods are shaped by the researcher's experience in collecting and analysing data. They hold the view that there exist multiple realities thus, reality is socially constructed (Fisher, 2010). Researchers in this type of paradigm aim to go beyond the observable actions of people in the context of social phenomena and understand the subjective meanings they assign to their actions and thereby interpret and understand the reasons behind those actions (Neuman, 2011).

Critical realism paradigm on the other hand holds that perceptions have certain plasticity (Fisher, 2010) and that there are differences between reality and people's perceptions of reality (Bisman, 2002). The purpose of the critical realist is not to predict but to explain social phenomena through examining the context-mechanism-outcome configurations (CMDOCs) such as patterns of associations and possible explanation.

Finally, the positivist paradigm which the study employed assumes an objective reality which is single and concrete and is independent of what is being researched. Distance or objective separateness between the researcher and the object of study is one of the main features of the positivist paradigm (Kaplan & Duchon, 1988). The purpose of the positivist paradigm is to instrumentally learn about reality so that the general laws that govern reality can be discovered

and explained in order to describe, predict and control reality. By employing theories (the TOE framework) and hypothesis and questions to study the social phenomenon of e-learning adoption in universities, Positivism is deemed fit to be used as a guiding lens.

In information systems, positivism can primarily be used to study how information is used by organisations and measure the perceived net benefits from using an information system (Bhaskar, 1998). Linking the study with the research framework, purpose and literature from extant studies, the choice of the positivist paradigm is deemed appropriate for this study.

4.3 Research Design and Methods

Johnson and Onwuegbuzie (2004) define research design as the pattern for collecting, unionizing, and integrating a research data for unearthing research findings. They further postulate two widely used broad categories of research methods as quantitative and qualitative. Qualitative research is "typically used to answer questions about the complex nature of phenomena, often with the purpose of describing and understanding the phenomena from the participants‟ point of view" (Leedy & Ormrod, 2010). On the other hand, quantitative research is used to answer questions about relationships among measured variables with the purpose of explaining, predicting, and controlling phenomenon. Newman and Benz (1998) are of the view that dichotomy does not exist, but rather there is an interactive continuum between the two approaches. The quantitative method has been linked with the positivist paradigm whiles the qualitative to the Interpretivism paradigm, and the mixed-method with the Critical paradigm (Mingers, 2004).

Research methods are the tools for data collection and analysis (Sarantakos, 1998). These two broad categories are based around experiments, surveys, or case studies. All these three instances - experiments, surveys, and case studies – have different questions to be answered. The choice of any research design is influenced by "three conditions: the type of research question posed, the extent of control the investigator has over actual behavioural events and the focus on contemporary as opposed to historical events" (Yin, 2003). Table 4.1 summarizes the choices of strategies or designs accompanied by the relevant questions. Experimental research is where an experimental variable is manipulated, and alternative influences on the dependent variable are controlled (Powell & Connaway, 2004). They further postulate that this is done to test a causal relationship stating that "causality suggests that a single event (the "cause") always leads to another single event (the "effect")".

In a case study, no basic laws exist to determine which factors and relationships are important, and when the factors and relationships can be observed directly (Fidel, 1984). A case study is used in areas characterized by a rapid pace of change in the nature and complexities of artefacts and issues involved (Benbasat, Goldstein & Mead, 1987).

Table 4.1: Relevant situations for different research strategies

Strategy	Form of research question	Requires control of behavioural events?	Focuses on contemporary events?
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how much/ many?	No	Yes
History	How, why	No	No
Case study	How, why	No	Yes

Source: Yin (2003)

A survey is defined as a research strategy that encompasses any measurement procedure that involves asking questions of respondents (Powell & Connaway, 2004). Direct or indirect contact is made with the units of the study (for example, individuals, organisations, communities) by using systematic methods of measurement such as questionnaires and interviews. The questions that form the research agenda include "who, what, where, how much, how many" (Yin, 2003).

In the current study, the method adapted is a survey, as it has been developed within the context of the positivist paradigm (Neuman, 2011). Survey is a type of quantitative research approach which is firmly grounded in the positivist paradigm, hence, best fit as this study adopted the Positivism paradigm as a methodological lens. Again, it is suitable for studying a large number of cases, even when they are geographically dispersed (Powell & Connaway, 2004) just as in this study where determinants of e-learning adoption in universities are looked at. The difference from a case study is that, while a case study examines one or more case(s) in detail and follows it through for some period of time, a survey can include several different individual things or people, not studied in as much detail or during as much time. In addition, studying the cause of a phenomenon with empirical evidence in relation to attitudes and behaviours of institutions, a survey is deemed appropriate (Hair, Black, Babin & Anderson, 2010).

According to Creswell (2009), "survey provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of the population". Hence, from the results of the sample, the researcher can then make claim or generalize about the population. In justifying the motives for choosing a quantitative approach as against qualitative and mixed approaches aside being fit for the study in context, was to unearth conclusive evidence rather than just provide information as postulated by Zikmund (2003). Again, the limited time scale

for the research makes the survey approach appropriate since it allows for the investigation of a particular phenomenon (e-learning adoption) to some depth in a short time.

4.4 Conducting the Survey

The following are highlights of how the survey was conducted for the research.

4.4.1 Questionnaire Development

In developing the survey instrument, Churchill (1979) and Straub's (1989) proposal for designing a survey instrument was used as a guide to ensure reliability and validity. They proposed that, the process of survey instruments development involves initial instrument development and refinement. As the tenets of the positivist paradigm asserted the use of questionnaire in a survey research is appropriate, the study deem the choice as suitable.

After the initial questionnaire was developed from constructs postulated by literature on e-learning adoption, the second stage of refinement was undertaken to ensure reliability and accuracy. The pre-test of the initial questionnaire was conducted by seeking expert opinion from information systems researchers in the Department of Operations and Management Information Systems who have experience in the field of technology adoption. This was done with the intention to validate the content of the survey instrument (Hair *et al.*, 2010). Content validity in the first place measures the extent to which the items on the questionnaire adequately captures different dimensions of a construct (Straub *et al*., 2004; Hair *et al.*, 2010). This was done through a thorough examination of interpretation, wording, consistency, logical sequencing and overall impression from look and feel of the survey. Constructive feedback was provided which helped to improve the questionnaire during the refinement stage.

After, the corrections, 20 questionnaires were used to pilot test students, instructors and administrators of University of Ghana e-learning systems with the intention to test the limpidity, legibility, comprehensibility and to gain initial insight into hidden issues such as time of response. The feedback from the pilot test was positive and demonstrated a substantial degree of content validity (Straub *et al.*, 2004) hence, the indication that the survey instrument was ready for data collection.

The questionnaire for the survey were designed based on the hypothesis established from the literature review in order to answer the research questions. The questionnaire comprised of two parts to help elicit responses on their demographic data, their e-learning usage and the factors that enable or inhibit their e-learning adoption. Each respondent was posed with a series of questions and asked to respond to it using the Likert Scale ranging from, one to five where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table below illustrates the hypothesis, constructs, and the number of questions under each construct. See appendix B for thorough questions.

Table 4. 2: Questionnaire Development

Hypothesis	**Factors**	**No. of questions**
The IT infrastructure has an influence on the adoption of e-learning in universities.	IT infrastructure	5
Perceived ease of using the system influences the adoption of e-learning in universities.	Perceived ease of use	5
Organisational compatibility influences adoption of e-learning in universities	Organisational compatibility	3
Expected benefits facilitate e-learning adoption in universities.	Expected benefits	5
Competitive Pressure influences e-learning adoption in universities.	Competitive Pressure	4
Educational Partners influence e-learning adoption in universities	Educational Partners	3
The content of the e-learning course influences e-learning adoption in universities.	content of e-learning course	5
The e-learning curriculum influences the nature of e-learning adoption in universities.	E-learning curriculum	5

Source: author's construction

4.4.2 Selection of Sample for the Study

The University of Ghana (2014) has a student population of thirty-five thousand, six hundred and eighty-three (35,683) (with a male/female ratio of about 3:2). Also, included in this number are 3,196 post-graduate students and 3,596 students on modular or sandwich programmes. Senior members engaged in research and teaching in total are eight hundred and sixty-five (865) and a total number of one hundred and twenty-eight (128) Senior Administrative and Professional staff.

According to Neuman (2011), sampling, like random assignment is a process of systematically selecting cases for inclusion in a research project. A researcher uses a set of cases (elements) or samples, which are more manageable and cost effective to work with than a pool of all the cases (Zikmund, 2003). Sampling therefore cuts costs, reduces labour requirements and quickly gathers vital information.

A sample is a small part of something intended as the representative of a whole. Sampling is that part of statistical practice concerned with the selection of an unbiased or random subset of individual observations within a population of individuals intended to yield some knowledge about the population of concern, especially for the purposes of making predictions based on the sample frame (Creswell, 2009).

A purposive sampling technique was adopted in the administration of the questionnaire, thus only people who engage in e-learning on University of Ghana campus were contacted. The purposive sampling technique also known as judgment sampling is “the deliberate choice of an informant due to the qualities the informant possesses” (Tongco, 2007). The intrinsic bias of this type of sampling has contributed to its efficiency; enabling it to stay robust even when

tested against random probability sampling and can also be employed with both qualitative and quantitative techniques (Tongco, 2007).

There is no defined answer to what constitutes an acceptable or sufficient size for a sample (Fraenkel & Wallen, 2000). The authors suggest that the best response is that a sample should be as large as the researcher can obtain with a reasonable expenditure of time, energy and financial resources. Alreck and Settle (1985) also opined that most experienced researchers consider a sample size of about 200 to 1000 respondents for a population of 10,000 or more. Since the objective of this study is to look at the determinants of e-learning adoption in universities, it was found necessary to collect information from some e-learning students, lecturers, tutors and experts of University of Ghana. Hence a sample size of not less than 400 respondents were targeted for this study.

Students in the context of the study included people who offer courses using electronic medium or e-learning systems. Instructors on the other hand include individuals who administer the courses to learners through electronic medium or e-learning platforms whiles the e-learning administrators include persons who neither offer courses nor administer teaching and learning on the e-learning platform but supervise and ensure the smooth running of the e-learning system.

4.4.3 Data Collection Method

Four hundred and fifty (450) sets of questionnaire were issued; 300 to students, 85 to instructors and 65 to e-learning administrators of University of Ghana. Four hundred and thirty (430) were received because some respondents opted to fill it later. However, efforts to recover the remaining proved futile. After close scrutiny, four hundred and seventeen (417) were

considered for the analysis. This is because, thirteen (13) of the questionnaires returned were not acceptable for processing since they were defective. These were questionnaires that were not fully completed, those that were found to be filled by unauthorized individuals (people outside the target group) and those that showed lack of understanding of the questions.

The data collection started on 15th February, 2015 and ended on the 5th of March, 2015. A period of a week was given to see if some questionnaires may be returned. Questionnaires received after this period were not included in the analysis because all the questionnaires were already coded and entered into the SPSS and the analysis has started by then.

4.5 Data Analysis

The survey data was coded and entered in the Statistical Package for Social Science (SPSS version 20.0) and analysed the outcome presented in frequency tables and charts (Vila & Kuster, 2011). Each of their contributions were measured accordingly to determine their contributions to each of the factors identified within the constructs in the research model. Descriptive analysis was undertaken which involved the characteristics of the sample such as the mean, standard deviation, range of scores, skewness and kurtosis. Also, any violation of assumptions underlying the chosen statistical technique was addressed.

This study used multivariate analysis technique. The exploratory factor analysis which groups data into conceptual factors in order to evaluate the construct validity of mechanisms known to determine e-learning adoption identified from the literature review (i.e. perceived ease of use, IT infrastructure, expected benefits, organisational compatibility, competitive pressure, educational partners, content of course and e-learning curriculum) was used. The use of exploratory factor analysis checks for internal consistencies among the variables used since

relationship between variables may be affected by their underlying factors due to some variables sharing common cause (Hair *et al.*, 2010).

Multiple regression was then done in order to validate the hypotheses that were established in the previous chapter (Malhotra & Birks, 2007). E-learning adoption is the only dependent variable while the independent variables are perceived ease of use, IT infrastructure, expected benefits, organisational compatibility, competitive pressure, educational partners, content of course and e-learning curriculum. Hence this statistical technique can help understand how the dependent variable is better predicted by the stated independent variables.

4.6 Ethics for the survey analysis (observed ethics)

Ethics were observed in the conduct of this research. Ethics are the codes and standards that the researcher must put up with in the course of the research (Fisher, 2010). There is the need to protect research respondents from any harm that may arise (Creswell, 2009; Fisher, 2010). As a result of this, permission was sought from the department of Operations and Management information system (OMIS). Also, to guarantee the protection of respondents, names of respondents were not collected in the survey. Furthermore, respondents' consent were also sought before the data was collected. Again, the respondents were assured with a declaration on top of the questionnaire that the collected data will be for academic purposes only. These were duly adhered to by the researcher.

4.7 Summary

This chapter provided detailed information concerning the research method used to answer the research questions posed at the beginning of the study by taking into consideration the research

paradigm, research method, sampling technique, data collection and analysis methods of this study. The positive paradigm was selected out of the other paradigms such as the interpretivism and realism discussed in the chapter. The dogma, principles, standards and techniques of the positivist paradigm fits well with the research method and techniques adopted by the researcher. The quantitative research method which is an inquiry into a social or human problem, based on testing a theory composed of variables, measured with numbers and analysed with statistical procedures in order to determine whether the predictive generalizations of the theory hold true (Creswell, 1994) was employed for this study. This approach is based on the premise that, reality is objective and therefore can be measured using questionnaires (Creswell, 1994).

The context of this study is therefore discussed in the next chapter which paves way for the analysis of the data gathered using the methodology discussed in this current chapter.

CHAPTER FIVE

CONTEXT OF THE STUDY

5.1 Introduction

This chapter delves into e-learning adoption in developing countries. The discussion is then narrowed to Ghana by looking at Ghanaian Universities' adoption of e-learning systems. There is also a focus on University of Ghana. This chapter seeks to set a foundation for the analysis of the data collected on e-learning adoption in developing countries and in Ghana to be specific.

5.2 E-learning in universities in Developing Counties

Governments in African countries have increasingly shown interests to utilize the current ICTs and to widen participation of education in higher learning institutions (Namisiko, Munialo & Nyongesa, 2014). This is evident from the study by Gakio (2006), who found out that 47 percent of 54 tertiary institutions from 27 African countries have installed educational technologies in their institutions. In a similar study, Isaacs and Hollow (2012) also discovered that 52 percent of 447 universities in Africa were using e-learning systems by the end of the year 2012.

The interest in e-learning can be attributed to the availability of web 2.0 technologies and Free Open Source Software (FOSS) (Namisiko, Mindila, Chepkoech & Nyeris, 2014). The authors further assert that web 2.0 technologies that have diversified the needs of contemporary learners and widen the participation of education to include: RSS, Wikis, Tagging, Blogs and Podcasts. Free and open-source software such as Moodle, Dokeos, EFRONT and Claroline have facilitated e-learning in universities in African countries (Selim, 2007).

5.3 E-learning in Ghanaian Universities

In Ghana, the traditional Face-to-Face (F2F) education which usually occurs in a classroom in which a teacher/tutor/instructor/lecturer imparts educational knowledge to students in an interactive manner has been the norm (Asabere & Mends-Brew, 2012). In Ghana and other developing countries, population increase and mismatch of available educational infrastructure and resources have made tertiary institutions adopt and implement other educational models such as e-learning to act as a supplement for the large number of people who qualify for educational opportunities but cannot gain access to these universities (Tagoe, 2012).

Currently, some universities in Ghana have adopted distance learning strategies by locating lecture halls and classrooms at different locations and sites that are away from their main campuses through various business models. One of such models is the use of ICT through e-learning (Asabere & Enguah, 2012). The introduction of e-learning by these institutions has really helped to improve both workers and non-workers' access to higher education in Ghana (Heer-Menlah, 2008). The spread of ICT has greatly improved access to tertiary education by ushering in other new educational modes such as e-learning and mobile learning which are very beneficial, however, mobile learning is very scarce in Ghana.

E-learning helps workers or working people who want to attain higher education but cannot opt for residential tertiary education for one reason or the other. Asabere and Enguah (2012) recommend that every tertiary institution in Ghana should make e-learning part of its structure, so as to facilitate and speed up the development of education in the country as a whole.

There are nine national public universities in Ghana; University of Ghana, Kwame Nkrumah University of Science and Technology, University of Cape Coast, University College of

Education, University for Development Studies, University of Mines and Technology, University of Health and Allied Sciences, University of Energy and Natural Resources and University of Professional Studies-Accra. Whereas, there are about 50 private universities (National Accreditation Board, 2012). The National Accreditation Board is the certifying agency in Ghana for offering licenses and permits to all the universities to operate in the country. It is worth noting that almost all these institutions have adopted a form of e-learning in their curricula (Asabere & Enguah, 2012). Kwame Nkrumah University of Science and Technology, for instance, introduced "Moodle"- an open-source and course management e-learning system in the second semester of the 2005-2006 academic year (Serbe Marfo & Okine, 2011).

5.3.1 University of Ghana

The University of Ghana was founded as the University College of the Gold Coast by ordinance on August 11, 1948 for the purpose of providing and promoting university education, learning and research. The University has a mission of developing world-class human resources and capabilities to meet national development needs and global challenges through quality teaching, learning, research and knowledge dissemination. The University which comprises three campuses, offers academic learning and research through its four colleges namely; the College of Health Sciences, the College of Basic and Applied Sciences, the College of Humanities and the College of Education. These colleges comprise of a number of schools, research institutes and centres, libraries, administrative offices and other support services (University of Ghana, 2014).

The College of Health Sciences, for instance, is made up of the school of Medicine and Dentistry, School of Public Health, School of Nursing, School of Pharmacy, School of

Biomedical and Allied Health Sciences, Noguchi Memorial Institute for Medical Research and Centre for Tropical, Clinical Pharmacology and Therapeutics. The College of Education is made up of three schools namely; School of Information and Communication Studies, School of Education and Leadership as well as School of Continuing and Distance Education. The College of Humanities comprises the University of Ghana Business School, School of Law, School of Arts, School of Languages, School of Social Sciences, School of Performing Arts, among others while the College of Basic and Applied Sciences is made up of the School of Physical and Mathematical Sciences, School of Biological Sciences, School of Agriculture, School of Engineering and the School of Veterinary Medicine (University of Ghana, 2014).

E-learning on the University of Ghana campus is not a new phenomenon. The University's first attempt at using e-learning systems was in 2004 when the university introduced a web-based learning system known as the Knowledge Environment for Web-based Learning – now KEWL. NEXTGEN (KNG) (Dadzie, 2009). The KEWL.NEXTGEN is a free open source online course learning management software that was developed collaboratively by twelve African universities through a larger project called the African Virtual Open Initiatives and Resources (AVOIR). The KEWL.NEXTGEN has a number of modules available within it and this ranges from simple assignment uploads and dictionary lookups to fully fledged survey tools and problem-based learning modules. Other important tools on this e-learning platform include Rubrics, Wiki, mailing lists, Groupware suite, events calendar and many more. One major advantage of the KEWL.NEXTGEN is the ability to be used within an institution quickly and easily, using minimal hardware and bandwidth to the internet (Dadzie, 2009).

Unfortunately, only 27 lecturers at the University of Ghana used the KEWL.NEXTGEN three years after its introduction. These lecturers were primarily from the faculty of Science and a

few from the faculty of Arts. Unfortunately, only one lecturer from the Faculty of Social Sciences attempted to use it (Dadzie, 2009). Some lecturers in one way or the other have created online platforms to support their classroom activities. Such lecturers have online blogs and other websites where lecture notes and other course information are posted. The new e-learning system introduced by the university is the Sakai e-learning system.

5.4 The SAKAI

The University of Ghana secured funding from the Chinese Government in 2012 through the Government of Ghana to provide e-learning resources. The project dubbed "Chinese phase 1 and 2" is expected to provide the University with the needed resources for e-learning. The phase one of the project was to secure an information infrastructure backbone and more reliable internet connectivity, email and IP-based services to Faculty and Departments and the university's UGNet was also put in place. The phase two also aims at extending the UGNet to all regional centres of the Institute of Continuing and Distance Education as well as fully equip all computer laboratories and videoconferencing centres. Part of the phase two is to introduce an integrated Digital Mobile Learning Platform (IDMP). Realizing the University had no institutionally-approved learning management system, the Sakai was acquired to serve that purpose. This was as a result of the low adoption rate of the KEWL. NextGen. The Sakai was therefore acquired because it can work for the whole University (University of Ghana, 2013).

The Sakai is a learning management system that allows lecturers, students and researchers of the university to virtually move the physical learning environment online. It is currently being piloted in some departments and schools such as the Department of Adult Education, the Department of Distance Education and the Business School. It is expected to be rolled out

completely by the 2015/16 academic year, and a lot more departments and courses are expected to be enrolled in the system.

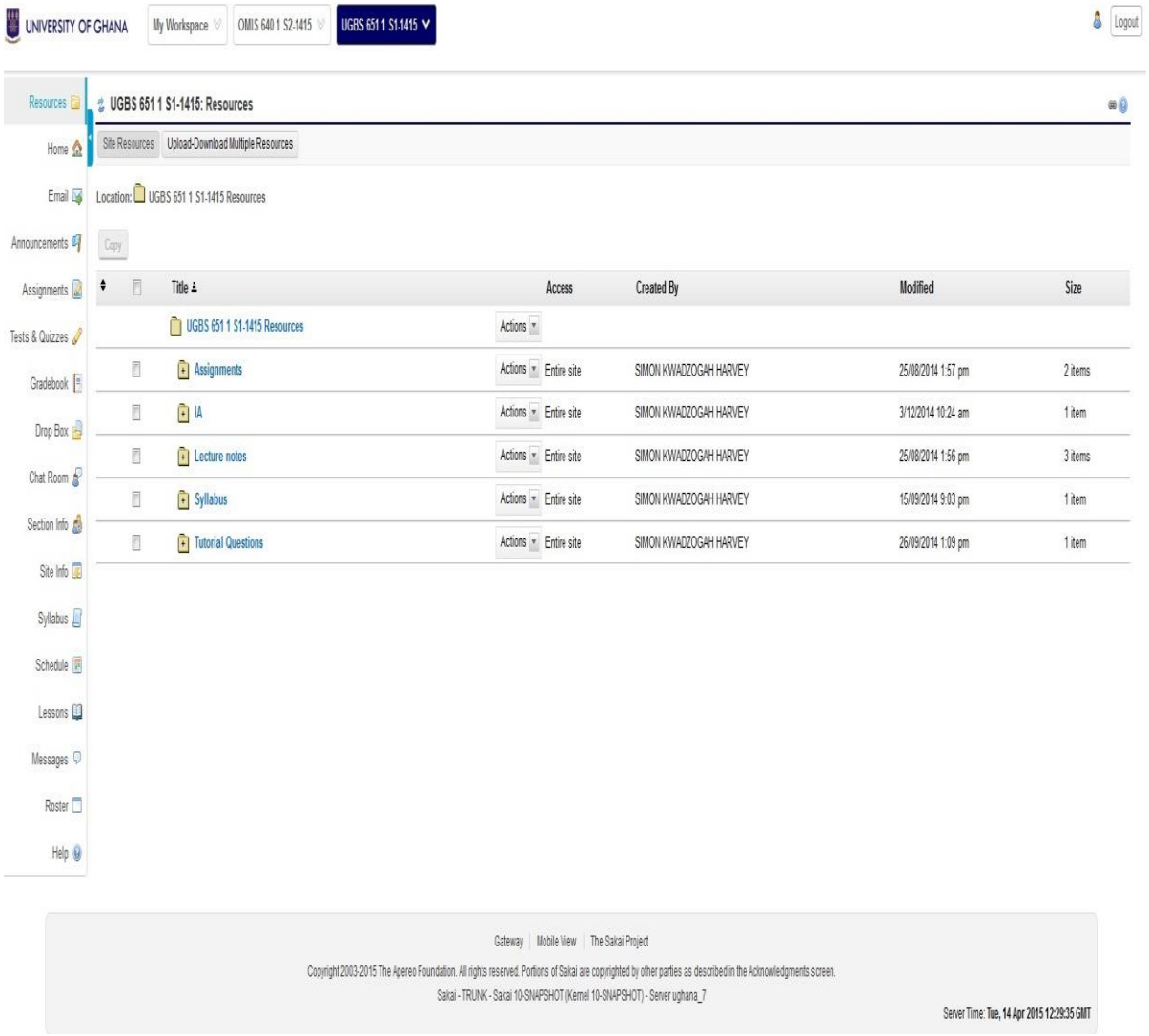
The Sakai learning management system is an online learning platform that allows its users to be enrolled into various course sites (for lecturers and students) and project sites (for researchers). In these course and project sites, the lecturers, students and researches have a myriad of tools available to them that allow them to do most of the things they do in their physical learning and working environments online.

Users typically log into the Sakai system with their student or staff ID and pin. When logged in, users see and enter all the course or project sites that they belong to, and use the tools made available to them by the instructors of the various course or project sites. Users are also able to edit/customize their own profiles (University of Ghana, 2015).

Some of the tools that are available to lecturers and students in this system include: An assignment tool that allows for giving, taking and submission of assignments online. A Gradebook tool that allows for instant calculation, distribution and storage of grades. A forum tool that allows for discussions of topics, creation of private or public groups etc. A lesson tool for organising lessons and lesson materials. A syllabus tool for a summary of courses (course outlines). A tests and quizzes tool for taking all kinds of tests and quizzes online. A chat tool that allows for chatting between lecturers and students, among course mates and between individuals. A resources tool for sharing course materials like slides, handouts and books. An announcement tool to keep students informed about upcoming tests/events, change of lecture times/venues, and any other information instructors or TAs may want to give to students. A presentations tool to do presentations online. The presenter may navigate through slides and

viewers may navigate independently of the presenter. A calendar tool to mark important dates of events, deadlines and any other activities pertaining to each course. A drop box tool for sharing all kinds of files with course mates. An email tool for sending emails to lecturers, course mates or individuals. A polls tool to easily create surveys, distribute and collect data from course members. A 'Turn it in' tool which will automatically detects and fishes out cheating and plagiarism in students' or researchers' work. Figure 5.1 shows a snapshot of the Sakai e-learning system interface.

Figure 5.1: A sample interface of UG's Sakai E-learning system



Source: University of Ghana Website, 2015

5.5 Summary

In a nut shell, the context of the study discussed the current state of e-learning in universities in developing countries with a focus on Ghana and University of Ghana in particular. It was evident that, e-learning adoption in developing countries is still at its infancy and most universities in Africa are now fully integrating it into their educational systems. There was a discussion on University of Ghana's current e-learning system, the 'SAKAI'.

This chapter was done in order to give more insights into the context under which the study took place.

CHAPTER SIX

ANALYSIS AND DISCUSSION OF FINDINGS

6.1 Introduction

This chapter discusses the data and findings of the study. The chapter presents the data examination, analysis and discussion of the findings from the data collected through the survey instrument. The analysis section of this chapter is divided into two subsections.

The first subsection provides a description of demographic characteristics of the respondents such as the role on the e-learning platform, academic status, years of usage of the system and some activities performed on the system. This is done to answer the first research question of the study that seeks to investigate the nature of e-learning adoption in Ghanaian universities.

The second subsection of the analysis comprises of the use of multiple regression after a series of tests proved that this approach can best be used to determine the factors that influence e-learning adoption. Hence leading to answering the second research question of the study, which is finding the determinants of e-learning adoption.

The second section of the chapter delves into the discussion of the findings in the preceding section and the final section provides a summary of the chapter.

6.2 Response rate

Errors were checked and corrected at each of the variable scores that were out of the accepted range in an attempt to avoid data incongruence (Pallant, 2003). In effect a total of four hundred

and seventeen (417) sets of questionnaire was used in the analysis after data screening and cleaning which represents a response rate of 92.7 percent.

6.3 Demographic profile of respondents

This section discusses the demographic profile of the sampled respondents who took part in the study. They have been profiled according to their gender, age, educational qualification, their role on the e-learning platform, college of affiliation, number of years using the e-learning system. This information is summarized in table 6.1 below.

Table 6.1 Demographic Characteristics of Respondents

Characteristic	**Respondents**	
Sex	**F**	**%**
Male	247	59.2
Female	170	40.8
Total	**417**	**100**
Age		
18-24	161	38.6
25-30	148	35.5
31-35	22	5.3
36-40	47	11.3
40+	39	9.4
Total	**417**	**100**
Educational Level		
Bachelor's Degree	236	56.6
Master's Degree	108	25.9
PHD	63	15.1
Professional Degree	10	2.4
Total	**417**	**100**

College of Affiliation of Respondents		
Health Sciences	45	10.8
Basic And Applied Sciences	84	20.1
Humanities	237	56.8
Education	45	10.8
Not Applicable	6	1.4
Total	**417**	**100**
Role on the System		
Student	288	69.1
Lecturer/Instructor	73	17.5
Administrator	56	13.4
Total	**417**	**100**
Number of courses administered on the platform		
1	185	44.4
2	141	33.8
3	17	4.1
4	19	4.6
5	23	5.5
6	18	4.3
7	7	1.7
8	7	1.7
Years spent on using the E-learning system		
Less Than 1 Year	244	58.5
2 Years	133	31.9
3 Years	35	8.4
5 Years And More	5	1.2
Total	**417**	**100**

Source: SPSS analysis output

Out of the four hundred and seventeen (417) valid questionnaires obtained, 247 were males signifying 59.2 percent and 170 were females signifying 40.8 percent of the total number of respondents used for this study. The sexes were done to ensure that the study was not skewed to any particular gender and to include views from both sexes so as to present a fair demographic result. It is fair to say that the ratio of men to women in this study is not biased and therefore does not affect the responses in any significant way.

Table 6.1 also indicates the ages of the respondents that took part in the study. The results show that most of the respondents (38.6 percent) were within the ages of 18 to 24 followed by those within the range of 25 to 30 (35.5 percent) and 36 to 40 (11.3 percent). The lowest number of respondents were those in the 31 to 35years group (5.3 percent).

With respect to the educational or academic levels of the respondents who took part in the study, the majority of them have a bachelor ‘s degree (56.6 percent), followed by those with a master ‘s degree and the least are those with PHD as presented in table 6.1.

Furthermore, the college of affiliation of respondents in table 6.1 indicates that the majority of the respondents is affiliated with the college of humanities (56.8 percent) followed by the College of Basic and Applied Sciences (20.1 percent), the College of Education (10.8 percent) and Health Sciences (10.8 percent). 1.4 percent of the respondents were not affiliated to any of the colleges. These were the administrators of the e-learning system.

Also, the role of the respondents on the e-learning system was assessed. 69.1 percent of the respondents use the system as students, 13.4 percent as administrators and 17.5 percent were instructors. Table 6.1 provides further elaboration.

The number of courses the respondents administered on the e-learning platform was also assessed. 44.4 percent of the respondents indicated only a single course either offered or managed on the e-learning platform whiles 4.6 percent had 4 courses. Table 6.1 throws more light on this.

There was also an analysis of the number of years respondents have spent using the e-learning system. 244 of the respondents representing 58.5 percent have spent less than a year on the e-learning system whiles 35 that is 8.4 percent indicated three years of usage. Elaborations are found in table 6.1.

6.4 Descriptive statistics

The means and standard deviations of the various variables used in the study are displayed in the table in Appendix B. These indicate the extent to which the respondents disagreed or agreed with the statements in the questionnaire. The mean results of the variables indicate how each statement performed from the 417 respondents' points of view. From Appendix B, the highest mean was 3.94 belonging to EA2 (*I intend to use the e-learning system again*) whilst the lowest was 2.90 (*I have not encountered problems using my device to log into the e-learning system*) which belongs to ITI4. It was also clear from the table in Appendix C that the values of standard errors for skewness and kurtosis are small. This can be explained by the large sample size of 417 which lead to reducing the standard errors for skewness and kurtosis.

Table 6.2 below shows the cumulative means and standard deviations of the factors which categorize the variables. These describe the cumulative extent to which respondents agreed or disagreed with the factors presented.

Table 6. 2: Means and Standard Deviation of the Factors

	N	Mean	Std. Deviation	Skewness		Kurtosis	
Factors	Stat	Stat	Stat	Stat	S. E	Stat	S. E.
E-learning Adoption	417	3.6403	.64286	-.285	.120	.455	.238
IT infrastructure	417	3.2245	.59378	-.358	.120	-.332	.238
Perceived ease of use	417	3.5693	.65751	-.563	.120	.591	.238
Organisational Compatibility	417	3.7266	.80919	-.641	.120	.594	.238
Expected Benefits	417	3.8158	.59342	-.503	.120	1.639	.238
Competitive Pressure	417	3.4646	.65167	.196	.120	-.442	.238
Educational Partners	417	3.5372	.68075	.325	.120	.070	.238
Content of Course	417	3.7492	.57304	-.849	.120	2.221	.238
E-learning Curriculum	417	3.7151	.65500	.072	.120	-.434	.238

Source: Field survey, 2015

6.5 Exploratory Factor Analysis

In quantitative research, a few components will most of the time explain for variations in a variable (Costello & Osborne, 2005). Hence, the need to use a data reduction method such as factor analysis to detect relationships among the variables measuring the factors identified from the literature review. The principal component method of extraction was adopted and it starts by looking at the linear combination of components that account for as much variation in the original variables as possible. Again, principal component analysis finds another component that accounts for as much of the remaining variation as possible and is uncorrelated with the previous component. This is repeated till there are as many components as original variables.

Ho (2006) has postulated three major steps for conducting exploratory factor analysis which are Assumptions, Extraction and Interpretation. These include Assumptions which are

univariate analysis tests such as inter-correlation tests. Assumptions involve going through the data to ensure that they can be analysed with exploratory factor analysis (EFA). Extraction also involves tests such as factor analysis, scree test and eigenvalues. Extraction deals with selecting only the required number of factors of the survey data. This was conducted with a common factor analysis, scree test, and eigenvalues. Interpretation also deals with providing unique identifiers for the extracted factors. This involved comparing the EFA's results with both the questionnaire and the conceptual model used for the study.

6.5.1 Univariate analysis tests

Univariate analysis is carried out to only look at one variable at a time to determine if there is anything strange going on in that variable. Hence, inter-correlation tests were carried out on the data in this study.

6.5.1.1 Inter-correlation tests

Brace, Kemp and Snelgar (2006) have asserted that a major theoretical assumption of EFA is that, the data should have some degree of inter-correlation. According to Hair *et al.* (2006), without inter-correlation, it will not be possible to extract from the data. Bartlett's test of sphericity and the Kaiser-Meyer- Olkin (KMO) measure of sampling adequacy which are tests that can be used to determine the factoriability of the matrix as a whole was used. Factorability is assumed if the Bartlett's test of sphericity is large and significant, and if the Kaiser-Meyer-Olkin measure is greater than 0.6 (Coakes & Ong, 2011). This was done before the extraction of components. The Bartlett test of Sphericity (Appox: Chi-square= 10627.035, df. 741, sig. 0.000) and the KMO measure of sampling adequacy (value of 0.790) affirmed that there was a huge connection among the variables to warrant the utilization of exploratory factor analysis. The table underneath shows the KMO test which was ran from the data from the respondents.

The KMO overall statistic of 0.790 for the variables used as a part of the study gives an evidence that there is a higher probability that there exists an inter-correlation between the variables in this manner making them conducive for analysis. Thus, based on this finding, it is right to continue with factor analysis to examine factors that contribute to the usability analysis.

Table 6. 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.790
Bartlett's Test of Sphericity	Approx. Chi-Square	10627.035
	Df	741
	Sig.	.000

Source: SPSS analysis output

6.5.2 Extraction of factors

Thirty-nine items were factor analysed initially to allow for the identification of key items pertaining to the respondents' opinions on each of the factors as well as to find the link between the various latent variables. This, therefore, allowed for the smallest possible number of items that better measure the constructs, hence simplifying the framework.

6.5.2.1 Eigenvalues

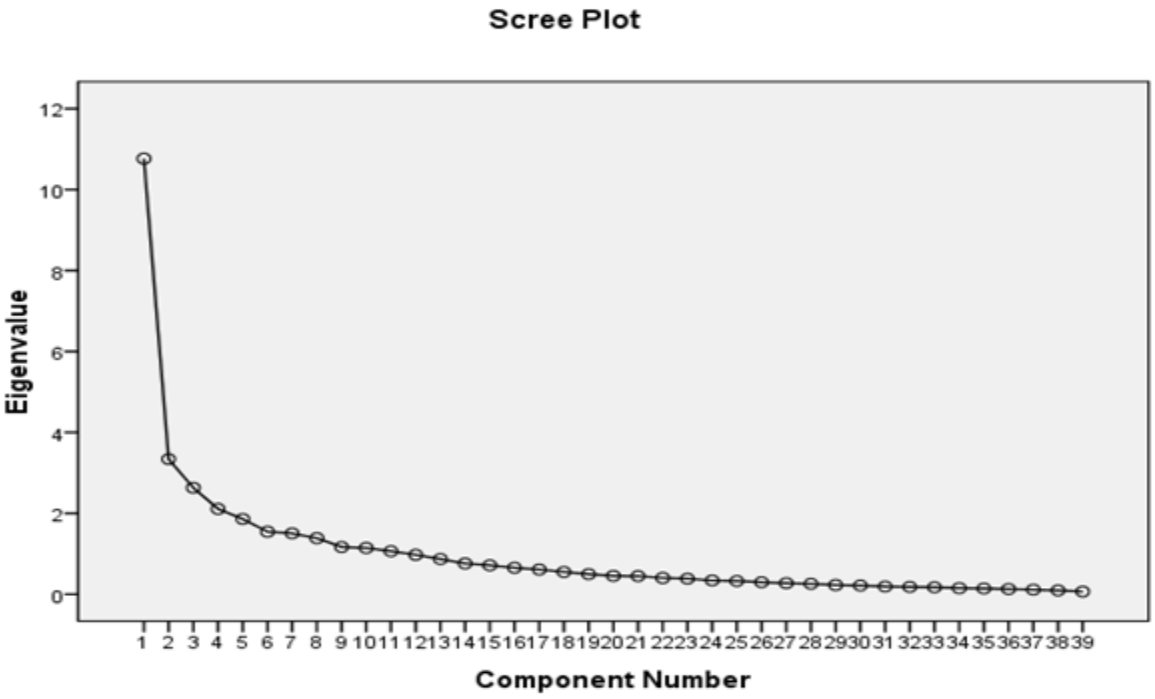
Eigenvalues are one major indicators used to distinguish between important items from possible extracted factors in EFA. According to Conway and Huffcutt (2003), a threshold of eigenvalues greater than 1 is often required for an item to be selected. Therefore, eigenvalues greater than 1 were retained. This is because, these items were important to this analysis and those less than 1 were discarded. As a result of this, eleven factors are important to this research because they have eigenvalues higher than 1 and these selected factors explain 73.1 percent of

the total variance. Fabrigar, Wegener, MacCallum and Strahan (1999) have indicated that, even though most researchers use eigenvalues greater than one, it cannot be relied solely upon since it can either lead a researcher to over factoring or under factoring. Therefore, the Scree test was also done. Appendix D shows the total variance and the eigenvalues.

6.5.2.2 The Scree test

Cattell (1996) has opined the need to use the scree test to help solve the problem of over factoring or under factoring. Scree test is done by simply plotting the eigenvalues into a graph. This shows the gain of eigenvalues for each extracted factor. A relatively straight line in shape indicates a cluster of the extracted factors that do not account for a substantial explanation of the conceptual model and hence such factors could be discarded. Figure 6.1 shows the scree plot for this study.

Figure 6. 1: Scree Plot



Source: SPSS analysis output

6.5.2.3 Varimax Rotation of Variables

In exploratory factor analysis, the variable loadings are viewed as high in the event that they are all of the 0.8 or greater (Wu, Tao & Yang, 2008) yet this is unrealistic to happen in genuine data. Hair *et al.* (2010) posits that, in a perfect world, variables ought to have loadings greater than 0.5 to be held for analysis. On the other hand, more normal magnitudes in the social sciences are low to direct variable loadings of above 0.40. In the event that a variable has a loading of less than 0.40, it might either not be identified with alternate things, or may propose an extra element that ought to be explored. Costella and Osborne (2005) declare that the researcher may consider why that item was incorporated in the data and choose whether to drop it or include similar items for future exploration. Be that as it may, it is worth noting that these numbers are basically correlation coefficients, and accordingly the magnitude of the loadings can be seen similarly.

Varimax rotation of variables tends to produce multiple group factors. The thirty-nine variables were rotated and the results revealed that twenty-seven (27) variables loaded perfectly on the nine (9) factor components. These nine factor components included IT infrastructure, perceived ease of use, organisational compatibility, expected benefits, educational partners, competitive advantage, content of the e-learning course, e-learning curriculum and e-learning adoption.

The first component out of the twenty-seven items which loaded perfectly had three items which were related to the content of the e-learning course. The second component had two items related to competitive pressure. The third component had four items which all related to e-learning adoption. The fourth component had four items which were related to expected benefits. The fifth component had three items, all related to e-learning curriculum. There were

two items in the sixth component which were all related to educational partners. Again, there were four items in the seventh component all related to IT infrastructure. The eighth component also had three items which were all related to perceived ease of use. Finally, the ninth component had three components which were all related to organisational compatibility. Table 6. 4 shows the elaborations of the varimax rotation of variables.

Table 6. 4: Rotated factor component matrix

Rotated Component Matrix[a]									
	Component								
	1	2	3	4	5	6	7	8	9
CE2: The knowledge or information provided from the e-learning system is important and helpful for coursework	.687								
CE4: The e-learning system makes it easy to check the up-to-date course notices	.647								
CE1: The content provided by the e-learning system are consistent with the course	.604								
CP3:I think University of Ghana experienced competitive pressure from other Universities to implement the e-learning system		.880							
CP2: The use of the e-learning systems differentiates UG from the other Universities		.639							
EA2: I intend to use the e-learning system again			.657						
EA3: I will continue using e-learning even if I face problems			.639						
EA1: I connect to the e-learning platform			.626						
EB1: I think using e-learning helps to accomplish work more quickly				.788					
EB2: I think using e-learning improves the quality of coursework				.735					
EB4: Using e-learning system improves teaching and learning				.670					
EB5: In general, I find e-learning to be of an advantage for tasks				.621					
EC2: The e-learning system provides materials that explains the course					.796				
EC4: The e-learning system provides useful and appropriate					.699				
EC3: I think the e-learning system provides some good functions to help complete course work					.617				
EP3: I think the government of Ghana has been helpful in the implementation of the e-learning system in the University						.791			
EP2: I think UG has received grants from NGO's for the introduction and implementation of the e-learning system						.630			
ITI5: The response time of the e-learning system is acceptable							.809		
ITI2: I can easily download/upload the teaching/learning materials in the e-learning system							.762		
ITI4: I have not encountered problems using my device to log into the e-learning system							.688		
ITI1: The university has a good internet connectivity							.684		
PEU1: I find it easy to use the e-learning system								.606	
PEU2: The e-learning system has clear navigational tools and guidelines for assisting usage								.604	
PEU4: Learning how to use the e-learning platform is easy for me								.602	
OC2: Implementing the changes to learning procedure initiated by the adoption of e-learning is well-matched with the practices of UG									.804
OC3: The adoption of the e-learning system is well-suited with the existing Information Systems infra-structure of the University									.756
OC1: The changes caused by the adoption of e-learning is well-suited with existing learning practices in the University									.688

Source: SPSS Analysis output

After the various extraction methods were applied, the following items were dropped because they had loadings which were below .600. These items were therefore not used for further analysis. However, only items that met the minimum value of 0.6 as postulated by Hair *et al.* (2010) were retained. Below are the items which were dropped.

Table 6.5: Rejected items

Items which were rejected
ITI3: The University has enough computers for the E-learning users
PEU3: The E-learning system is user friendly
PEU5: It is clear and easy to understand how to use the E-learning platform.
EB3: Using E-learning system improves my performance
EP1: I think the telecommunications networks provide support for the E-learning system in the University
CP1: I think other universities see UG as more respected because of the use of the E-learning system
CE5: The knowledge or information provided by the E-learning system is meaningful, understandable, and practicable
EC1: I am satisfied with the presentation methods of the E-learning system
EC5: I think the course(s) is/are suitable to be run on an E-learning platform
EA4: I spend most of my time using the E-learning platform

Source: SPSS analysis output

6.5.3 Reliability and re-specification of factors

Reliability is the extent to which a measurement reproduces consistent results, particularly if the process of measurement is to be repeated (Malhotra & Birks, 2007). Similarly, Pallant (2003) suggests that the scales used for analysis should be checked for reliability to make sure items that make up the scale "hang together" (that is, internal consistency). Pallant (2003) and Hair *et al.* (2010) have, therefore, suggested the use of the Cronbach's alpha coefficient, which

is one of the common indicators for checking internal consistency. These authors further propose that the Cronbach's alpha coefficient should be greater than 0.7 for managerial decisions; however, threshold of 0.6 is accepted in exploratory research. This was therefore employed in this study to determine the reliability of the scales used in the survey. A compilation of the various alpha values is presented in table 6.6 below.

Table 6.6: Reliability of Scales- independent variables

Variables	Loadings	No. of Items	Cronbach 's alpha
IT infrastructure		**4**	**.605**
ITI1: The university has a good internet connectivity	.684		
ITI2: I can easily download/upload the teaching/learning materials in the E-learning system	.762		
ITI4: I have not encountered problems using my device to log into the E-learning system	.688		
ITI5: The response time of the E-learning system is acceptable	.809		
Perceived Ease of use		**3**	**.731**
PEU1: I find it easy to use the E-learning system	.606		
PEU2: The E-learning system has clear navigational tools and guidelines for assisting usage	.604		
PEU4: Learning how to use the E-learning platform is easy for me	.602		
Organisational compatibility		**3**	**.832**
OC1: The changes caused by the adoption of E-learning is well-suited with existing learning practices in the University	.688		
OC2: Implementing the changes to learning procedure initiated by the adoption of E-learning is well-matched with the practices of UG	.804		
OC3: The adoption of the E-learning system is well-suited with the existing Information Systems infrastructure of the University	.756		
Expected benefits		**4**	**.811**
EB1: I think using E-learning helps to accomplish work more quickly	.788		
EB2: I think using E-learning improves the quality of coursework	.735		
EB4: Using E-learning system improves teaching and learning	.680		
EB5: In general, I find E-learning to be of an advantage for tasks	.621		
Competitive Pressure		**2**	**.652**
CP2: The use of the E-learning systems differentiates UG from the other Universities	.639		
CP3: I think University of Ghana experienced competitive pressure from other Universities to implement the E-learning system	.880		

Educational Partners		**2**	**.643**
EP2: I think UG has received grants from NGO's for the introduction and implementation of the E-learning system	.680		
EP3: I think the government of Ghana has been helpful in the implementation of the E-learning system in the University	.791		
The content of the E-learning course		**3**	**.692**
CE1: The content provided by the E-learning system are consistent with the course	.604		
CE2: The knowledge or information provided from the E-learning system is important and helpful for coursework	.687		
CE4: The E-learning system makes it easy to check the up-to-date course notices	.647		
The E-learning curriculum		**3**	**.737**
EC2: The E-learning system provides materials that explains the course better	.796		
EC3: I think the E-learning system provides some good functions to help complete course work	.617		
EC4: The E-learning system provides useful and appropriate knowledge/information about the course	.699		

Source: SPSS Analysis output

Using the Cronbach's coefficient alpha helped to determine the internal reliabilities of the factor components. These items met the minimum value of 0.6 as postulated by Hair *et al.* (2010) and hence were retained.

6.5.4 Reliability of the dependent variable

The reliability of the scales used for the dependent variable which is E-learning Adoption (EA) was also analysed and it was discovered to be appropriate. Three items loaded perfectly on the dependent variable. These three items had high loadings and loaded perfectly on the dependent variable which shows that these statements portray a complete structure in e-learning adoption. The Cronbach's alpha of .751 is also good as postulated by Pallant (2003) and Hair *et al.* (2010). The results have been summarized in Table 6.7 below.

Table 6. 7: Reliability of Scale-Dependent Variable

Variables	Loadings	Cronbach's alpha
E-learning Adoption		**.701**
EA1: I connect to the E-learning platform	.626	
EA2: I intend to use the E-learning system again	.657	
EA3: I will continue using E-learning even if I face problems	.639	

Source: SPSS Analysis output

6.6 Correlation

Correlation was carried out on the variables before multiple regression was performed. A correlation is a solitary number that portrays the level of association between two variables. Pearson correlation was performed in order to examine the strength and relationships between the dependent and independent variables. This is presented in table 6.8. Again, the significant levels were tested.

Table 6.13: Correlation Matrix

		EA	ITI	PEU	OC	EB	CP	EP	CE	EC
EA	Pearson Correlation	1								
	Sig. (2-tailed)									
	N	417								
ITI	Pearson Correlation	.332**	1							
	Sig. (2-tailed)	.000								
	N	417	417							
PEU	Pearson Correlation	.431**	.615**	1						
	Sig. (2-tailed)	.000	.000							
	N	417	417	417						
OC	Pearson Correlation	.295**	.389**	.602**	1					
	Sig. (2-tailed)	.000	.000	.000						
	N	417	417	417	417					
EP	Pearson Correlation	.584**	.190**	.499**	.514**	1				
	Sig. (2-tailed)	.000	.000	.000	.000					
	N	417	417	417	417	417				
CP	Pearson Correlation	.343**	.305**	.264**	.229**	.124*	1			
	Sig. (2-tailed)	.000	.000	.000	.000	.011				
	N	417	417	417	417	417	417			
EP	Pearson Correlation	.504**	.123*	.301**	.432**	.442**	.250**	1		
	Sig. (2-tailed)	.000	.012	.000	.000	.000	.000			
	N	417	417	417	417	417	417	417		
CE	Pearson Correlation	.297**	.195**	.511**	.506**	.498**	.121*	.375**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.013	.000		
	N	417	417	417	417	417	417	417	417	
EC	Pearson Correlation	.606**	.201**	.376**	.448**	.586**	.151**	.530**	.564**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.002	.000	.000	
	N	417	417	417	417	417	417	417	417	417

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

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

Source: SPSS Analysis output

Pearson relationship coefficients (r) can tackle just values from –1 to +1. An immaculate relationship of 1 or –1 demonstrates that the estimation of one variable can be dead set precisely by knowing the worth on the other variable. Then again, a value of 0 demonstrates no relationship between the two variables. The sign at the front shows whether there is a positive correlation (as one variable builds, so too does the other) or a negative relationship (as one variable expands, alternate reductions). The measure of indisputably the worth (disregarding any sign) gives an evidence of the quality of the relations. Squaring correlation coefficients make them easier to understand. The square of the coefficient (or r square) is equal to the percentage of the variation in one variable that is related to the variation in the other (Pallant, 2011).

From table 6.8, none of the variables exhibited a very strong relationship with each other. Variables which were closer had correlation coefficients less than 40 percent. For instance, PEU and ITI (.615), EC and EA (.606) and OC and PEU (.602) showed only 30 percent correlation. All the variables exhibited positive correlations with each other. This implies they all contribute to the adoption of e-learning in this study and the variables are independent of each other hence multiple regression should be carried on.

6.7 Multiple regression analysis

Multiple regression was used to analyse the relationship between e-learning and its determinants. The multiple regression was done to extract the independent variables that can better explain the dependent variable. That is, to investigate the significant variables that affect e-learning. E-learning adoption was used as the dependent variable whilst the independent variables were IT infrastructure, perceived ease of use, organisational compatibility, expected benefits, educational partners, competitive pressure, content of the e-learning course and e-

learning curriculum. But a series of assumption tests were first carried out on the data for the study.

6.7.1 Regression assumptions

Most statistical tests depend upon certain assumptions concerning the variables used in the analysis (Osborne & Waters, 2002). If these assumptions are not met, the results may not be trustworthy. This leads to a Type I or Type II error, or over- or under-estimation of significance or effect size(s). Four assumption tests are therefore proposed to be carried out before multiple regression can be carried out. These tests include linearity, homoscedasticity, normality and independence of errors. These tests were carried out on the data before multiple regression was carried out.

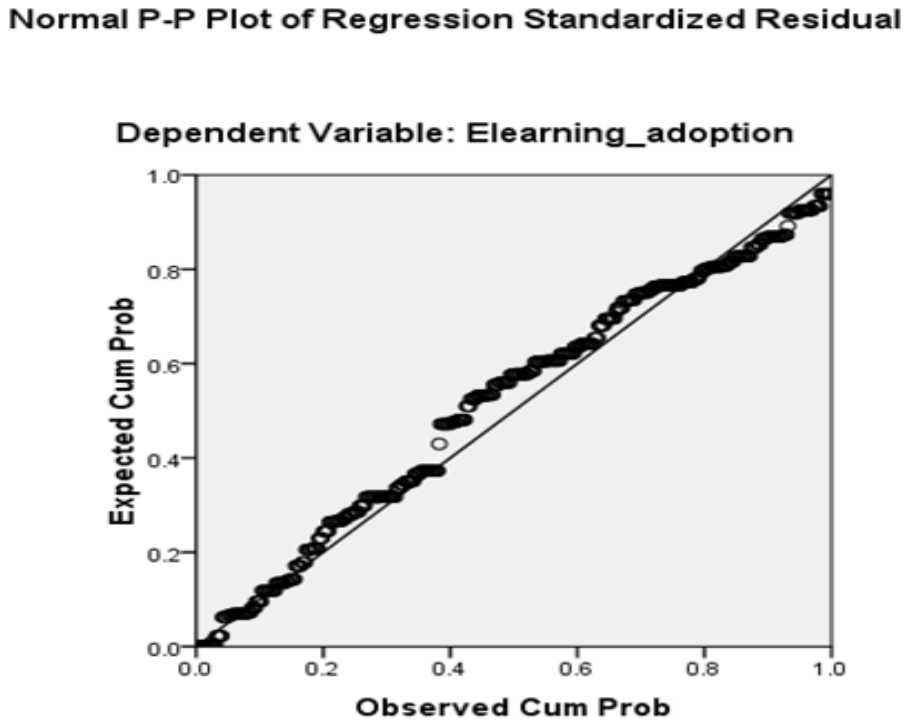
6.7.1.1 Linearity test

The relationship between the dependent and the independent variables can accurately be estimated by the use of standard multiple regression only if the relationships are linear in nature. The results of the regression analysis will under estimate the original nature of the relationship if there is no linear relationship between the dependent and the independent variable. Osborne and Waters (2002) have outlined two major risks associated with under-estimation. The first risk is an increased chance of a Type II error for that independent variable and secondly, in the case of multiple regression, an increased risk of Type I errors (over-estimation) for other independent variables that share variance with that Independent Variable.

An examination of residual plots is the preferable method for checking for linearity (Hair *et al.*, 2010). To determine whether the variables under study are linearly related in nature, a prior

test of linearity was done and below indicates the linearity between the dependent variable and the independent variables. From the plot, there is a linear relationship between the independent and the dependent variables as shown in the figure 6.2 below.

Figure 6. 2: Residual plots



Source: SPSS Analysis output.

6.7.1.2 Normality test

Yazici and Yolacan (2007) have outlined twelve different normality tests that are used for assessing the assumption that a sample was drawn from a normally distributed population. These tests include chi-square, Kolmogorov–Smirnov, Anderson–Darling, Kuiper, Shapiro–Wilk, Ajne, modified Ajne, modified Kuiper, D'Agostino, modified Kolmogorov–Smirnov, Vasicek and Jarque–Bera. In conducting multiple regression and EFA, the data should be normally distributed to ensure accuracy in the findings (Brace, Kemp & Snelgar, 2006).

There are two major ways of conducting normality test as postulated by Hair *et al.* (2006). These include; graphical and statistical analysis. The graphical representation involves the use of a symmetrical, bell-shaped curve, which has the greatest frequency of scores in the middle with smaller frequencies towards the extremes.

In this study, two types of normality tests are ran. The Shapiro-Wilk test is used for dataset smaller than 2000 elements, otherwise, the Kolmogorov-Smirnov test is used. The Shapiro-Wilk test is ideal in this case since the dataset has 417 elements. With the Kolmogorov test, a value closer to 0 signifies data approaching normality whiles with Shapiro-Wilk test, a value closer to 1 represents data becoming normally distributed (Hair *et al.*, 2010). The Shapiro-Wilk test generated statistical values of 0.961 (e-learning adoption), 0.972 (IT infrastructure), 0.969 (perceived ease of use), 0.953 (organisational compatibility), 0.949 (expected benefits), 0.965 (educational partners), 0.952 (competitive pressure), 0.941 (content of the e-learning course) and 0.978 (e-learning curriculum) indicated values closer to 1. Whereas the Kolmogorov-Smirnov test in the table 6.9 indicated values very close to 0. It clearly indicates that the distribution of the residuals is normally distributed. The assumptions above are satisfied for a regression analysis. Table 6.9 outlines the results of the normality tests.

Table 6. 9: Tests of Normality

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E-learning Adoption (EA)	.116	417	.000	.961	417	.000
IT infrastructure (ITI)	.122	417	.000	.972	417	.000
Perceived ease of use (PEU)	.133	417	.000	.969	417	.000
Organisational Compatibility (OC)	.113	417	.000	.953	417	.000
Expected Benefits (EB)	.147	417	.000	.949	417	.000
Competitive Pressure (CP)	.107	417	.000	.965	417	.000
Educational Partners (EP)	.138	417	.000	.952	417	.000
Content of Course (CE)	.117	417	.000	.941	417	.000
E-learning Curriculum (EC)	.085	417	.000	.978	417	.000

a. Lilliefors Significance Correction

Source: SPSS analysis output

6.7.1.3 Independence of Errors

It is necessary to find whether no single observation in the data is probably dependent on any other observation. This assumption concerns another type of systematic error in the residuals that is produced by estimating values of the dependent variable that are correlated from one case to the next that is, serially correlated. Using the Durbin-Watson statistic test in SPSS this assumption is verified. The value of Durbin-Watson statistics ranges from 0 to 4. As a general rule of the thumb, the residuals are not correlated if the statistic value is approximately 2 and an acceptable range is 1.50 – 2.50 (Durbin & Watson, 1951). From table 6.10, the value of the Durbin-Watson statistics for the regression model is 1.74 which falls within the range, showing that the analysis satisfies the assumption of independence of errors indicating, thus, the assumption of no autocorrelation is also satisfied. Hence multiple regression can be carried out.

6.7.2 The Regression Model

Table 6.10: Model Summary

Mode	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.772a	.597	.589	1.64893	1.74

a. **Predictors**: (Constant) IT infrastructure, Perceived ease of use, Organisational compatibility, Expected benefits, Educational partners, Competitive advantage, Content of the E-learning course and E-learning curriculum

b. **Dependent Variable**: E-learning Adoption

Source: SPSS Analysis output

The correlation coefficient in the table 6.10 above is 0.772. This shows that there is a strong correlation among the various constructs. Thus, the relationships among the constructs are very close and have the ability to explain the dependent variables. Also, the Adjusted R Square value is 0.589, meaning that 59 percent of the variance in e-learning adoption can be predicted by IT infrastructure, perceived ease of use, organisational compatibility, expected benefits, educational partners, competitive advantage, content of the e-learning course and e-learning curriculum. In conclusion, e-learning is well modelled by the regression. That is, the model explains more than half of the variation in e-learning adoption. The summary of the analysis of Variance (ANOVA) is presented in table 6. 11.

Table 6. 11: ANOVA Table

Model	Sum of Squares	Sum of Squares	Df	Mean Square	F	P-value
1	Regression	1641.353	9	205.169	75.459	.000a
	Residual	1109.338	408	2.719		
	Total	2750.691	417			

Source: SPSS Analysis output

From the ANOVA table above, the F-value of the table was found to be significant with the p-value < 0.05. This indicates that the combination of the independent variables can significantly predict the dependent variable.

Table 6. 12: Multiple Regression Analysis of University of Ghana

	S.E	*B*	T	Sig.
(Constant)[a]	.190		**-.592**	**.554**
IT infrastructure	.046	.147	3.484	.001
Perceived ease of use	.050	.146	2.869	.004
Organisational Compatibility	.035	-.251	-5.728	.000
Expected Benefits	.047	.360	8.241	.000
Competitive Pressure	.034	.183	5.393	.000
Educational Partners	.037	.208	5.273	.000
Content of Course	.048	-.175	-4.093	.000
E-learning Curriculum	.044	.384	8.569	.000

a. Dependent Variable: E-learning Adoption
95% confidence interval (= 0.05), * significant at = 0.05

Source: SPSS Analysis output

6.7.3 The Regression Equation Model

EA = K +.147ITI +.146PEU - .251OC+.360EB +.183CP + .208EP -.175CE + .384EC + ε_i, where

EA = E-learning adoption

ITI = IT infrastructure

PEU = Perceived Ease of Use

OC = Organisational Compatibility

EB = Expected Benefits

EP = Educational Partners

CP = Competitive Pressure

CE= Content of the E-learning course

EC= E-learning curriculum

K = Regression Constant

The regression equation model above indicated that it can be used to predict future e-learning adoption at the institutional level once the beta values/scores of IT infrastructure, perceived ease of use, organisational compatibility, expected benefits, educational partners, competitive advantage, content of the e-learning course and e-learning curriculum are known.

6.7.4 Analysis of the Stakeholders

The factors were further tested on the various stakeholders to determine the specific factors that influence their adoption of e-learning. The analysis is elaborated below.

6.7.4.1 Students e-learning adoption

Below is the data analysis for the students of the e-learning system. Table 6.13 shows the ANOVA table of the data for the students, while table 6.14 also shows the multiple regression analysis of the data for the students.

Table 6. 13: ANOVA Table for Students

Model	**Sum of Squares**	**Sum of Squares**	**Df**	**Mean Square**	**F**	**P-value**
1	Regression	68.017	8	8.502	46.076	.000a
	Residual	51.483	279	.185		
	Total	119.500	287			

Source: SPSS Analysis output

Table 6. 14: Multiple Regression Analysis of Factors of E-learning Adoption for students

	S.E	*B*	T	Sig.
(Constant)[a]	.242		**-.020**	**.984**
IT infrastructure	.054	.176	3.289	.001
Perceived ease of use	.060	.092	1.500	.135
Organisational Compatibility	.044	-.181	-3.419	.001
Expected Benefits	.059	-.273	5.806	.000
Competitive Pressure	.047	.264	5.416	.000
Educational Partners	.046	.181	3.881	.000
Content of Course	.058	-.232	-4.626	.000
E-learning Curriculum	.051	.388	7.825	.000

a. Dependent Variable: E-learning Adoption

95% confidence interval (= 0.05), * significant at = 0.05

Source: SPSS Analysis output

The Regression equation model for students

EA = K +.176ITI +.092PEU - .181OC-.273EB +.264CP + .181EP -.232CE + .388EC + ε, where

EA = E-learning adoption

ITI = IT infrastructure

PEU = Perceived Ease of Use

OC = Organisational Compatibility

EB = Expected Benefits

EP = Educational Partners

CP = Competitive Pressure

CE= Content of the E-learning course

EC= E-learning curriculum

K = Regression Constant

6.7.4.2 Instructors e-learning adoption

Below is the data analysis for the instructors of the e-learning system. Table 6.15 shows the ANOVA table of the data for the instructors. Table 6.16 also shows the multiple regression analysis of the data for the instructors.

Table 6. 15: ANOVA Table for instructors

Model	**Sum of Squares**	**Sum of Squares**	**df**	**Mean Square**	**F**	**P-value**
1	Regression	4.347	8	.543	14.812	.000a
	Residual	2.348	64	.037		
	Total	6.695	72			

Source: SPSS Analysis output

Table 6. 16: Multiple Regression Analysis of Factors of E-learning Adoption for Instructors

	S.E	***B***	**T**	**Sig.**
(Constant)[a]	.633		**-.592**	**.052**
IT infrastructure	.082	.027	3.484	.792
Perceived ease of use	.188	-.201	2.869	.000
Organisational Compatibility	.095	.219	-5.728	.255
Expected Benefits	.135	-.273	8.241	.058
Competitive Pressure	.057	.144	5.393	.244
Educational Partners	.078	.573	5.273	.000
Content of Course	.076	.041	-4.093	.665
E-learning Curriculum	.084	.493	8.569	.000

a. Dependent Variable: E-learning Adoption
95% confidence interval (= 0.05), * significant at = 0.05
Source: SPSS Analysis output

The Regression equation model for students

EA = K +.027ITI -.201PEU - .219OC-.273EB +.144CP + .573EP +.041CE +.493EC + ε, where

EA = E-learning adoption

ITI = IT infrastructure

PEU = Perceived Ease of Use

OC = Organisational Compatibility

EB = Expected Benefits

EP = Educational Partners

CP = Competitive Pressure

CE= Content of the E-learning course

EC= E-learning curriculum

K = Regression Constant

6.7.4.3 Administrators e-learning adoption

Below is the data analysis for the administrators of the e-learning systems. Table 6.17 shows the ANOVA table of the data for the administrators. Table 6.18 also shows the multiple regression analysis of the data for the administrators.

Table 6. 17: ANOVA Table for administrators

Model	**Sum of Squares**	**Sum of Squares**	**Df**	**Mean Square**	**F**	**P-value**
1	Regression	26.093	8	3.262	19.055	.000a
	Residual	8.045	47	.171		
	Total	34.138	55			

Source: SPSS Analysis output

Table 6. 18: Multiple Regression Analysis of Factors of e-learning Adoption for Administrators

	S.E	***B***	**T**	**Sig.**
(Constant)[a]	1.72		**-.101**	**.9.20**
IT infrastructure	.305	.031	.156	.007
Perceived ease of use	.488	.593	1.562	.125
Organisational Compatibility	.204	-.611	-2.512	.015
Expected Benefits	.193	.669	3.109	.003
Competitive Pressure	.197	.007	.065	.948
Educational Partners	.226	.151	.585	.561
Content of Course	.524	-.102	-.461	.647
E-learning Curriculum	.206	.106	.569	.572

a. Dependent Variable: E-learning Adoption

95 percent confidence interval (= 0.05), * significant at = 0.05

Source: SPSS Analysis output

The Regression equation model for students

EA = K +.031ITI +.593PEU - .611OC+.669EB +.007CP + .151EP -.102CE + .106EC + ε_i, where

EA = E-learning adoption

ITI = IT infrastructure

PEU = Perceived Ease of Use

OC = Organisational Compatibility

EB = Expected Benefits

EP = Educational Partners

CP = Competitive Pressure

CE= Content of the E-learning course

EC= E-learning curriculum

K = Regression Constant

6.7.5 Model Evaluation

This section deals with the evaluation of the model. From the analysis of all the stakeholders, there is a strong and a significant reliability between the variables used for the model to represent e-learning adoption and its determinant factors (F = 21.086, Prob. F-stats <0.05). Hair *et al.* (2010) have postulated that the model reaches statistical significance if the Sig<.05. In this study, for instance, the Sig =.000 of the F-statistics shows that the model is statistically significant. The degree of variance in the dependent and independent variables which are explained by the model is depicted by the R-Square in the model summary in table 6.10. From the table, R Square value = 0.597. This indicates an acceptably strong relationship between the dependent and independent variables of the regression model. In other words, at a level of 60 percent of the sample of the population, the independent variables can explain e-learning adoption.

A closer look at the regression analysis output at the institutional level indicates that all the independent factors have a statistically significant relationship with the dependent variable with e-learning curriculum having the greatest influence on e-learning adoption (β =0. 384, t=8. 569, p=0. 000, < 0.05). This means that the e-learning stakeholders in the university take into consideration the e-learning curriculum before adopting the e-learning system. The next strongest contributor to e-learning adoption is Expected Benefits (β =.360, t= 8.241, p=0.000, < 0.05), implying that the university as a whole is likely to adopt e-learning when it anticipates to achieve some benefits from it.

The third factor influencing e-learning adoption in the University of Ghana is Educational Partners (β = 0.208, t=5.273, p=0. 000, < 0.05). This indicates that educational partners have an influence on e-learning adoption in the university. The next factor is the Competitive Pressure (β=0.183, t=5.393, p=0.000, < 0.05). IT infrastructure is the fifth factor influencing e-learning adoption (β=0.147, t=-3.484, p=0.001, < 0.05).

Organisational compatibility (β = -.251, t= -5.728, p=.000, < 0.05) and Content of the e-learning course (β = -.175, t= -4.093, p=.000, < 0.05) were also found to be statistically significant to e-learning adoption. This implies, the two factors also influence e-learning adoption. Perceived ease of use was the last factor influencing e-learning adoption (β = 0.146, t= 2.869, p=.004, < 0.05).

6.7.5.1 Model Evaluation for Students

This section evaluates students' adoption of e-learning looking at factors which were statistically significant and otherwise.

Seven of the eight factors which were tested were statistically significant to e-learning adoption. These factors had their p-values less than 0.05 (p-value<0.05). These factors include IT infrastructure (p-value=.001<0.05), organisational compatibility (p-value=.001<0.05), expected benefits (p-value=.000<0.05), competitive pressure (p-value=.000<0.05), educational partners (p-value=.000<0.05), content of the e-learning course (p-value=.000<0.05) and e-learning curriculum (p-value=.000<0.05). This means that students in the university take into consideration these seven factors before adopting the e-learning system.

The only factor which was statistically insignificant to e-learning adoption was Perceived ease of use. This was because, the p-value of Perceived ease of use (.135) was greater than 0.05 which implies that e-learning adoption by students is not influenced by the perceived ease of use of the system.

6.7.5.2 Model Evaluation for Instructors

Two of the eight factors were statistically significant to e-learning adoption in terms of the instructors. Educational Partners (p-value=000<0.05) and e-learning curriculum (p-value=000<0.05) are the two factors which were statistically significant to e-learning adoption. This implies that, educational partners and the e-learning curriculum influence the instructors to adopt e-learning systems.

The remaining factors were statistically insignificant to e-learning adoption. This means these factors do not influence the instructors to adopt e-learning systems. These factors include, IT infrastructure (p-value=.792>0.05), Perceived ease of use (p-value=.352>0.05), Organisational Compatibility (p-value=.255>0.05), Expected benefits (p-value=.058>0.05), Competitive

Pressure (p-value=.244>0.05) and Content of the e-learning course (p-value=.665>0.05). These factors have their p-values greater than 0.05, hence making them statistically insignificant to e-learning adoption.

6.8 Discussion of results

This section discusses the analysis presented in the previous section towards evaluating the research questions and drawing findings. The discussion is in two parts reflecting the two research questions and the constructs in the research framework.

6.8.1 Nature of E-learning Adoption

Eze *et al.* (2013) and Senyo, Addae and Boateng (2014) are some studies which looked at the nature of technology adoption at the institutional level. Eze *et al.* (2013) for instance looked at the nature of the adoption of information technology (IT) by government-owned universities in Nigeria. In the quest to address the first research question of this study, a number of cross-tab analysis were done to determine the nature of e-learning adoption. The first cross tabbing was based on the various stakeholders and the number of years on the e-learning systems.

Table 6. 19: Stakeholders and period of using the system

	How long have you been using the e-learning system				
	Less Than 1 Year	2 Years	3 Years	5 Years And More	
Student	174	75	35	4	288
Lecturer/Instructor	29	44	0	0	73
Administrator	41	15	0	0	56
Total	**244**	**134**	**35**	**4**	**417**

Source: Field survey, 2015

The cross-tabbing of the various stakeholders and the period of their usage or interaction with the system revealed the following findings. The majority of the stakeholders combined have used the system for less than a year with a frequency of 244. The students who are in the majority of the respondents scored the highest frequency of 174 for using the e-learning system for less than a year. None of the instructors and administrators who answered the questionnaire had used the e-learning system for more than two years. This therefore affirms the assertion made by Macharia and Nyakwende (2010) that e-learning is still very much in its infancy across most of the African continent, though there is much enthusiasm amongst university administrators to fully develop e-learning systems.

Finding 1: E-learning yet to obtain a university-wide adoption.

A number of activities performed on the e-learning platform were presented to the respondents. These activities are seen to be basic in most e-learning systems, especially the SAKAI e-learning system which is the official e-learning system of the University of Ghana. These activities are outlined below.

i. View marks and grades
ii. Send and receive course announcements
iii. Upload assignments
iv. Download course materials
v. Send/Receive class announcements
vi. Discussions of topics with course mates and Instructors
vii. Organising lessons and lesson materials
viii. Taking all kinds of tests and quizzes online
ix. Sending emails to instructors, course mates or individuals
x. Detecting and fishing out cheating and plagiarism in students' or researchers' work

xi. Doing presentations online

Table 6.13 below illustrates how the respondents indicated their awareness and use of these functions on the E-learning platform:

Table 6. 20: Activities performed on the E-learning platform

ACTIVITIES ON THE E-LEARNING SYSTEM					
	YES	Percent	NO	Percent	TOTAL
View marks and grades	349	83.7%	68	16.3%	417
send and receive course announcements	247	59.2%	170	40.8%	417
Upload assignments	312	74.8%	105	25.2%	417
download course materials	337	80.8%	80	19.2%	417
Send/Receive class announcements	225	54.0%	192	46.0%	417
Discussions of topics with course mates and instructors	196	47.0%	221	53.0%	417
Organising lessons and lesson materials	113	27.1%	304	72.9%	417
Taking all kinds of tests and quizzes online	258	61.9%	159	38.1%	417
Sending emails to instructors, course mates or individuals	199	47.7%	218	52.3%	417
Detecting and fishing out cheating and plagiarism in students' or researchers' work	86	20.6%	331	79.4%	417
Doing presentations online	191	45.8%	226	54.2%	417

Source: SPSS Analysis output

From table 6.13 above, 83.7 percent of the respondents indicated that they are aware of the e-learning system being used for viewing marks and grades. In an e-learning report (University

of Ghana-BSU, 2015), a student indicated that instructors marked their assignments online, give their comments and marks/grades and resend the work to the students.

Again, from table 6.13, only 26 percent of the respondents indicated their knowledge and usage of the function of "Detecting and fishing out cheating and plagiarism in students' or researchers' work". Further elaboration on the various categories of users of the e-learning system is found in Appendix E. The administrators who should be more knowledgeable in all the various activities of the system were always in the minority in indicating their knowledge of most of the activities. This, therefore, shows that there should be enough training and orientation for the various stakeholders to keep them abreast with all the various activities on the e-learning system. Pituch and Lee (2006) in their study of the influence of system characteristics on e-learning use assert that the university administrators should prearrange some face-to-face class meetings and orientation programs prior to use of the e-learning system as a distance education method. They further suggest that, during these initial meetings, they should train all the users on how to use the e-learning system. This will help the users to be more receptive to the e-learning system.

Finding 2: Orientation and training programs, even if organized, have not been sufficient for all the stakeholders of the e-learning system, especially the administrators of the system to keep them abreast with the various activities that can be carried out on the system.

Deducing from the discussions above, the disparity in the awareness and the use of the various activities on the e-learning platform as shown in table 6.13 can be attributed to the absence of an e-learning policy for the university. An e-learning policy will provide a systematic guideline on how well the various stakeholders will be integrated into the e-learning platform which will promote total usage. This is supported by a report on the state of e-learning in University of

Ghana (University of Ghana- BSU, 2015) where it is asserted that the university had a draft e-learning policy that is yet to be approved.

Finding 3: The activities on the e-learning platform are not properly coordinated hence requiring a policy implementation.

6.8.2 Determinants of E-learning Adoption

This section is in two parts, first is the examination of the hypothesis to determine the significant factors from the conceptual model that fit the measurement model. Next, is the discussion of the conceptual model of the determinants of e-learning adoption.

6.8.2.1 Examination of Hypotheses

This section takes a closer look at how the hypothesis generated in chapter three after a thorough review of literature reviewed after the analysis.

Table 6. 21: Summary of hypotheses and results for University of Ghana

Hypothesis	Relationship	β	Result
H_1	IT infrastructure ⟶ E-learning adoption	.147	Significant
H_2	Perceived ease of use ⟶ E-learning adoption	.146	Significant
H_3	Organisational compatibility ⟶ E-learning adoption	-.251	Significant
H_4	Expected benefits ⟶ E-learning adoption	.360	Significant
H_5	Competitive Pressure ⟶ E-learning adoption	.183	Significant
H_6	Educational Partners ⟶ E-learning adoption	.208	Significant
H_7	Content of the course ⟶ E-learning adoption	-.175	Significant
H_8	E-learning curriculum ⟶ E-learning adoption	.384	Significant

Source: Author's construction

Hypothesis one (H1) stated that IT infrastructure has an influence on the adoption of e-learning in universities. From the regression analysis, the β coefficient of IT infrastructure is .147 with a p-value of 0.01. Since p-value of 0.01 is less than the alpha level of 0.5 (p-value<0.05), it

shows that, IT infrastructure has a positive and significant relationship with e-learning adoption. Therefore, the hypothesis that, "IT infrastructure has an influence on the adoption of e-learning" was accepted since there was enough evidence to support this. IT infrastructure was also statistically significant for students (p-value=.001) and administrators (p-value=.007) but was insignificant for the instructors (p-value=.792). Hence, it can be concluded that, the IT infrastructure has a direct influence on the adoption of e-learning for students and administrators but not on instructors.

Hypothesis two (H2) stated that "Perceived ease of using the system influences the adoption of e-learning in universities." The β coefficient of perceived ease of use was .146 with a p-value of .004. Since the p-value is lesser than the alpha level of 0.5 ($p<0.05$), perceived ease of using the system has an influence on the adoption of e-learning at the institutional level hence the hypothesis is accepted. Further analysis also shows that perceived ease of use is statistically insignificant for students (p-value=.135) and administrators (p-value=.125) but not on instructors (p-value=.000). Therefore, perceived ease of use influences e-learning adoption for only instructors but not students and administrators.

Hypothesis three (H3) also stated that "Organisational compatibility influences the adoption of e-learning in universities". The results indicated that the β coefficient was -.251 with p-value of .00. Since the p value is less than the significance level of 0.05, the hypothesis was accepted. The negative means there is an inverse relationship between organisational compatibility and e-learning adoption. Organisational compatibility was also statistically significant for students (p-value=.001) and administrators (p-value=.015). But was insignificant for instructors (p-value=.255). Therefore, organisational compatibility influences students and administrators to adopt e-learning but not instructors.

Investigating hypothesis four (H4) revealed the β coefficient of expected benefits .360 and the p value being .000. Therefore, the hypothesis that "Expected benefits facilitate e-learning adoption in universities." was accepted since there was enough evidence to support it. Further analysis also indicates that expected benefits influence students (p-value=.000) and administrators (p-value=.003) to adopt e-learning systems. Whereas expected benefits was statistically insignificant for instructors (p-value=.054). Hence, expected benefits does not influence adoption of e-learning systems by instructors but influences students and administrators.

Hypothesis five (H5) states that "competitive pressure influences e-learning adoption in universities". The β coefficient of competitive pressure is .183 with a p value of .000. Since the p value is less than the significance level of 0.05, the hypothesis is accepted. The hypothesis is also accepted for only students (p-value=.000) but not instructors (p-value=.244) and administrators (p-value=.948). This implies students' adoption of e-learning is influenced by competitive pressure, whiles there is no influence of competitive pressure on instructors and administrators to adopt e-learning.

"Educational partners influence e-learning adoption in universities" is the hypothesis six (H6). From the model the β coefficient of educational partners when regressed on E-learning adoption is .208 at a significance level of .000, hence the hypothesis is accepted. On the other hand, educational partners are insignificant for administrators (p-value=.561) but not students (p-value=.000) and instructors (p-value=.000). This means educational partners influence students and instructors to adopt e-learning but not administrators.

In examining hypothesis seven (H7) which is "The content of the e-learning course influences e-learning adoption in universities", β coefficient of -.175 with a significant p value of .000. The negative β coefficient indicates an inverse relationship with e-learning adoption, but there is a statistically significant relationship between content of the e-learning course and e-learning adoption at the institutional level. At the stakeholder level, the content of the e-learning course is not statistically significant for instructors (p-value=.665) and administrators (p-value=.647). On the other hand, it is significant for students (p-value=.000). This shows that, the content of the e-learning course influences only students but not instructors and administrators to adopt e-learning.

Hypothesis eight (H8) states that "the e-learning curriculum influences the nature of e-learning adoption in universities". The results of the analysis indicate β coefficient of .384 and a p value of .000 which is less than the alpha level of 0.5 (p-value<0.05). This shows that the e-learning curriculum has an influence on e-learning adoption. The e-learning curriculum is also statistically significant for students (p-value=.000) and instructors (p-value=000) but not for administrators (p-value=.572). This implies, e-learning curriculum influences students and instructors to adopt e-learning but not administrators. Table 6.22 below shows a summary of the hypotheses and the stakeholders.

Table 6. 22: Summary of hypotheses and results for stakeholders

Hypothesis	Factor	Students	Instructors	Administrators
H_1	IT infrastructure	Significant	Insignificant	Significant
H_2	Perceived ease of use	Insignificant	Significant	Insignificant
H_3	Organisational compatibility	Significant	Insignificant	Significant
H_4	Expected benefits	Significant	Insignificant	Significant
H_5	Competitive Pressure	Significant	Insignificant	Insignificant
H_6	Educational Partners	Significant	Significant	Insignificant
H_7	Content of the course	Significant	Insignificant	Insignificant
H_8	E-learning curriculum	Significant	Significant	Insignificant

Source: Author's construction

6.8.2.2 Discussion of Critical Determinants of E-learning Adoption

6.8.2.2.1 Technological Context

In the literature review, the technological context of the study initially consisted of perceived ease of use, IT infrastructure, system quality and e-learning experts.

IT infrastructure was seen to have a significant impact on the adoption of e-learning and this is in in line with extant studies (Raouf, Naser & Jassim, 2012; Hassanzadeh, Kanaani & Elahi, 2012; Namisiko, Munialo & Nyongesa, 2014; Sharma & Pandit, 2011; Eze *et al.*, 2013). These prior studies emphasized the importance of the IT infrastructure of the universities in promoting the adoption of e-learning systems. For instance, Eze *et al.*, 2013 in their study in Nigeria, which is another developing country, discovered that the ICT infrastructure is a key component of every development in ICT including e-learning adoption. They further postulated that, ICT assists socioeconomic development and promotes operational efficiency. They categorized ICT

infrastructure as consisting of electricity, internet connectivity, technology support, obsolete technology, and knowhow. They concluded that IT infrastructure was the most significant determinant of e-learning adoption in Nigeria, which is in line with this study. In the study, IT infrastructure influences students and administrators but not instructors.

Perceived ease of use, which refers to the degree to which the prospective user expects an e-learning system to be free of effort (Davis, 1989) was also seen to be significant to the adoption of e-learning in this study. Perceived ease of use, therefore, influences only instructors to adopt e-learning but not students and administrators. This finding also reinforces those of Bhuasiri *et al.* (2012), Namisiko, Munialo and Nyongesa (2014), Motaghian, Hassanzadeh and Moghadam (2013), Islam (2013) and Tseng, Lin and Chen (2011) who found out that Perceived ease of use was a motivational factor for e-learning adoption. For instance, in a finding by Namisiko, Munialo and Nyongesa (2014) on developing an optimization framework for e-learning in developing countries using private universities in Kenya as the case, the authors defined perceived ease of use as the degree to which users can utilize the contemporary ICT tools for e-learning purposes.

6.8.2.2.2 Organisational Context

The organisational context in this study refers to the universities in the developing countries. Organisational compatibility, expected benefits/ perceived usefulness, size of the institution and human and financial resources. After the analysis, organisational compatibility and expected benefits/Perceived usefulness had significant impact on the adoption of e-learning in universities.

Organisational compatibility was looked at in terms of beliefs, values and past experiences, needs, priorities and policies of the university (Raouf, Naser & Jassim, 2012). The university as a whole should be ready to accept the use of the e-learning systems to support teaching and learning. Accordingly, organisational compatibility had a significant influence on e-learning adoption as supported by extant e-learning adoption literature on developing countries (Liaw & Huang, 2013; Islam, 2013; Motaghian, Hassanzadeh & Moghadam, 2013; Sawang, Newton & Jamieson, 2013). Sawang, Newton and Jamieson (2013) for instance, also assert that organisational support significantly predicted learners' intention to adopt further e-learning. From the study, organisational compatibility had an inverse relationship with e-learning adoption. This implies that, a more complex organisational compatibility will lead to e-learning being less adopted. This assertion is in line with Raouf, Naser and Jassim (2012). According to Raouf, Naser and Jassim (2012), rate of e-learning adoption becomes less when the organisation is more complex and vice versa. They further posit that there is likely to be less variance in the organisational environments in which their e-learning adoption is embedded in their social setting hence requiring less organisational compatibility to influence adoption. In the study, organisational compatibility influences students and administrators but not instructors.

Perceived benefits or Expected benefits, refer to the belief that new technologies provide more benefits than old ones (Raouf, Naser & Jassim, 2012). Expected benefits was statistically significant to e-learning adoption in universities. This also complements the findings of Liaw and Huang (2013), Islam (2013), Tagoe (2012) and Motaghian, Hassanzadeh and Moghadam (2013) who found a significant relationship between expected benefits and e-learning adoption. These prior studies emphasized the importance of expected benefits in adoption of e-learning. Tagoe (2012) also posits that there is a significant relationship between expected benefits and

the frequency that one uses e-learning systems. Hence, expected benefits' significance as a determinant in this study was in the right direction. Again, it was significant for students and administrators but not instructors.

6.8.2.2.3 Environmental Context

The environmental context includes the size and structure of the industry, the firm's competitors, the macroeconomic context, and the regulatory environment (Tornatzky & Fleischer, 1990). The environment of a university includes other competing universities, agencies such as Non-governmental organisations, governments, local authorities, ministries and others. Environmental context constituted of educational partners and Competitive Pressure.

Educational partners and competitive pressure were both significant determinants of e-learning adoption. Educational partners include governments, Non-Governmental organisations (NGOs), multi-national agencies and others. These agencies are indispensable contributors to the successful implementation of projects in developing countries mostly in African countries. This study found educational partners to be important contributors to the adoption of e-learning as this is supported by extant literature (BSU-University of Ghana, 2015; Islam, 2013; Hassanzadeh, Kanaani & Elahi, 2012; Raouf, Naser & Jassim, 2012). Educational partners influence in e-learning adoption, especially in developing countries is immeasurable. The active role of educational partners in the implementation of e-learning was highlighted in a mapping report on the state of e-learning in the University of Ghana (University of Ghana-BSU, 2015). According to the report, the University had secured funding from the Chinese Government through the Government of Ghana to provide e-learning resources. The project, dubbed Chinese phase 1 and 2 is expected to provide the university with the needed resources

for e-learning implementation. Therefore, Educational Partners' significance as a determinant in this study was in the right direction. Also, it was significant for students and instructors but not administrators.

Universities are virtually in a competition for dominance, prestige, popularity and even for students. Technological innovations in one university are viewed as threats for another university. Universities who adopt e-learning are seen as being better in the functions of the higher education and this opens new opportunities in the fields of teaching and transferring knowledge to the students (Raouf, Naser & Jassim, 2012). Prior studies (Noh *et al.*, 2012; Raouf, Naser & Jassim, 2012; Amirkhanpour, Kaufmann & Garcia-Gallego, 2014) have affirmed the significance of competitive pressure in the adoption of e-learning which this study postulates. Noh *et al.* (2012) for instance postulates that the implementation of e-learning in other universities had encouraged i-Learn Centre (iLeC) of Universiti Teknologi MARA (a public university in Malaysia) to move forward to also adopt e-learning. The university's position as the premier university in the country and in competition with other public and private universities for prestige and attention puts a lot of pressure on the university to adopt innovations including e-learning. It is therefore right for this study to find competitive pressure as a determinant of e-learning adoption. The study also found competitive pressure to be significant for students to adopt e-learning but not instructors and administrators.

6.8.2.2.4 The Nature of the Course

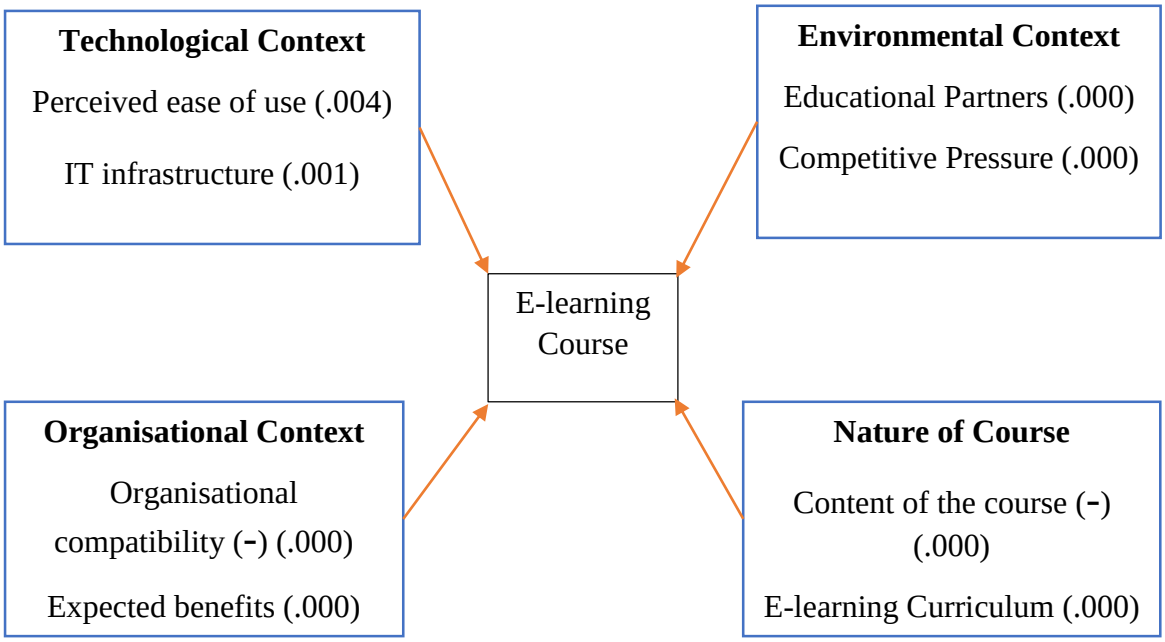
In extending the TOE framework, other factors were identified to also contribute to e-learning adoption. These factors were grouped under the nature of the course. This constituted the content of the course and e-learning curriculum.

The content of the course was statistically significant to e-learning adoption. This is supported by extant literature (Hassanzadeh, Kanaani & Elahi, 2012; Amirkhanpour, Kaufmann & Garcia-Gallego, 2014; Šolc, Legemza & Sütőová, 2012). The content of the course had an inverse relationship with e-learning adoption. This implies a more complex content of the course will lead to less e-learning adoption and vice versa. Hence, the content of the course should be structured to meet the various needs of the users. As postulated by Šolc, Legemza and Sütőová (2012), users adopt e-learning systems based on the visualization of explained lessons, attractively of learning environment, provision of a platform for individual study and testing, especially for external students, and study programs with higher number of students. A more complex visualization and complicated feature of the e-learning system will lead to less of e-learning adoption. It is therefore in the right direction in this study for the content of the e-learning course to influence the adoption of e-learning. Again, the content of the e-learning course was significant for students to adopt e-learning but not instructors and administrators.

Some subjects are difficult to teach and learn than others. Chemotherapeutic pharmacology for instance is a traditionally challenging subject to both teach and learn (Anderson, Plevin & McKinnon, 2012). Prior studies (Baumann-Birkbeck *et al.*, 2014; Namisiko, Munialo & Nyongesa, 2014; Anderson, Plevin & McKinnon, 2012) pointed e-learning curriculum as a significant determinant of e-learning. This study also found e-learning curriculum as a very strong determinant of e-learning. This position is elaborated by Namisiko, Munialo and Nyongesa (2014) who assert that, for an effective e-learning strategy, a proper e-learning curriculum that is not pulled directly from books and classroom courses should be designed. The absence of a proper e-learning curriculum is a major obstruction to effective deployment and adoption of e-learning in universities. It can therefore, be concluded that, the subjects offered on the e-learning platform at the university is suitable to be run on the e-learning

system. Hence, making the e-learning curriculum a significant determinant of e-learning adoption. Again, e-learning curriculum was significant for students and instructors but not administrators. The final model is presented in figure 6.3 below.

Figure 6. 3: E-learning Adoption Model



(-) indicates an inverse relationship with e-learning adoption.

Figures in parentheses indicate the p-values (significant values) of the factors.

Source: Author's construction

6.9 Summary

The Chapter provided a thorough discussion on the analysis and findings from the data. The analysis and discussion was to answer the research questions posed at the beginning of the study. The analysis section provided findings on the demographic survey of participants in order to address the first research objective of determining the nature of e-learning adoption in Ghanaian universities. The second research objective of investigating the determinants of e-learning adoption was undertaken through the use of correlation test, regression analysis, reliability tests, factor analyses and ANOVA.

The discussion of the findings from the analysis in relation to the first research objective indicated that e-learning is yet to receive a university-wide adoption.

In relation to the second research question, which is the final measurement model after the various statistical tests were carried out, all the eight variables proposed in the conceptual model were retained (IT infrastructure, perceived ease of use, organisational compatibility, expected benefits, Educational partners, competitive advantage, content of the e-learning course and e-learning curriculum). Further analysis also indicated that IT infrastructure, organisational compatibility, Expected benefits, competitive pressure, educational partners, content of the e-learning course and e-learning curriculum influence students' adoption of e-learning. Whereas perceived ease of use, educational partners and e-learning curriculum influence instructors to adopt e-learning. Again, IT infrastructure, organisational compatibility and expected benefits are adoption determinant factors for the e-learning administrators. Therefore, these factors are the determinants of e-learning adoption.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATION

7.1 Introduction

The previous chapters presented the introduction to the study, review of literature, research framework, the methodology, study context, analysis and discussion of findings. This research study has explored the nature and determinants of e-learning adoption in Ghanaian universities. This concluding chapter presents the summary of the study and presents the contribution to knowledge. The chapter begins by reviewing the research questions as outlined in Chapter 1 and how the questions were addressed by the study. Following this, there is a discussion on the study's contribution to knowledge in terms of application of theory, offering rich insight and drawing specific implications for research and practice. The limitations of the research are then addressed followed by recommendations for further research.

7.2 Summary of the Research Process

This study investigated the adoption of e-learning in universities in a developing country. Specifically, the nature and determinants of e-learning adoption. To this end, these research objectives were formulated:

1. To describe the nature of e-learning adoption in Ghanaian universities.
2. To explore the determinants of e-learning adoption in Ghanaian universities.

To address these objectives, the Technology, Organisation, and Environment (TOE) framework was therefore adopted as a guiding lens in order to tackle e-learning adoption from multiple contexts. The ability of the TOE framework to address organisational adoption of IT from three different perspectives (technology, organisation and environment) was the motive

for its selection out of other adoption frameworks like DOI and TAM (Nkhoma & Dang, 2013). Again, the TOE model was chosen for this work because it is about the only model that emphasizes more on individual different factors (IDFs) to underpin the distinctive nature of decision making while recognizing the influence of technology development and organisation's conditions involving necessary business and organisational reconfiguration shaped by industry environment (Eze *et al.*, 2013).

The TOE framework was therefore extended to include a fourth component (Nature of Course), hence looking at adoption from four different perspectives. After an extensive review of literature, development of appropriate hypothesis and a discussion of the context of study, the study employed questionnaires to collect data from all the three major e-learning stakeholders (students, instructors and e-learning administrators). The constructs employed in the study were validated by correlation tests, regression assumption tests, and then multiple regression and ANOVA.

7.3 Summary of the Research Findings

The finding of the study is in two strands. First, the findings on the nature of e-learning adoption in Ghanaian universities. Second, findings on the determinants of e-learning adoption. Detailed discussion on the findings are provided in the two subsections below.

7.3.1 Nature of E-learning Adoption

Three situations were revealed after rigorous cross-analysis of the demographic data. The first finding indicates that, e-learning is yet to be fully accepted university-wide as most of the users of the e-learning system in universities; students, instructors and administrators, have used the e-learning systems for less than a year. This was not surprising as e-learning is yet to be fully

adopted university-wide in developing countries for which Ghana is one as postulated by Macharia and Nyakwende (2010).

Another finding evident was the popular activity on the e-learning platform. It was discovered that, the prevalent activity on the e-learning platform was "viewing marks and grades". The e-learning users in the University indicated that they are aware the e-learning system is used for viewing marks and grades. And some activities were less popular with the users of the e-learning system. For instance, "Detecting and fishing out cheating and plagiarism in students' or researchers' work" was the least popular activity on the e-learning platform.

The low patronage of the activities on the e-learning system was blamed on the orientation and training programs, if organized, which have not been sufficient for all the stakeholders of the e-learning system, especially the administrators of the system to keep them abreast with the various activities that could be carried out on the system.

7.3.2 Determinants of E-learning Adoption

The second research objective of determining e-learning adoption factors necessitated the use of exploratory factor analysis, Correlation tests, multiple regression and ANOVA to validate the conceptual model and the hypothesis through the Technology, Organisation and Environment Framework (TOE) and the Nature of the Course.

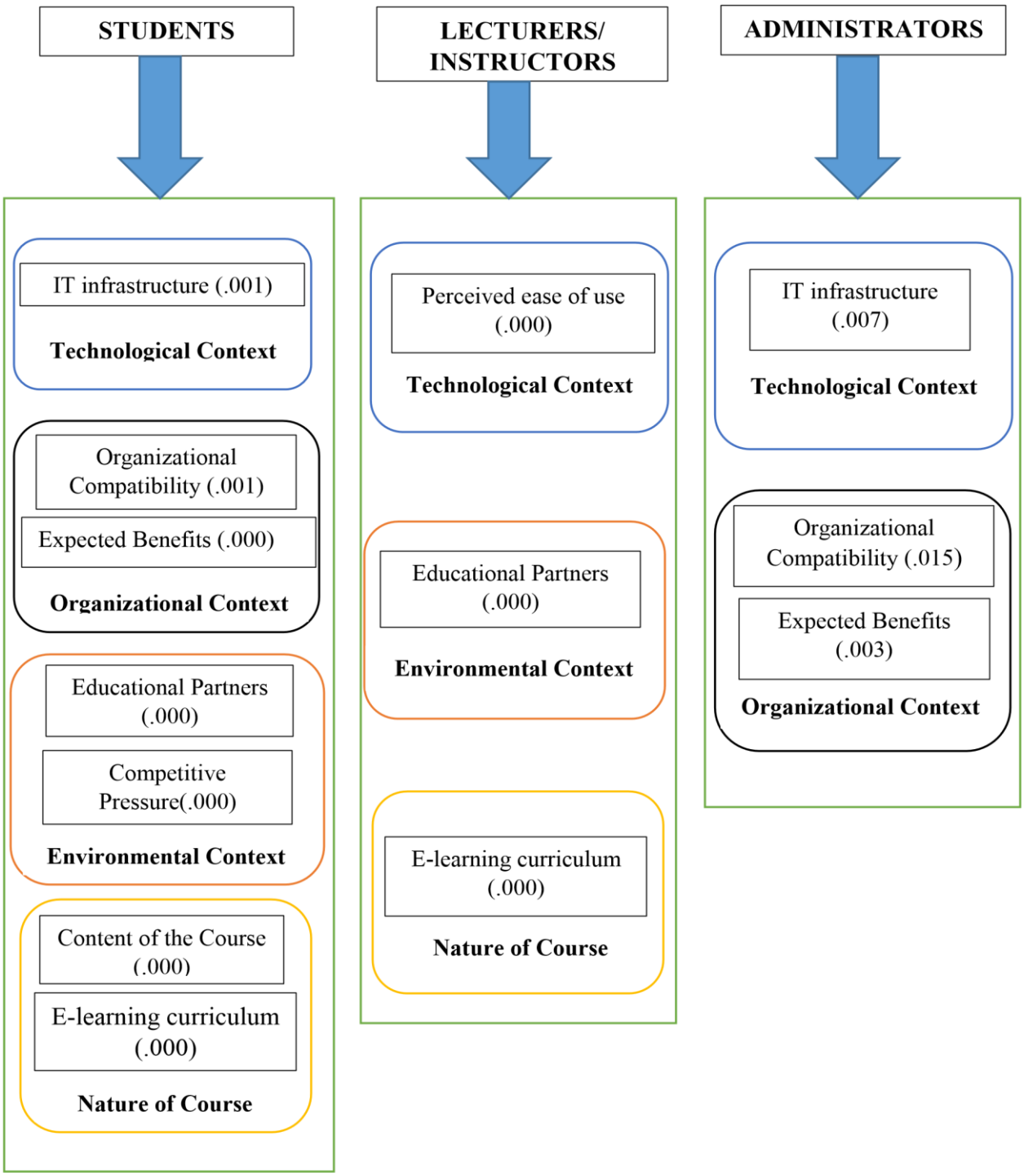
The conceptual model built from constructs of the TOE framework and the fourth factor (Nature of course) consisted of eight (8) factors. The results of the measurement model validation using exploratory factor analysis and correlation tests indicated that, IT infrastructure, perceived ease of use, expected benefits, organisational compatibility,

competitive pressure, educational partners, content of course and e-learning curriculum were factors applicable to investigating e-learning adoption in Ghanaian universities.

The multiple regression technique was chosen among other techniques to test and validate the hypotheses proposed in relation to the eight (8) factors and the dependent variable. The test indicated that, all eight factors were statistically significant to e-learning adoption. Thus, their p-values were all less than 0.05 ($p<0.05$).

Overall, the determinants of e-learning adoption are IT infrastructure, perceived ease of use, expected benefits, organisational compatibility, competitive pressure, educational partners, content of course and e-learning curriculum.

Figure 7.1: E-learning adoption factors for stakeholders



Figures in parenthesis indicate the p-values (significant values) for the factors.

Source: Author's construction

Further analysis also indicated that IT infrastructure, organisational compatibility, expected benefits, competitive pressure, educational partners, content of the e-learning course and e-learning curriculum influence students' adoption of e-learning. Whereas perceived ease of use, educational partners and e-learning curriculum influence instructors to adopt e-learning. Also, IT infrastructure, organisational compatibility and expected benefits are adoption determinant factors for the e-learning administrators. This is summarized in Figure 7.1.

7.4 Implications of the Study

Significant contributions have been made to research, practice and policy.

7.4.1 Implication for research

In terms of research, this study contributes to the body of knowledge on e-learning by validating and extending the Technology, Organisation and Environment framework in an African perspective. This is an imperative contribution given the presence of cultural contrasts and societal peculiarities existing in diverse nations (Effah, 2012). The study also provides empirical support that, the adoption of e-learning can also be studied from a multi-dimensional perspective (technological, organisational and environmental contexts) (Raouf, Naser and Jassim, 2012). This has, therefore, provided generalizability power to the factors that determine e-learning adoption in higher learning institutions. Lastly, the study bridges the ostensible literature gap by providing a multi-facet (student, lecturer/instructor and e-learning administrator) perspective in identifying the determinants of e-learning adoption from a developing country. For instance, the study provides the specific factors that influence the various stakeholders to adopt e-learning. That is, IT infrastructure, Organisational compatibility, Expected benefits, competitive pressure, educational partners and content of the e-learning course and e-learning curriculum influence students' adoption of e-learning.

Whereas perceived ease of use, educational partners and e-learning curriculum influence instructors to adopt e-learning. IT infrastructure, organisational compatibility and expected benefits influence the e-learning administrators to adopt e-learning systems.

7.4.2 Implication for Practice

The study contributes to practice by drawing attention of university administrators to specific factors that either enable or hinder e-learning adoption. Thus, universities venturing into e-learning adoption have a fundamental understanding of the nature and determinants, a knowledge arguably not available previously to Universities in developing countries. Therefore, universities planning to adopt e-learning in Ghana can take a critical look at IT infrastructure, perceived ease of use, expected benefits, organisational compatibility, competitive pressure, educational partners, content of course and e-learning curriculum.

Again, the university can introduce cloud computing technology to support the e-learning systems. The cloud computing environment is becoming an important platform in the provision of online systems. Therefore, there is the need to redefine and redesign the educational systems to meet the current educational needs in the light of cloud as postulated by Verma and Rizvi (2013). Cloud computing will provide convenient, on-demand network access to a shared pool of configurable computing resources. For example, networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction (Mell & Grance, 2011).

7.4.3 Implication for Policy

In terms of policy, it is believed that creating a conducive ICT environment will positively influence the adoption of e-learning. The enabling environment in the form of legislation, ICT

infrastructure (Tagoe, 2012) and policy (University of Ghana-BSU, 2015) will propagate the e-learning agenda thereby stimulating economic growth and development. An e-learning policy will provide a systematic guideline on how well the various stakeholders will be integrated into the e-learning platform which will promote total usage. Again, the policy should be structured taking into consideration the different adoption determinants for the various stakeholders. This will provide a comprehensive policy which will lead to the full adoption of e-learning hence stakeholders will not only use the system to view grades but also perform other activities which are equally important in the system.

7.5 Limitations and Future Research Directions

Any research work inevitably is expected to encounter some basic limitations, and this study is no exception. Below are some limitations that have been identified in this study with suggested future research directions.

First, the timeframe for the completion of this research was a significant constraining element which influenced the conduct of a comprehensive research. However, in view of these difficulties, all attempts were made to undertake a valid and comprehensive study. Again, the study was limited to the University of Ghana because of the ease of access to respondents and data that the researcher needed to gather. Hence, making it difficult for generalization of findings. Therefore, future studies should be carried out using more than a single university to provide for comparison and testing of findings.

Again, the result of the quantitative study might not be applicable in qualitative studies. Therefore, future studies should consider testing the determinants in a qualitative setting to

lend more generalization of the findings as postulated by Eze *et al.* (2013) that qualitative methods help to generate rich insights.

Future studies should consider researching into mobile enabled learning (m-learning) and e-learning in cloud computing since they are emerging trends in the educational sector.

REFERENCES

Abel, R. (2005). *Will Open Source Software Become an Important Institutional Strategy in Higher Education?* London: Alliance for Higher Education Competitiveness Inc. Retrieved from http://www.a-hec.org

Afifi, G. M. (2011). E-learning as an alternative strategy for tourism higher education in Egypt. *Quality Assurance in Education, Vol. 19 Iss 4,* 357 - 374.

Ali, Z. M., Mustafa, Z., Ying, Y. S., Suradi, N. R., Abidin, N. Z., Shahabuddin, F. A., . . . Ahmad, S. (2011). E-learning Service in the School of Mathematical Sciences. *Procedia Social and Behavioral Sciences 18,* 316–325.

Alkhalaf, S., Drew, S., & Alhussain, T. (2012). Assessing the impact of E-learning systems on learners: a survey study in the KSA. *Procedia - Social and Behavioral Sciences 47,* 98 – 104.

Alkhalaf, S., Drew, S., AlGhamdi, R., & Alfarraj, O. (2012). E-learning system on higher education institutions in KSA: attitudes and perceptions of faculty members. *Procedia - Social and Behavioral Sciences 47,* 1199 – 1205.

Alreck, P. L., & Settle, R. B. (1985). *The survey research handbook.* Homewood, Ill: R.D. Irwin.

Al-Samarraie, H., Teo, T., & Abbas, M. (2013). Can structured representation enhance students' thinking skills for better understanding of E-learning content? *Computers & Education 69,* 463–473.

Amirkhanpour, M., Kaufmann, H. R., & Garcia-Gallego, A. (2014). An extensive study of the E-learning practices within Cyprus universities. *International Journal of Organisational Analysis, Vol. 22 Iss 3,* 317 - 341.

Anderson, C., Plevin, M., & McKinnon, A. (2012). Educating our students about pharmaceutical care for those living with cancer. *Am J Pharm Educ. 76 (7).*

Angeles, R. (2013). 7G's Environmental Initiative through the Lens of the Technology-Organisation-Environment (TOE). *Computer Technology and Application, 4,* 39-68.

Archer, M., Bhaskar, R., Collier, A., Lawson, T., & Norrie, A. (1998). *Critical Realism: Essential Readings.* London: Routledge.

Asabere, N. Y., & Enguah, S. E. (2012). Use of Information & Communication Technology (ICT) in Tertiary Education in Ghana: A Case Study of Electronic Learning (E-learning). *International Journal of Information and Communication Technology Research, Volume 2 No. 1*.

Asabere, N. Y., & Mends-Brew, E. (2012). Distance Learning and Electronic Learning (E-learning): Are They the Same? An Overview of Some Tertiary Institutions in Ghana. *International Journal of Information and Communication Technology Research 2 (9)*, 704-715.

Awidi, I. (2008). Developing an E-learning Strategy for Public Universities in Ghana. *EDUCAUSE Quarterly Vol. 31 No. 2*, 66 – 69.

Back, D. A., Haberstroh, N., Sostmann, K., Schmidmaier, G., Putzier, M., Perka, C., & Hoff, E. (2014). High Efficacy and Students' Satisfaction after Voluntary vs Mandatory Use of an E-learning Program in Traumatology and Orthopedics—A Follow-up Study. *Journal of Surgical Education*. Retrieved from http://dx.doi.org/10.1016/j.jsurg.2013.11.007

Bader, L., & Ko¨ttstorfer, M. (2013). E-learning from a student's view with focus on Global Studies. *Multicultural Education & Technology Journal, Vol. 7 Iss 2/3*, 176 - 191.

Baloian, N., Pino, J., & Hoppe, H. (2000). A Teaching/Learning Approach to CSCL. *Proceedings of the 33rd Hawaii International Conference on Systems Sciences.* Hawaii: IEEE Computer Society, 2000.

Barker, K., Omoni, G., Wakasiaka, S., Watiti, J., Mathai, M., & Lavender, T. (2013). 'Moving with the times' taking a glocal approach: A qualitative study of African student nurse views of e learning. *Nurse Education Today 33*, 407–412.

Barrett, B., Higa, C., & Ellis, R. (2012). Emerging university student experiences of learning technologies across the Asia Pacific. *Computers & Education 58*, 1021–1027.

Bates, T. (2001). *National strategies for E-learning in post-secondary education and training.* Paris: UNESCO: International Institute for Educational Planning.

Baumann-Birkbeck, L., Karaksha, A., Anoopkumar-Dukie, S., Grant, G., Davey, A., Nirthanan, S., & Owen, S. (2014). Benefits of E-learning in chemotherapy

pharmacology education. *Currents in Pharmacy Teaching and Learning*. Retrieved from http://dx.doi.org/10.1016/j.cptl.2014.09.014

Bell, B. S., & Federman, J. E. (2013). E-learning in Postsecondary Education. *The Future of Children, Vol. 23, No. 1,* 165-185.

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case Research Strategy in studies of Information Systems. *MIS Quarterly 11 (3),* 369-386.

Benta, D., Bologa, G., & Dzitac, I. (2014). E-learning Platforms in Higher Education. Case Study. *Procedia Computer Science 31,* 1170 – 1176.

Berry, W. D., & Feldman, S. (1985). *Multiple Regression in Practice. Sage University Paper Series on Quantitative Applications in the Social Sciences.* Newbury Park, CA: Sage.

Beverly, L. (2014). Temporal experiences of E-learning by distance learners. *Education + Training, Vol.56 Iss 2/3,* 179 - 189.

Bhaskar, R. (1998). *The possibility of naturalism: a philosophical critique of the contemporary human sciences.* London: Routledge.

Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J. J., & Ciganek, A. P. (2012). Critical success factors for E-learning in developing countries: A comparative analysis between ICT experts and faculty. *Computers & Education 58,* 843–855.

Bisman, J. E. (2002). The critical realist paradigm as an approach to research in accounting. *Poster presentation at the Accounting Association of Australian and New Zealand Annual Conference,* Perth, Australia.

Boateng, R., Molla, A., & Heeks, R. (2009). E-commerce in Developing Economies: A Review of Theoretical Frameworks and Approaches. In K. Rouibah, O. Khalil, & H. Ella, *Emerging Markets and E-commerce in Developing Economies.* Hershey PA: IGI Publishing.

Brace, N., Kemp, R., & Snelgar, R. (2006). *SPSS for Psychologists* (3rd Ed.). New York: Palgrave Macmillan.

Brandon, B. (. (2007). The E-learning Guild's handbook of E-learning strategy. *The E-learning Guild*. Santa Rosa, CA. Retrieved from http://www.learningpeaks.com/100107_strategy-ebook (2).pdf

Brown, T. H. (2003). The role of m-learning in the future of E-learning in Africa? *Presentation at the 21st ICDE World conference, June 2003, Hong Kong*.

Bushaway, R. (2003). *Managing research.* Berkshire, GBR: McGraw-Hill Education.

CampusComputing. (2013). A Profile of the LMS Market. *CampusComputing*, 23.

Cattell, H. (1996). The original big-five: A historical perspective. *European Review of Psychology, 46(1),* 5-14.

Chen, S., & Dhillon, G. (2003). Interpreting dimensions of consumer trust in e-commerce. *Information and Technology Management, 4*(2/3), 303-318.

Chen, Y.-C. (2014). An empirical examination of factors affecting college students' proactive stickiness with a web-based English learning environment. *Computers in Human Behaviour 31,* 159–171.

Chikh, A., & Berkani, L. (2010). Communities of practice of E-learning, an innovative learning space for E-learning actors. *Procedia - Social and Behavioral Sciences Volume 2, Issue 2*, 5022–5027.

Chokri, B. (2012). Factors influencing the adoption of the E-learning technology in teaching and learning by students of a University class. *European Scientific Journal vol.8, No.28*.

Clark, R., & Mayer, R. (2011). *E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning, 3rd ed.* San Francisco, CA: Pfeiffer.

Coakes, J. C., & Ong, C. (2011). *SPSS Version 18.0 for Windows Analysis without Anguish* (1st Ed.). Dougall Street, Milton: John Wiley & Sons Australia Ltd.

Conole, G., & Oliver, M. (2007). *Contemporary Perspectives in E-learning Research.* London: Routledge.

Conway, J., & Huffcutt, A. (2003). A review of evaluation of exploratory factor analysis practices in organisational research. *Organisational Research Methods, 6*(2), 147-168.

Costello, A. B., & Osborne, J. W. (2005). Exploratory Factor Analysis. *Practical Assessment Research & Evaluation, Vol 10, No 7*.

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and mixed Methods Approach* (3 Ed.). Los Angeles, CA: SAGE Publications, Inc.

Creswell, J. W., & Clark, V. L. (2010). *Designing and Conducting Mixed Methods Research.* California: Sage Publications Inc.

Creswell, J., & Clark, P. V. (2007). *Designing and conducting mixed methods research.* Thousand Oaks, CA: Sage.

Csete, J., & Evans, J. (2013). Strategies for impact: enabling e-learning project initiatives. *Campus-Wide Information Systems, Vol. 30 Iss 3,* 165 - 173.

Csikosova, A., Senova, A., & Culkova, K. (2012). Improving of communication and presentation skills of the universities' students through e- learning. *Procedia - Social and Behavioral Sciences 46,* 2847 – 2851.

Csikosova, A., Teplicka, K., & Senova, A. (2012). Communication and humanization of university education through e- learning. *Procedia - Social and Behavioral Sciences 46,* 2978 – 2982.

Czerniewicz, L., & Brown, C. (2009). A study of the relationship between institutional policy, organisational culture and E-learning use in four South African universities. *Computers & Education 53,* 121–131.

Dadzie, P. S. (2009). E-learning and E-Library Services at the University of Ghana: prospects and challenges. *Information Development Vol. 25, No. 3,* 207-217.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13(3),* 319-340.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19(4),* 9–30.

Deng, L., & Tavares, N. J. (2013). From Moodle to Facebook: exploring students' motivation and experiences in online communities. *Computers & Education, 68,* 167–176.

Duan, Y., He, Q., Feng, W., Li, D., & Fu, Z. (2010). A study on E-learning take-up intention from an innovation adoption perspective: A case in China. *Computers & Education 55,* 237–246.

Durbin, J., & Watson, G. S. (1951). Testing for Serial Correlation in Least Squares Regression, II. *Biometrika 38 (1–2),* 159–179.

Effah, J. (2012). Mobilizing Culture for E-Business in Developing Countries: An Actor Network Theory Account. *Electronic Journal of Information Systems in Developing Countries, 52(5)*, 1-17.

Ellis, R. K. (2009). Field Guide to Learning Management Systems. *ASTD Learning Circuits*.

EPSA. (2011). *EPSA Implementation Framework.* (INTAN): I. T. A. N.

eSyllabus. (2015). *Our Mission/Programs*. Retrieved from eSyllabus.com: http://esyllabustrial.artisteer.net/

Eze, S. C., Awa, H. O., Okoye, J. C., Emecheta, B. C., & Anazodo, R. O. (2013). Determinant factors of Information Communication Technology (ICT) Adoption by Government Owned Universities in Nigeria- A qualitative approach. *Journal of Enterprise Information Management Vol. 26 No. 4*, 427-443.

Fabrigar, L., Wegener, D., MacCallum, R., & Strahan, E. (1999). Evaluating the use of exploratory factor anlysis in psychological research. *Psychological Methods, 4*(3), 272-299.

Ferna´ndez-Molina, J. C., Muriel, E., Vives-Gracia, J., Riera, P., & Martı´n, O. (2011). Copyright and e-learning: professors' level of knowledge about the new Spanish law. *Aslib Proceedings, Vol. 63 Iss 4*, 340 - 353.

Fidel, R. (1984). The case study method: a case study. *Library & Information Science Research, 6(3)*, 273-288.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Fisher, C. (2010). *Researching and Writing a Dissertation, An Essential Guide for Business Students.* Essex: Pearson Education Limited.

Fontaine, G. (2002). Presence in "Teleland.". In K. E.-R. (eds.), *Handbook of Online Learning: Innovations in Higher Education and Corporate Training* (pp. 21–52). Thousand Oaks, CA: Sage.

Fraenkel, J. R., & Wallen, N. E. (2000). *How to Design and Evaluate Research in Education.* Boston: McGraw Hill.

Frehywot, S., Vovides, Y., Talib, Z., Mikhail, N., Ross, H., Wohltjen, H., . . . Scott, J. (2013). E-learning in medical education in resource constrained low- and middle-income countries. *Human Resources for Health*.

Frimpon, M. F. (2012). A Re-Structuring of the Critical Success Factors for E-learning Deployment. *American International Journal of Contemporary Research Vol. 2 No. 3*, 115-127.

Gakio, K. (2006). *African tertiary institutions connectivity survey (ATICS).* Ottawa: IDRC.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report, 8(4)*, 597-607.

Gondwe, G. (2012). *Microsoft employees train Malawi school teachers*. Retrieved from Bizcommunity Daily, http://www.bizcommunity.com

Gotschall, M. (2000). E-learning strategies for executive education and corporate training. *Fortune 141(10).*

Guba, E. G., & Lincoln, Y. S. (1994). Competing Paradigms in qualitative research. In N. K. Denzin, & Y. S. Lincoln, *Handbook of qualitative research* (pp. 105-117). London: Sage.

Hage, J. (1980). *Theories of organisations: Forms, process and transformation.* New York: John Wiley & Sons.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis (7th Ed.).* Upper Saddle River, New Jersey: Prentice Hall.

Hair, J. J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate data analysis* (6th Ed.). Upper Saddle River: Pearson Education, Inc.

Hall, B. (1997). *Web-based training cookbook.* New York: Wiley.

Hall, B. (2002). *Steps to Developing a Successful E-learning Initiative.* New York: McGraw-Hill.

Hamid, A. A. (2002). Is it the "E" or the Learning that Matters? *Internet and Higher Education, Vol. 4*, 311-316.

Harasim, L. (2006). A history of E-learning: Shift happened. . In J. N. J. Weiss, *The international handbook of virtual learning environments* (pp. 59-94). Netherlands: Springer.

Hassanzadeh, A., Kanaani, F., & Elahi, S. (2012). A model for measuring E-learning systems success in universities. *Expert Systems with Applications 39*, 10959–10966.

Heeks, R. (2010). Do Information and Communication Technologies (ICTs) Contribute to Development? *Journal of International Development, 22(5)*, 625-640.

Ho, R. (2006). *Handbook of univariate and multivariate data analysis and interpretation with SPSS.* Boca Raton: Chapman & Hall/CRC.

Hogan, R., & Kedrayate, A. (2010). E-learning: A Survival Strategy for Developing Countries. *Eleventh Annual Conference of the Sir Arthur Lewis Institute of Social and Economic Studies.* Republic of Trinidad and Tobago: University of the West Indies. Retrieved from http://sta.uwi.edu/conferences/09/salises/documents/R%20Hogan.pdf

Honeyman, M., & Miller, G. (1993). Agriculture distance education: A valid alternative for higher education? *Proceedings of the 20th Annual National Agricultural Education Research Meeting*, 67–73.

Horn, M. B., & Staker, H. (2011). The rise of K-12 blended learning. *Innosight Institute*. Retrieved November 17, 2014, from http://www.leadcommission.org/sites/default/files/The%20Rise%20of%20K-12%20Blended%20Learning_0.pdf

Horton, W. (2006). *E-learning by design.* San Francisco: Pfeiffer.

Hrastinski, S. (2008). Asynchronous & synchronous E-learning. *Educause Quarterly, 31(4)*, 51-55.

Hsu, P., Kraemer, K., & Dunkle, D. (2006). Determinants of e-business use in us firms. *International Journal of Electronic Commerce Vol. 10, No. 4*, 9-45.

Instructional Design Experts. (2009). *The Five E-learning Components.* Retrieved 2015, from Instructional Design Experts.com: http://www.instructionaldesignexpert.com/eLearning_Components.html#.VLUTdtnu7IU

International Statistical Institute. (2014). *Developing Countries*. Retrieved from International Statistical Institute: http://www.isi-web.org/component/content/article/5-root/root/81-developing

Isaacs, S., & Hollow, D. (2012). *The eLearning Africa 2012 Report.* Berlin: ICWE.

Islam, A. N. (2013). Investigating E-learning system usage outcomes in the university context. *Computers & Education 69*, 387–399.

Islam, M. S., Kunifuji, S., Hayama, T., & Miura, M. (2011). E-learning in LIS education: an analysis and prediction. *Library Review, Vol. 60 Iss 7*, 544 - 559.

Janssen, C. (2015). *Course Management System (CMS).* Retrieved 2015, from Technopedia.com: http://www.techopedia.com/definition/6651/course-management-system-cms

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33(7)*, 14-26.

Kanuka, H., & Anderson, T. (2007). Ethical issues in qualitative E-learning research. *International Journal of Qualitative Methods, 6 (2)*, 1–14.

Kaplan, B., & Duchon, D. (1988). Combining qualitative and quantitative methods in information systems research: a case study. *MIS Quarterly*, 571-586.

King, W., & He, J. (2005). Understanding the role and methods of meta-analysis in IS research. . *Communications of the AIS 16 (1)*, 665-686.

Klement, M. (2012). Tools for the Electronic Learning Supports' Quality Assessment. *DIVAI 2012 - 9th International Scientific Conference on Distance Learning in Applied Informatics*.

Klement, M., & Dostál, J. (2014). Students and E-learning: a longitudinal research study into university students` opinions on E-learning. *Procedia - Social and Behavioral Sciences 128*, 175 – 180.

Kothari, C. (2008). *Research Methodology: Methods and Techniques.* New Age International.

Kuhn, T. (1970). *The Structure of Scientific Revolutions.* Chicago: University of Chicago Press.

Kwapong, O. A. (2009). Comparing Knowledge and Usage of ICT among Male and Female Distance Learners of an Endowed and Deprived Area in a Developing Country in Africa. *Journal of Information Technology Education*, 1-17.

Lam, P., McNaught, C., Lee, J., & Chan, M. (2014). Disciplinary difference in students' use of technology, experience in using eLearning strategies and perceptions towards eLearning. *Computers & Education 73*, 111–120.

Lee, B.-C., Yoon, J.-O., & Lee, I. (2009). Learners' acceptance of E-learning in South Korea: Theories and results. *Computers & Education 53*, 1320–1329.

Lee, C.-P., & Shim, J. (2007). An Exploratory Study of Radio Frequency Identification (RFID) Adoption in the Healthcare Industry. *European Journal of Information Systems 16 (6),* 712-724.

Lee, O.-K., Wang, M., Lim, K. H., & Peng, Z. (2009). Knowledge management systems diffusion in Chinese enterprises: A multistage approach using the technology-organisation-environment framework. *Journal of Global Information Management 17(1)*, 70–84.

Lee, S., Kim, I., Rhee, S., & Trimi, S. (2006). The role of exogenous factors in technology acceptance: the case of object-oriented methodology. *Information &Management, 43*, 469- 480.

Lee, Y.-H., Hsieh, Y.-C., & Hsu, C.-N. (2011). Adding innovation diffusion theory to the technology acceptance model: Supporting employees' intentions to use E-learning systems. *Educational Technology & Society, 14(4)*, 124–137.

Leedy, P., & Ormrod, J. (2010). *Practical research: planning and design.* Upper Saddle River, N.J.: Pearson.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management, 40(3),* 191-204.

Liaw, S.-S., & Huang, H.-M. (2013). Perceived satisfaction, perceived usefulness and interactive learning environments as predictors to self-regulation in E-learning environments. *Computers & Education 60,* 14–24.

Liebowitz, J., & Frank, M. S. (2011). The synergy between knowledge management and E-learning. . In J. Liebowitz, & M. S. Frank, *Knowledge Management and E-learning.* . CRC Press.

Lihitkar, S. R. (2014). LIS E-learning programs: a study of Student Support Services. *Library Hi Tech News, Vol. 31 Iss 6*, 16 - 20.

Lim, D. H., Morris, M. L., & Kupritz, V. W. (2014). *Online vs. blended learning: Differences in instructional outcomes and learner satisfaction.* ERIC-Education Resources Information Centre.

Lin, H.-F., & Lin, S.-M. (2007). Determinants of Implementation Success of E-Business Systems: Using a Technology-Organisation-Environment Framework. *International Conference on Business and Information.* Tokyo, Japan.

Lin, W.-S., & Wang, C.-H. (2012). Antecedences to continued intentions of adopting E-learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit. *Computers & Education 58*, 88–99.

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. *The Sage Handbook of Qualitative Research*, 97128.

Littlejohn, A., & Pegler, C. (2007). *Preparing for Blended E-learning.* London: Routledge.

Liu, S.-H., Liao, H.-L., & Pratt, J. (2009). Impact of media richness and flow on E-learning technology acceptance. *Computers & Education, Vol. 52 No. 3*, 599-607.

Lowenthal, P. R., Wilson, B., & Parrish, P. (2009). *Context matters: A description and typology of the online learning landscape.* Louisville, KY: Paper presented at the 2009 AECT International Convention.

Macharia, J., & Nyakwende, E. (2010). Influence of university factors on the students' acceptance of internet based learning tools in higher education. *Journal of Communication and Computer, 7, 10,* 72-82.

Macionis, J. J., & Gerber, L. M. (2010). *Sociology* (7th Canadian Edition Ed.). Canada: Pearson.

Mackay, S., & Stockport, G. (2006). Blended Learning, Classroom and E-learning. *The Business Review, Cambridge; Vol. 5, Issue 1*.

Malhotra, N., & Birks, D. (2007). *Marketing research. An applied approach.* London: Prentice Hall.

Marold, K., Larsen, G., & Moreno, A. (2000). Web-Based Learning: Is it working? A Comparison of Student Performance and Achievement in Web-Based Courses and their in-Classroom Counterparts. *Challenges of Information Technology Management in the 21st Century*, 350 -353.

McIntosh, D. (2015). Learning Management Vendors. Trimeritus eLearning Solutions Inc.

Mell, P., & Grance, T. (2011). The NIST Definition of Cloud Computing. National Institute of Standards and Technology Special Publication 800-145.

Merriam Webster Dictionary. (2014). *Learning*. Retrieved 2014, from Merriam Webster Dictionary: http://www.merriam-webster.com/dictionary/learning

Mindflash. (2015). *Types of Learning Management Systems*. Retrieved 2015, from Mindflash.com: https://www.mindflash.com/learning-management-systems/types-of-learning-management-systems

Mingers, J. (2004). Realizing information systems: critical realism as an underpinning philosophy for information systems. *Information and Organisation, 14*, 87-103.

Mishra, A. N., Konana, P., & Barua, A. (2007). Antecedents and consequences of internet use in procurement: An empirical investigation of us manufacturing firms. *Information Systems Research, 18*(1), 103–120.

Mitsweni, J., & Biermann, E. (2008). *An investigation into the implementation of open source software within the SA government: An emerging expansion model.* ACM.

Morabito, J., Sack, I., & Bhate, A. (1999). *Organisation Modelling: Innovative Architectures for the 21st Century.* Upper Saddle River, NJ: Prentice Hall.

Motaghian, H., Hassanzadeh, A., & Moghadam, D. K. (2013). Factors affecting university instructors' adoption of web-based learning systems: Case study of Iran. *Computers & Education 61*, 158–167.

Myers, D. M., & Avison, D. (2002). *Qualitative research in Information systems.* London: Sage.

Namisiko, P., Mindila, R., Chepkoech, E., & Nyeris, R. (2014). A Review of Application of Web 2.0 and Open Source Softwares in E-learning: A Baseline Survey in a Private University, Kenya. *International Journal of Computer Science Issues, 11(2).*

Namisiko, P., Munialo, C., & Nyongesa, S. (2014). Towards an Optimization Framework for E-learning in Developing Countries: A Case of Private Universities in Kenya. *Journal of Computer Science and Information Technology Vol.2 (2)*, 131-148.

National Accreditation Board. (2012). *Public Universities.* Retrieved from National Accreditation Board website: http://www.nab.gov.gh/index.php?option=com_content&view=category&layout=blog&id=56&Itemid=184

Neuman, W. (2011). *Basics of Social Research: Qualitative and Quantitative Approaches (2nd Ed.).* New Jersey: Pearson Education.

Newman, I., & Benz, C. (1998). *Qualitative-quantitative research methodology: Exploring the interactive continuum.* Carbondale: Southern Illinois University Press.

Nkhoma, Z., & Dang, D. (2013). Contributing Factors of Cloud Computing Adoption: a Technology-Organisation-Environment Framework Approach. *International Journal of Information Systems and Engineering, 1(1)*, 38 - 49.

Noh, N. M., Isa, P. M., Samah, S. A., & Isa, M. A. (2012). Establishing an Organisational E-learning Culture to Motivate Lecturers to Engage in E-learning in UiTM. *Procedia - Social and Behavioral Sciences 67*, 436 – 443.

Oliveira, T., & Martins, F. M. (2011). Literature review of information technology adoption models at firm level. *The Electronic Journal Information systems Evaluation, 14*(1), 110-121.

Oliveira, T., & Martins, M. (2009). Determinants of information technology adoption in Portugal. *Proceedings of the international conference on e-business*, (pp. 264-270). Milan, Italy.

Oliveira, T., & Martins, M. (2010). Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems, 110*(9), 1337 - 1354.

Osborne, J., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research & Evaluation, 8(2)*.

Oztekin, A., Delen, D., Turkyilmaz, A., & Zaim, S. (2013). A machine learning-based usability evaluation method for eLearning systems. *Decision Support Systems 56*, 63–73.

Pailing, M. (2002). E-learning: is it really the best thing since sliced bread. *Industrial and Commercial Training, Vol. 34 Iss: 4*, 151 - 155.

Palacios-Marqués, D., Cortés-Grao, R., & Carral, C. L. (2013). Outstanding knowledge competences and web 2.0 practices for developing successful E-learning project management. *International Journal of Project Management*, 14–21.

Pallant, J. (2011). *SPSS survival manual: A step by step guide to data analysis using SPSS* (4Th Ed.). Australia: Allen & Unwin.

Pan, M., & Jang, W. (2008). Determinants of the adoption of enterprise resource planning within the technology-organisation-environment framework: Taiwan's communications industry. *Journal of Computer Information Systems, 48*, 94-102.

Persico, D., Manca, S., & Pozzi, F. (2014). Adapting the Technology Acceptance Model to evaluate the innovative potential of E-learning systems. *Computers in Human Behaviour 30*, 614–622.

Pineda-Herrero, P., Quesada, C., & Stoian, A. (2011). Evaluating the efficacy of E-learning in Spain: a diagnosis of learning transfer factors affecting E-learning. *Procedia - Social and Behavioral Sciences 30*, 2199 – 2203.

Pituch, K. A., & Lee, Y.-k. (2006). The influence of system characteristics on E-learning use. *Computers & Education 47*, 222–244.

Porter, M., & Millar, V. (1985). How Information Gives You Competitive Advantage. *Harvard Business Review, 63(4)*, 149-160.

Powell, R., & Connaway, L. (2004). *Basic research methods for librarians*. London: Libraries Unlimited.

Rădulescu, Ș. A. (2014). A perspective on E-learning and Cloud Computing. *Procedia - Social and Behavioral Sciences 141*, 1084 – 1088.

Ramakrisnan, P., Yahya, Y., Hasrol, M., & Aziz, A. (2012). Blended learning: a suitable framework for E-learning in higher education. *Procedia Social and Behavioral Sciences Vol. 67*, 513-526.

Raouf, J. B., Naser, I. S., & Jassim, B. K. (2012). Determinants of E-learning Implementation Success in the Iraqi MoHE. *Eng. &Tech. Journal, Vol. 30, No.4*, 659-671.

Ritchie, J., & Lewis, J. (2003). *Qualitative Research Practice: A Guide for Social Science Students and Researchers.* London: Sage.

Rogers, E. (1995). *Diffusion of innovations, Fourth Edition Ed.* New York: Free Press.

Rogers, E. M. (2003). *Diffusion of innovations (5th Ed.).* New York: Free Press.

Roloff, K. (2002). *E-learning in Developing Countries, Opinion Paper.* Cologne: Detecon.

Rostaminezhad, M., Mozayani, N., Norozi, D., & Iziy, M. (2013). Factors Related to E-learner Dropout: Case Study of IUST E-learning Centre. *Procedia - Social and Behavioral Sciences 83*, 522 – 527.

Rothblatt, S. (1988). Review: Supply and Demand: The Two Histories of English Education. *History of Education Quarterly Vol. 28*, 627-644.

Rouse, M. (2005). *Distance learning (E-learning).* Retrieved from WhatIs.com: http://whatis.techtarget.com/definition/distancE-learning-E-learning

Sánchez, R. A., Hueros, A. D., & Ordaz, M. G. (2013). E-learning and the University of Huelva: a study of WebCT and the technological acceptance model. *Campus-Wide Information Systems, Vol. 30 Iss: 2*, 135 - 160.

Sarantakos, S. (1998). *Social Research.* South Melbourne: Macmillan.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students London (5th Ed.).* London: Pearson Education/Prentice Hall.

Sawang, S., Newton, C., & Jamieson, K. (2013). Increasing learners' satisfaction/intention to adopt more e-learning. *Education + Training, Vol. 55 Iss 1*, 83 - 105.

Schmitz, M. (2014, July 1). *The Importance of Responsive Design in Online Education*. Retrieved from E-learning Industry: http://elearningindustry.com/importance-of-responsive-design-in-online-education

Selim, H. M. (2007). Critical success factors for E-learning acceptance: Confirmatory factor models. *Computers & Education, 49(2)*, 396–413.

Senyo, P., Addae, E., & Boateng, R. (2014). *Determinant of Cloud Computing Adoption: Evidence from Ghanaian organisations. MPhil thesis*. Accra: University of Ghana

Serbe Marfo, J., & Okine, R. K. (2011). *Implementation of E-learning in Ghanaian Tertiary Institutions (A case study of KNUST).* Kumasi: Kwame Nkrumah University of Science and Technology.

Sergiovanni, T. J. (1994). *Building Community in Schools.* New York: Jossey-Bass.

Sharma, K., & Pandit, P. (2011). Critical success factors in crafting strategic architecture for e-learning at HP University. *International Journal of Educational Management, Vol. 25 Iss 5*, 423 -452.

Sharma, R., & Mishra, S. (2007). Global E-learning practices: An introduction. In R. M. Sharma, *Global Cases in E-learning Practices: Successes and Pitfalls* (pp. 1-11). Hearsey: IDEA Group Publishing.

Šimonová, I. (2010). Styly učení v aplikacích eLearningu. Hradec Králové: *M&V Hradec Králové.*

Simonova, I. (2014). Concept of E-learning Reflected in Mind Maps of University Students. *Procedia - Social and Behavioral Sciences 116*, 1394 – 1399.

Siritongthaworn, S., Krairit, D., Dimmitt, N. J., & Paul, H. (2006). The study of E-learning technology implementation: a preliminary investigation of universities in Thailand. *Education and Information Technologies, 11 (2)*, 137–160.

Sofiadin, A. b. (2014). Sustainable development, E-learning and Web 3.0: A descriptive literature review. *Journal of Information, Communication and Ethics in Society Vol. 12 No. 3*, 157-176.

Šolc, M., Legemza, J., & Sütőová, A. (2012). Experiences with utilizing E-learning in education process in university environment. *Procedia - Social and Behavioral Sciences 46*, 5201 – 5205.

SØrebØ, Ø. Halvari, H., Gulli, V. F., & Kristiansen, R. (2009). The role of self-determination theory in explaining instructors' motivation to continue to use E-learning technology. *Computers & Education, 53,* 1177–1187.

Starbuck, W. (1976). *Organisations and their environments.* Chicago: Rand McNally.

Sumranwong, D. (2011). An E-learning model application for AS9100 Standard. *2011 International Conference on Information Management, Innovation Management and Industrial Engineering, Shenzhen*.

Szabo, M., & Flesher, K. (2002). CMI Theory and Practice: Historical Roots of Learning Management Systems. *World Conference on E-learning in Corporate, Government, Healthcare, and Higher Education 2002 (White Paper).* Montreal, Canada.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5TH Ed.). Boston: Pearson.

Tagoe, M. (2012). Students' perceptions on incorporating E-learning into teaching and learning at the University of Ghana. *International Journal of Education and Development using Information and Communication Technology Vol. 8, Issue 1,* 91-103.

Tai, L. (2005). Corporate E-learning: How E-learning is created in Three Large Corporations. *PhD Thesis, University of Pennsylvania*.

Tait, A. W. (2014). Reflections on Student Support in Open and Distance Learning. International Review of Research in Open and Distance Learning. *Open Plaxis, 6*(1), 5-16. Retrieved from http://dx.doi.org/10.5944/openpraxis.6.1.102

TeachThought. (2013). *The Definition of Blended Learning*. Retrieved November 17, 2014, from teachthought: http://www.teachthought.com/blended-learning-2/the-definition-of-blended-learning/

Technopedia. (2015). *Course Management System (CMS).* Retrieved January 14, 2015, from Technopedia.com: http://www.techopedia.com/definition/6651/course-management-system-cms

Thompson, J. (1967). *Organisations in action.* New York: McGraw-Hill.

Thong, J. (1999). An Integrated Model of Information Systems Adoption in Small Businesses. *Journal of Management Information Systems 15 (4),* 187-214.

Tongco, M. (2007). Purposive Sampling as a Tool for Informant Selection. *Ethnobotany Research & Applications, 5*, 147-158.

Tornatzky, L., & Fleischer, M. (1990). *The Processes of Technological Innovation.* Massachusetts: Lexington Books.

Tseng, M.-L., Lin, R.-J., & Chen, H.-P. (2011). Evaluating the effectiveness of e-learning system in uncertainty. *Industrial Management & Data Systems, Vol. 111 Iss 6,* 869 - 889.

Turyasingura, W. (2011). *Interdependency of Knowledge Management and Organisational Learning: The Case of Higher Education Institutions in Uganda (PHD Thesis).* Johannesburg: University of the Witwatersrand.

University of Ghana. (2013). *UG in Discussions with Exim Bank of China and Unispendour*. Retrieved from University of Ghana: http://www.ictd.ug.edu.gh/index1.php?linkid=212&archiveid=1407&page=1&date=26%2F03%2F2013

University of Ghana. (2014). Handbook: University of Ghana General Information. Accra: University of Ghana.

BSU-University of Ghana. (2015). BSU Mapping study on the State of e-learning in the University of Ghana, Legon. Accra: BSU- University of Ghana.

University of London International Programmes. (2014). *Our history*. Retrieved from University of London International Programmes: http://www.londoninternational.ac.uk/our-global-reputation/our-history

Uzunboylu, H. (2006). A Review of Two Mainline E-learning Projects in the European Union. *Educational Technology Research and Development, Vol. 54, No. 2,* 201-209.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46(2)*, 186–204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27(3)*, 425-478.

Verma, K., & Rizvi, M. (2013). Impact of Cloud on E-Learning. 5th International Conference on Computational Intelligence and Communication Networks (CICN), 2013, 480 - 485.

Vila, N., & Kuster, I. (2011). Consumer Feelings and Behaviours towards Well Designed Websites. *Information & Management 48*, 166–177.

Wade, M., & Hulland, J. (2004). Review: The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research. *MIS Quarterly, 28*, 107-142.

Wang, W. T., & Wang, C. C. (2009). An empirical study of instructor adoption of web based learning systems. . *Computers & Education, 53*, 761–774.

Wang, Y.-S., Li, C.-R., Lin, H.-H., & Shih, Y.-W. (2014). The measurement and dimensionality of E-learning blog satisfaction: Two-stage development and validation. *Internet Research, Vol. 24 Iss 5*, 546 - 565.

Watts, I. (1743). *The improvement of the mind, or a supplement to the art of logic.* London: Oxford University Press.

Webopedia. (2015). *commercial software*. Retrieved January 15, 2015, from Webopedia.com: http://www.webopedia.com/TERM/C/commercial_software.html

White, M. (1982). Distance education in Australian higher education — a history. *Distance Education 3 (2)*, 255–278.

Wilson, J., & Beatty, B. (2001). *Blended Learning: Combining Instructional Methods for Maximum Training Impact.* Bloomington, Indiana: Option Six Inc.

Woods, D., & Giuliani, G. (2005). *Open Source for the Enterprise: Managing Risks Reaping Rewards.* California: O'Reilly.

Wu, Y. L., Tao, Y., & Yang, P.-C. (2008). Using UTAT to explore the behaviour of 3G mobile Communication Users. *Journal of Statistics & Management Systems 11(5)*, 919–949.

Yazici, B., & Yolacan, S. (2007). A comparison of various tests of normality. *Journal of Statistical Computation and Simulation Vol. 77, No. 2*, 175–183.

Yin, R. (2003). *Case study research: design and methods.* Thousand Oaks, Calif: Sage.

Yunus, Y., & Salim, J. (2008). Framework for the evaluation of E-learning in Malaysian Public Sector from the pedagogical perspective. *Information Technology, ITSim 2008 International Symposium, Universiti Kebangsaan, Malaysia*, 1-8.

Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: A cross-country assessment of the facilitators and inhibitors. *European Journal of Information Systems*, *12*(4), 251–268.

Zounek, J. (2009). *E-learning – one of the forms of learning in modern society.* Brno, Czech Republic: Masarykova univerzita,

APPENDICES

Appendix A - Introduction Letter for Participants

UNIVERSITY OF GHANA
BUSINESS SCHOOL
DEPARTMENT OF OPERATIONS AND MANAGEMENT INFORMATION SYSTEMS

UGBS
University of Ghana Business School

Ref. No.: OMIS/ST/01

27th February, 2015

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION: MR. ANSONG ERIC

This is to introduce to you the above-named student of the University of Ghana Business School pursuing MPhil in Management Information Systems.

He is writing a thesis on **Determinants of E-learning adoption in Universities: Evidence from a developing Country.**

I would appreciate any assistance you can give him to collect the relevant information.

This project is under the supervision of Dr. Richard Boateng of the Department of Operations and Management Information Systems.

Yours faithfully,

Dr. Richard Boateng
Supervisor

COLLEGE OF HUMANITIES

P. O. Box LG 78, Legon, Accra, Ghana.
• Telephone: +233 (0) 302 501 594 • Email: omis@ug.edu.gh • Website: www.ug.edu.gh

Appendix B- Research Questionnaire

Students

DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS

Dear Respondent,

The bearer of this questionnaire is a student of the University of Ghana Business School pursuing **MPhil MIS**. He is conducting a survey on "**Determinants of E-learning Adoption in Universities: Evidence from a Developing country"**. Please kindly respond to the following questions for the student. Your responses will be duly appreciated and treated with utmost confidentiality.

Please tick **[√]** where appropriate.

Section A; **Socio-Demographic Characteristics and Professional Background**

1. Your age Less than 18 [ ] 18-24[ ] 25-30[ ] 31-35[ ] 36-40[ ] 40+ [ ]

2. Your gender Male [ ] Female [ ]

3. Educational Level Bachelor's Degree [ ] Master's Degree [ ] PHD [Professional Degree [ ] Others please specify.....

4. Which College are you affiliated to?
Health Sciences [ ] Basic and Applied Sciences [ ] Humanities [ ]
Education [ ] Not Applicable [ ]

5. How many of your courses are administered on the e-learning platform? .....

6. How long have you been using the e-learning system as a Student?

Less than 1 year [ ] 2 years [ ] 3 years [ ] 4 years [ ] 5 years and more [ ]

7. What do you use the e-learning system for? [Multiple Responses Are Allowed]

View marks and grades [ ] send and receive course announcements [ ]
Upload assignments [ ] download course materials [ ]
Receive class announcements [ ]
Discussions of topics with course mates and instructors [ ]
Taking all kinds of tests and quizzes online [ ]
Sending emails to instructors, course mates or individuals [ ]
Viewing Lecturer presentations online [ ]
Detecting and fishing out cheating and plagiarism in work [ ]

Other(s) please specify …….

Section B: The following questions seek to ascertain respondent's perception about e-learning in University of Ghana (the Sakai e-learning system).

8. Please show how you agree or disagree with the following statements

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

IT infrastructure	1	2	3	4	5
The university has a good internet connectivity					
I can easily download the available learning materials in the e-learning system					
The University has enough computers for the e-learning users					
I have not encountered problems using my device to log into the e-learning system					
The response time of the e-learning system is acceptable					
Perceived Ease of use	1	2	3	4	5
I find it easy to use the e-learning system					
The e-learning system has clear navigational tools and guidelines for assisting usage					
The e-learning system is user friendly					
Learning how to use the e-learning platform is easy for me					
It is clear and easy to understand how to use the e-learning platform.					
Organisational compatibility	1	2	3	4	5
The changes caused by the adoption of e-learning is well-suited with existing learning practices in the University					
Implementing the changes to learning procedure initiated by the adoption of e-learning is well-matched with the practices of UG					
The adoption of the e-learning system is well-suited with the existing Information Systems infrastructure of the University					
Expected benefits	1	2	3	4	5
Using e-learning helps to accomplish coursework more quickly					
Using e-learning improves the quality of coursework					
Using e-learning system improves my performance					
Using e-learning system improves teaching and learning					
In general, I find e-learning to be of an advantage for my tasks					
Competitive Pressure	1	2	3	4	5
I think other universities see UG as more respected because of the use of the e-learning system					
The use of the e-learning systems differentiates UG from the other Universities					

I think University of Ghana experienced competitive pressure from other Universities to implement the e-learning system					
I think UG experiences competitive advantage as a result of the use of the e-learning systems					
Educational Partners	1	2	3	4	5
I think the telecommunications networks provide support for the e-learning system in the University					
I think UG has received grants from NGO's for the introduction and implementation of the e-learning system					
I think the government of Ghana has been helpful in the implementation of the e-learning system in the University					
The content of the e-learning course	1	2	3	4	5
The content provided by the e-learning system are consistent with my course					
The knowledge or information provided from the e-learning system is important and helpful for my coursework					
The e-learning system makes it easy to share ideas with my group mates through social media					
The e-learning system makes it easy to check the up-to-date course notices					
The knowledge or information provided from the e-learning system is meaningful, understandable, and practicable					
The e-learning curriculum	1	2	3	4	5
I am satisfied with the presentation methods of the e-learning system					
The e-learning system provides materials that explains the course better					
The e-learning system provides me with some good functions to help complete course work					
The e-learning system provides useful and appropriate knowledge/information about the course					
I think the course(s) is/are suitable to be run on an e-learning platform					
E-learning adoption	1	2	3	4	5
I connect to the e-learning platform					
I intend to use the e-learning system again					
I will continue using e-learning even if I face problems					
I spend most of my time using the e-learning platform					

Thank you.

Lecturer/instructor

DEPARTMENT OF MANAGEMENT INFORMATION SYSTEM

Dear Respondent,

The bearer of this questionnaire is a student of the University of Ghana Business School pursuing **MPhil MIS**. He is conducting a survey on "**Determinants of E-learning Adoption in Universities: Evidence from a Developing country"**. Please kindly respond to the following questions for the student. Your responses will be duly appreciated and treated with utmost confidentiality.

Please tick **[√]** where appropriate.

Section A; **Socio-Demographic Characteristics and Professional Background**

1. Your age Less than 18 [ ] 18-24[ ] 25-30[ ] 31-35[ ] 36-40[ ] 40+[ ]

2. Your gender Male [ ] Female [ ]

3. Educational Level Bachelor's Degree [ ] Master's Degree [ ] PHD [Professional Degree [ ] Others please specify.....

4. Which College are you affiliated to?
Health Sciences [ ] Basic and Applied Sciences [ ] Humanities [ ]
Education [ ] Not Applicable [ ]

5. How many of your courses are administered on the e-learning platform? .....

6. How long have you been using the e-learning system as a Lecturer/Tutor?

Less than 1 year [ ] 2 years [ ] 3 years [ ] 4 years [ ] 5 years and more [ ]

7. What do you use the e-learning system for? [Multiple Responses Are Allowed]
Upload class marks and grades [ ] send class announcements [ ]
Send and receive class assignments [ ] upload course materials [ ]
Discussions of topics with students [ ]
Organising lessons and lesson materials [ ]
Taking all kinds of tests and quizzes online [ ]
Sending emails to other instructors and individuals [ ]
Detecting and fishing out cheating and plagiarism in students' or researchers' work [ ]
Doing presentations online [ ]

Other(s)……

Section B: The following questions seek to ascertain respondent's perception about e-learning in University of Ghana (the Sakai e-learning system)

9. Please show how you agree or disagree with the following statements

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

IT infrastructure	1	2	3	4	5
The university has a good internet connectivity					
I can easily upload the available teaching materials in the e-learning system					
The University has enough computers for the e-learning users					
I have not encountered problems using my device to log into the e-learning system					
The response time of the e-learning system is acceptable					
Perceived Ease of use	1	2	3	4	5
I find it easy to use the e-learning system					
The e-learning system has clear navigational tools and guidelines for assisting usage					
The e-learning system is user friendly					
Learning how to use the e-learning platform is easy for me					
It is clear and easy to understand how to use the e-learning platform.					
Organisational compatibility	1	2	3	4	5
The changes caused by the adoption of e-learning is well-suited with existing learning practices in the University					
Implementing the changes to learning procedure initiated by the adoption of e-learning is well-matched with the practices of UG					
The adoption of the e-learning system is well-suited with the existing Information Systems infrastructure of the University					
Expected benefits	1	2	3	4	5
Using e-learning helps to accomplish tasks more quickly					
Using e-learning improves the quality of my work					
Using e-learning system improves my performance					
Using e-learning system improves teaching					
In general, I find e-learning to be of an advantage for my tasks					
Competitive Pressure	1	2	3	4	5
I think other universities see UG as more respected because of the use of the e-learning system					
The use of the e-learning systems differentiates UG from the other Universities					
I think University of Ghana experienced competitive pressure from other Universities to implement the e-learning system					
I think UG experiences competitive advantage as a result of the use of the e-learning systems					
Educational Partners	1	2	3	4	5
I think the telecommunications networks provide support for the e-learning system in the University					
I think UG has received grants from NGO's for the introduction and implementation of the e-learning system					
I think the government of Ghana has been helpful in the implementation of the e-learning system in the University					
The content of the e-learning course	1	2	3	4	5
The content provided by the e-learning system are consistent with my course					

The knowledge or information provided from the e-learning system is important and helpful for my work					
The e-learning system makes it easy to share ideas with my colleagues through social media					
The e-learning system makes it easy to check the up-to-date course schedules					
The knowledge or information provided from the e-learning system is meaningful, understandable, and practicable					
The e-learning curriculum	1	2	3	4	5
I am satisfied with the presentation methods of the e-learning system					
The e-learning system provides materials that explains the course better					
The e-learning system provides me with some good functions to help complete course work					
The e-learning system provides useful and appropriate knowledge/information about the course					
I think the course(s) is/are suitable to be run on the e-learning platform					
E-learning adoption	1	2	3	4	5
I connect to the e-learning platform					
I intend to use the e-learning system again					
I will continue using e-learning even if I face problems					
I spend most of my time using the e-learning platform					

Thank you.

Administrator

DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS

Dear Respondent,

The bearer of this questionnaire is a student of the University of Ghana Business School pursuing **MPhil MIS**. He is conducting a survey on "**Determinants of E-learning Adoption in Universities: Evidence from a Developing country"**. Please kindly respond to the following questions for the student. Your responses will be duly appreciated and treated with utmost confidentiality.

Please tick **[√]** where appropriate.

Section A; **Socio-Demographic Characteristics and Professional Background**

1. Your age Less than 18 [ ] 18-24[ ] 25-30[ ] 31-35[ ] 36-40[ ] 40+[ ]

2. Your gender Male [ ] Female [ ]

3. Educational Level

Bachelor's Degree [ ] Master's Degree [ ] PHD [ ]
Professional Degree [ ]

Others please specify.....

4. Which College are you affiliated to? Health Sciences [ ] Basic and Applied Sciences [ ] Humanities [ ] Education [ ] Not Applicable [ ]

5. How many courses do you supervise on the e-learning platform? .....

6. How long have you been using the e-learning system as an Administrator?

Less than 1 year [ ] 2 years [ ] 3 years [ ] 4 years [ ] 5 years and more [ ]

7. What are some of the activities performed on the e-learning system? [Multiple Responses Are Allowed]

Upload class marks and grades [ ] send/receive class announcements [ ]
Send and receive class assignments [ ] upload/download course materials [ ]
Discussions of topics between students and instructors [ ]
Organising lessons and lesson materials [ ]
Taking all kinds of tests and quizzes online [ ]
Sending emails to instructors, course mates or individuals [ ]
Detecting and fishing out cheating and plagiarism in students' or researchers' work [ ]
Doing presentations online [ ]

Section B: The following questions seek to ascertain respondent's perception about e-learning in University of Ghana (The Sakai e-learning system in particular).

8. Please show how you agree or disagree with the following statements

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

IT infrastructure	1	2	3	4	5
The university has a good internet connectivity					
It is easy to download/upload the teaching/learning materials in the e-learning system					
The University has enough computers for the e-learning users					
I have not encountered problems using my device to log into the e-learning system					
The response time of the e-learning system is acceptable					
Perceived Ease of use	1	2	3	4	5
I find it easy to use the e-learning system					
The e-learning system has clear navigational tools and guidelines for assisting usage					
The e-learning system is user friendly					
Learning how to use the e-learning platform is easy for me					
It is clear and easy to understand how to use the e-learning platform.					
Organisational compatibility	1	2	3	4	5
The changes caused by the adoption of e-learning is well-suited with existing learning practices in the University					
Implementing the changes to learning procedure initiated by the adoption of e-learning is well-matched with the practices of UG					
The adoption of the e-learning system is well-suited with the existing Information Systems infrastructure of the University					
Expected benefits	1	2	3	4	5
I think using e-learning helps to accomplish work more quickly					
I think using e-learning improves the quality of coursework					
Using e-learning system improves my performance					
Using e-learning system improves teaching and learning					
In general, I find e-learning to be of an advantage for tasks					
Competitive Pressure	1	2	3	4	5
I think other universities see UG as more respected because of the use of the e-learning system					
The use of the e-learning systems differentiates UG from the other Universities					
I think University of Ghana experienced competitive pressure from other Universities to implement the e-learning system					
I think UG experiences competitive advantage as a result of the use of the e-learning systems					
Educational Partners	1	2	3	4	5
I think the telecommunications networks provide support for the e-learning system in the University					
I think UG has received grants from NGO's for the introduction and implementation of the e-learning system					
I think the government of Ghana has been helpful in the implementation of the e-learning system in the University					
The content of the e-learning course	1	2	3	4	5
The content provided by the e-learning system are consistent with the course					
The knowledge or information provided from the e-learning system is important and helpful for coursework					

The e-learning system makes it easy to share ideas with my group mates through social media					
The e-learning system makes it easy to check the up-to-date course notices					
The knowledge or information provided from the e-learning system is meaningful, understandable, and practicable					
The e-learning curriculum	1	2	3	4	5
I am satisfied with the presentation methods of the e-learning system					
The e-learning system provides materials that explains the course better					
I think the e-learning system provides some good functions to help complete course work					
The e-learning system provides useful and appropriate knowledge/information about the course					
I think the course(s) is/are suitable to be run on an e-learning platform					
E-learning adoption	1	2	3	4	5
I connect to the e-learning platform					
I intend to use the e-learning system again					
I will continue using e-learning even if I face problems					
I spend most of my time using the e-learning platform					

Thank you.

Appendix C- Descriptive Statistics

Descriptive Statistics

Item	N	Min	Max	Mean		Std. Deviation	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	S. E.	Stat	Stat	S. E	Stat	S. E.
ITI1	417	1	4	3.24	0.043	0.878	-0.883	0.120	-0.165	0.238
ITI2	417	1	5	3.48	0.039	0.800	-0.437	0.120	-0.066	0.238
ITI3	417	1	5	3.09	0.049	1.006	-0.245	0.120	-0.774	0.238
ITI4	417	1	5	2.90	0.054	1.103	0.148	0.120	-0.911	0.238
ITI5	417	1	5	3.41	0.039	0.789	-0.062	0.120	-0.025	0.238
PEU1	417	1	5	3.55	0.044	0.903	-0.713	0.120	0.008	0.238
PEU2	417	1	5	3.59	0.041	0.836	-0.762	0.120	0.567	0.238
PEU3	417	2	5	3.58	0.035	0.710	-0.309	0.120	-0.121	0.238
PEU4	417	1	5	3.61	0.044	0.905	-0.235	0.120	-0.445	0.238
PEU5	417	1	5	3.52	0.044	0.896	-0.138	0.120	-0.016	0.238
OC1	417	1	5	3.79	0.048	0.977	-0.731	0.120	0.277	0.238
OC2	417	1	5	3.74	0.044	0.897	-0.627	0.120	0.434	0.238
OC3	417	1	5	3.65	0.046	0.931	-0.549	0.120	0.044	0.238
EB1	417	1	5	3.83	0.042	0.851	-1.086	0.120	1.913	0.238
EB2	417	1	5	3.80	0.040	0.823	-0.777	0.120	1.180	0.238
EB3	417	2	5	3.71	0.034	0.702	-0.022	0.120	-0.290	0.238
EB4	417	2	5	3.90	0.038	0.769	-0.305	0.120	-0.283	0.238
EB5	417	2	5	3.84	0.035	0.719	-0.071	0.120	-0.438	0.238
CP1	417	1	5	3.47	0.046	0.941	-0.589	0.120	0.395	0.238
CP2	417	1	5	3.46	0.047	0.965	-0.535	0.120	0.150	0.238
CP3	417	1	5	3.31	0.055	1.118	-0.404	0.120	-0.506	0.238
CP4	417	1	5	3.61	0.044	0.897	-0.345	0.120	0.008	0.238
EP1	417	1	5	3.39	0.044	0.903	-0.439	0.120	0.290	0.238
EP2	417	2	5	3.62	0.039	0.796	0.408	0.120	-0.751	0.238
EP3	417	1	5	3.60	0.041	0.844	-0.067	0.120	-0.130	0.238
CE1	417	1	5	3.73	0.040	0.816	-1.088	0.120	1.991	0.238
CE2	417	1	5	3.76	0.035	0.720	-1.282	0.120	3.202	0.238
CE3	417	1	5	3.60	0.045	0.912	-0.283	0.120	-0.283	0.238
CE4	417	1	5	3.85	0.042	0.864	-0.898	0.120	1.400	0.238
CE5	417	2	5	3.80	0.036	0.741	-0.055	0.120	-0.478	0.238
EC1	417	1	5	3.57	0.051	1.047	-0.453	0.120	-0.060	0.238
EC2	417	1	5	3.65	0.042	0.867	-0.457	0.120	0.301	0.238
EC3	417	2	5	3.79	0.038	0.766	-0.359	0.120	-0.084	0.238
EC4	417	2	5	3.81	0.037	0.759	-0.337	0.120	-0.094	0.238
EC5	417	1	5	3.76	0.041	0.830	-0.359	0.120	0.157	0.238
EA1	417	1	5	3.92	0.044	0.900	-0.951	0.120	1.227	0.238
EA2	417	1	5	3.94	0.044	0.901	-0.941	0.120	0.952	0.238
EA3	417	1	5	3.26	0.051	1.046	-0.288	0.120	-0.586	0.238
EA4	417	1	5	3.44	0.047	0.962	-0.020	0.120	-0.487	0.238
Valid N (listwise)	417									

Appendix D- Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.765	27.603	27.603	10.765	27.603	27.603
2	3.339	8.56	36.164	3.339	8.56	36.164
3	2.631	6.746	42.91	2.631	6.746	42.91
4	2.109	5.408	48.318	2.109	5.408	48.318
5	1.859	4.768	53.086	1.859	4.768	53.086
6	1.546	3.964	57.05	1.546	3.964	57.05
7	1.504	3.857	60.907	1.504	3.857	60.907
8	1.387	3.557	64.464	1.387	3.557	64.464
9	1.167	2.992	67.456	1.167	2.992	67.456
10	1.144	2.934	70.389	1.144	2.934	70.389
11	1.063	2.726	73.115	1.063	2.726	73.115
12	0.974	2.499	75.614			
13	0.87	2.23	77.844			
14	0.76	1.949	79.794			
15	0.714	1.831	81.624			
16	0.653	1.675	83.3			
17	0.611	1.566	84.866			
18	0.551	1.413	86.279			
19	0.496	1.271	87.55			
20	0.453	1.161	88.711			
21	0.449	1.151	89.862			
22	0.403	1.032	90.894			
23	0.385	0.986	91.88			
24	0.34	0.871	92.751			
25	0.326	0.836	93.587			
26	0.296	0.76	94.347			
27	0.273	0.699	95.046			
28	0.257	0.659	95.705			
29	0.227	0.583	96.288			
30	0.214	0.549	96.837			
31	0.19	0.488	97.325			
32	0.181	0.463	97.788			
33	0.17	0.437	98.225			
34	0.15	0.385	98.61			
35	0.141	0.362	98.972			
36	0.129	0.33	99.302			
37	0.112	0.286	99.588			
38	0.094	0.242	99.83			
39	0.066	0.17	100			

Extraction Method: Principal Component Analysis.

Appendix E- Stakeholders and activities on the E-learning platform