UNIVERSITY OF GHANA

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

BY

FRANKLIN YAWO AZUMAH

10028477

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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.

_____ _____

Franklin Yawo Azumah (10028477) Date

CERTIFICATION

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

_____ _____

Prof. Richard Boateng Date
(Supervisor)

_____ _____

Dr. John Effah Date
(Co-Supervisor)

DEDICATION

To my late father Lt Col (rtd) Stephen Atakuma Koku Azumah, my caring,loving and supportive wife Mrs Vivian Dela Ama Azumah and my sons Franklin Xorlali Azumah, Aseye Kodzo Azumah and Sedem Yawokuma Azumah.

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LIST OF ACRONYMS AND ABBREVATIONS

CD–ROM	Compact Disc Read-Only
CMS	Course management systems
US	United States
DVD	Digital Versatile Disc
E-learning	Electronic Learning
HTML	HyperText Markup Language
PHP	Hypertext Pre-Processor
ICT	Information and Communication Technology
IS	Information System
IT	Information Technology
LMS	Learning Management Systems
MP3	Moving Picture Experts Group (MPEG -3)
TAM	Technology Acceptance Model
TV	Television
RFID	Radio-Frequency Identification
RSS	Rich Site Summary
UG	University of Ghana
UTAUT	Unified Theory of Acceptance and Use of Technology

ABSTRACT

Electronic learning (e-learning) has come to revolutionize the way students receive educational information from their teachers/instructors and it is ushering in a new era of active and creative thinkers and students. This has spurned on a lot of interest in the field of Information Systems research which has led to researchers looking at factors that either support or inhibit the adoption of e-learning with little focus on the influence of moderating factors on these adoption factors. It is in this vein that this study sought to research into the factors that explain the acceptance of the University of Ghana Sakai Learning Management System (LMS) and also look at the effects of gender and age as moderating variables on these adoption factors.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was therefore adopted to be used as the guiding lens for the study after a rigorous review of e-learning literature. The UTAUT model was selected because it is proven to be able to better explain the discrepancy in usage intention than previous acceptance models. Using the quantitative survey research approach, four hundred and five (405) students enrolled in University of Ghana Sakai LMS answered the questionnaire which was based on the four traditional constructs of the UTAUT model (Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions). Multiple regression analysis was therefore carried out on the collected data.

The results showed that the intention to use the Sakai LMS was directly influenced by performance expectancy, social influence and facilitating conditions. Again, it was revealed that only the age variable had a moderating effect on student's intention to use the Sakai LMS and even with this the moderation was only statistically significant on Performance Expectancy and Facilitating Conditions. Gender on the other hand, did not moderate any of the factors. These findings tend to iterate previous research which established that younger students are

more likely to be receptive to new technologies such as e-learning and further, in an educational context, these new technologies are more likely to be receptive to both gender, with no significant differences in adoption.

These findings do not only add to the scientific literature on e-learning and technology adoption, but it also leads to a better practical understanding of the factors, especially from a developing African country, that may incite or discourage students to use online technologies in higher education especially in developing countries. Previous e-learning research in developing African countries have often been silent on moderating factors such as age and gender. Faculty members and administrators should use these results to develop strategies to align users' expectations with the use of technology for learning.

Keywords*: e-learning, UTAUT model, Sakai LMS, Developing country, technology acceptance, gender, age.*

CHAPTER ONE

INTRODUCTION

1.1 Research Background

The historians assert that the knowledge of the past is paramount to understanding present events (Szasz, 2006). In the history of electronic learning (e-learning), it is imperative to note that there is no single evolutionary tree and no single agreed definition of e-learning. E-learning has evolved since the 1960s, in different ways in Education, Business, the Training Sector, and the Military (Fletcher & Rockway, 1986). Campbell (2004) asserts that the educational sector sees "e-learning" as the use of both software-based and online learning, whereas in Business, Higher-Education, the Military and Training Sectors, it refers solely to a range of online practices. E-learning may include delivery of course materials, tuition or assessment by means of asynchronous (one-way) learning where interaction occurs intermittently with a time delay and at the learner's own pace, and synchronous (two-ways) learning, or real-time online learning where learning takes place at the same time and pace.

The shift enhancing the adoption of e-learning in teaching and learning is not different with universities in Ghana, namely: University of Education (UEW), Kwame Nkrumah University of Science and Technology (KNUST), University of Ghana (UG), and Ghana Institute of Management and Public Administration (GIMPA) and the rest (National Accreditation Board, 2012). E-learning or computer and internet-based learning have shown to exhibit numerous potential benefits over many traditional forms of learning. E-learning is less expensive and faster to deliver, promotes self-efficacy, provides good accessibility from anywhere and

anytime, and gives students more control over their learning processes (Cantoni, Cellario, & Porta, 2004; Dewhurst & Williams, 1998; Smith & Rupp, 2004; Horn & Staker, 2011).

Kanuka and Anderson (2007) assert that the spread of internet usage has led to e-learning becoming vastly widespread and many universities are using it to support teaching and learning. 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). Again, the 2004 "Teacher Talk Tech" survey which was conducted by the Computer Discount Warehouse-Government (CDW-G) Incorporated, a leading provider of technology to governments and educators in the United States of America, also asserts that Eighty-one percent of teachers reported that information technology in education increases students' academic performance. A majority of teachers said that information technology is a valuable teaching tool for all core academic skills. Only fifteen percent of the teachers however, indicated that the quality of available software for students' learning is "excellent", and fifty-two percent of them said, is "poor" or just "okay" (Rother, 2004).

E-learning has evolved from its predecessor, namely distance learning. The flexibility of the distance learning did attract many learners irrespectively of their countries or places across the globe. In 2002, the global market for e-learning reached US $90 billion. This is because, majority of companies are venturing into e-learning (Yong, 2003). Tagoe (2012) also indicates 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 especially in Ghana to implement e-learning strategies in order to catch up with their counterparts in the developed countries.

In the early years of 200, Morgan (2001) estimated that the online learning market would grow to reach US$22 Billion in the near future. These figures seem to suggest a bright market for e-learning. The demand and use of alternatives to the typical classroom setting has been ongoing for more than 100 years from correspondence courses in paper form through video and computer access (Coleman, 2011). Enhancing the adoption of e-learning especially in universities in developing countries would facilitate teaching and learning in the universities as a whole.

In recent times, studies (Lloyd & Robertson, 2012; Mestre, 2012; Hartsell & Yuen, 2006) have clearly argued that, the use of technology, provides bidirectional communication between teachers and students, thus, a continuous exchange of ideas and information between Faculty and students. It is worth noting that, the application of technology to teaching and learning brings about possibilities that hitherto were difficult or close to impossible. Publication of content is instantly made, making room for regular update which encourages the participation of multiple authors (Alexander, 2006).

With the current advances in Information and Communication Technologies (ICTs) by way of improved computer power, faster data transfer rates, and attendant lowering of costs, coupled with the fact that the effective integration of these technologies into educational curricula has been demonstrated to have positive effects on student learning (Harvey, 2003; Kiluk, 1994; Salpeter, 1998), technology-enabled instruction, especially online learning, has emerged as the

most feasible and economically sound means of expanding access to quality higher education. Online learning is thus being rapidly adopted by educational institutions worldwide as an alternate or complementary mode of education delivery, and indeed has been heralded as the next democratizing force in education, particularly in higher education (Jones, 1997). However, Ghanaian universities have arguably not yet fully developed the use of e-learning among faculty members and students, in relation to teaching and learning hence the need for an assessment of the adoption of e-learning in the country.

1.2 Research Problem

Technological advancements and the evolvement of web 2.0 technology has increased the desire to apply technology to higher education in different fields of study (Hew & Cheung, 2013; Matschke, Moskaliuk, & Cress, 2012; Su, Yang, Hwang, & Zhang, 2010). The prevalent infusion of virtual tools to complement traditional teaching and learning methods is due to the outstanding benefits and the diffusion potential that has been exhibited over the years (Dunlap & Lowenthal, 2013; Wang, 2009). Predominantly considering the impact of these applications to higher education in contemporary times (Kunicina, Zhiravecka, Patlins, Chaiko, & Ribickis, 2012; Gilroy, 2010), it is imperative to strategically adopt e-learning to have a greater impact.

Encouragingly, the field of e-learning has seen so many valuable academic studies. However, there is a seeming dominance of research about e-learning adoption in higher educational institutions (Kunicina et al., 2012; Lloyd & Robertson, 2012; Bauk, 2015; Dunlap & Lowenthal, 2013). These studies provide understanding about factors influencing adoption of e-learning in higher learning institutions. Most of these researches were conducted using the experimental settings. Bauk (2015), for instance, conducted an experimental study assessing thirty (masters and doctoral) students' perception of e-learning in blended environment in

Croatia. One major critique of experimental researches is the control of irrelevant variables at times which also means creating situations that are somehow artificial (Cohen, Manion & Morrison, 2013). Hence, there has been calls for observational researches that draw inferences from a sample to a population where the independent variable is not under the control of the researcher because of ethical concerns or logistical constraints (Von Elm *et al*., 2014). Again, observational research allows for the researcher to observe ongoing behaviour which is the focus of this study.

In another vein, e-learning studies have been conducted looking at factors that support adoption whiles others look at barriers to adoption. Duan, He, Feng, Li and Fu (2010) 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. Motaghian, Hassanzadeh and Moghadam (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. Bhuasiri, Xaymoungkhoun, Zo, Rho and Ciganek (2012) also identified perceived ease of use and organisational compatibility as factors that influence e-learning adoption. These papers used models such as Technology Adoption model (TAM) (Namisiko, Munialo, & Nyongesa, 2014; Arteaga Sánchez, Duarte Hueros & García Ordaz, 2013; Persico, Manca, & Pozzi, 2014), Technology Organisation and Environment Framework (TOE) (Raouf, Naser, & Jassim, 2012, Ansong, Boateng, Boateng & Effah, 2016) and Delone and McLean IS Success Model (Hassanzadeh, Kanaani, & Elahi, 2012). On the other hand, some papers (Baek, 2008; Nichols, 2008; Lee, 2010) also primarily looked at factors that hinder the adoption of e-learning. For instance, Baek (2008) indicated that unless a state of institutional sustainability is achieved, it is likely that e-learning activity will in the long term be limited to only enthusiasts. In light of this, there is the need for a study that seeks to combine

factors that support and also moderate the adoption of e-learning to better understand the adoption of e-learning specifically from a developing country's perspective.

The foregoing arguments provide the needed basis to investigate into the factors that support and also hinder the adoption of e-learning in a university from a developing country. A study which combines an adoption framework (UTAUT) and the effects of gender and age serving as moderating variables will provide a comprehensive and interesting results similar to the study of Khechine, Lakhal, Pascot and Bytha (2014). The unified theory of acceptance and use of technology (UTAUT) which was proposed by Venkatesh et al. (2003) is a definitive model that synthesizes what is known and provides a foundation to guide future research in the area of technology adoption and usage. It has also been proven that the UTAUT model was able to better explain the variance in usage intention of innovations than previous models (Khechine et al., 2014). These reasons therefore provide the basis for the choice of this integrative and global model to explain technology acceptance by its users. Thus, there is a need for studies from the perspective of a developing country. Also, due to the significant number of studies conducted in the developed world context, there exist a dominance of literature over the developing countries thus; this study comes in a welcoming time to bridge the gap of abundance of research from the developed country context on the issue of gender serving as a mediating factor to the adoption of technology.

1.3 Research Purpose

To address the research problems, the study explores factors that determine e-learning adoption among University of Ghana students using the Sakai Learning Management System with gender and age serving as moderators.

1.4 Research Objectives

The research seeks to:

1. Identify the factors that support the adoption of e-learning in University of Ghana
2. Analyse whether the effects of the adoption factors on the intention of students to use the e-learning system are moderated by gender and age.

1.5 Research Questions

For the above problem and purpose, the study seeks to answer the following specific research questions:

1. What factors support the adoption of e-learning in University of Ghana?
2. Are the effects of the adoption factors on the intention of students to use the e-learning system moderated by gender and age?

1.6 Significance of Research

This research study makes several contributions. This research contributes to the limited literature on e-learning adoption looking at the moderating effects of gender and age from a developing country. Again, the research findings provide insight into different e-learning facilities that students and university authorities could use. In addition, this research outcome will help the university authority to identify critical factors that could affect the successful adoption of e-learning. Again, research results could guide students and universities authority on the barriers to successful e-learning experiences. Finally, the research findings will help the university's authority to clearly identify strategies on how e-learning will address emerging issues.

1.7 Chapter Outline

The remainder of this thesis is organised as follows.

In the next chapter, efforts have been made to review relevant literature on the dogma required to find answers and connect to the research questions. This chapter covers the development of e-learning: Applications and Concepts, Pros and Cons of e-learning, Effective e-learning Environment, Intention Based Models, Technology Acceptance Model, and Learners' Satisfaction.

Chapter three 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 tackles the methodology adopted in this study. It presents a series of steps which include research perspectives, research purpose, research approach, research strategy, sample election and data collection. Finally, structured questionnaire, pilot testing and administration, response rate, access strategies and credibility of the research.

Chapter five deals the discussion on the context of the study including the state of e-learning in Ghana. Chapter six presents the findings and discussion on the findings of this study which allowed answering the research questions.

Chapter seven is the concluding chapter which summarises the purpose and objectives of the study, the major findings and conclusions. It also discusses the implication of e-learning adoption, and presents recommendations for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced the study by stating the research objectives, research purpose, research questions and the justification for the study. This chapter examines relevant literature related to the study on e-learning adoption in order to identify gaps in previous research. This chapter reviews literature from previous research on mobile phone apps, its adoption and usage and social networks as well as the diffusion of Technology.

2.2 Paradigm Shift from Learning to E-learning

Education and training are major strategic tools which communities need to apply continuously in order to sustain a global competitive advantage, create a better standard of living or development. Hence, e-learning has increasingly been used in most areas as a sustainable alternative to the conventional education. Again, in order to understand e-learning as a key competence it is necessary to explore the traditional concept of learning, which is usually made up of a combination of knowledge, skills, attitudes and values (Hamid, 2002).

Researchers see learning to be a rather permanent change in one's behaviour that results from practice (Atkinson et al., 1993; Hall, 2002). Again, learning can be said to be an individual process of changing behavioural patterns, increasing or altering models of the mind and processes (Tusting, 2003). Learning is a complex process of obtaining knowledge or skills which involves the learner's biological characteristics or senses (physiological dimension); personality characteristics such as attention, motivation, emotion and also curiosity (affective dimension); ways of processing information such as gut feelings or logical analysis (cognitive

dimension); and psychological or individual differences (psychological dimension) (Dunn et al.,1989).

2.2.1 The use of Technology in Education

The United States National Library of Medicine (2004) defines technology broadly as the application of scientific knowledge, (in addition, techniques, tools, processes, products and methods) to practical tasks which is ubiquitous in most societal contexts in America and other industrialized countries. The use of technology has become a very important component of education, work, communication, and entertainment.

In this regard, the internet is not only gaining popularity in education globally, but also all sorts of ICTs such as mobile technologies are also helping to build a robust momentum in the educational field. "Connected Age" which is the new phenomenon has arisen as a result of the adoption of technology which is making societies increasingly interconnected in what many ways. Some decades ago, access to technology was limited and providing internet connectivity to schools was not one of a country's highest education priorities (Hitlin & Rainie, 2005). On the other hand, along with expanded access, there has become a growing pervasiveness of technology in most societies globally. Technology, particularly the internet has assumed a greater stake in the social and educational lives of students in recent times (Lenhart, Rainie & Lewis 2002; Aydin, Akkan, Arpaz, & Koparan, 2015).

According to Casonato and Morello (2002), students must combine their technical skills with an intellectual toolbox enriched with expensive roles, team building, and knowledge in the classrooms. Hence, ICT literacy reflects the need for the students to develop learning skills that will help them to think to critically analyse information, solve problems, collaborate and

also communicate. The essential role that technology plays in realising these learning ambitions in today's knowledge-based society cannot be overemphasized. Students are able to learn from computers where technology is used essentially as a tutor and therefore serves to increase the student's basic skills and knowledge. Again, the student is able to learn with computers where technology is used as a tool that can be applied to achieving several goals in the learning process. Furthermore, technology can also serve as a resource to help in developing a critical thinking, creativity and research skills (Ringstaff & Kelly, 2002).

A lot of opportunities for personalizing tools and other services are provided by the new developments in the Web. This has contributed to assisting students to perform self-directed learning in an open and social context within their personal learning environments (Klamma, et al., 2007). Students are able to unconventionally put together various tools and human resources into personal learning spaces and environments (Fiedler & Pata, 2009). These fundamental transformations are also predicted to be visible in business enterprises. The rapidly changing business and social environments in recent times require the individuals to be constantly learning and creative, independent, responsible and also autonomous (Burns & Light, 2007).

Technology has been integrated into the learning environments of most universities. This has resulted the development of a range of pedagogical and administrative tools which are offered for university teaching and learning (Coates, James & Baldwin, 2005). Technology has also made the world a truly global community, where students are being prepared for this global community. A technology-rich education helps students to bridge cultural and geographical differences around tasks, projects, information gathering and relationship building activities.

Technology also makes learning more meaningful to students and more adequately prepares the student for the world in which they will live and work.

Several researchers have hailed the significant role of technology in the educational sector. The table below outlines some positive remarks from researchers on the important role technology plays in education.

Table 2.1: Technology in education

Author(s)	Remarks
Kulik, Kulik, and Bangert-Downs (1991)	Students in classes that use technology perform better that their colleagues in tests on basic skills achievement by 30 percent on average.
Barron and Goldman (1994)	Students with wide-ranging access to technology are able to learn how to organize complex information, recognize patterns, draw inferences, and communicate findings.
Zorfass (1994)	Studies of students with disabilities show that technology can expand access to educational resources and improves the ability of the students to process and remember information.
Dwyer (1994)	The use of technology in the classroom helps to improve the motivation of students and attitudes about themselves and about learning.
Henriquez & Riconscente (1998)	The teacher's role in a technology-infused classroom often shifts to that of a facilitator or coach rather than a lecturer.
Tinzmann (1998)	Technology use tends to foster collaboration among students in the classroom.

Information access has been made possible by technology, easily to teachers and students and it has given them opportunities to work with an extraordinary range of tools and current information were previously impossible to have been found in the classroom. The easy access to this educational material literally gives all schools regardless of their location or financial strength, the potential to have libraries of superior collections and connections to the same collections that other universities may have (Honey et al., 1996). Tutors can individualize the lessons by integrating technology into their course models and customize it to the needs of individual students to achieve their potential.

2.3 E-learning Explained

The origin of the term e-learning is not certain or officially known, although it is suggested that the term most likely became popular during the 1980's. This was within the same time frame when a similar mode of educational delivery called online learning also came up. While some researchers and writers clearly define e-learning, others also imply a specific definition or view of e-learning in their research works (Moore, 2010). E-learning has been construed in a variety of contexts, which include distance learning, networked learning and also online learning (Wilson, 2001). In the context of this study all of these instances will be considered to describe learning that utilises information communications technology (ICT) to improve educational interaction between students, lecturers and learning communities. Engelbrecht (2005) therefore defines e-learning by restricting it to the mode of distance education by asserting that e-learning involves the application of electronic media such as the internet, DVD, CD-Rom, videotapes, television, cell phone and others) for teaching and learning at a distance. On the other hand, in the area of active learning, Lee, Yoon and Lee (2009) do not impose such a restriction, hence defining e-learning as "Web based learning which utilize web-based communication, collaboration, knowledge transfer, multimedia and training to support learner's active learning

without the barriers of time and space. The latter definition which takes into consideration active learning seems more appropriate and hence is adopted as the definition of e-learning for this study, taking into consideration the fact that in many educational institutions, e-learning systems are used by students who are on-campus as well as students who are off-campus or on distance modules.

2.4 Characteristics and features of e-learning systems

The structure of higher learning educational institutions has been transformed greatly by the introduction of initiatives in technology. LeRouge *et al.* (2013) assert that these technological developments and the network infrastructure improvements (specifically the world wide web) have led to exciting opportunities created for the introduction of computers in all areas. These developments have merged together with an ever evolving role for the educational sector as a lot of students now wish to study at part-time, distance or even wish to integrate their education with their professional careers. Again, this has led to the evolution and also the adoption of some e-learning systems and environments which are discussed below.

2.4.1 Learning Management Systems

The e-learning environments which are also known as Learning Management Systems (LMSs) include, MOODLE, Sakai, Blackboard, WebCT, and these are either commercial or open source. LMSs are mostly used in universities for the creation, distribution, management, and retrieval of educational materials and also to improve interaction, enable institutional innovations in teaching and learning. Again, LMSs provide tools which are used for active online engagement such as discussion, summative assessment, chat rooms, wikis, and blogs (Cigdemoglu et al., 2011). Caminero et al. (2013) assert that, the most widely accepted and also preferred Learning Management Systems include MOODLE and Sakai. Their popularity

can be attributed to their flexibility, ease of use, popularity and compatibility. The Sakai and Moodle are e-learning environments that facilitate the creation of online course content (Martín-blas & Serrano-Fernández, 2009). These Learning Management Systems have various tools for communication, assessment, uploading of content, submission of students' assignments, administration of student groups, tracking tools, questionnaires, wikis, chats, blogs, forums and a host of activities performed on the internet. Learning Management Systems are also beneficial for the development of reciprocity and cooperation among students through the usage of active learning techniques which include providing prompt feedback, communicating high standards, and also acknowledging diverse talents and ways of studying (Wang et al., 2013). In addition, improvement in the level of learning which is student-led, student morale and also an enhanced information skills acquisition are some other benefits derived from LMS. Woods et al. (2004) postulate that these benefits may help to even reduce the number of student withdrawals and also absenteeism. In addition, some LMSs can automate notifications of due dates on a readily available calendar, and some can also send email automatically if students are not participating as required (Rubin et al, 2010).

Some of the Learning Management Systems used by most universities include Moodle and Sakai. Martin Dougiamas, an Australian graduate student, basically developed Moodle in 1999 as a course management system. Moodle was later released to the general public in 2002, initially with only the education market in mind. PHP is used to write the source code of Moodle. PHP is common, free scripting language which was originally developed for building dynamic Web pages. There is a Moodle Trust which manages the platform's main development. On the other hand, the Moodle software is seen to be highly modular, and so a lot of developers and organizations have decided to create several plug-ins and other add-ons to enlarge and also improve its functionality. Much of Moodle's popularity is dependent upon

its ease of use. This is because, as a Learning Management System, Moodle provides a very robust toolset, which is particularly as a result of the plug-in modules that greatly improves and other functionalities (Caminero et al., 2013).

The Sakai Learning Management System is discussed in section 5.3 of this study.

2.5 Review of e-learning research

A literature review can be referred to as a synthesis of available resources and materials which have a strong relation to the topic in question, accompanied by a description and a critical evaluation and comparative analysis of each work as postulated by Boateng (2014). Onwuegbuzie, Leech and Collins (2013) postulate that a thorough, sophisticated literature review is the foundation and inspiration for substantial, useful research. It is therefore, according to Fraenkel and Wallen (2006), helpful in two ways; thus, it does not only help researchers glean the ideas of others interested in a particular research question, but it also lets them read about the results of other (similar or related) studies.

It is important for every research to have a literature review. Consequently, in interrogating a phenomenon such as the adoption of e-learning, it is very prudent to discuss some concepts that are relevant to enhance its understanding.

Consequently, the review underwent four phases; categorisation of literature by factors, classification, mapping and conceptual approaches used in e-learning research.

2.5.1 Classification of e-learning literature

In order to help give a sense of direction to the review, literature on e-learning was reviewed under the following thematic areas: geographical context, issues, methodological approaches and conceptual approaches. Similar to the reviews of Similar to the works of Boateng, Molla and Heeks (2009) and Ansong et al. (2016), this review was conducted in to provide the researcher with a better insight of the e-learning literature which is intended to help to identify new areas of research and also to provide a solid theoretical basis for the proposed research.

2.5.2 Methodology for the Literature review

A total of 200 research papers were reviewed. The Table 2.2 below outlines the literature review procedure. The first activity was aimed at searching and downloading current articles from leading Information Systems journals in selected academic databases which included EmeraldInsight, Sciencedirect, EBSCOHOST and JSTOR. Articles published from 2009 to 2016 were therefore retrieved for the review. The second activity was to filter or sort these articles into relevant and less relevant ones. Commentaries and editorial notes were therefore dropped. The articles were later perused to ensure they are scholarly in nature and articles that made use of theories were also prioritized. The final activity was therefore to group the articles under the identified thematic areas.

Table 2.2: Literature identification and Review Methodology

Step	Activity	Description
1	Search	Articles from leading IS journals. Selected articles from EmeraldInsight, Sciencedirect, EBSCOHOST, and JSTOR spanning from 2009 to 2016.
2	Filter/Sort	Commentaries and Editorial notes were dropped
3	Peruse	Peruse the articles to ensure they are scholarly in nature and prioritising those that made use of theories.
4	Confirm	Grouped the articles under the identified thematic areas

Source: Author's construction

2.5.3 Mapping e-learning research: Issue and evidence

This section shows the categorization of the articles used for the review under the various themes with much emphasis on research works carried out in developing countries particularly Africa. Elaboration is as follows: Evaluation and use of e-learning systems (15%), Design and Development of e-learning systems (41.2%), E-learning adoption (43.8%). Some of the articles used in the review process are shown in table 2.3 below.

Table 2.3: Study distribution by Research gaps

Research	Focus	Underpinning Theory and Framework	Research Methods and Countries	Findings	Gaps for future research
Osgerby and Rush (2015)	The aim of the study was to investigate the perceptions of undergraduate accounting students using Twitter as a learning support tool	Conceptual Framework	Quantitative United Kingdom	The students offered varied perceptions about the value of using twitter to support their education.	The exploratory case study was with a small sample size (37 accounting students). The study can be replicated in other environments with an increased sample size.
Punnoose (2012)	Investigated the determinants of the intention to using e-learning.	Technology Acceptance Model	Quantitative Thailand	The significant predictors of Behavioral Intention (BI) to engage in e-learning were Perceived Usefulness (PU), Subjective Norms (SN), and Perceived Ease of Use.	The study can be conducted in other contexts to include a larger sample size.
Khechine et al. (2014)	The paper sought to find the factors that explain students' acceptance of a webinar system called Elluminate.	UTAUT	Quantitative Quebec-Canada	Intention to Use the e-learning was directly influenced by performance expectancy, effort expectancy, and facilitating conditions. Only the age variable had a moderating effect.	Future research should focus on studying other e-learning systems that contain different features. Other moderating variables, like personality traits can be applied on the UTAUT model. Other studies need to evaluate and compare students' acceptance of e-learning for courses with different topics.

Aydin et al. (2015)	The study investigated vocational school students' practices and perceptions of online learning based.	Conceptual framework	Qualitative Turkey	Communication between the students and teachers has an effect on influencing students' perceptions and approach to online learning. Also, the respondents have some negative perceptions about using and implementing technology in lectures.	Perception, approach, and outcome should be tested on the model which may provide a better understanding of how best to design online education.
Bauk (2015)	The study analyzed students level of satisfaction with the available e-learning resources in blended environment.	Conceptual model	Quantitative Montenegro	The technical stability of the system and also the presence of self-evaluation features are among the categories that must be involved into the e-learning system.	For future researches, a larger number of researchers, teachers and students should be involved in redesigning the questionnaires in order to evaluate the performances of e-learning systems.
Ansong et al. (2016)	The study explored the determinants of e-learning adoption in universities in developing countries.	TOE framework	Quantitative Ghana	IT infrastructure, Perceived ease of use, Organizational compatibility, Expected benefits, Educational partners, Competitive advantage, Content of the e-learning course and e-learning curriculum are jointly responsible for determining e-learning adoption.	Future studies should be carried out using more than one university in different developing countries, to provide for comparison and validation of findings.

Mtebe and Raisamo (2014)	The study investigated students' behavioural intention to adopt and use e-learning	UTAUT	Quantitative Tanzania	Performance expectancy, effort expectancy, social influence, and facilitating conditions had positive effects on students' e-learning acceptance with performance expectancy being the strongest predictor.	Further studies should be carried out on e-learning adoption in other East African countries.
Oye, Iahad, Rahim & Zairah (2012)	The paper examined the impact of UTAUT model and ICT theoretical framework on some academicians of a university.	UTAUT	Quantitative Nigeria	Performance Expectancy is most influential Predictor of intention to use. Effort Expectancy is most influential Predictor of intention to use.	The study should be replicated in other contexts.
Tagoe (2012)	The study examined students' perceptions on incorporating e-learning into teaching and learning.	TAM	Quantitative Ghana	Male students were more likely to use the internet than female students. Again, there was a relationship between the length of time students have been using the internet and frequency of use of the internet.	Further studies should be conducted in other universities and also increasing the sample size.

2.5.4 Discussion of issues and evidence

The studies as outlined in Table 2.3 above, have varying propositions on the factors that support or inhibit the adoption of e-learning in higher learning institutions or universities. Hence it becomes imperative to discuss some of these adoption factors in this section.

In the African context, Ansong et al. (2016) in their study on exploring the determinants of e-learning adoption in universities in Ghana discovered that IT infrastructure, Perceived ease of use, Organizational compatibility, expected benefits, Educational partners, Competitive advantage, Content of the e-learning course and e-learning curriculum were jointly responsible for determining e-learning adoption. The focus of the study was on the students, lecturers and the e-learning administrators in a University.

Again, in Tanzania, Mtebe and Raisamo (2014) investigated students' Behaviour intention to adopt and use e-learning and also found out that Performance expectancy, effort expectancy, social influence, and facilitating conditions had positive effects on students' e-learning acceptance with performance expectancy being the strongest predictor. From Nigeria, Oye et al. (2012) also examined the impact of UTAUT model and ICT theoretical framework on some academicians of a university and also discovered that Performance Expectancy Effort Expectancy are the most influential predictors of intention to use the system.

Tagoe's (2012) study was arguably one of the few studies in Africa that attempted to look at how gender mediated the adoption of e-learning by students. In the study, Tagoe (2012) discovered that gender mediated the adoption of e-learning by indicating that male students were more likely to use the internet than female students. Again, in Canada, Khechine et al. (2014) sought to find the factors that explain students' acceptance of a webinar system by

looking at the roles age and gender plays in mediating students' adoption. It was therefore discovered that the intention to use the system was directly influenced by performance expectancy, effort expectancy, and facilitating conditions whereas only age had a moderating effect on the student'.

In general, the adoption factors were grouped into performance expectancy; Effort expectancy; Social influence; Effort expectancy; and Facilitating conditions. These factors were mostly used in the studies reviewed (Deng, Liu & Qi, 2011; Cheng, Yu, Huang, Yu, & Yu, 2011; Khechine et al., 2014; Oye, Iahad, Rahim & Zairah, 2012).

This therefore brings to the fore the need for a framework which will combine these factors to study the adoption of e-learning and how age and gender mediate or influence them since the studies reviewed on the African context seem to be silent on the mediating effect of gender and age on technology adoption.

2.5.5 Conceptual Approaches in E-learning Research

This subsection discusses some of the research frameworks used in the literature as shown in Table 2.3 above, to pave way for the selection of an appropriate research framework for the study and subsequent development of the conceptual model.

The models discussed include: Technology Adoption Model (TAM), Technology, Organization and Environment model and the UTAUT. These frameworks were used at different levels of e-learning adoption studies.

2.5.5.1 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is one of the popular models in Information Systems which is related to the acceptance of technology and use and it has been used extensively in the study of e-learning adoption (Punnoose, 2012, Tagoe, 2012). It was originally proposed by Davis in 1986. The model has proven to be a theoretical model in assisting to explain and predict how users adopt and use technology (Legris, Ingham, & Collerette, 2003). Ajzen and Fishbein (1980) assert that the Technology Acceptance Model is a major extension of the theory of reasoned action (TRA). The Technology Acceptance Model is proposed to offer explanation to why a user accepts or rejects technology. TAM therefore provides a solid basis with which one is able to trace how external variables influence belief, attitude, and intention to use a technology (Davis, 1989; Davis, Bagozzi & Warshaw, 1989).

In addition, the Technology Acceptance Model being an adaptation of theory of reasoned action is specifically formulated for modelling user acceptance of technology. According to the theory of reasoned action, beliefs influence attitudes, which lead to intentions, which then form behaviour of a user. The Technology Acceptance Model therefore adopted this relationship of belief-attitude-intention-behaviour to model users' acceptance of Technology (Riemenschneider & McKinney, 2001; Di Benedetto, Calantone, & Zhang, 2003). The Technology Acceptance Model posits that two factors (perceived usefulness and perceived ease of use) are very important in influencing Technology acceptance. Davis (1989) therefore asserts that the relationship between perceived usefulness and perceived ease of use is that perceived usefulness mediates the impact of perceived ease of use on the user's attitudes and intention to use.

The problem of measuring and finding the factors that determine technology adoption has inspired many Information Systems researchers over the years. On the other hand, the Technology Acceptance Model has been criticized for the issue of self-reporting (Khan & Woosley, 2011). Thus, the model tends to measure change in self-reported use, which may not necessarily be precise. Again, TAM does not include factors which are also influenced by the dynamics of the organization (Legris et al., 2003). Even though TAM is a very useful model, it has been revealed by extant studies in Information Technology adoption studies that the Technology Acceptance Model is able to explain only about forty percent of Information Technology usage and hence it is recommended to be expanded to include some social and human factors (Legris et al., 2003). In this regard, TAM falls short of the objective of this study which is to investigate students' adoption of e-learning looking at the role of gender and age.

2.5.5.2 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). Whereas this study focuses on students' adoption of the e-learning system in University of Ghana, according to Tornazky and Fleisher (1990) who proposed the framework assert that TOE framework is a firm level technology acceptance theory which looks at the issues influencing the firm or the organisation's adoption of technology. This therefore makes the TOE framework fall short in meeting the objectives of the current study which involves investigating the moderating role of gender and age on e-learning adoption.

2.5.5.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

Eight different technology acceptance models were thoroughly examined and based on this, the Unified Theory of Acceptance and Use of Technology (UTAUT) was formulated by Venkatesh et al. (2003). The UTAUT therefore integrates and also unifies the various characteristics and other elements of these eight models which include; the Theory of reasoned action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Combination of TPB and TAM, Motivational Model, Personal Computer (PC) Utilization, Diffusion of Innovation (DOI), and the Social Cognitive Theory. The theory has four key constructs (Venkatesh et al., 2003), which are direct factors of usage intention and behaviour: Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions.

The theory has been used extensively in the information systems research to investigate a number of technology innovations such as e-learning (Maldonado, Khan, Moon & Rho, 2011;

Chang, 2013), e-banking (Yu, 2012; Zhou, Lu & Wang, 2010) and 3G mobile Communication (Mardikyan, Besiroglu & Uzmaya (2012).

To this end, the UTAUT is deemed fit to achieve the purpose of this study. This is because of the theory's ability to integrates the common elements of eight theories hence covering every aspect of the adoption of e-learning from a very holistic point of view by taking into consideration factors of the institution to study the adoption of technological innovation such as e-learning. Further, elaboration on the UTAUT is provided in Chapter three of the study and the justification for its selection.

2.6 Summary

In sum, the review of literature discussed the genesis of e-learning, pertinent definitions, characteristics of e-learning, and how the literature review was conducted, taking into consideration some adoption issues and conceptual frameworks. The research frameworks and determinants exhibited in the studies reviewed provides direction for the research framework selection and hypotheses development in the next chapter. The next chapter presents an overview of the UTAUT and adapts its constructs to arriving at a research framework for the study.

CHAPTER THREE

RESEARCH FRAMEWORK

3.1 Introduction

This chapter establishes the theoretical stance of the study upon deliberating on the pertinent and contemporary literature in relation to the adoption of e-learning in the previous chapter. According to Swanson & Chermack (2013), theories are formulated to explain, predict and understand phenomena and within the limits of critical bounding assumptions. They further assert that theoretical framework is the structure that can hold or support a theory of a research study. Also Creswell (2009) indicated that the theory for a study guides the entire study. It is an organising model for the research questions and for the data collection procedure. The theoretical framework introduces and describes the theory that explains why the research problem under study exists.

Upon thoroughly reviewing theories in Information Systems, it came to light that the Unified theory of Technology Acceptance and Use was apt to help cover every aspect of the adoption of e-learning from a holistic perspective and again to understand how gender and age influenced these factors.

3.2 UTAUT- An overview

The originators of the Unified Theory of Acceptance and Use of Technology (UTAUT) model unified eight theories and models which include Theory of reason Action (TRA) (Fishbein and Ajzen 1975), Technology acceptance model (TAM) (Davis 1989), Motivational model (MM) Davis et al., (1992), Theory of planned behaviour (TPB) Ajzen (1991), combined TAM and TPB (C-TAM-TPB) Taylor and Todd (1995), Model of PC Utilization (MPCU) Thompson et

al. (1991), Innovation Diffusion Theory (IDT) Rogers (1995) and Social Cognitive Theory (SCT) Bandura (1986). The unification by the researchers sum up all the constructs from the eight models to four determinants which predicts intentions and usage and four moderators of the key relationships Venkatesh et al. (2003). Figure 1 illustrates the relationships that exist in the UTAUT model.

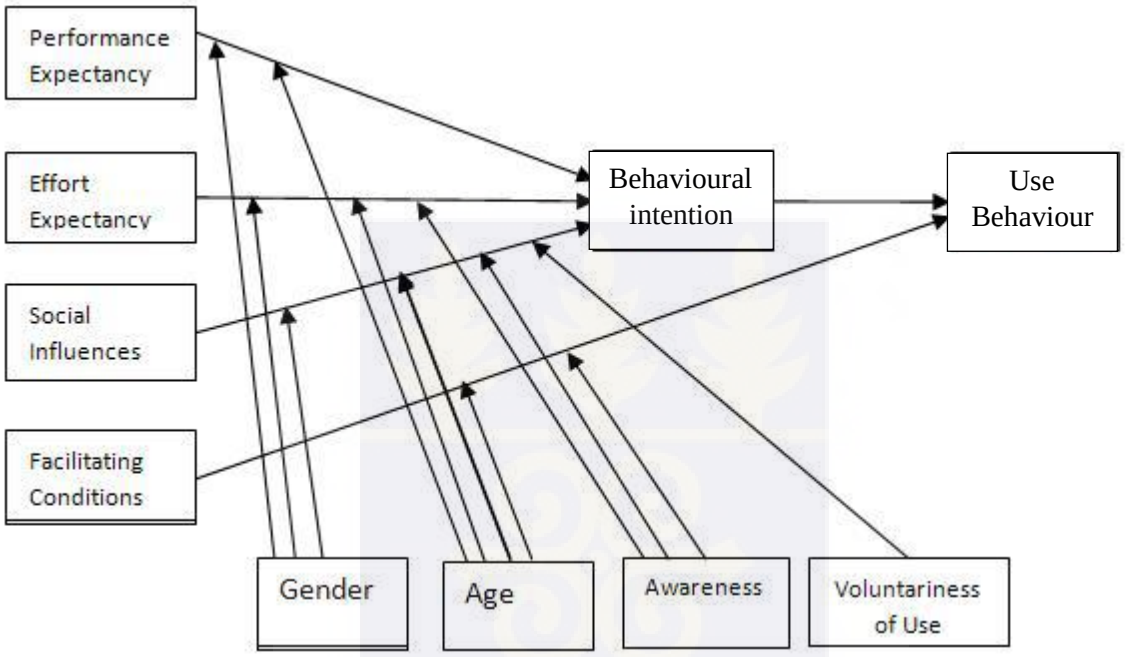


Figure 3.1: UTAUT Model (Venkatesh et al. 2003)

The UTAUT model has four major exogenous variables which are Effort Expectancy, Performance Expectancy, Social Influence, and Facilitating Conditions and also two endogenous variables, intention to use technology and use behaviour. Performance expectancy refers to as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. Effort expectancy is the degree of ease associated with the use of the system. Social influence is the degree to which an individual perceives that important others believe he or she should use the new system. Facilitating conditions are

defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Khechine et al., 2014).

This model was selected because of its global and integrative approach, incorporating a wide variety of explanatory variables from the main theoretical models developed to explain technology acceptance and use. Venkatesh et al. (2003) for instance carried out an in depth analysis of literature on technology adoption and proposed a unified model that integrates the contributions common to the previous theories. Therefore, it is reasonable to expect a theory that integrates the most important contributions from other models to be superior to the previous theories on technology adoption.

3.3 Empirical Grounding of the framework

The UTAUT model has been used extensively in the information systems research to investigate a number of technology innovations such as e-learning (Maldonado, Khan, Moon & Rho, 2011; Chang, 2013), e-banking (Yu, 2012; Zhou, Lu & Wang, 2010) and 3G mobile Communication (Mardikyan, Besiroglu & Uzmaya (2012). Table 3.1 below outlines some studies which applied the UTAUT model.

Table 3.1: Studies with UTAUT and its Extensions as Research Model

Author	Sample Size, Location & Model	Statistical Techniques	Results
3G mobile Communication			
Su, Yang, Hwang & Zhang (2010)	394 Taiwan UTAUT	KMO Bartlett's test Cronbach's Alpha SEM	PE has positive influence towards BI and UB. FC has positive influence on BI and UB. SI has positive influence on BI and UB. BI has positive influence on UB. EE did not influence BI
Mardikyan, Besiroglu & Uzmaya (2012)	150 Turkey UTAUT + TAM	T-test One-way ANOVA Pearson's Correlations Multiple Linear Regression	PU is a strong determinant of user acceptance, adoption, and UB. Strong relationship between PU and PEOU. Variety of services and SQ are influential factors for 3G technology acceptance. SI positively affects the tendencies of 3G usage.
Banking			
AbuShanab & Pearson (2007)	940 Jordan UTAUT	Multiple Regression	PE, EE, and SI were significant and explained a significant amount of the variance in predicting a customer's intention to adopt internet banking
Zhou, Lu & Wang (2010)	250 China UTAUT + TTF	CFA Path Analysis.	PE, TTF, SI, and FC have significant effects on user adoption. TTF has a significant effect on PE
Yu (2012)	441 Taiwan UTAUT + PFC + PSE	AVE CR PLS	intention to adopt mobile banking was significantly influenced by SI, PFC, PE, and PC in their order of influencing strength
Martins, Oliveira, Popovič (2014)	249 Portugal UTAUT +PR	Validity and Reliability Analysis SEM and PLS	PE, EE, SI and Risk strongly predicts BI BI predicts usage behaviour of Internet Banking
Education			
Oye, Iahad, Rahim & Zairah (2012)	100 Nigeria UTAUT + Anxiety + SE + ATUT	Regression analysis	PE is most influential Predictor of intention to use. EE is most influential Predictor of intention to use.
Nassuora (2012)	80 Saudi Arabia UTAUT	Pearson product-moment correlation	SI and FC Predicts Attitude PE and EE influence BI Attitude and intention to use

Chang (2013)	363 Taiwan UTAUT + TTF	Measurement model Analysis (Reliability and validity) SEM	PE, EE, SI, and FC determine users' BI of using library mobile applications. Moderating effect of TTF fit is also significant
Wong, Russo & McDowall (2012)	112 UTAUT	Analysis (Reliability and Validity) SEM	PE and EE have a direct and statistically significant positive effect on BI The model accounted for 41% of the variance in BI to use IWB among student teachers
Khechine et al. (2014)	114 Quebec-Canada UTAUT	Regression analysis	IU was directly influenced by performance expectancy, effort expectancy, and facilitating conditions. Only the age variable had a moderating effect.

Key: **BI** – Behavioural Intentions, **EE**- Effort Expectancy, **FC**- Facilitating Conditions, **PC**- Perceived Credibility, **PE**- Performance Expectancy, **PFC**- perceived financial cost, **PR**- Perceived Risk, **PSE**- Perceived Self Efficacy, **PU**- Perceived Usefulness, **PEOU**- Perceived Ease of Use, **SQ**- Systems Quality, **TTF** - Task Technology Fit, **SI**- Social Influence, **IWB**- interactive whiteboard, **IU**- Intention to Use.

3.4 Research Model and Hypotheses

From the discussion so far (sections 3.2 and 3.3), the UTAUT model tends to be a better fit hence, the research model and hypothesis for the study were developed from the constructs of the UTAUT model. From the UTAUT model, the five main constructs (one dependent variable and four independent constructs) and two moderating variables (Venkatesh et al., 2003) were used to develop the hypothesis for the study.

The dependent variable was the Intention to Use Sakai (IU). Sakai is the Learning Management System for University of Ghana. Ajzen (1991) assert that "Intentions are assumed to capture the motivational factors that influence a behaviour". Hence, Intention to Use refer to as the indications of how hard people are willing to try, of how much of an effort they are planning

to exert in order to perform a behaviour. In the context of this study, the dependent variable is the intention of the students to use Sakai.

The first construct of the UTAUT model is chosen as the first independent variable which is Performance Expectancy (PE). Venkatesh et al. (2003) postulate that it is the strongest predictor of behavioural intention to adopt a technology. Hence, Performance Expectancy was defined as the degree to which a student believes that using the e-learning system will help him or her to attain gains in academic performance. Extant studies (Venkatesh et al., 2003; AbuShanab et al., 2010; San Martin & Herrero, 2012) have shown a positive relationship between Performance Expectancy and Intention to Use a technology. Hence, for this study, the first hypothesis is proposed as follows:

H1: Performance expectancy has a positive effect on the intention to use Sakai LMS.

The second independent variable of the UTAUT model is Effort Expectancy (EE). It is also referred to as the degree of ease in using a system. Extant studies (Venkatesh et al., 2003; Thompson, Higgins, & Howel, 1991) have indicated that in the earlier stages of a new behaviour, the users tend to feel that there are some obstacles related to the use of the technology. On the other hand, once the users become accustomed to the technology, the perceived ease of using the technology becomes stronger. However, it is assumed that the Sakai LMS of University of Ghana is an easy-to-use and a user-friendly software. Thus, its ease of use will support adoption. Hence, the second hypothesis as follows:

H2: Effort expectancy has a positive effect on the intention to use Sakai.

The third independent variable of the UTAUT model used for the study is Social influence (SI). Social Influence refers to the degree to which a student perceives that important people believe he should use the system. Important people such as friends, colleagues, or family members tend

to influence students' adoption of a technology. Similar studies (Venkatesh et al., 2003: Eckhardt et al., 2009; San Martin & Herrero, 2012) which used the UTAUT model have indicated a positive relationship between Intention to use and Social Influence. Consequently, the third hypothesis as follows:

H3: Social influence has a positive effect on the intention to use Sakai.

The fourth independent variable of the UTAUT model used for the study is Facilitating Conditions (FC). Facilitating Conditions refers to as the degree to which a student believes that an organizational and technical structure exists to support the use of the system (Khechine et al., 2014). Empirical evidence has indicated that when users feel that they are well supported in a number of ways, they will be more inclined to use system (San Martin & Herrero, 2012; Chang, 2013). In the context of this study, it is assumed students have access to support services from the Computing Services directorate of University of Ghana, hence the fourth hypothesis as follows:

H4: Facilitating conditions have a positive effect on the intention to use Sakai LMS.

Two moderating variables (age and gender) were added to the four main constructs of the UTAUT model to answer the second research question (Are the effects of these adoption factors on the intention of students to use the e-learning system moderated by gender and age?). These moderating factors will contribute to evaluate the strength of the relationships between the independent and the dependent variables according to the intrinsic characteristics of the students (Baron & Kenny, 1986). As Venkatesh et al. (2003) asserted that when gender and age are considered as moderating variables, they play an important role in the relationships between the psychological constructs of the UTAUT model and the intention to use a technology.

Gender has a moderating effect on the relationship between the constructs of the UTAUT model (Venkatesh et al., 2003). For the first construct, (Performance Expectancy), the effect was stronger for men (Venkatesh & Morris, 2000), while for the two other constructs (Effort Expectancy and Social Influence), the effects were more significant for women (Cheng et al., 2011). It can be deduced that performance is a significant concern for male students, whereas female students are more worried about ease of use and others' opinions. The hypotheses related to the moderating effects of gender are as follows:

H5: The positive effect of performance expectancy on the intention to use Sakai LMS is moderated by gender.

H6: The positive effect of effort expectancy on the intention to use Sakai LMS is moderated by gender.

H7: The positive effect of social influence on the intention to use Sakai LMS is moderated by gender.

In previous studies on technology adoption (Lu, Yu, & Liu, 2009; Venkatesh et al., 2003), age was seen to moderate the relationship between performance expectancy, effort expectancy, social influence, and the dependent construct behavioural intention. The effect of performance expectancy on intentions was stronger for younger people, but the effects of effort expectancy and social influence were more significant for older people (Venkatesh *et al.*, 2003). Hall and Mansfield (1975) claim that older people attach more importance to help and support in the job context, known as facilitating conditions. In the case of this study, it is assumed that age of students moderates their expectancy to adopt e-learning systems. Hypotheses related to the moderating effects of age are as follows:

H8: The positive effect of performance expectancy on the intention to use Sakai LMS is moderated by age.

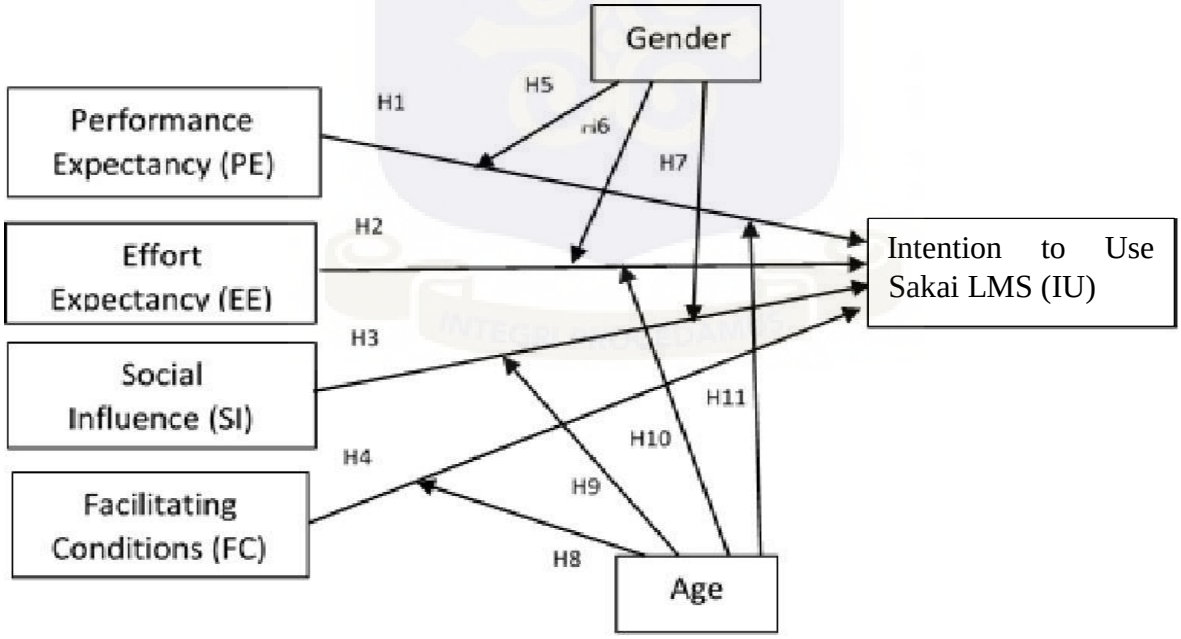
H9: The positive effect of effort expectancy on the intention to use Sakai LMS is moderated by age.

H10: The positive effect of social influence on the intention to use Sakai is moderated by age.

H11: The positive effect of facilitating conditions on the intention to use Sakai is moderated by age.

The figure 3.2 below shows the research model used for the study.

Figure 3.2. Research model



3.5 Summary

This chapter discussed the research framework used to achieve the purpose of the study. The chapter discussed the Unified Theory of Acceptance and Use of Technology (UTAUT) model, its various constructs, and its application in other information systems studies. Finally, the chapter discussed the research model and hypotheses used for the study to answer the research questions. The next chapter describes the methodology for conducting this study.

CHAPTER 4

METHODOLOGY

4.1 Introduction

The previous chapter discussed the theoretical foundation of the study and why the Unified Theory of Acceptance and Use of technology (UTAUT) proposed by Venkatesh, Morris, Davis, and Davis (2003) best fitted the study in the light of other prominent adoption theories. This chapter therefore discusses the methodology for conducting the study. Barbie and Mouton (2006) assert that, the methodological dimension of research refers to the knowledge of "how or know how'' to do things or total set of means that scientists employ in researching their goal of valid knowledge. The methodology establishes ground for scientific researchers to clearly spell out their methodological approaches, as such this study emulated the steps postulated by Eldabi et al. (2002). Thus, this chapter employed the following: philosophical perspectives, research approach, design, purpose, data collection and data analysis methods.

4.2 Research Paradigm

The researcher's orientation and world view usually influence the research works carried out. Thus, each researcher's set of beliefs with regards to the phenomenon which is being studied results in variations in how each research work is conducted. Creswell (2009) goes further to classify this worldview into the general orientation about the world and the nature of research that a researcher holds hence referring to them as the research paradigms. Although these beliefs usually remain implicit in most research, they affect the practice of the research. Taylor, Kermode and Roberts (2007) define paradigm as "a broad view or perspective of something." Similarly, Weaver and Olson (2006) define paradigms as patterns of beliefs and practices that regulate inquiry within a discipline by providing lenses, frames and processes through which

investigation is accomplished. This definition therefore highlights the importance of paradigms in research (inquiry) by showing how paradigms (a researcher's world view) guides a research work. In this regard, prior to expressing the structure of inquiry for this research and any methodological choices, the researcher must clarify the philosophical world view (paradigm) governing the research in question.

This study was undertaken from the perspective of the critical realism paradigm. Even though there exist other paradigms, such as positivism, constructivism, interpretivism and relativism among others, the researcher's view to this study falls directly in line with the propositions of the critical realism paradigm. Unlike any of the afore stated paradigms, the critical realism paradigm recognizes plasticity in human perceptions (Churchland, 1988) and posits that, there are differences between reality and people's perceptions of reality (Bisman, 2010). In this regard, in this Critical realism assertion, the researcher acknowledges that the perceptions about e-learning are divergent, and there may be differences between the adoption determinants for the different gender groups. Healy & Perry (2000) for instance expressed that critical realism enables the information science researcher to acquire multiple perceptions about a single, mind-independent reality. Dobson (2002) asserts that the critical realist agrees that the knowledge of reality is as a result of social conditioning and, thus, cannot be understood independently of the social actors involved in the knowledge derivation. Krauss (2005) however postulate that it takes issue with the belief that the reality itself is a product of this knowledge derivation process. Hence, the critical realist asserts that "real objects are subject to value laden observation"; the reality and the value-laden observation of reality operating in two different dimensions, one intransitive and relatively enduring; the other transitive and changing. Therefore, for this study, e-learning is treated as a single-minded independent reality,

which as a result of the plasticity in human perception, generates multiple views about its nature and challenges in a developing country.

From the above, it is imperative for choosing the appropriate data collection methods and modes of analysis which agrees with the doctrines of the critical realism paradigm, and supports the research purpose. These are discussed in the following sections of this chapter.

4.3 Research Approach

The critical realism philosophical paradigm, is known for its ability to accommodate both qualitative and quantitative research approaches (Healy & Perry, 2000; Krauss, 2005). Again, Healy and Perry (2000) hold the view that the critical realism paradigm allows a researcher to benefit from both quantitative and qualitative approaches. A mathematical or statistical explanation may be appropriate if the property of the object can be expressed extensionally; and likewise a qualitative approach is appropriate if the property can be expressed intentionally (Scott, 2007). With this stance, the researcher adopted the quantitative research method in finding answers to the research questions.

The use of the quantitative research method was considered apt to understand the adoption determinants and challenges involved in using e-learning systems in a developing country, because of the very nature and demands of the study. The study aimed to gather data from a significant number of respondents, to help generalize its findings. In this case numeric (quantitative) data analysis is needed.

4.4 Research Design

Research design is referred to as the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions (Yin, 2013). In the current study, the method adapted is a survey. Survey is a type of quantitative research approach which is suitable for studying a large number of cases, even when they are geographically dispersed (Powell & Connaway, 2004) just as in this study where factors that influence e-learning adoption in University of Ghana are examined. 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 & Tatham, 2010).

4.5 Conducting the Survey

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

4.5.1 Target Population

Kumekpor (2002) refers to a target population as the entire group of individuals or objects to which researchers are interested in generalizing their findings. The target population usually exhibits varying characteristics and it is also known as the theoretical population. It consists of a total number of elements or units from or about whom survey information is collected.

In this study, the target population was the students of the University of Ghana. 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.

4.5.2 Selection of sample for the survey

A sample is defined as a small part of something intended as the representative of a whole. Sampling is that part of statistical practice which is 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 therefore adopted in the administration of the questionnaire, thus only students who engage in e-learning on University of Ghana campus were contacted. Students currently enrolled on the Sakai LMS were contacted for the study. The purposive sampling technique which is also referred to 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).

Fraenkel and Wallen (2000) assert that there is no defined answer to what constitutes an adequate or sufficient size for a sample. Hence, the best answer 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 suggest 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 factors that influence the adoption of e-learning in

University of Ghana, it was deemed prudent to collect data from some e-learning students of University of Ghana. Hence a sample size of not less than 400 respondents were targeted for this study.

4.5.3 Questionnaire development

The questionnaire for the survey was designed on the constructs of the Unified Theory of Acceptance and Use of Technology model. This was to help meet the purpose and objectives of the research, and also to answer the research questions.

The questionnaire for the survey was designed based on the theoretical framework in order to answer the research questions. The questionnaire was in two broad parts. The first part centred on demographic data, whiles the second part focused on the factors that influence e-learning adoption in University of Ghana using the constructs of the UTAUT model. For this part of the questionnaire, each respondent was posed with a series of questions and asked to respond to it using the Likert Scale ranging from, 1- 5 where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. The table 4.1 sheds light on the nature of questions and the number of questions under each construct.

Table 4.1: Questionnaire Development and Constructs

Constructs	Number of Items
Behavioural Intentions	3
Performance Expectancy	6
Effort Expectancy	4
Social Influence	5
Facilitating Conditions	5

Source: Author's constructs

The above table shows how the constructs of the theoretical model informed the formulation of the questionnaire and the number of questions asked under each construct. This was done to enable the researcher undertake a survey which in the critical realism paradigm is very crucial as it helps to triangulate with other data collected.

4.5.3.1 Pre-testing of Questionnaire

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 are experienced in the field of technology adoption. In order to ensure reliability and validity of data collected, Churchill (1979) and Straub (1989), propose that, the process of survey instruments development should involve initial instrument development and refinement.

Consequently, after the questionnaires were developed based on the tenets of the UTAUT model, 20 questionnaires were used to pilot test some students from the University of Ghana Business School. The aim of this activity was to test the, legibility, comprehensibility, limpidity and to help unearth hidden issues such as time of response. The feedback from the pilot test reflected a substantial degree of content validity (Straub, 1989) hence, the indication that the survey instrument was ready for data collection.

4.6 Data Collection

Four hundred and fifty (450) sets of questionnaire were issued to students of University of Ghana. Four hundred and fourteen (414) were received because some respondents opted to fill

it later. However, efforts to recover the remaining proved futile. After close examination, four hundred and five (405) were considered for the analysis. This is because, nine (9) of the questionnaires returned were not acceptable for processing since they were defective. These were questionnaires that were not fully completed and those that showed lack of understanding of the questions.

The data collection started on 25th January, 2016 and ended on the 10th of March, 2016. A period of a week was given to allow for questionnaires to be returned. Questionnaires received after these periods 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.

4.7 Data analysis

The data was coded and entered into the Statistical Package for Social Science (SPSS version 20.0) and the analysed outcome presented in frequency tables and charts (Vila & Kuster, 2011). 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.

Multiple regressions was then done in order to validate the hypotheses that were established in the previous chapter (Malhotra & Birks, 2007). This was done to answer the two research questions. Firstly, the regression was done to identify factors that influenced the intention to adopt the e-learning system. Secondly, regression was done on the factors and the moderating factors (age and gender) to determine their significance.

4.8 Summary

In this chapter, the researcher discussed a methodological review. The chapter therefore provided detailed information concerning the research paradigm which was the critical realism and the quantitative research approach used to answer the research questions posed at the beginning of the study.

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 STUDY

5.1 Introduction

The previous chapter discussed the methodological issues concerning this study; focusing on the appropriate research paradigm and its associated principles that needs to be followed in terms of the research design and data collection method. As indicated earlier, the study explores factors that determine e-learning adoption among University of Ghana students using the Sakai Learning Management System with gender and age serving as moderators. The purpose of this chapter therefore is to provide an overview of e-learning in University of Ghana as well as the Sakai LMS.

5.2 E-learning in 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 delivering and promoting university education, learning and research. The University's mission is to develop world-class human resources and capabilities to meet national development needs and global challenges through quality teaching, learning, research and knowledge dissemination. The University comprises of three campuses; Legon, Korle Bu and Accra City Campus. The University also 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).

The University of Ghana's initial attempt at using e-learning systems was in 2004 when a web-based learning system known as the Knowledge Environment for Web-based Learning – now Kewl.Nextgen (KNG) was introduced (Dadzie, 2009). KEWL.NextGen is a PHP version of the Learning Management System called Kewl which was basically written using a MVC paradigm with modular, architecture, running on Apache, PHP, and MySQL. The framework used for the system is called KINKY. 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 vital tools on the Kewl.Nextgen 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 (Kewl.Nextgen, 2016).

Twenty-Seven lecturers unfortunately adopted the Kewl.Nextgen LMS three years after it was introduced in the University of Ghana. These lecturers were from the faculty of Science and a

few from the faculty of Arts. Only one lecturer from the Faculty of Social Sciences attempted to use it (Dadzie, 2009).

It must however be noted that 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 e-learning system introduced by the university is the Sakai Learning Management System.

5.3 The University of Ghana's Sakai LMS

The University of Ghana secured funding from the Chinese Government in 2012 through the Government of Ghana to provide e-learning resources. The project which was dubbed "Chinese phase 1 and 2" is expected to provide the University with the needed resources for e-learning. The first phase 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. 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 LMS was acquired to serve that purpose. This was as a result of the low adoption rate of the Kewl.Nextgen. The Sakai LMS was therefore acquired because it can work for the whole University (University of Ghana, 2013).

The Sakai Learning Management System is a free, community source, educational software platform which is designed to support teaching, research and collaboration. Thus, it allows lecturers, students and researchers of the university to virtually move the physical learning environment online. Sakai's development was originally sponsored by a grant from the Mellon

Foundation as the Sakai Project. The initial versions of the Sakai software were based on existing tools created by the founding institutions, with the greatest piece coming from the University of Michigan's software called "CHEF" course management system. "Sakai" is therefore a play on the word “chef,” and refers to Iron Chef Hiroyuki Sakai (Berg & Dolphin, 2011). The Sakai Project's software is a Java-based, service-oriented application suite which is supposed to be scalable, reliable, interoperable and extensible. The first version of Sakai (Version 1.0) was released in March 2005. In September 2012, Sakai was estimated to be in production at over 300 institutions and is being piloted by considerably more universities globally (Severance, 2013).

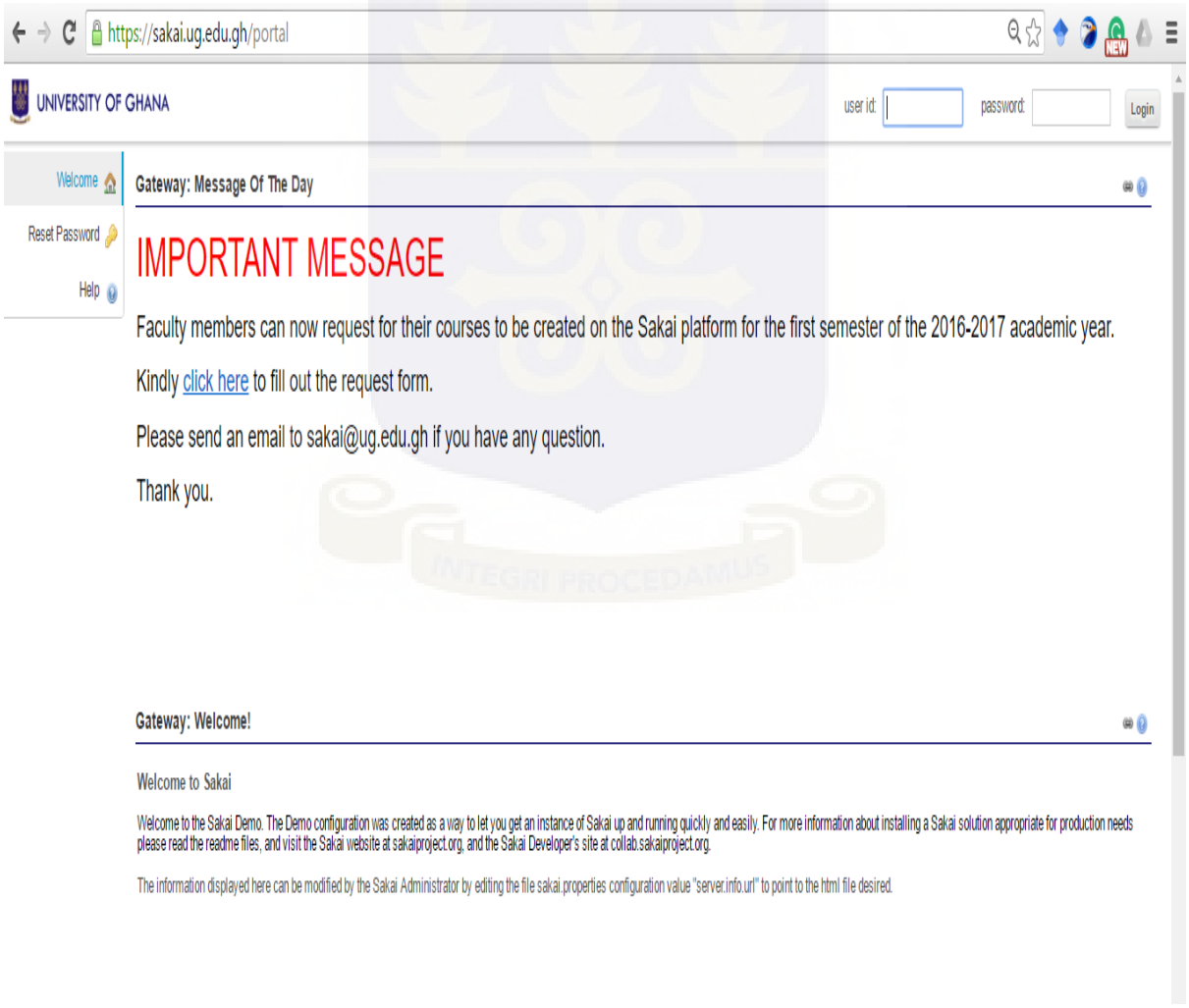
The Sakai LMS is being piloted in University of Ghana by some departments and schools such as the Department of Adult Education, the Department of Distance Education and the Business School. A lot more departments and courses are expected to be enrolled in the system. The University of Ghana Sakai system is customized to include course and project sites where 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.

The users use their student or Staff identification numbers and pins to log into the Sakai system. In the system, the users are able to see and go to 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. The users are also able to edit/customize their own profiles.

Sakai LMS therefore represents a unique and a fundamentally different approach to the traditional learning management systems. Unlike other available “open” systems available today, the direction and feature set of Sakai originates from within higher education to address

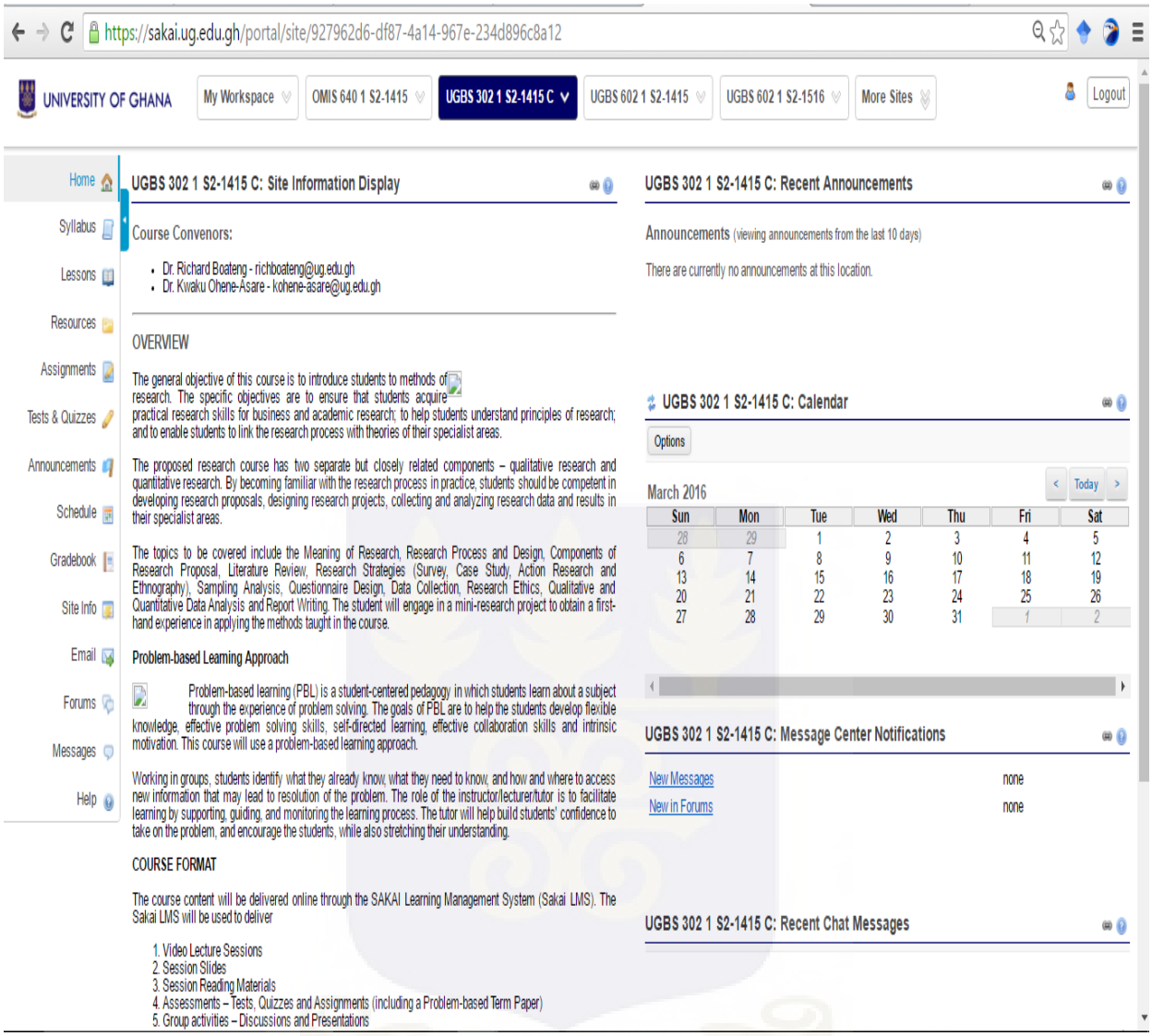
the dynamic needs of a global academic community. The Sakai LMS was purposely designed to meet the needs of higher education. It is therefore conceived as an alternative to rigid, business-driven proprietary systems. Sakai LMS provides a flexible, innovative platform for online learning. With development driven by a broad, global community of adopters and other commercial affiliates, Sakai offers powerful functionality while remaining true to its nature as 100% open-source (Sakaiproject, 2016). Below, figures 5.1, 5.2 and 5.3, are sample interfaces of the University of Ghana Sakai LMS for students.

Figure 5.1: University of Ghana Sakai LMS login interface



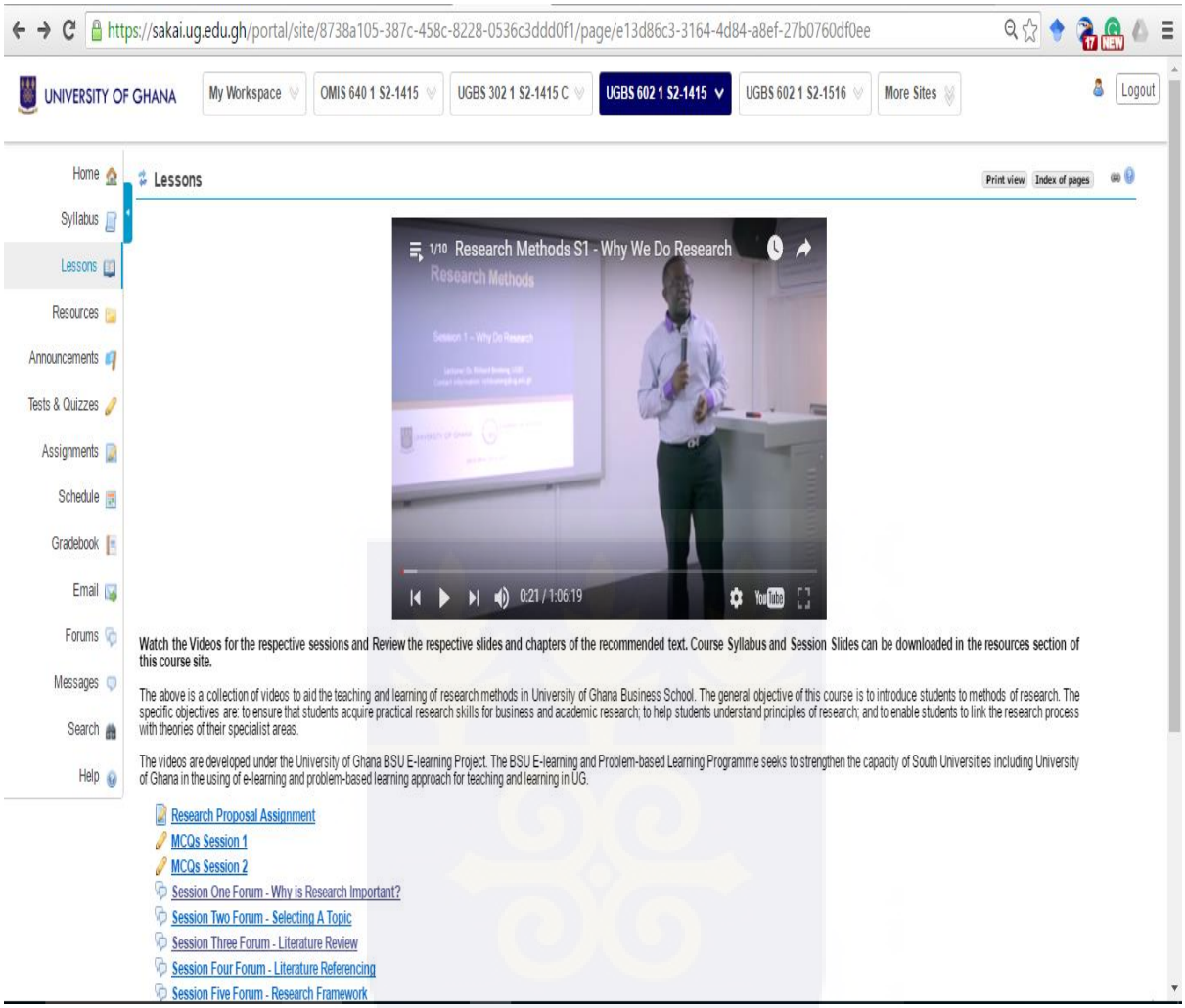
Source: University of Ghana Website, 2016

Figure 5.2: Student homepage on UG Sakai LMS



Source: University of Ghana Website, 2016

Figure 5.3: Lecture video page on UG Sakai LMS



Source: University of Ghana Website, 2016

5.4 Summary

In a nut shell, this chapter discussed the current state of e-learning in University of Ghana. There was a discussion on University of Ghana's current e-learning system, the 'SAKAI'. This was necessitated 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 presents a discussion of 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 the demographic characteristics of the respondents such age, gender, college of affiliation, academic level and years of usage of the system. 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 research questions of the study, which are e-learning adoption to identify the factors that support the adoption of e-learning in University of Ghana and also to find out whether the effects of these adoption factors on the intention of students to use the e-learning system are moderated by gender and age.

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

Inaccuracies and mistakes 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, 2011). In effect a

total of four hundred and five (405) 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 of the study 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	221	54.6
Female	184	45.4
Total	**405**	**100**
Educational Level		
Bachelor's Degree	263	64.9
Master's Degree	102	25.2
PHD	25	6.2
Diploma	15	3.7
Total	**405**	100
College of Affiliation of Respondents		
Health Sciences	32	7.9
Basic and Applied Sciences	91	22.5
Humanities	248	61.2
Education	34	8.4
Total	**405**	**100**
Years of computer use		
Less Than 1 Year	0	0.0
1−2	22	5.4
2−3	26	6.4
3−4	104	25.7
>4	253	62.5
Total	**405**	100.0

Both genders were well represented in the sample used for the study. Out of the four hundred and five (405) valid questionnaires obtained, 221 were males representing 54.6 percent and

184 were females signifying 45.4 percent of the total number of respondents used for this study. This implies the study was not skewed to any particular gender.

Table 6.2: Age distribution of respondents

Ages in years	Frequency	Percentage (%)
less than 20	103	25.4
20-24	218	53.8
25-30	61	15.1
30+	23	5.7
TOTAL	**405**	**100**

Concerning the ages, Table 6.2 shows the age distribution of the respondents. Majority of the respondents were in less than 25 years old. Thus, 53.8% of the respondents were 20 to 24 years and 25.4% were less than 20 years. Only, 20.8% of the respondents were above 24 years.

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 (64.9 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 are affiliated with the college of humanities (61.2 percent) followed by the College of Basic and Applied Sciences (22.1 percent), the College of Education (8.4 percent) and Health Sciences (7.9 percent).

There was also an analysis of the number of years the respondents have spent using computers. Most of the respondents have used the computer for over 4 years (62.5). only a few of the students indicated that they were inexperienced with computer use, hence have used it for less than two years (5.4%) as shown in Table 6.1 above.

6.4 Exploratory Factor Analysis

The principal component method of extraction was used to conduct the data reduction and also to determine factor items which needed to be retained. The principal component method of extraction considers 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.

The exploratory factor analysis was done in conformity with the norms of qualitative studies as Costello and Osborne (2005) assert that a few components most of the time explain for variations in a variable better. Hence, the need to use a data reduction method such as factor analysis to detect relationships among the variables measuring the constructs of the UTAUT model which include (Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Intention to Use Sakai). The Inter-Correlation test which is an example of the univariate analysis tests was performed in this regard.

6.4.1 Inter-correlation tests

One of the major theoretical assumptions of Exploratory Factor Analysis is that, the data should have some degree of inter-correlation (Brace, Kemp & Snelgar, 2006). With no inter-correlation, it will be impossible to extract from the data (Hair *et al.*, 2006). 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 attained 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= 10824.036, df. .840, sig. 0.000) and the KMO measure of sampling adequacy (value of 0.853) 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.

Table 6. 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.853
Bartlett's Test of Sphericity	Approx. Chi-Square	10824.036
	Df	.840
	Sig.	.000

Source: SPSS analysis output

6.4.2 Extraction of factors

Twenty-three 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.

6.4.2.1 Varimax Rotation of Variables

In exploratory factor analysis, Hair *et al.* (2010) posit 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. Varimax rotation of variables tends to produce multiple group factors. The twenty-three items were rotated and the

results revealed that twenty of the items loaded perfectly on the five factor components, thus their loading values were greater than 0.5 as recommended by Nunnally (1978).

Two of the six items of Performance Expectancy (PE) which was the first component were dropped. None of the items of the second component (Effort Expectancy (EE)) was dropped. On the other hand, one item of the third component (Social Influence (SI)) was also dropped. Table 6. 4 shows the elaborations of the varimax rotation of variables.

Table 6. 4: Rotated factor component matrix

Rotated Component Matrix					
	1	**2**	**3**	**4**	**5**
PE3: Using the Sakai LMS enables me to accomplish my learning activities more quickly.	.910				
PE1: Using the Sakai LMS will improve my performance in the course.	.895				
PE6: Using the Sakai LMS enhances my effectiveness in my learning activities.	.854				
PE2: I'll find the system useful in my learning activities.	.821				
PE5: Using the Sakai LMS makes my learning activities easier.	**5.32**				
PE4: Using the Sakai LMS improves the quality of my learning activities.	**4.28**				
EE1: Learning to operate the Sakai LMS will be easy for me.		.942			
EE3: It'll be easy for me to become skilful at using the Sakai LMS.		.860			
EE2: My interaction with the Sakai LMS will be clear and understandable.		.845			
EE4: I'll find the Sakai LMS easy to use.		.781			
SI2: The teacher of this course has been helpful in the use of the Sakai LMS.			.951		

SI1: People who are important to me think I should use the Sakai LMS.			.875		
SI4: Using the Sakai LMS is academically status-enhancing for students.			.821		
SI3: In my class, students who use the Sakai LMS enjoy more prestige than those who do not.			.751		
SI5: Using the Sakai LMS is academically status-enhancing for students.			**5.10**		
FC2: I have the knowledge necessary to use the Sakai LMS.				.914	
FC3: The Sakai LMS is not compatible with other systems I use.				.911	
FC4: A specific person is available for assistance with the Sakai LMS difficulties				.890	
FC1: I have the resources necessary to use the Sakai LMS.				.854	
FC5: Using the Sakai LMS fits my learning style.				.782	
BI3: I plan to use the Sakai LMS in future sessions.					.975
BI1: I intend to use the Sakai LMS in future sessions					.951
BI2: I predict I will use the Sakai LMS in future sessions.					.844

Source: SPSS Analysis output

After the various extraction methods were applied, the items below 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	
PE5: Using the Sakai LMS makes my learning activities easier.	**4.32**
PE4: Using the Sakai LMS improves the quality of my learning activities.	**4.28**
SI5: Using the Sakai LMS is academically status-enhancing for students.	**5.10**

Source: SPSS analysis output

6.4.2.1 Reliability and re-specification of factors

Malhotra and Birks (2007) assert that, reliability refers to as the extent to which a measurement reproduces consistent results, particularly if the process of measurement is to be repeated. Pallant (2011) and Hair *et al.* (2010) have, therefore, recommended the use of the Cronbach's alpha coefficient, which is one of the common indicators for the checking of internal consistency. These authors further propose that the Cronbach's alpha coefficient should be greater than 0.7 for managerial decisions. The Cronbach alphas for all constructs were satisfactory as they were greater than 0.7. A compilation of the various alpha values is presented in table 6.6 below.

Table 6.6: Reliability of Scales

Variables	**No. of Items**	**Cronbach's alpha**
Performance Expectancy (PE)	4	.961
Effort Expectancy (EE)	4	.879
Social Influence (SI)	4	.823
Facilitating Conditions (FC)	5	.773
Intention to Use (IU)	3	.956

Source: SPSS Analysis output

6.5 Multiple regression analysis

Multiple regression was used to analyse the relationship between the constructs used for the study (Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC) and Intention to Use (IU)). The multiple regression was done to extract the independent variables that can better explain the dependent variable (Intention to Use (IU)). That is, multiple regression analysis was used to test the various hypotheses as outlined below.

6.5.1 Hypotheses Testing – Direct Links

Multiple regression analysis was used to test the first set of hypotheses without the moderators. Direct links were sought in these hypotheses (**H1-H4**) as shown in table 6.7 below.

Table 6.7: Hypothesis with Direct links

Hypothesis
H1: Performance expectancy has a positive effect on the intention to use Sakai LMS.
H2: Effort expectancy has a positive effect on the intention to use Sakai.
H3: Social influence has a positive effect on the intention to use Sakai.
H4: Facilitating conditions have a positive effect on the intention to use Sakai LMS.

6.5.1.1 The Regression Model

Table 6.8: Model Summary

Mode	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.801a	.514	.505	1.56484	1.63

a. **Predictors**: (Constant) Performance expectancy, Effort expectancy, Social influence and Facilitating conditions

b. **Dependent Variable**: Intention to Use

Source: SPSS Analysis output

The correlation coefficient in table 6.8 above is 0.801. This indicates that there is a strong correlation among the constructs used for the study. This indicates that, the relationships among the various constructs are very close and have the ability to explain the dependent variable. Again, the R Square value is 0.514, meaning that 51 percent of the variance in intention to Use (IU) can be explained by the four independent constructs (Performance expectancy, Effort expectancy, Social influence and Facilitating conditions). In conclusion, e-learning is well modelled by the regression. That is, the model explains more than half of the variation in intention to Use. The summary of the regression model is presented in table 6.9.

Table 6. 9: Multiple Regression Analysis

	S.E	*B*	T	Sig.
(Constant)[a]	.190		**.632**	**.611**
Performance expectancy	.053	.455	5.154	.000
Effort expectancy	.078	.067	0.921	.364
Social influence	.064	.248	2.712	.010
Facilitating conditions	.075	.166	1.925	.029

a. Dependent Variable: Intention to Use

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

Source: SPSS Analysis output

6.5.1.2 The Regression Equation Model

IU = K +.455PE +.067EE + .248SI+.166FC+ ε_i, where

IU = Intention to Use Sakai

PE = Performance Expectancy

EE = Effort Expectancy

SI = Social Influence

FC = Facilitating Conditions

K = Regression Constant

The regression equation model above indicated that it can be used to predict future intention to use the Sakai LMS at the institutional level once the beta values/scores of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions are known.

6.5.1.3 Model Evaluation

This section deals with the evaluation of the regression model for the direct links. From the table, R Square value = 0.517. This indicates an acceptably strong relationship between the dependent and independent variables of the regression model. In other words, at a level of 51 percent of the sample of the population, the independent variables can explain Intention to Use Sakai.

A closer look at the regression analysis output in University of Ghana indicates that Performance Expectancy (PE) has a greatest influence on Intention to Use (IU) (β =0.445, p=0.000, < 0.05). This means that the students in the university take into consideration Performance Expectancy before developing an Intention to use the Sakai learning management System. Thus, the students believe that using the Sakai system will help them to attain gains in their academic performance.

On the other hand, Effort Expectancy (EE) was found not to be statistically significant to Intention to Use (β =.067, p=0.364, > 0.05), implying that the students' intention to use the Sakai LMS is not influenced by Effort Expectancy.

Social Influence (SI) was statistically significant to students' intention to use (β = 0.248, p=0.010, < 0.05). This indicates that social influence has an influence on intention to use the Sakai LMS in the university.

The last factor (Facilitating Conditions (FC)), which is the fourth hypothesis was supported with a path coefficient of β=0.166, p=0.029, < 0.05). Indicating that facilitating conditions makes students more willing to use the Sakai LMS.

6.5.2 Hypotheses Testing – Moderating Variables

Multiple regression analysis was used to test the first set of hypotheses without the moderators. Direct links were sought in these hypotheses (**H6-H11**) as shown in table 6.10 below.

Table 6.10: Hypothesis with moderating variables

Hypothesis
H5: The positive effect of performance expectancy on the intention to use Sakai LMS is moderated by gender. **(PExGender)**
H6: The positive effect of effort expectancy on the intention to use Sakai LMS is moderated by gender. **(EExGender)**
H7: The positive effect of social influence on the intention to use Sakai LMS is moderated by gender. **(SIxGender)**
H8: The positive effect of performance expectancy on the intention to use Sakai LMS is moderated by age. **(PExAge)**
H9: The positive effect of effort expectancy on the intention to use Sakai LMS is moderated by age. **(EExAge)**

H10: The positive effect of social influence on the intention to use Sakai is moderated by age. **(SIxAge)**
H11: The positive effect of facilitating conditions on the intention to use Sakai is moderated by age. **(FCxAge)**

6.5.2.1 Multiple Regression Analysis

Table 6. 11: Multiple Regression Analysis

	S.E	***B*** ***R^2*= 736**	**T**	**Sig.**
(Constant)[a]	.211		**.632**	**.781**
PExGender	.060	.056	0.363	.683
EExGender	.124	-.034	-0.312	.910
SIxGender	.221	-.052	-0.239	.611
PExAge	.075	.383	1.924	.041
EExAge	.022	.089	0.584	.532
SIxAge	.034	.311	1.381	.327
FCxAge	.047	.154	1.806	.032

a. Dependent Variable: Intention to Use
95% confidence interval (= 0.05), * significant at = 0.05

Source: SPSS Analysis output

6.5.2.1 Model Evaluation

This section involves the evaluation of the multiple regression for the constructs with the moderating variables as shown in Table 6.11 above. From the table, R Square value = 0.736. This indicates an acceptably strong relationship between the dependent and independent variables of the regression model. In other words, at a level of 74 percent of the sample of the population, the independent variables can explain Intention to Use Sakai.

The multiple regression analysis of the moderating variables and the factors indicated that only Age moderated students' intention to use the Sakai LMS and even with this the moderation was statistically significant on Performance Expectancy and Facilitating Conditions. The analysis revealed that, Age moderated the relationship between Performance Expectancy and Intention to Use Sakai (β =0.383, p=0.041, < 0.05). This shows a statistically significant relationship between Performance Expectancy and Age (PExAge) and Intention to use. Again, there was a statistically significant relationship between Facilitating Conditions and Age (FIxAge) and intention to use Sakai LMS (β =0.154, p=0.032, < 0.05).

A closer look at the regression analysis output in University of Ghana indicates that Performance Expectancy and Gender (PExGender) do not have an influence on Intention to Use (IU) (β =0.056, p=0.683, > 0.05). This implies that the Gender does not play a role on Students' Performance Expectancy into using the Sakai learning management System.

Again, the multiple regression analysis indicated that Gender does not moderate the relationship between Effort Expectancy and Intention to Use the Sakai LMS (β =-0.034, p=0.910, > 0.05), implying that the relationship between Gender and Effort Expectancy (EExGender) and intention to use is not statistically significant.

The influence of Gender on Social Influence (SIxGender) was also statistically insignificant to students' intention to use (β = -0.052, p=0. 611, > 0.05). This indicates that gender does not moderate the relationship between social influence and intention of Students to use the Sakai LMS in the university.

Age's moderation on Effort Expectancy (β = 0. 089, p=0.532, < 0.05) and Social Influence (β = 0. 311, p=0.327, > 0.05) were statistically insignificant. This indicates that age does not moderate the relationship between Effort Expectancy and Social influence on intention to use Sakai Learning Management System.

6.6 Discussion of results

This section of the study discusses the analysis of data 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. The two research questions are: 1) What factors support the adoption of e-learning in University of Ghana? And 2) Are the effects of these adoption factors on the intention of students to use the e-learning system moderated by gender and age?

6.6.1 E-learning adoption factors

This section presents a discussion of the factors identified in the UTAUT model for e-learning adoption. This is analysed in relationship to the first four hypotheses which looked at the direct links between the factors and the intention to use the Sakai LMS. Table 6.12 shows a summary of the hypothesis and the results.

Table 6.12: Summary of hypothesis and results

Hypothesis	Relationship	P value	Result
H_1	Performance Expectancy ⟶ Intention to Use Sakai	.000	Significant
H_2	Effort Expectancy ⟶ Intention to Use Sakai	.364	Not Significant
H_3	Social Influence ⟶ Intention to Use Sakai	.010	Significant
H_4	Facilitating Conditions ⟶ Intention to Use Sakai	.029	Significant

The evaluation of the first hypothesis revealed that Performance Expectancy (PE) has a greatest influence on Intention to Use (IU). This means that the students in the university take into consideration Performance Expectancy before developing an Intention to use the Sakai learning management System. This finding is consistent with other research results (AbuShanab et al., 2010; San Martin & Herrero, 2012; Pardamean & Susanto, 2012; Venkatesh et al., 2003). The findings of these researches have shown a positive relationship between Performance Expectancy and Intention to Use a technology.

The second construct of the UTAUT model tested was Effort Expectancy (EE). Effort Expectancy refers to as the degree of ease in using a system (Venkatesh et al., 2003). In this study, Effort Expectancy was found not to be statistically significant to Intention to Use, implying that the students' intention to use the Sakai LMS is not influenced by Effort Expectancy. This is in contradiction to earlier studies (Chang, 2013; Wong, Russo & McDowall (2012). On the other hand, this finding is consistent with the study of Khechine et al. (2014) where Effort Expectancy was not a factor for determining students' intention to use an e-learning system. Khechine et al. (2014) therefore argued that, their finding could be explained by factors such as the availability of support for the use of the technology, prevailing learning

and teaching culture which was impregnated with the technological trend and students' characteristics which showed that almost 94% of the students in the sample had been using computers for at least four years and hence, accustomed enough with technologies. This explanation can therefore be arguably applied to the context of this study.

The third factor was Social Influence (SI). Social Influence refers to the degree to which a student perceives that important people believe he should use the system (San Martin & Herrero, 2012). These important people may include friends, colleagues, or family members. Consistent with extant e-learning studies (Pardamean & Susanto, 2012; Šumak et al.; 2010; Khechine et al., 2014), Social influence is a determinant of student's intention to use the Sakai LMS. Hence, this indicates that social influence has an influence on intention to use the Sakai LMS in the University of Ghana.

The last construct of the UTAUT model tested was Facilitating Conditions (FC). Facilitating Conditions refers to as the degree to which a student believes that an organizational and technical structure exists to support the use of the system (Khechine et al., 2014). The analysis of data indicated that facilitating conditions were proven to make students more willing to use the Sakai LMS. This finding is also in line with extant e-learning adoption studies (San Martin & Herrero, 2012; Chang, 2013; Khechine et al., 2014).

6.6.2 Adoption factors with moderating variables

This section presents the discussion of the adoption factors of the UTAUT model and the impact of the moderating variables (Gender and Age). Thus, the second research objective seeks to analysis whether the effects of the adoption factors on the intention of students to use

the e-learning system are moderated by gender and age. Table 6.13 shows a summary of the results of the hypotheses.

Table 6.13: Summary of results for hypothesis with moderators

Hypothesis	Factor	Moderator	P-value	Results
H5	PE	Gender	.683	No
H6	EE	Gender	.910	No
H7	SI	Gender	.611	No
H8	PE	Age	.041	**Yes**
H9	EE	Age	.532	No
H10	SI	Age	.327	No
H11	FC	Age	.032	**Yes**

Age was the only moderator of students' intention to use the Sakai LMS and even with this the moderation was only statistically significant on Performance Expectancy and Facilitating Conditions. Consistent with this study, extant studies on e-learning adoption (Schultz, Schultz, & Round, 2010; Khechine et al., 2014) have reported that age of students is a significant contributor to performance expectancy and facilitating conditions. Venkatesh et al. (2003) attempt to provide an explanation for this outcome by indicating that, younger students are proven to be more interested in performance expectancy than older ones. Again, Khechine et al. (2014) explain the impact of age on the facilitating conditions by indicating that, older students mostly fear the use of new technologies. Hence, finding multiple choices to support them either on the technological side or the pedagogical front would help to remove impediments to the intention of usage. These assertions are arguably true for the current study.

On the other hand, Gender moderated none of the adoption factors. Even though Gender was significant in the first study that used the UTAUT model (Venkatesh et al., 2003), it was not

significant in this study which is consistent with extant e-learning studies (Al-Gahtani, Hubona & Wang, 2007; Khechine et al. (2014). The disparity in the findings can be explained by the environment in which the studies were carried out. Indeed, the study of Venkatesh et al. (2003) was carried out in the work environment but in the educational context where this study was carried out, male and female students have roughly the same characteristics in terms of learning objectives, experience with the technology, and the attention that they pay to the opinions of their peers (Khechine et al., 2014).

6.7 Summary

This chapter discussed the data analyses as well as the findings of the study. This analysis was carried out to in order to answer the research questions outlined in the beginning of the study. The data was analyzed to investigate the constructs of the UTAUT model that supported students' adoption of e-learning in University of Ghana as well as the influence of Gender and Age on these costructs. Multiple regression analysis was performed to test the hypothesis. Eleven hypotheses were tested in all.

The next chapter presents the summary, conclusion and recommendations of the study.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

The previous chapter presented the analysis and discussion of findings to meet the research objectives. This concluding chapter therefore presents the summaries of the research process, research findings, contributions of the study and recommendations for future studies.

7.2 Summary of the research process

The study investigated e-learning adoption by students in a University in a developing country such as Ghana. In this regard, the following research objectives were formulated:

1. Identify the factors that support the adoption of e-learning in University of Ghana.
2. Analyse whether the effects of these adoption factors on the intention of students to use the e-learning system are moderated by gender and age.

To address these objectives, the Unified Theory of Acceptance and Use of Technology (UTAUT) model was used as the guiding lens in order to find the factors that supported e-learning adoption as well as the moderating effects of Gender and Age. 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 sampled students in University of Ghana who use the Sakai Learning Management System. The constructs employed in the study were validated and then tested using the multiple regression analysis. Below is a breakdown of the research process after the introductory section.

The chapter two of the study examined existing literature on e-learning adoption. The chapter critically examined e-learning adoption literature by classifying them into themes such as areas:

geographical context, issues, methodological approaches and conceptual approaches. The adoption factors identified in the review of e-learning adoption literature were generally categorized into performance expectancy; Effort expectancy; Social influence; Effort expectancy; and Facilitating conditions (Deng, Liu & Qi, 2011; Cheng et al, 2011; Khechine et al., 2014). In the conceptual approaches to the study of e-learning adoption, models and theories identified included; Technology Adoption Model (TAM), Technology, Organization and Environment model and the Unified Theory of Acceptance and Use of Technology (UTAUT) model. It was therefore evident that the UTAUT model was deemed fit to be used as the guiding lens for the study.

The chapter 3 also discussed the theoretical framework used for the study. Following from the review of e-learning literature, it was prudent to adopt the UTAUT to study the adoption of e-learning in University of Ghana looking at the moderating influences of gender and age. The eleven hypotheses were therefore developed based on the research questions formulated in the first chapter of the study.

The chapter four of the study dealt with a discussion on the methodology of the research. From the Critical Realism paradigm, the study adopted the Quantitative research approach using the Survey. The Students of the University of Ghana were the population for the study. Using a purposive sampling method, e-learning students were contacted to answer the questionnaire which was designed based on the hypotheses developed to meet the research objectives.

Chapter five of the study also presented a discussion of the context of the study. The environment within which the study was contacted needed to be made known to better analyse

and discuss the data collected from the respondents. E-learning on the University of Ghana was discussed with emphasis on the Sakai Learning Management System. The features of the Sakai LMS were discussed to better understand its usage and adoption.

The Chapter six presented an analysis and discussion of data. There was a demographic analysis of the data and the validity and reliability tests conducted on the data. Multiple regression tests were also conducted to analyse the hypotheses. Hence, some of the hypotheses were deemed to be statistically significant whiles others were not significant. This led to the discussion of the findings where explanations were provided for the results of the analysis. These findings were therefore discussed based on existing literature to provide encompassing explanations to the various findings.

7.3 Summary of the Research findings

The finding of the study is in two strands. First, the findings on factors that support the adoption of e-learning in University of Ghana. Second, findings on whether the effects of these adoption factors on the intention of students to use the e-learning system are moderated by gender and age. These are provided in the table 7.1 and the two subsections below.

Table 7.1: Summary of findings

Hypothesis	Factor	Moderator	P-value	Results
H1	Performance Expectancy (PE)		.000	Significant
H2	Effort Expectancy (EE)		.364	**Not Significant**
H3	Social Influence (SI)		.010	Significant
H4	Facilitating conditions (FC)		.029	Significant
H5	Performance Expectancy (PE)	Gender	.683	No
H6	Effort Expectancy (EE)	Gender	.910	No
H7	Social Influence (SI)	Gender	.611	No
H8	Performance Expectancy (PE)	Age	.041	**Yes**
H9	Effort Expectancy (EE)	Age	.532	No
H10	Social Influence (SI)	Age	.327	No
H11	Facilitating conditions (FC)	Age	.032	**Yes**

7.3.1 E-learning adoption factors

The first research objective was to identify e-learning adoption factors. This therefore necessitated the use of exploratory factor analysis and multiple regression to validate the conceptual model and the hypothesis through the Unified Theory of Acceptance and Use of Technology (UTAUT).

The conceptual model built from constructs of the UTAUT model and the fourth factor (Nature of course) consisted of four (4) factors. The multiple regression technique was chosen among other techniques to test and validate the hypotheses proposed in relation to the four (4) factors and the dependent variable. The test indicated that, three of the four factors (Performance Expectancy, Social Influence and Facilitating Conditions) were statistically significant to e-

learning adoption. Thus, their p-values were all less than 0.05 ($p<0.05$). On the other hand, Effort Expectancy was non statistically significant to e-learning adoption ($p=0.364 > 0.05$).

Overall, the factors that support the adoption of e-learning include Performance Expectancy, Social Influence and Facilitating Conditions. This finding is consistent with extant e-learning adoption studies (AbuShanab et al., 2010; San Martin & Herrero, 2012; Pardamean & Susanto, 2012; Khechine et al., 2014)

7.3.2 Adoption factors with moderating variables

The second research objective sought to analysis whether the effects of the adoption factors on the intention of students to use the e-learning system were moderated by gender and age. Age was the only moderator of students' intention to use the Sakai LMS and even with this the moderation was only statistically significant on Performance Expectancy and Facilitating Conditions. Consistent with this study, extant studies on e-learning adoption (Schultz, Schultz & Round, 2010; Khechine et al., 2014) have reported that age of students is a significant contributor to performance expectancy and facilitating conditions.

On the other hand, Gender moderated none of the adoption factors. Even though Gender was significant in the first study that used the UTAUT model (Venkatesh et al., 2003), it was not significant in this study which is consistent with extant e-learning studies (Al-Gahtani, Hubona & Wang, 2007; Khechine et al., 2014).

7.4 Implications of the Study

This study has made significant contributions to research, practice and policy. These are outlined in the sub-sections below.

7.4.1 Implication for research

In terms of research, this study contributes to the body of knowledge on e-learning by applying the Unified Theory of Acceptance and Use of Technology (UTAUT) model in an African perspective. The study also provides empirical support that, the adoption of e-learning can also be studied looking at how the adoption factors are moderated by gender and age which makes the study arguably one of the first to study adoption of e-learning looking at gender and age as moderators.

7.4.2 Implication for Practice

The study contributes to practice by drawing to the attention of administrators of universities and other stakeholders to specific factors that either enable or hinder students' adoption of e-learning. Thus, universities venturing into e-learning adoption will have a fundamental understanding of how gender and age moderates the factors that support or hinder the adoption of e-learning. This knowledge was arguably not available previously to Universities mostly in in developing countries. Faculty members and administrators can use these findings to develop strategies to align students' expectations with technology used for learning.

7.4.3 Implication for Policy

In terms of policy, it is understood that creating a conducive ICT environment will positively influence the adoption of e-learning. This enabling environment should therefore include policies that take into consideration the adoption factors which include Performance Expectancy, Social Influence and Facilitating Conditions. This will therefore propagate the e-learning agenda thereby stimulating economic growth and development. This will provide a comprehensive policy which will lead to the total 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 encounters some basic limitations, and this study is not an exception. Some limitations that have been identified in this study with suggested future research directions are outline below.

In the first place, the timeframe for the completion of this research was a significant constraining factor which really influenced the conduct of a very comprehensive research work. On the other hand, to be able to overcome these difficulties, all attempts were made to undertake a valid and comprehensive study. In addition, this study was limited to only the University of Ghana. This was to allow for easy access to respondents and data that the researcher needed to gather for the study. This therefore make it difficult to make generalizations of findings. In view of this, it is therefore recommended that future studies should be carried out using more than a single university to provide for comparison and testing of findings.

In addition, the result of the quantitative study might not be applicable in qualitative studies. In this regard, it is recommended that, future studies should consider applying the research model in a qualitative setting to lend more generalization of the findings as Eze *et al.* (2013) assert that qualitative methods help to generate rich insights.

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APPENDICES

Appendix A-Research Questionnaire

DEPARTMENT OF OPERATIONS AND MANAGEMENT INFORMATION SYSTEMS

Dear Respondent,

The bearer of this questionnaire is a student of the University of Ghana Business School pursuing **MPhil in MIS**. He is conducting a survey on "**An Assessment 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 Academic Background***

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 [ ] Diploma [ ] others please specify.....

4. Which College are you affiliated to?
Health Sciences [ ] Basic and Applied Sciences [ ] Humanities [ ]
Education [ ]

5. How long have been using computer? Less than 1 year [ ] 1-2 years [ ] 2-3 years [ ] 3-4years [ ] >4[ ]

Section B: The following questions seek to ascertain respondent's perception about the mobile app on their phones.

8. Please show how you agree or disagree with the following statements
1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

Performance Expectancy	1	2	3	4	5
Using the Sakai LMS will improve my performance in the course.					
I'll find the system useful in my learning activities.					
Using the Sakai LMS enables me to accomplish my learning activities more quickly.					
Using the Sakai LMS improves the quality of my learning activities.					
Using the Sakai LMS makes my learning activities easier.					
Using the Sakai LMS enhances my effectiveness in my learning activities.					
Effort Expectancy	1	2	3	4	5
Learning to operate the Sakai LMS will be easy for me.					
My interaction with the Sakai LMS will be clear and understandable.					
It'll be easy for me to become skilful at using the Sakai LMS.					
I'll find the Sakai LMS easy to use.					
Social Influence	1	2	3	4	5
People who influence my behaviour think I should use the Sakai LMS.					
People who are important to me think I should use the Sakai LMS.					
The teacher of this course has been helpful in the use of the Sakai LMS.					
In my class, students who use the Sakai LMS enjoy more prestige than those who do not.					
Using the Sakai LMS is academically status-enhancing for students.					
Facilitating Conditions	1	2	3	4	5
I have the resources necessary to use the Sakai LMS.					
I have the knowledge necessary to use the Sakai LMS.					
The Sakai LMS is not compatible with other systems I use.					
A specific person is available for assistance with the Sakai LMS difficulties					
Using the Sakai LMS fits my learning style.					
Behavioural Intentions	1	2	3	4	5
I intend to use the Sakai LMS in future sessions					
I predict I will use the Sakai LMS in future sessions.					
I plan to use the Sakai LMS in future sessions.					

Thank you.