E-LEARNING IN UNIVERSITIES IN UGANDA: PREDICTORS OF SUCCESSFUL ADOPTION

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Declaration

I hereby declare that this thesis titled

"E-learning in Universities in Uganda: Predictors of Successful Adoption"

is my own work, and all sources have been acknowledged through referencing. Part of this thesis

consists of work in my Research Proposal submitted to the Department of Information Systems,

University of Cape Town, South Africa.

Signed by candidate

Esther Namirembe

Dedication

To God the Father, God the Son and God the Holy Spirit (KJV Matthew 28:19).

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Abstract

Adoption of e-learning technology has been carried out by numerous universities in the developing countries with the aim of advancing the knowledge society and economic development. However, the adoption of e-learning technology in the said universities is fraught with challenges leading to low level use for instructional purposes. The study aims at: (i) identifying the predictors of successful adoption of e-learning, (ii) investigating causes of failures of past e-learning information systems initiatives, and (iii) developing a predictive framework for the advancement of e-learning programmes for universities in Uganda.

In order to determine possible predictors of successful adoption, the researcher adopted the configurational (Gestalts) approach. The hypotheses were tested in a survey that involved 73 lecturers and 184 students from Uganda's Makerere University and Gulu University. The respondents' opinions are obtained using questionnaires and interviews and analysed using descriptive, clustering and deductive thematic analyses techniques.

The research identified four analytical clusters from the target group of the lecturers, while the target group of the students are described by six analytical clusters. Results from cluster 1 among lecturers indicate that successful adoption is dependent on being familiar with the objectives of the university's e-learning policies, finding time to experiment with ICT, availability of financial support and commitment of university management. However, it should be noted that while the study was conducted within two Universities, the majority of the lecturer respondents were from Makerere University. Therefore, while organisational characteristics contribute to the adoption of e-learning among lecturers, their influence is more pronounced in the established university, that is, Makerere.

Both lecturers and students adopt e-learning facilities at later stages of their studies or career which raises great concern. The majority of the lecturers in the lead cluster were male and PhD holders while most of the students in the lead cluster were male and in their second year of study. Lecturers in Cluster 1 are adopters because of the knowledge and long-time experience with e-learning facilities compared to their counterparts in Clusters 2 and 3. Students in Cluster 4 were adopters because they had more knowledge and skills in the use of ICTs than their counterparts in the other clusters. Cluster 3 and 6 among lecturers and students respectively were least adopters of e-learning mainly because they were unfamiliar with the university e-learning policy. The main causes of failure of past e-learning information systems initiatives were lack of

structured approach to e-learning and inadequate empowerment. From the cluster findings, a predictive framework for the advancement of e-learning programmes in universities in Uganda was developed.

It was recommended that: adoption of e-learning technology should be encouraged during the early school years of the students and earlier career years of the academic if universities are to be competitive.

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List of Abbreviations and Acronyms

ACC	Acceptance
AFS	Availability of Financial Support
ANOVA	Analysis of Variance
ATIEXICT	Availability of Time to Experiment with ICT
BI	Behavioural Intention
CAES	College of Agriculture and Environmental Sciences
CBL	Computer-Based Learning
CBT	Computer-Based Training
CD-ROM	Compact Disk Read Only Memory
CERN	Conseil Européen pour la Recherche Nucléaire
CIT	Classical Innovation Theory
CLT	Connectivism Learning Theory
COMAN	Commitment of Management
CSCL	Computer-Supported Collaborative Learning
CSFs	Critical Success Factors
C-TPB-TAM	Combined Theory of Planned Behaviour/ Technology Acceptance Model
DFID	Department for International Development
DiLT	Discovery-Based Learning Theory
DL	Distance Learning
DOI	Diffusion of Innovations Theory
DT	Diffusion Theory
ERC	Education Review Committee
EE	Effort Expectancy
E-Learning	Electronic Learning
E-learning IS	Electronic Learning Information Systems
ELPP	European Laboratory for Particle Physics
ELT	Experiential Learning Theory
E-mail	Electronic Mail
EnLT	Engagement Learning Theory
F2F	Face-to-Face
FCs	Facilitating Conditions
GEN	Gender
GETAMEL	General Extended Technology Acceptance Model for E-learning
GUELP	Goal of University E-learning Policy
GU	Gulu University
HCI	Human-Computer Interaction
HDI	Human Development Index
HE	Higher Education
HEIs	Higher Education Institutions
IA	Internet Access

ICT	Information Communications Technologies
IDT	Innovation Diffusion Theory
IFS	Institute for Statistics
IITE	Institute for Information Technologies in Education
INU	Innovative Use
ISs	Information Systems
IT	Information Technology
KJV	King James Version
LEDUC	Level of Education
LMSs	Learning Management Systems
MAGAART	Maseno, Aarhus, Gulu, Aalborg, Roskilde and Tribhuvan
M-banking	Mobile Banking
MHRD	Ministry of Human Resource and Development
MM	Motivational Model
MoES	Ministry of Education and Sports
MoETS	Ministry of Education Technology and Sports
MOOCS	Massive Open Online Courses
MPCU	Model of PC Utilization
MS Word	Microsoft Word
MU	Makerere University
MUELE	Makerere University E-learning Environment
MUKLA	Makerere University Kampala Network
N	Population
NASAC	Network of African Science and Academies
NCHE	National Council for Higher Education
NIICD	Netherlands International Institute for Communication and Development
NPTEL	National Program on Technology Enhanced Learning
ODeL	Open Distance and e-Learning
OPACs	Online Public Access Catalogues
OWSD	Organisation for Women in Science for the Developing World
PBL	Problem Based Learning
PC	Personal Computers
PDF	Portable Document Format
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PINF	Poor Infrastructure
PP	Microsoft Power Point
PU	Perceived Usefulness
RCDF	Rural Communications Development Fund
RE-AIM	Reach, Effectiveness, Adoption, Implementation, Maintenance
RFID	Radio Frequency Identification

S^1	Sample
S	Student
SAQs	Self-Administered Questionnaires
SCT	Social Cognitive Theory
SDL	Self-directed learning
SEM	Structural Equation Modelling
SI	Social Influence
SLT	Situated Learning Theory
TAM	Technology Acceptance Model
TBEL PM	Theory-Based E-learning and Pedagogical Model
TEL	Technology Enhanced Learning
TOE	Technology-Organisation-Environment
TPACK	Technological Pedagogical and Content Knowledge
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TSL	Technology Supported Learning
UCC	Uganda Communications Commission
UNDP	United Nations Development Programme
UNESCO	United Nations Education Scientific and Cultural Organisation
UNPF	United Nations Population Fund
UPE	Universal Primary Education
USE	Universal Secondary Education
UTAUT	Unified Theory of Acceptance and Use of Technology
VL	Virtual Learning
VLE	Virtual Learning Environment
VU	Virtual University
WWW	World Wide Web
ZPD	Zone of Proximal Development

PART I

INTRODUCTION

CHAPTER ONE

INTRODUCTION

1.1   Background of the Study

Role of e-learning technology. Knowledge is an imperative resource for socio-economic development of nations (Aarts & Greijn, 2010; Kefela, 2010; Tchamyou, 2017; United Nations, 2018), especially in the 21st century. This resource allows sustainable growth in the information society (Nawaz & Khan, 2012; Tebbens, Berge & Jacovkis, 2009; United Nations, 2018). Large investments in Information and Communications Technologies (ICTs) have been made to enhance African knowledge and innovations (Butcher & Associates, 2011; Lwoga, 2014; United Nations, 2018). Universities, in particular, are increasingly adopting e-learning programmes in the developing countries (Mufutumari, 2010; Tchamyou, 2017). They indicate that this is done as a means of boosting the contemporary knowledge society and economic development. The parameters of successful adoption of e-learning include acceptance, intention to use, innovative use and usage of e-learning technologies (Drent & Meelissen, 2008; Kimwise, 2017; Salloum, 2018). Adoption of e-learning can be realized through delivery of learning materials in different formats, ability to interact through collaborative tools and accessing up-to-date information among other means (Gwamba, Renken, Nampijja, Mayende & Muyinda, 2018).

A synopsis of the adoption of e-learning in developing country context. While there is evidence of the integration of e-learning projects, many developing countries still experience challenges in the adoption process of e-services (Gwamba et al., 2018; Nisperos, 2014). E-services are amenities that are provided electronically (Urumsah, 2015). This implies that e-learning is an electronic service. Researchers maintain that the adoption process of the adoption of e-learning is daunting and requires proper planning and evaluation (Bach, Haynes & Smith, 2007; Gwamba et al., 2018; Kintu, Zhu & Kabagambe, 2017; Nisperos, 2014). Only a limited number of studies have investigated the challenges involved in e-learning development, implementation and utilization in developing countries like Uganda (Bervell & Umar, 2017). Substantial tax payers' money has been invested in e-learning initiatives and institutions of

higher learning, and educational environments such as Makerere University might soon be held accountable for this investment.

Theoretical perspective of the study. To overcome such the adoption challenges, there is need to identify predictors of successful adoption of e-learning in universities in Uganda. The said predictors can be studied at organisational (macro) and individual (micro) levels (Hardaker & Singh, 2011). Hence, they can be refered to as macro and micro predictors in relation to Giddens' structuration theory of 1979 and 1984. The macro predictors are perceived as the structural predictors while the micro predictors as the human-agency predictors. Structuration concepts can synchronised with the IS concepts (Jones & Karsten, 2003). A thorough explanation of the synchronisation of structuration and IS concepts has been expounded in section 2.3. The said explanation was hinged on the integration of grand and midde-range theoretical approaches. While a brief theorisation of the adoption of e-learning has been made, it is important to define the term e-learning.

Definition of key terms. E-learning has been defined differently by several authors (such as Hardaker & Singh 2011; Neil, 2014). Hardaker and Singh (2011) for instance defines e-learning as an innovation that is positioned in the interplay between organisation and individual and how this leads to adoption and diffusion processes. Neil (2014) on other hand, defines e-learning as the use of information technology in teaching and learning. Organization for Economic Cooperation and Development (OECD), (2016) highlights that e-learning is the interaction between systems (i.e. ICTs, IS and people) and the environment in teaching and learning. In this study, e-learning is regarded as technology-supported learning (TSL), positioned in the interaction between an organisation and individual. More details about the concept of e-learning can be found in the Literature Review Section 2.3. Predictors of successful adoption can be referred to as critical success factors or determinants. Pollard and Cater-Steel (2009) report that CSFs are factors influencing the successful adoption of IT for an organisation to flourish. In relation to the adoption of innovations, these are key factors that must be in place to ensure adoption. It is worth noting that in many ways e-learning can be perceived as an innovation or being innovative. In this particular research, predictors of the successful adoption of e-learning are perceived as the factors that aid adoption of e-learning. From the above definitions, one can also argue that e-learning is not an end in its-self, it can be adopted or used by different entities such as universities, governments and people in a particular country.

Contextual perspective of the study. The adoption of e-learning in the education system of Uganda commenced with development of a National ICT Policy which was formulated in 1998 by the Uganda National Council of Science and Technology (UNCST) Torach, Okello and Amuuriat (2006 cited in Kimwise, Maiga & Jehopio, 2016). However, this policy did not succeed in investing in e-learning right from primary to higher institutions (Kimwise et al., 2016). The education system in Uganda has gone through changes such as the introduction of Universal Primary Education and Universal Secondary (Gwamba et al., 2018; Kituyi & Tusubira, 2013; Oroma et al., 2012). The preceding researchers argue that as a result of these changes, student enrolments doubled in Uganda thereby putting more pressure on higher institutions of learning. To ensure that the increasing numbers of students get quality education, new innovations such as e-learning had to be integrated in universities in Uganda (Kituyi & Tusubira, 2013).

However, the level of adoption of e-learning in universities in Uganda is on a small scale (Kasse & Balunywa, 2013; Gulu University, 2017; Gwamba et al., 2018). The adoption of e-learning in universities in Uganda has been limited to basic usage such as sending notes via electronic mail (e-mail), teaching using Power-Point presentations and posting notes to the Learning Management System (LMS) (Kahiigi, 2013; Kintu & Zhu, 2016). Gwamba et al. (2018) also confirm low adoption of the Makerere University E-learning Environment (MUELE). These notions suggest that e-learning information systems (E-learning ISs) are not used effectively in Uganda's university environments. It seems that e-learning has not been fully accepted, innovatively used or even utilized in Uganda.

Furthermore, e-learning adoption processes in universities in Uganda have been carried out without adequate preparations (Gwamba et al., 2018; Oroma, Wanga, & Ngumbuke, 2012). For example, there are no proper national guidelines or clear frameworks (Gwamba et al., 2018; Kituyi & Tusubira, 2013; Oroma et al., 2012) for the adoption of e-learning ISs in Uganda. In the past years, the Makerere University (MU) report (2012) indicated that approximately, 1,326 courses were supposed to be put online, but that had not happened yet. In addition, of those that were successfully online, few lecturers would fully utilize them (Kahiigi, 2013). If the lecturers

cannot fully exploit the e-learning IS, then the students' ability to adopt such a system is going to be low. This is in line with Rogers (2003) who argues that adoption is based on the opinion of our peers.

More recently, Gwamba et al. (2018) indicated that MUELE has no ability to use LMS to add and replace rich and interactive media content integrated with the use of hyperlinks for non-linear navigation that suits individual online courses). These facts indicate serious problems, not only in the conversion of existing courses, but also in making use of those already converted. Students from Gulu University come from rural areas with no experience in the use of ICT hence limiting their ability to adopt e-learning at university level (Gulu University, 2017; Okidi-Lating, 2006). Gulu University experiences poor network connectivity and the university has limited number of computers (Gulu University, 2017; Olango, Bouma, Andogah & Nerbonne, 2013). For instance, the network connectivity in Gulu University is low and the ratio of computers to students is 1 to 40 (Olango et al., 2013). The experience of poor network connectivity is also present at other universities such as Mbarara University of Science and Technology (MUST) (MUST, n.d.). Worse still Gulu University has no formal e-learning policy (Gulu University, 2017). Since 2015, Busitema University, has been struggling to comeup with an ICT unit; to provide technical and managerial support to realize excellence in quality training, learning and research (Busitema University, 2015).

Integration of e-learning in universities in Uganda is at its infancy (Gwamba et al., 2018; Kahiigi, 2013); and has mainly been achieved with assistance from international bodies or institutions. In Makerere University for example, the integration of e-learning was aided through assistance from the University of Uppsala (UOU), Sweden and Technological University of Delft (TUOD), Netherlands (Tusubira, Mulira, Kahiigi & Kivunike, 2008). In Gulu University, computers were donated by the Netherlands' International Institute for Communication and Development (Ndawula, 2014) and organisations such as the Uganda Communications Commission (Gulu University, 2014). Bodies such as the National Council for Higher Education (NCHE) that are expected to spear head and regulate e-learning in Uganda have acted contrary to their expectation. Up-to-date, there is no accredited on-line programme supported by the NCHE. E-learning is used as a back-up instruction strategy to face to face.

It appears like e-learning information systems in universities in Uganda have yielded minimal success as indicated by inefficiencies such as failure to fully develop online courses and

exploit functionalities of the LMS by lecturers in outstanding universities like Makerere (Gwamba et al., 2018; Kahiigi, 2013). The unsuccessful outcomes of e-learning ISs in these universities, and the prioritisation of the education sector in Uganda's Vision 2040 (Ugandan Government, 2020) as well as the United Nations millennium sustainable development goals (MSDGs) forced an empirical investigation (United Nations, 2020).

1.2   Problem Statement

The integration of e-learning within higher education is inevitable given the fact that information technology models have become popular in storing, accessing and disseminating academic information (Neil, 2014; Nyeko & Ogenmungu, 2017). Although e-learning has been adopted in universities in Uganda; the level of its adoption is still on a small scale, so that e-resources utilisation is limited compared to the potentially large number of users. Despite the fact that universities in Uganda have re-engineered their pedagogical methods with best practices, the question of what factors predict successful adoption continues to be an important issue. In a developing environment such as Uganda where e-learning technology is still at its infancy and where unsuccessful outcomes have been observed, it might be of greater public interest to understand the determinants of successful adoption of this technology.

In particular universities may want to employ new knowledge in developing their multi-facetted learning environments and study programmes. Changes in today's learning landscapes evoked by global trends, legislative issues, changing study behavior (demand by stakeholders who prefer studying at their own time, place and pace) and others, is an indicator that universities may want to effectively adopt e-learning.

1.3   Research Question

Based on the challenges associated with the adoption of e-learning, and the gaps that emerge in the background sections; this research sought to find solutions to the following question: What are the factors that predict successful adoption of e-learning in universities in Uganda?

1.4   Specific Objectives

 i.   To identify predictors of successful adoption of e-learning in universities in Uganda.

 ii. To investigate the causes of failure of past e-learning information systems initiatives in universities in Uganda.

iii. To develop a predictive framework for the advancement of e-learning programmes for universities in Uganda.

1.5   The Importance of Studying the Predictors of Successful Adoption of E-Learning

Identifying users' expectations and experiences in e-learning studies has significant implications for management of e-learning in organisations (Kattoua, Al-Lozi, & Alrowwad, 2016; Sørebø et al. 2010; Wan, Wang & Haggerty, 2008). These studies also act as a basis for initiating other related studies in the area of educational technology (Kattoua et al., 2016; Sun, Tsai, Finger, Chen & Yeh, 2008). By investigating predictors of successful adoption/ Critical Success Factors (CSFs) of the adoption of e-learning, researchers can obtain reasons as to why there are low adoption levels and then provide possible recommendations (Drent & Meelissen, 2008).

It seems not much changed since ten years back when Evelyn Kahiigi noted that "E-learning is at its infancy in Uganda", and thereby eventually also in the developing world (Bhuasiri, Xaymoungkhoun, Zo, Jeung, & Ciganek, 2012; Gwamba et al., 2018; Kahiigi, Ekenberg, Hansson, Tusubira & Mats, 2008 p. 197). Gwamba et al. (2018); Kahiigi, Hansson, Danielson, Tusubira and Vesisenaho (2011) and Kintu and Zhu (2016) identify the discrepancies in the incorporation of e-learning in pedagogical practices in Uganda. The number of shortcomings signifies that more research is needed in the field. Underlining the need Bervell and Umar (2017) and Chen and Fang (2013), postulate that one of the commendable research areas in the 21st century is the study of the adoption of e-learning in the educational system.

1.6   Scope

Geographically, the study took place at universities in Uganda where the integration of e-learning is still at an early stage (Gwamba et al., 2018; Kahiigi, 2013). The study specifically investigated the factors for successful adoption of e-learning. Conceptually, two social systems,

university learning environment and human-agent were investigated as potential predictors of the adoption of e-learning in the sampled universities.

1.7   Contributions of the Study

1.7.1 Research Value

While several researchers (such as Barton, 2010; Drent & Meelissen, 2008; FitzPatrick, 2012; Tomas, Evans, Doyle & Skamp 2019) have attempted to measure the adoption of e-learning, their studies are based on linear models. This research measured predictors of successful adoption of e-learning using the Gestalts perspective. The challenge in determining the influence of the predicting variables is that they interplay, thereby making the measurement of these variables difficult. The Gestalts perspective or configuration approach emphasises focusing on the configuration. It is argued that when a configuration or pattern among variables is formed, there is coherence among them and successful results are achieved (Miller, 1989). By adopting this perspective, the researcher managed to determine combinations of factors that could lead to the successful adoption of e-learning. In addition, Bervell and Umar (2017) and Chen and Fang (2013) call for more research in the area of educational innovations. This study is therefore, a response to the preceding call.

1.7.2 Theoretical and Methodological Contributions

The grounds for the present thesis have been formed by integrating Giddens' Structuration Theory (1979) and Rogers' Diffusion of Innovations Theory (2003) to set up a comprehensive framework for the study. Unlike kinds of researches which take on either a grand or a middle-range approach as a stand point, this study was based on hybrid philosophy that draws from both grand and middle-range theories. For instance, Giddens' theory (1979) is a grand theory while Rogers' (2003) DOI theory, is a middle-range theory. The researcher has chosen the hybrid philosophy because of the limitations associated with each of the theoretical foundations. For example, grand theories are abstract (Peterson & Bredow, 2013) and not empirical (Moore, John & Pinder, 1979) while middle-range theories are narrow and empirical (Moore et al., 1979; Peterson & Bredow, 2013). Hence, predictors or factors of adoption of e-learning were studied by using a more integrated and comprehensive conceptual framework.

This research contributes to the epistemological foundations of IS research through the development of constructs and variables (such as university learning environments, human-agents, and learning supported by technology). This is in line with Kibera (1997) cited in Bakkabulindi (2007) and Bervell and Umar (2017) who argue that conceptualization models in Africa are replete with an inadequate definition of some key variables. Constructs are derived from theory and defined through variables by operationalisation (Bhattacherjee, 2012). For example, the human-agent has been derived from Giddens' Structuration Theory and operationalised according to age, gender and level of education in relation to Rogers' Diffusion of Innovations Theory (DOI). Contextually, the study excavates predictors of successful adoption that correlate to the adoption of e-learning in universities. In addition the study contributes to testing several hypotheses derived from the conceptual framework. Researchers and organisations interested in the field of information systems (IS) may, therefore, benefit from the research objectives and outcomes in the form of theoretical input.

Factors that contribute to successful adoption of e-learning were assessed by the level of alignment between the university learning environment and human agent factors. From the lecturers' data set, four clusters were attained while from the students' data set, six clusters were attained. Results from either category of respondents revealed an adequate level of alignment among the majority of the respondents. Based on the findings, it was concluded that the adoption of e-learning was successful to some extent, thus the university learning environment and human agent factors have led to successful adoption of e-learning in universities in Uganda. The Gestalts perspective therefore provided a valid platform for measuring complex interactions among organisational and individual characteristics and the adoption of e-learning.

The study is timely because the organisation of e-learning information systems in universities is still in its infancy stage in Uganda. Such complex interactions provide a way of understanding of e-learning integration challenges.

Given the fact that Gestalts is a pattern-based approach (Venkatraman, 1989), results were based on different groups of insights which empowered the researcher to describe and forecast the magnitude of the contribution of the university learning environment and human-agent factors to the adoption of e-learning in universities. The Gestalts perspective simulated along the K-means clustering algorithm is a valid technique for assessing factors for successful adoption of e-learning; hence a meticulous methodological contribution.

1.7.3 Incorporation/ Inclusiveness of Different Disciplines

The study benefits from various theories, particularly from the fields of sociology, communication studies, information technology innovation, management and education.

1.7.4 Practical Contributions

The results reveal the role of demographic factors in the adoption process. Demographic factors such as age can be a basis of kick-starting adoption in a particular organisation. For instance, results have revealed that the adoption of e-learning technology takes place at an older age in universities in Uganda. It is advisable to encourage the use of such technologies at an early age in institutional settings (Plaza et al. 2018).

The research is a basis for integrating up-to-date e-learning technologies such as video conferencing, social networking, podcasts, blogs and wikis and MOOCs that are not commonly used in universities in Uganda.

Findings are the basis for transforming universities in the developing world. This can be through availing time to experiment wih ICTs, financial resources and providing management support. Management can support their staff through training or offering technical support.

The research offers a basis for solving problems such as limited structured approach and inadequate of empowerment as revealed from the findings. Such problems are impediments to the development of e-learning information systems.

On a practical basis, results from this study can be used by policy makers in developing e-learning policies for the education industry. For example, through understanding the successful adoption of e-learning in universities, educational technology policies can be put in place or enriched.

This research also forms a basis for efficient adoption and implementation of e-learning in educational organisations in Uganda and other developing countries hence, ensuring proper use of financial resources invested in e-learning. This is justified by Cross and Adam (2007) and Gwamba et al. (2018) who observe that institutions of higher learning in African countries have no vision or strategy on the use of ICT; their activities are driven by particular project implementations.

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Findings can be used by e-learning information system designers to improve the quality of such systems. This can be through identifying understanding the role of certain factors in the adoption of e-learning. For instance, system designers improve the quality of a given information system by considering the age of its users.

1.8   Structure of the Thesis

Part I: This part is paramount in introducing the entire thesis. It gives an overview of the thesis. To achieve this aim, this part has one chapter subdivided into sections such as the background and problem statement, pointing to a discourse in a logical manner.

Part II: The literature review is part and parcel of any academic research. The review ensures that the research is embedded in the ongoing academic debate while building on available knowledge.

This part contains three chapters. Chapter Two uncovers the concepts of learning, theories of traditional learning, and e-learning in general. Chapter Three contains a discourse on innovation adoption, looking at earlier studies on the adoption of e-learning. In this chapter the researcher problematises and raises gaps from the literature reviewed. Chapter Three also highlighted and expounded on the main theories (i.e. Structuration Theory and Diffusion of Innovations Theory) and the alignment model adopted for the study. The following chapter (Chapter Four) uses the alignment perspective and techniques such as conceptualisation and theorisation based on the previous chapter to layout the conceptual framework on predictors of adoption of e-learning.

Part III: This part presents Chapters Five and Six (i.e. research methodology and design). Chapter Five begins by discussing different research procedures and the research procedure adopted for this study. The chapter also reviews several philosophical aspects of information systems (ISs). The study borrowed from the ontological, epistemological, methodological and axiological aspects of ISs using a positivist point of view. Chapter Six presents the research design that is quantitative, survey, mixed and cross-sectional in nature.

Part IV: This part constitutes Chapters Seven and Eight of the research findings and discussions as pertained to lecturer and student respondents respectively. Each of the chapters presents quantitative and qualitative responses of lecturers and students in Makerere and Gulu universities. Presentation of the findings in each chapter begins with a descriptive analysis of

background information (such as age and possession of personal laptops). Furthermore, each of the chapters presents cluster, thematic and integrative analyses. Chapter eight also entails the summary of findings. Adoption of e-learning is successful to some extent and is mainly enhanced by organisational factors. The advanced age of the human agent hinders the adoption of e-learning to some extent. The main causes of failure of past e-learning ISs initiatives are the limited structured approach and inadequate empowerment in relation to e-learning by university management from lecturers and students

Part V: This part entails the last chapter of the study (i.e. chapter nine) which encapsulates the conclusions and research implications. Using the research findings, this chapter presents a conclusion illuminating key issues. The chapter also presents contributions of the study and finally, limitations of the study and further research are presented.

Table 1. 1: Thesis Structure

Part I	
	Chapter 1: Thesis Introduction
Part II	
	Chapter 2: Learning and Challenges Involved
	Chapter 3: Innovations and Adoption of E-learning
	Chapter 4: Alignment and Conceptual Framework
Part III	
	Chapter 5: Research Methodology
	Chapter 6: Research Design
Part IV	
	Chapter 7: Findings and Discussions (Lecturers' Responses)
	Chapter 8: Findings and Discussions (Students' Responses)
Part V	
	Chapter 9: Conclusion, Research Contributions, Limitations and Future Work

PART II

LITERATURE REVIEW

CHAPTER TWO

LEARNING AND CHALLENGES INVOLVED

2.1 Learning

Many researchers (such as Alonso, López, Manrique & Viñes, 2005; Girvan, Conneely & Tangney (2016); Kolb & Kolb, 2008; Elkjaer, 2009; Phillips, McNaught & Kennedy, 2010 and Tomas et al., 2019) have attempted to define the term 'learning'. According to Alonso et al. (2005), learning is the process of forming, inserting and making efficient use of knowledge. However, this definition does not indicate the environment in which learning takes place. In the view of Girvan et al. (2016), Kolb and Kolb (2008) and Elkjaer (2009), learning is the process of creating knowledge through the transformation of experience. This definition is biased towards experiential learning theory which is individualistic, cognitivist, and technological. Additionally, the role of Vygotsky's social constructivist theory that supports the creation of social knowledge is ignored in this case.

Phillips et al. (2010) and Tomas et al. (2019) define learning as a combination of an environment, process and outcome. The learning environment is the setting that facilitates learning; the learning process depicts the activities which are part of learning; and learning outcomes signify the skills gained. While this definition incorporates all aspects of learning, it does not indicate how students and teachers interact with the learning environment, processes and outcomes. They argue that learning is a multi-dimensional concept in nature; it can be viewed as a noun (i.e. a way of obtaining knowledge), in the present participle form (i.e. we are *learning*), and also as an adjective (i.e. the student's hard *learning* practices).

The learning process takes place in the environment and envisions the outcome. The learning process involves knowledge creation. Some of the stakeholders in this process may include learners, tutors and instructional designers (OECD, 2018). The said stakeholders can undertake several activities such as providing feed-back on lectures' assignments, assessing learners' assignments and developing courseware respectively (Lubega & Mugarura, 2008). These stakeholders aim at achieving different purposes depending on the activities carried out within the learning process. Traditionally, learning takes place in a learning environment based on theories (Khasanova & Sanger, 2018; Nagata, Kigawa & Aoki, 2018). For example, the

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constructivism theory positions the learners or students with an active role to play in the creation of knowledge (Fosnot, 1996; Honebein, Duffy & Fishman, 1993; Khasanova & Sanger, 2018; Steffe & Gale, 1995). The learning process is an individual effort; students learn from their personal experiences. Thus, a learner acts in a different way based on his or her own perception. Designing an effective instruction requires consideration of theoretical bases in which learning is grounded. Learning theories offer frameworks throughout the learning process. Some of the theories that exist to explain the learning process include: behaviourism; cognitivism; and constructivism (Khasanova & Sanger, 2018; McLeod, 2003).

Behaviourism is rooted in the works of Mager (1962) and Skinner (1938), Thorndike (1905) and Watson (1913). The above theorists assume that the learning process is an observable change in behavior (McLeod, 2003). They believe that the environment nurtures the behaviour and learning takes place through repetition and reinforcement to develop desired habits (McLeod, 2003). Behaviourism enables learners to find quick responses to well-defined problems if there are incentives to prompt the learners' behaviour (McLeod, 2003). Although this theory is instrumental in instructional design, it has its own challenges. For example, if incentives are not present, then the expected and desired performance of a learner may not take place. Secondly, the instructor is burdened to maintain reinforcement (McLeod, 2003). While the behaviourists agree that learning is thought to be best facilitated through the reinforcement of an association between a particular stimulus and a response, the cognitivist discourse runs otherwise. The cognitivist theory was postulated by Atkinson and Shiffrin in 1968 (Bishop (In Press); McLeod, 2003). These theorists argue that learning takes place within the learner's mind. Hence, learning is regarded as an internal and active mental process, which develops within a learner (Mayes & de Freitas, 2004; Stavredes, 2011).

Another assumption of cognitivism is that there must be an existing 'knowledge structure', referred to as a schema from which comparison is drawn in order to process new information for learning (McLeod, 2003; Stavredes, 2011). Furthermore, learning is developed through receiving, storing and retrieving information (McLeod, 2003; Stavredes, 2011). This implies that instructional designers must consider appropriate tasks needed in order for learners to effectively process the information received. The cognitivist theorists consider the learner as a central point for the instructional design process (McLeod, 2003). Cognitive instruction has the potential to provide more meaningful learning to the learner if it relates to the existing concepts

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in a person's cognitive structure (McLeod, 2003). Cognitive philosophy is appropriate for describing higher levels of learning (McLeod, 2003).

While schemas help to make learning more meaningful, in the absence of relevant schemas, a learner is at a disadvantage (McLeod, 2003). Incorporating the above features of cognitivism in instructional design is costly and time-consuming (McLeod, 2003). Later philosophical developments led to the constructivist theory which was orchestrated by psychologists such as Glasersfeld (1989) and Vygotsky (1978). This theory is multi-faceted whereby the construction of knowledge is deemed to be social or radical. Social constructivists such as Vygotsky (1978) believe that individuals construct knowledge through social interaction (Koohang, Riley, Smith, & Schreurs, 2009; McLeod, 2003).

Radical constructivists such as Glasersfeld (1989, p. 162) opine that "each individual constructs reality for him or herself". This implies that the construction of reality is based on an individual. Constructivist learning is pertinent to experiential learning, self-directed learning and reflective practice (Giridharan 2012; Koohang et al., 2009). A teacher is expected to understand the knowledge constructed by a learner within a social setting to promote the building of new knowledge. The strengths of this theory include: learners are given the chance to actively construct knowledge; and they have multiple perspectives from individual representations of knowledge (McLeod, 2003). Generally, the constructivist approach is an active learning process in which learners have an opportunity to construct new ideas based on both their past and current knowledge (Geçera & Özel, 2012).

The weaknesses of constructivism are: individual learner interpretations and interests create an instructional problem in adequately evaluating learning (McLeod, 2003). Furthermore, it may become hard for the teacher to respond to a multitude of student/ learner interests due to lack of resources. Given the strengths and weaknesses of the above theories; it is important to understand what traditional learning is.

2.2   Traditional Learning

The learning process can be categorised according to the method used in forming, inserting and making efficient use of knowledge by an institution (Alonso et al., 2005; Tomas, et al., 2019). The two main methods of learning are traditional and modern. Traditionally based learning is a form of learning that takes place in brick and mortar institutions (Lee & Tsai, 2011;

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Svetsky, Moravcik, Tanuska & Markechova, 2018) as opposed to modern learning. 'Brick and mortar institutions' are physical institutions in which learning takes place by the face-to-face approach. This setting requires both teachers and learners to exist on campus or interact physically in a classroom setting (Lee & Tsai, 2011; Svetsky et al., 2018). In traditional learning, teachers are the custodians of information and knowledge (Svetsky et al., 2018). While the information revolution is at its highest peak, some universities are still using traditional methods of learning especially in the developing world. The challenges of traditional learning according to Rashty (2010), Svetsky et al. (2018) and Tomas et al. (2019), include the following: 1) A teacher is usually burdened because he or she talks more than the student. 2) Learning is conducted with the whole class participating in making the evaluation of students a tedious process. 3) There is almost no group or individual study in traditional learning which affects students' ability to be constructive. 4) The teacher conducts the lesson according to the study programme and the existing curriculum, which implies that there is no opportunity to incorporate new ideas. 5) Students learn "what" and not "how", which has limited students' ability to use their skills and knowledge practically. 6) Students and the teachers are busy completing the required subject matter quota. 7) Learning takes place within the classroom and the school, and the teacher dictates the structure of the lesson and the division of time. Given the above challenges of traditional learning, strategies have been adopted by institutions to address such challenges.

The need for quality teaching and learning in higher educational institutions has led to the development of different strategies to re-engineer the pedagogical approach in these institutions. Therefore, part of the responsibilities of universities is to improve learning. Phillips et al. (2010) and Tomas et al. (2019) indicate that learning comprises the learning environment, the learning process, and the learning outcomes which indicate the skills. Each of these components can contribute to learning problems if not catered for. Learning problems may include poor infrastructure (Ali, Haolader & Muhammad, 2013; Geçera & Özel, 2012) which affects the rate at which learning can develop. Others include low interactivity between teachers and students in the class, and lack of group discussions in class, among others (Rashty, 2010). As a result of the given problems, learning institutions have come up with strategies.

The major strategy adopted by universities to overcome the problems of traditional learning is through the adoption of e-learning systems (Tomas et al., 2019). For instance, the

University of Rijeka in Croatia put efforts toward a functionally integrated e-learning system to support the learning process (Zuvic-Butorac, Nebic & Nemcanin, 2011). In addition universities need to develop policies to prevent learning problems. For example the University of Rijeka took a step to enhance sustainable development with high quality and strong performance in outcome-based and lifelong learning (Zuvic-Butorac et al., 2011). Policies guide leaders in carrying out their duties well (Barton, 2010; Common Wealth of Learning, Educational Technology Management Academy, 2015). Carey, Davis, Ferreras and Porter (2015) argue that the use of open educational practices which support open resource use and open learning architectures transform learning. Putting in place support structures such as learning laboratories motivates learners to work on their own. Generally, universities have integrated e-learning as a modern learning strategy to overcome traditional learning problems. Although most universities have integrated e-learning, the level of its adoption is still low in some countries.

2. 3   Concepts of E-Learning

Despite its existence, there is little agreement on the definition and measurement of e-learning. There is, therefore, no unanimous definition of e-learning given the fact that it is defined and measured in different contexts. Several researchers (such as Bower, Hedberg & Kuswara, 2009; Eze et al., 2018; Hardaker & Singh, 2011; Mayer, Cotgreave, Rosenkvist, Einarsdottir & Osborne, 2011 and Neil 2014) have attempted to define the term 'e-learning'. Hardaker and Singh (2011, p.222) define e-learning as "an innovation situated in the interplay between structure and individual and how this leads to adoption and diffusion". Similarly, Eze et al. (2018) have defined e-learning as technology-mediated learning that uses hardware and software systems at any given range to aid teacher and student interactions.

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┌──────────────┐              ┌──────────────┐
│  Structure   │              │  Individual  │
└──────────────┘              └──────────────┘
         ╲                        ╱
          ╲                      ╱
      E-learning = innovation
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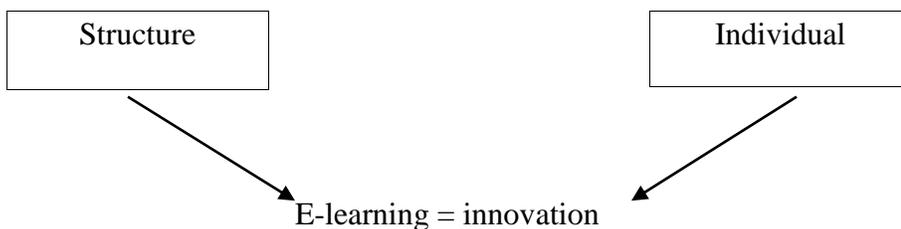
Figure 2.1: Hardaker and Singh's (2011) Perspectives of E-Learning

Hardaker and Singh (2011) describe a structure as an institution characterised by signification, domination and legitimation. They perceive an individual as an agent. E-learning is an

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innovation resulting from the interaction between structure and individual and how this leads to adoption and diffusion. Innovation is defined as something perceived as new by an individual (Rogers, 2003).

2.3.1 Structure of E-Learning

Structure, as perceived in this study, is rooted in Giddens' (1979) Grand Social Theory based on the assumption that the creation and reproduction of social systems are grounded in the analysis of both structure and agents, without giving dominance to either.
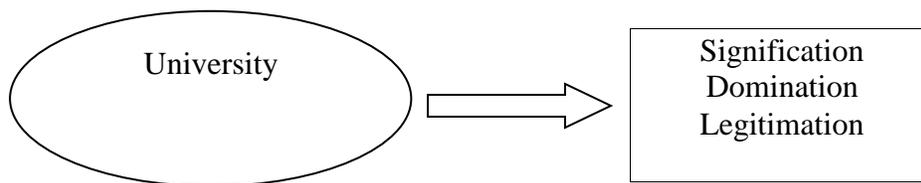
Figure 2.2: Giddens' (1979) Perspective of Structure

Giddens (1979) defines signification as the way in which individuals create meaning of the organisation through communication using interpretive schemes (Orlikowski, 1992). In relation to this research, signification is perceived as a shared understanding among teaching staff/ lecturers and students using ICTs as communication modes.

Giddens (1979, cited in Orlikowski, 1992) conceptualises domination as the ability of organisational management to exercise power through authoriszing and allocating resources. In this research, domination signifies the use of power by university management through control of resources such as actual place and spaces, finances, computers (i.e. hardware and software licensces) and Internet accessibility. Legitimation is a moral or sanction or cultural norm used to regulate people's behaviour in an organisation (Giddens, 1979 cited in Orlikowski, 1992). In regard to this research, legitimisation was conceptualizsed as rights, standards, obligations, norms and rules that guide employee conduct in relation to use of the e-learning information system (i.e. e-learning policies such as non-disclosure agreements).

The learning environment can also be viewed as the context in which a learner operates (Phillips et al., 2010). However, a learning environment is not restricted to a university alone. In this research, the learning environment was perceived as a 'university learning environment' comprising ICT policy; time as a resource to experiment with ICT learning; management

operations in relation to ICT (such as financial support, and commitment of management). According to Giddens' (1984) model (cited in Hardaker & Singh, 2011), an individual is an agent who communicates, exercises power through acting upon resources and is governed by sanctions. With respect to this study, an individual is perceived as a lecturer/ teacher or learner/ student (human agent) who interacts with the university learning environment and can be identified according to age, gender, and level of education.

Learning situated in the interplay between the university learning environment and individual, therefore, signifies that learning emerges from the interaction between the learning environment and individual (human agent). The learning environment is important because it provides the context of operation for the learner (Phillips et al., 2010). In view of this research, the learning environment is important because it provides the context of operation for the human agent (learner and lecturer). Through shared understanding among lecturers and students, awareness is created. Interaction with management operations in relation to e-learning (such as financial support, and commitment of management) can empower human agents and thus enhance the adoption of e-learning. By accessing the university e-learning policy, human agents obtain rights, standards, obligations, norms and rules to guide them on using resources.

Once the human-agents interact with the learning environment, they gain awareness, expertise, become empowered, and a framework on how to use e-learning resources is developed, and so aiding the adoption and diffusion of a particular technology in question. This is congruent with Kundi and Nawaz (2014), who argue that the use of e-learning tools such as podcasts strengthens e-learning capacity, and as a result, e-learning is adopted. The Organisation for Economic Cooperation and Development (OECD, 2016) highlights that e-learning is the interaction between systems (i.e. ICTs, IS and people) and the environment in teaching and learning.

2.3.2 E-Learning Tools

Neil (2014) conceptualises e-learning as the application of ISs and ICTs in teaching and learning. Eze et al. (2018) and Neil (2014) indicate that office information technology, portable learning presentation tools, network systems services, learning management systems (LMSs), learning labs, and library systems are all e-learning resources.
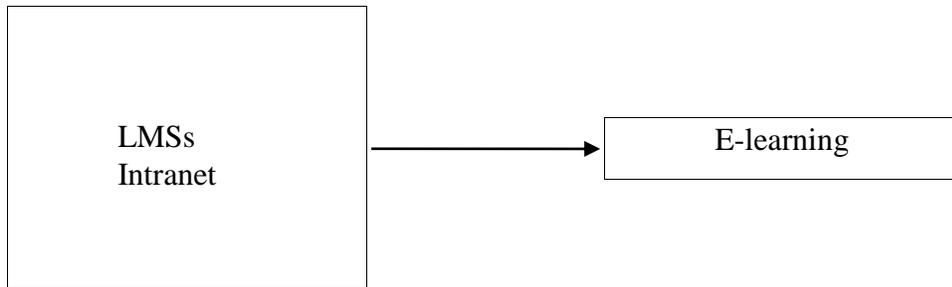
Figure 2.3: Neil (2014) Perspective of E-learning

An information system can be defined as a set of interrelated components that retrieve, process, store, and disseminate information to support management or any organisational activities (Laudon & Laudon, 2010). ICT is defined as a tool for information and communication purpose (Kintu & Zhu, 2016). LMSs are programs that support teaching and learning (Gwamba et al., 2018). An intranet is a private network within an enterprise (Rouse, 2015, January, 5). E-learning is the use of IS and ICT for pedagogical purposes (Neil, 2014).

2.3.3 E-Learning Environments

Mayer et al. (2011) conceptualize e-learning as an interactive blended environment for personalization of teaching and learning for both teachers and pupils. In relation to this definition, the following three premises for personalization of learning are considered for both teachers and learners: 1) The learning curriculum is designed to suit the learner's ability 2) the way in which the learner is assessed as suitable for learning, and 3) learners have an opportunity to choose and control their learning. While this model considers the learner and the teacher, it is limited to an interactive blended environment.

Secondly, the three premises for personalization of learning place more emphasis on the learner as opposed to the teacher. Bower et al. (2009) conceptualize e-learning as a web 2.0 technology based on the Technological Pedagogical and Content Knowledge (TPACK) model of educational practice. This definition is biased towards web 2.0 technologies/ environments. Eze et al. (2018) assume that e-learning is mediated by technology at a particular range and it aids interactions between teacher(s) and student(s).

2.3.4   Operational Definition of E-Learning Adopted for the Study

Drawing from Eze et al. (2018), Hardaker and Singh's (2011), Neil (2014) and OECD (2016), in relation to this study; e-learning was perceived as technology-supported learning (TSL), resulting from the interplay between the university learning environment and the human-agent.
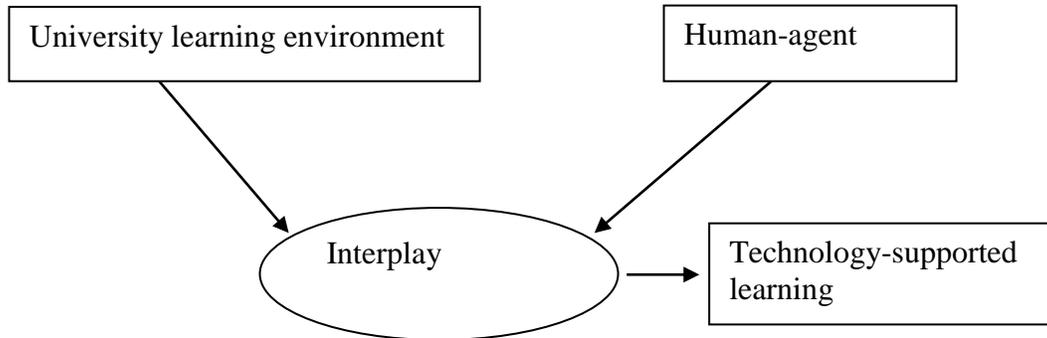
Figure 2.4: Study Perspective of E-Learning

A university can be defined as an advanced educational institution, which grants degrees and conducts academic research (Pearsall, 2001). According to Giddens' (1979) as reported by Hardaker and Singh (2011), a university is defined as a structure or an organisation with the following features: signification, domination and legitimation. With reference to Giddens, a human agent can be referred to as human-agent who is an individual.

Structuration theory concepts can be applied in the information systems (IS) field to provide a mapping between structurational and IS language (Jones & Karsten, 2003). They assert that aspects of this theory may not be invoked in order to overcome the problems encountered in the use of this theory. Additionally, Jones and Karsten (2003), argue that this theory can be linked to other theoretical approaches. Thus, the researcher has opted to map structuration theory to Rogers' (2003) DOI theory, since DOI theory can be used in quantitative studies. Rogers (2003) theorised that there are individual, innovation and social system/organization characteristics that affect the adoption of innovations. The university learning environment characteristics, namely: the goal of university e-learning policy, time to experiment with ICT, financial support and commitment of management, are invoked as organizational factors with reference to Rogers' DOI theory. The human-agency is perceived as a human-agent and reflected

as an individual in relation to Rogers' DOI theory. The human-agent was appraised according to attributes of age, gender and level of education of lecturer or student. The attributes were considered because of their important role in the development and adoption of e-learning (Kattoua et al., 2016). While the university learning environment and human-agent are rooted in Giddens' Structuration Theory, they were invoked based on Rogers' (2003) DOI theory to objectively measure their impact on the adoption of e-learning.

2.3.5   Types of E-Learning

According to Neil (2014, p.23), there are four types of e-learning which include "informal, self-paced, leader-led and learning through performance support tools". Informal e-learning enables a learner to access any kind of relevant online information (Neil, 2014). Self-paced e-learning is self-responsible learning via pre-programmed software or open Internet access. Neil indicates that leader-led e-learning is a guided learning process and can either be synchronous (real-time learning) or asynchronous (delayed learning). The fourth type of learning uses performance support tools, i.e. learning through materials that can aid learners to perform a task (such as using a wizard in troubleshooting a software problem).

User engagement in any of the above types of e-learning depends on a number of reasons. For instance, the interest, expertise, benefits among other reasons. Assuming a user of a particular 'Internet powered' smart phone wanted to check for the meaning of a particular word in English, he or she may make use of google dictionary to get the meaning. At that particular time that may be the interest of such a user. At the same time the user may have expertise in searching his or her smart phone. This user also would have benefited of getting the meaning easily using his or her smart phone. Thus, the ability of any user to engage in a particular type of e-learning depends on a number of reasons.

2.3.6   Classification of E-Learning

E-learning can also be classified according to the learning environment, learning mode, synchronicity, location, number of participants involved, the mix of methods used to carry it out and mobility. One way of dichotomising e-learning is in accordance with the learning environment, either classroom-based or non-classroom-based. Classroom-based e-learning is geared towards passing exams where there are a teacher and a student (Epignosis LLC, 2014). In

classroom-based e-learning, a teacher can use a projector and computer while attending to a class and depositing lecture notes or assignments on an LMS. Non-classroom-based learning, at times referred to as corporate e-learning, is learning that aims at improving work (Epignosis LLC, 2014). Learners can, for example, improve their knowledge and capabilities by using e-learning tools (tutorials).

With reference to the learning mode, e-learning can be categorised as either online or offline. E-learning is said to be online if it is implemented through digital technology with the assistance of the Internet. E-learning is said to be offline if it uses digital applications such as CD-ROMs, databases that are not run via the Internet (Doherty & McKimm, 2010; Hrastinski, 2008; Lee, Yoon & Lee, 2009). Regarding synchronicity, e-learning can be either be synchronous or asynchronous. Synchronous e-learning is one supported by media, such as video conferencing and chat which make e-learners feel like participants rather than non-participants (Kithsiri et al., 2018). Asynchronous e-learning, on the other hand, is e-learning where a teacher and a student cannot communicate at the same time; for example, through the use of mobile phone technology one person has to talk and finish before another responds (i.e. half-duplex), (El-Deghiady & Nouby, 2008; Hrastinsk, 2008; Nabushawo, Muyinda, Isabwe, Prinz & Mayende, 2018).

In view of the location, e-learning can be described as "same location" or "distributed locations" e-learning (Wagner et al., 2008). In the case of "same location" e-learning, the teacher and student are in the same class room, while in "distributed locations" e-learning a teacher serves students in dispersed geographical areas. According to the number of participants involved, e-learning may be categorised as individual- or group-based. Individual-based e-learning is one form of e-learning where a student learns on his/ her own, while group-based e-learning is one that allows students to benefit from interacting with other learners (Khasanova & Sanger, 2018; Oludare, Modareke & Kolawole, 2012). Furthermore, e-learning can be distinguished on the basis of the mix of methods being used to carry it out, in which case, it can either be blended or unblended (Das, 2016). Blended e-learning is a learning situation that combines more than one delivery methods, such as online and offline, with the goal of providing the most efficient and effective instruction experience (Das, 2016; Dziuban, Graham, Moskal, Norberg & Sicilia, 2018 and Kahiigi et al., 2008).

Unblended e-learning is a form of e-learning that uses a single e-method of delivery such as online or offline but not both (El-Deghiady & Nouby, 2008). In relation to Uganda, blended e-learning is the approach most used at universities where e-learning delivery technologies such as web-based learning, computer-based learning, CD-ROM, e-mail and LMSs are integrated (Kasse & Balunywa, 2013; Nabushawo et al., 2018).Mobile learning is a type of e-learning carried out using mobile devices and platforms (Crompton & Burke, 2018; Gwamba et al. 2018).

Mobile learning enables learners to work in difficult and irregular environments making them more critical thinkers (Suárez, Specht, Prinsen, Kalz, & Ternier, 2018). However, there are no practical strategies to support this type of e-learning (Suárez et al., 2018). In Uganda today, applications such as e-mails, Facebook and WhatsApp are informally used by lecturers and students (see Appendices 10 and 14 of the interviews taken). However, the challenge of this type of learning would be the limited bandwidth in developing countries like Uganda. On the contrary if the devices used in learning are fixed, then it is the reverse of mobile learning. Implying that individuals must be present at a particular location for learning to take place.

2.4   Evolution of E-Learning

The origin of e-learning whose aliases include online learning (OL), cyberspace learning (CL) and virtual learning (VL) was inspired by the need to enhance traditional learning through distance learning (DL) (Guri-Rosenblit, 2005). E-learning is a modern learning method which incorporates the use of ICTs such as the Internet and performance support tools (Mbarek & Zaddem, 2013). E-learning is used as a solution to the challenges of traditional learning because of the following benefits: the student participates in designing the subject matter (Islam, Beer & Slack, 2015; Rashty, 2010); the teacher does not have to talk as much due to the multimedia support it offers. Most of the learning process takes place in groups or by an individual; the students are given an opportunity to learn "how" something is carried out rather than "what" it is; students are highly motivated; and are directed by the teacher to the information; learning can take place anywhere; the structure of the lesson is enriched by group dynamics; and learners are given the chance to work on their own, for example they can use the Internet to obtain information to enhance their work (Rashty, 2010).

Distance learning (DL) is a form of education where students study away from their tutor and the educational organisation (Angelaki & Mavroidis, 2013). This type of learning has existed

for centuries, and has benefited a number of learners. The distance type of learning was initially introduced to educate students in remote areas (Wagner, Hassanein & Head, 2008). Distance learning can be looked at as a dichotomy distinguishing between ancient and modern versions. The origin of ancient DL can be traced back to the days of philosophers such as Cicero (106 BC – 43 BC) and Plato (427 BC – 347 BC), (Guri-Rosenblit, 2005); and the Apostle Paul (AD 5-67) during their correspondence through letters to their students and the early Christian community respectively (Guri-Rosenblit, 2005; Williams, Nicholas & Gunter 2005). The idea of modern DL was born in 1728 in Boston in the United States of America (USA) by Caleb Philips, a short hand teacher who advised that students who desired to learn the new art of shorthand could do so by having several lessons sent to them weekly; and be as perfectly instructed as those that lived in Boston (Sleator, 2010).

Nevertheless, it was not until the 19th century when modern postal services were put into place that distance education flourished (Sleator, 2010). For example in 1840 in the English city of Bath, Isaac Pitman began teaching shorthand by correspondence formally (Williams et al., 2005). Mail correspondence courses were established in different universities such as the University of London, the UK around the 1840s (Williams et al., 2005); the Phonographic Institute based in Cincinnati, Ohio USA in 1852 (Sleator, 2010), and St. Andrew's University in Scotland in 1877 (Guri-Rosenblit, 2005). The early 1920s saw the emergence of electronic technology in DL, starting with radio broadcasting which improved instructional delivery time and also offered distance students an opportunity to interact with their instructors by hearing their voices. By 1923 over 10% of the radio broadcasting stations in the USA were owned by educational institutions. By the mid-late 1930s, radio technology was challenged by television technology, because the latter offered learners an opportunity of both audio and visual services (Sleator, 2010).

In 1963 the Federal Communications Commission in the USA created an Instructional Television Fixed Service, a collection of 20 channels which were made available to educational institutions, with the California State University being the first to subscribe (Sleator, 2010). In the early 1970s, one of the first recorded uses of the Internet for teaching was the use of computer-mediated communication systems at the New Jersey Institute of Technology whereby classroom teaching was combined with online discussions between the students and the teacher but limited to sending small amounts of data (Bates, 2011). Nonetheless, extensive development

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of the Internet and its applications began in 1989 and the early 1990s (Bates, 2011) as discussed in the next paragraph. Furthermore, in the mid-1970s, satellite communication technology began to be used for television broadcasting and the idea of teleconferencing began to emerge (William et al., 2005). However, significant developments in this technology in DL sprung up in the 1980s which continued to improve television delivery in terms of satellite transmissions that could be viewed at specified sites, or transmissions that could be recorded for later viewing at home or school (Sleator, 2010).

In 1989, the World Wide Web (WWW) was developed by the English scientist, Tim Berners-Lee, using concepts from earlier hypertext systems (Bates, 2011) with an aim of sharing information among internationally dispersed teams of researchers at the European Laboratory for Particle Physics, Conseil Européen pour la Recherche Nucléaire (CERN) near Geneva, Switzerland (Nedeva & Dineva, 2012). The 1990s saw the extensive development of the Information Superhighway (the Internet) by introducing its applications such as the World Wide Web as tools for education service delivery. During the same period, affordability of personal computers (PCs) led to further development of the WWW. This, in turn led to the development of LMSs that enhanced e-learning in terms of multimedia (Sleator, 2010). A learning management system is a software platform for managing learning resources such as lecture notes and assignments (Bates, 2011). In 1993, the then for-profit Jones International University in Centennial, Colorado, USA became the first fully online-based university offering five Bachelors and 24 Master's degree programmes accredited by the Higher Learning Commission of the USA. While several developments of e-learning have taken place in the previous years, for instance game-based learning (Czerwinski, Milosz, Karczmarczyk, Kutera & Najda, 2018) and use of mobile devices, today Massive Open Online Courses (MOOCs) are in use (Naidu, 2019). Although e-learning originated from developed countries, currently the technology has also diffused in developing countries.

2.5   E-Learning in Developing Countries

As a way of competing favourably in the global knowledge economy, developing countries have adopted e-learning. For instance, Iran has invested in e-learning projects such as the National Program on Technology Enhanced Learning (NPTEL), funded by the Ministry of Human Resource and Development (MHRD) to cater for Iranian and Indian Institutes

respectively (Omidinia, Masrom & Selamat, 2011; Common Wealth of Learning, Educational Technology Management Academy, 2015). The Pakistan government has also invested in the establishment of Virtual University (VU) and Information Technology (IT) centres in all public and private sector universities connected with high-speed internet (Commonwealth of Learning, Educational Technology Management Academy, 2015; Kundi, Nawaz & Khan, 2010).

Proper adoption of e-learning has significantly transformed developing economies to donor economies. For instance, the Republic of South Korea has been transformed into a donor economy coming up with good supportive e-learning policies (OECD, 2016; Hwang, Yang & Kim, 2010). In Africa, there are academic networks such as the Network of African Science Academies (NASAC) that corresponds with the European Science Foundation and the International Council of Science to stimulate research for development (Inter-Academy Council, 2015). Donor agencies such as the Rural Communications Development Fund (RCDF) have supported the adoption of e-learning in Uganda (Barakabitze et al., 2019). Since e-learning originated from the developed world, the adoption and utilization models developed there have been considered as benchmarks worldwide (Alkharang & Ghinea, 2013).

Alkharang and Ghinea (2013), however observe that factors for and barriers to the adoption of e-learning in the developing country context may not be the same as those in the developed one. Based on the preceding argument, they advise that the models available for adoption need to be modified according to a particular context. Despite the transformation that developing countries are undergoing as a result of e-learning, they are still facing challenges. These challenges include inadequate infrastructure and technical skills, lack of organisational support (Eze, Chinedu-Eze & Bello, 2018; Kisanga & Ireson, 2015); and corruption (Coto et al, 2013). Furthermore, economic, social, political and cultural constraints (Kisanga & Ireson, 2015) are also challenges of e-learning. Coupled with the above, there is power shortage (i.e. electricity shortage) and lack of approved policies and strategies for ICT in education (Eze et al., 2018; Waiswa & Okello-Obura, 2014). Such challenges have in turn, affected the adoption of e-learning in developing countries. The adoption of e-learning in any country does not take place at random institutions, it usually takes place in universities.

2.6 E-Learning in Universities

The increasing influence of globalization and the formation of the information society have 'dictated' new requirements for universities (Kattoua et al., 2016; Shopova, 2011). This has resulted in the integration of e-learning information systems in universities with the aim of enhancing teaching and learning (Kattoua et al., 2016). Some of the commonly used e-learning technologies in universities include databases, social networking, podcasts, blogs and wikis (Commonwealth of Learning, Educational Technology Management Academy, 2015; Kattoua et al., 2016). Others include learning management systems (LMSs) such as Black Board (Bervell, & Umar, 2017); and Massive Open Online Courses (MOOCs), (Kintu et al., 2017; US Department of Education, Office of Educational Technology, 2017). The adoption of such tools has been intense in universities found in the advanced world as opposed to those in the advancing world.

The Rehatschek (2018) and US Department of Education, Office of Educational Technology (2017) indicate that e-learning increases access to learning and enhances the quality of education in universities. However, e-learning has widened the knowledge divide between universities in developed and developing countries (Nyeko & Ogenmungu, 2017). For instance, universities in developing countries are in remote areas and do not have access to knowledge hubs or hotspots as compared to their counterparts in the developed world (Kithsiri et al., 2018). E-learning in universities has also contributed to increased student dropout rate because some students are bread winners (Kithsiri et al., 2018; Odunaike, Olugbara & Ojo 2013). For this reason, they may find it difficult to concentrate on learning while at the same time fending for their families. The advent of e-learning and its penetration into all levels of education has challenged universities to restructure their teaching and research practices and their organisational infrastructures (Nyeko & Ogenmungu, 2017).

The costly high failure rate of e-learning projects demands attention from management and system designers. Kattoua et al. (2016) and Kundi, Nawazi and Khan (2010) argue that the adoption process of e-learning is not only a technical matter, but also a social one. It should be noted that the integration of e-learning ISs varies from community to community (Bon, 2010; Gwamba et al. 2018). This implies that the factors that determine the adoption of e-learning are likely to vary from community to community. Gwamba et al. (2018); Kinengyere (2008) and Kintu and Zhu (2016) seem to indicate that African universities still lag behind in the adoption of

e-learning technologies. While there are several ways of understanding the adoption of e-learning, the application of theories of e-learning has been one of them.

2.7   Theories of E-Learning

Scholars have come up with theories which underpin the development of e-learning. E-learning theories are derived from traditional learning theories. The following discourse points at the theories of e-learning which include: problem-based learning, discovery learning, experiential learning, engagement learning, situated learning, connectivism, social-learning and activity learning.

2.7.1 Problem-based Learning Theory (PBLT)

Using a constructivist approach, problem-based learning (PBL) can be enhanced in an online environment (Donolley). In this case, the students are given the chance to engage in solving a given problem online. Problem-based learning was developed in the medical field in the late 1960s by Howard Barrows (Neville, 2009). A problem can be theoretical, social, and/or technical, and is dependent on users' interaction within different environments (Barge, 2010). In this type of learning, there is no single correct answer to the problem (Hmelo-Silver, 2004). Problem-based learning is based on the assumption that learning is participatory, integrated and involves the construction of ideas influenced by social and contextual factors (Castelan & Bard, 2018; White, 2001). Learning is student-centred and teachers are facilitators (Castelan & Bard, 2018; Hmelo-Silver, 2004). By doing this, students get an opportunity to handle topics of their own interest. In order to carry out PBL effectively, students need metacognitive skills i.e. students must learn to scrutinise information for PBL (Dostal 2015; White, 2001).

Students work in collaborative groups (Barge, 2010). The goals of PBL include: 1) Flexible knowledge (this involves creation and application of knowledge across different domains); 2) achieving effective problem-solving skills (students are expected to develop metacognitive skills which are applied appropriately); 3) self-directed learning (SDL) skills (meta-cognitive skills help enhance SDL skills); 4) effective collaboration (this deals with how to be a good team player); 5) enhanced intrinsic student motivation (students are engaged in personally meaningful tasks) (Castelan & Bard, 2018; Hmelo-Silver, 2004). The advantages of PBL include: students are given a chance to actively engage in the construction of knowledge

(Castelan & Bard, 2018; White, 2001). In addition, there is an opportunity for building student confidence in PBL since students actively participate.

Although this theory is advantageous, it has the following limitations: if it is applied in diverse settings, it requires a sufficient number of skilled facilitators in many settings (Hmelo-Silver, 2004). Secondly, effective facilitation is a challenge in PBL (Hmelo-Silver, 2004). In other words, the teacher's role changes from an e-tutor to an e-facilitator.

2.7.2 Discovery Learning Theory (DiLT)

In virtual enviroments, learners can use the constructvist principles to discover new ideas (Borthic & Jones, 2000). This can be done collaboratively in a virtual environment. Discovery learning (DiL) is inquiry-based and uses constructivist principles to support problem-solving environments (Bruner, 1961). The learners obtain knowledge by themselves through drawing on their past experiences and existing knowledge (Schunk, 2008). According to Bruner (1960, cited in Schunk, 2008) and Khasanova and Sanger (2018), social influence affects cognitive development. Bruner's finding (1960), also reflected in his (1961) epistemology, is extended in Vygotsky's (1978; 1986) argument on Zone of Proximal Development (ZPD), and concurred with by Piaget's (1936) stages of cognitive development. The ZPD is the "discrepancy between a child's actual mental age and the level he reaches in solving problems with assistance which indicates the ZDP" (Vygotsky 1986, p. 187). The ZPD relates to the role of speech and the interplay in the mental development of a learner. This notion can be accomplished by providing online problem scenarios for learners to solve until they are established. Piaget (1936) observed that there are four stages of cognitive development, namely: sensorimotor (0-2 years), pre-operational (2-7 years), concrete operational (7-12 years), and formal operational (12 years and above). Piaget (1936) argued that children are able to actively construct meaning.

Piaget's (1936) and Vygotsky's (1978; 1986) ZPD arguments can be corroborated with the epistemology of Bruner, who earlier on argued that children learn best through interaction. However, Bruner transcends Vygotsky's ZPD and Piaget's operational stages of development by suggesting that learning takes place through discovery (Clabaugh, 2009). One of the benefits of discovery learning is that it motivates learners since they are actively engaged (Hardy, 1967; Khasanova & Sanger, 2018; Pirker, Gütl & Löffler, 2018). It also gives learners an opportunity to retain the information they have acquired (Alleman & Brophy, 1992; Khasanova & Sanger,

2018; Pirker et al., 2018). Disadvantages of discovery learning include: part of the course content may not be covered (Schank & Cleary, 1994), and it may require too much time for the preparation of instructional materials (Schank & Cleary, 1994).

2.7.3 Experiential Learning Theory (ELT)

Experiential learning can take on the principles of constructivism and congnitivism in assisting a learner to create knowledge in a virtual environment. In such a virtual environment, the learner engages in real-life experience and may obtain an opportunity to create knowledge. Experiential learning theory (ELT), as postulated by Kolb in 1984, is based on works of theorists such as Dewey, Lewin, Piaget, James, Jung, Freire, Rogers and others (Kolb & Kolb, 2008). This theory views learning as a process and not an outcome. The experiential learning approach sees learning as a sequence of activities that enhance the educational experience of the learner (Clark, Threeton & Ewing, 2010).

The ELT is applicable in the formal education and other areas of life (Clark et al., 2010; Kolb & Kolb, 2008; Nagata et al., 2018). This theory is based on the following assumptions: learning is a process not an outcome; learning is relearning; learning involves solving conflicts between dialectically different modes of adaptation to the world; learning is a universal process of adaptation; learning is a product of interaction between an individual and the environment; learning is a knowledge creation process (Kolb & Kolb, 2008, Nagata et al., 2018). Experiential learning is said to take two forms, namely: 1) Formal learning; 2) Informal learning (Clark et al., 2010; Middleman & Goldberg, 1998).

Formal learning correlates with structured contemporary careers which prepare students for advanced-level occupations. Informal learning is less structured. The advantages of structured experiential learning are: the facilitator has less control within the boundaries of learning (Middleman & Goldberg, 1998; Nagata et al., 2018). However, in the non-structured experiential learning, the facilitator has more control within the boundary of learning (Middleman & Goldberg, 1998; Nagata et al., 2018). In structured experiential learning, the application of organisation limits the power of the facilitator to ensure that there is integrity, no potential vagaries of style, mood and recent life experience of a single central person (Middleman & Goldberg, 1998; Nagata et al., 2018). One of the disadvantages of structured

experiences is that these impedes group development and creates leader/ individual dependency (Kurtz, 1998).

2.7.4   Engagement Learning Theory (EnLT)

The engagement learning theory can be embedded in the principles of constructivism, cognitivism and behaviourism to cater for the diverse student needs involved. Humber (2018) indicates that with the increasing number of students who prefer engaging in online courses, it is important to encourage students to be involved in the use of ICTs. The engagement theory was advanced by Meece, Blumenfeld and Hoyle (1988). This theory supports learner collaboration with the learning material, learning activities, and the learning community.

The engagement theory of learning came into place as a way of refining educational achievement (Dunleavy & Milton, 2010). This theory is a model for technology-oriented teaching and learning (Kearsley & Schneiderman, 1999). The theory is based on the assumption that students must engage in learning activities through interaction with others and carry out worthwhile tasks. According to O'Brien and Toms (2008), the engagement theory of learning supports user-interaction with technology. However, O'Brien and Toms (2008) argue that the experience of users' interaction with technology-based systems is not limited to educational applications.

Although engagement may occur without technology (Kearsley & Schneiderman, 1999), the ability of technology in facilitating engagement cannot be overlooked. Engagement is based on the view of creating successful collaborative teams that work on worthwhile projects that are meaningful to the outside world (Kearsley & Schneiderman, 1999). Engagement could either be student-based (involving participation in the life of the school), academically based (which involves participation in the requirements for school) and intellectually based (which involves participation in learning with serious psychological and cognitive investment in learning) (Dunleavy & Milton, 2010). Students have input into central services resulting into more personalised and student-centred service (Velden, Pool, Lowe, Naidoo & Bótas, 2013). This type of learning may cause tension because individuals may have different opinions (Healey, Flint & Harrington, 2014).

2.7.5 Situated Learning Theory (SLT)

The situated learning theory uses cognitive philosophy to provide knowledge in authentic online environments. Learners form online communities to build relationships inside and outside class (Norainna & Besar, 2018). The theory as postulated by Lave and Wenger in the early 1990s (Clancey, 1995), assumes that learning takes place within an authentic context and culture. The SLT is based on epistemological ideas of theorists such as Dewey and Vygotsky, who argue that students learn better by actively participating in the learning experience (Clancey, 1995). Situated learning theorists assume that learning revolves around creating meaning from real-life activities in relation to the teaching environment (Stein, 1998). For instance, mobile devices are especially well suited to different contexts, and so can draw on those contexts to enhance the learning activity (Naismith, Lonsdale, Vavoula, & Sharples, 2006).

The advantages of situated learning include: learners are able to become experts through social interactions as a result of the experiences they gain (Oregon Technology in Education Council, 2007). It also enhances critical thinking whereby learners are engaged in cooperative learning activities where they are challenged. Although situated learning is able to engage students in cooperative learning where they can get a broad range of knowledge, it can produce undesirable knowledge if not well scrutinized (Billett, 1995). Secondly, this type of learning is likely to lead to the construction of opaque knowledge, affecting the depth of understanding of a novice learner (Billett, 1995).

2.7.6 Connectivism Learning Theory (CLT)

Connectivism is a theory of e-learning (Siemens 2004 cited in Neil, 2014). This theory uses cognitive principles to enhance knowledge creation via large network communities (Duke et al., 2013; Khasanova & Sanger, 2018). The learner is actively engaged in the creation of knowledge across social networks (Duke et al., 2013; Khasanova & Sanger, 2018). This theory is based on the assumption that, there is a learning community, described as a node, which is always part of a larger network (Khasanova & Sanger, 2018; Kop & Hill, 2008). Duke, Harper and Johnston (2013) and Khasanova and Sanger (2018) argue that connectivism theory is characterised by a rapidly changing society which is complex, connected socially and globally, and mediated by increasing advancements in technology. The learner does not have control, but there is a collaboration of ideas daily across the networks.

Therefore, the learner must be in a position to synthesise the ideas to facilitate continual learning. It is also important for the learner to be connected to outside networks to access varieties of knowledge. Connectivism begins with an individual who has knowledge that consists of a system of networks. This system supplies an organisation, and the organisation in turn gives back to the system. The individual continues the cycle of knowledge growth by accessing the system. Piaget (1977)'s framework of cognitive constructionism explains two learning principles that are defined in connectivism theory (i.e. active and authentic learning principles), (Duke et al., 2013; Khasanova & Sanger, 2018). Connectivism expresses the first principle by providing specific technological opportunities for the learner to actively engage in the presentation of knowledge. The second principle is where the learner experiences reality in different social networks.

With connectivism theory, the learners maintains up-to-date information on any topic through the networks they have created (Duke et al., 2013; Khasanova & Sanger, 2018). Connectivism can promote and sustain a well-organised flow of knowledge among learners with a common goal (Duke et al., 2013; Khasanova & Sanger, 2018). However, the connectivism theory is not a totally new educational approach to learning, because of its overlapping ideas. Connectivism ''misrepresents the current state of established alternative learning theories (for example. behaviourism, cognitivism and constructivism), so its basis as a new theory is also dubious'' (Duke et al., 2013, p. 8). Connectivism might not be very applicable to the medical field, for instance, it might not be so wise to consult an iPod to diagnose a patient).

2.7.7 Social Learning Theory

Social learning theory is based on Vygotsky's human development principles (Hassan, 2011 cited in O'Donnell, Lawless, Sharp, & O'Donnell, 2015). A learner can use practical and intellectual techniques to learn from videos without necessarily imitating the behaviour (Rutherford-Hemming, 2012, cited in O'Donnell et al. 2015). Social learning theory involves watching the actions of others through technologies such as videos, but without necessarily adopting their behaviour. The learner does not necessarily incur the costs of purchasing the equipment needed for a particular action (O'Donnell et al., 2015). The society and environment in which a learner is engaged is very important for learning to take place and should be imitated in a particular technology (O'Donnell et al., 2015). Thus, educational institutions should know

that the learners come from a broad range of socio-cultural backgrounds and tailor their content accordingly (O'Donnell et al., 2015). The advantage is that students from poor backgrounds can engage in learning certain actions that could not be affordable to them. However, the disadvantage of such a theory would be in the complexity of incorporating a wide range of socio-cultural backgrounds in course content.

2.7.8 Activity Learning Theory

Activity learning uses constructivist philosophy by applying the analytic approach of questioning and problem solving (Scot, 2011 cited in O'Donnell et al., 2015). The interactivity feature of online computer technology can draw students into activities in which they become engaged and learn from. For example, students can engage in attempting online pre-tests, whereby students can learn from their past mistakes and achieve better scores (O'Donnell et al., 2015). Activity learning theory results from understanding the activity in question, the reasaons for carrying out such activity and outcomes (both anticipated and actual out comes), (O'Donnell et al., 2015). The theory provides a basis for activiely engaging individuals in the learning process. A learner is provided with room for improvement about a particular course unit, given the fact that some activities can have pre-tests. The learner has a reason for carrying a particular out come, of which the learner has a picture. The above e-learning theories support this study with a theoretical background that gives a glimpse into possible expectations of e-learning.

2.8   Applications of E-learning

As a way of enhancing education, e-learning applications have been developed. Das (2016) and García-Valcárcel and Tejedor (2009), indicate that Microsoft PowerPoint and comparable open-source software are most commonly used as e-teaching applications. They further argue that the Internet is a common application for communication between both lecturers and students. The Internet is useful in a way that educational programmes and content can be distributed online through personal websites, blogs and platforms. Communication between lecturers and students is mainly aided through the use of e-mail technology.

Audio, video and text applications can be part of course material (Lee & Pituch, 2002). Liaw, Huang and Chen (2007), Kattoua et al. (2016), and Nagata et al. (2018) indicate that e-learning can be categorised as web-based learning, internet-based training, advanced distributed

learning and online-learning. Amos, Adelani and Adebola (2015); Nagata et al. (2018) assert that Computer-based Learning (CBL), Computer-based Training (CBT), Computer-supported Collaborative Learning (CSCL), Technology-enhanced Learning (TEL), among other forms of learning, are part of e-learning systems. In this study, e-learning is perceived as Technology-supported Learning (TSL). Technology-supported Learning Environments (TSLEs) include individual workplaces equipped with desktop computers or laptops, or collective learning laboratories that all allow for web-based learning, mail exchange and video conferencing.

2.9   Benefits of E-learning

E-learning offers continuous educational improvements by offering online learning services (Bichsel, 2013). For example, users are able to interact with each other through collaboration tools (Alkharang, 2014; Nabushawo et al., 2018). In addition, students' learning and scores are improved through the use of e-learning technology (Dawood, Syaryadhi, Irhamsyah & Roslidar, 2018; Mikre, 2011). E-learning has shifted learning from the traditional paradigm of leader-led to the constructivist one where students are more independent and responsible for their own learning (Mikre, 2011; Mojžiš, Balogh, Ásványi, & Budinská, 2018). Learners are able to learn in their own time and at their own pace. E-learning offers timely access to information, up-to-date content materials, self-paced learning, cost-effectiveness, and customised and consistently enhanced course content (Barton, 2010; Nabushawo et al., 2018).

E-learning ensures access to quality education (Nikolic & Nicholls, 2018). Instructors of higher calibre can share their knowledge across borders, hence allowing learners to attend courses across physical, political, and social boundaries (Docherty & Gaubinger, 2018). Recognised scholars can distribute information internationally at minimum costs. E-learning information systems improve the learning process and reduce the negative effects of traditional learning (Dorobat, 2014). E-learning has blended learning methods by incorporating more than two methods of learning (Das, 2016). With blended learning, teaching can be adapted to individual learning style. An individual learning style can be termed as the learner's ability to assimilate new knowledge and skills. The e-learning materials are delivered to students in different formats (for instance text, audio, and visual), so enhancing their learning (Das, 2016; Kwofie & Henten, 2011).

E-learning has been regarded as a means to cost reduction in learning institutions. Unlike traditional learning, whereby lecturers must be present at a particular location to distribute the teaching materials at a cost (i.e. lecturers may incur transport costs to reach lecture rooms), in electronic learning such materials can be delivered online over thousands of miles to students at no cost. Cotic, Rees, Wark and Car (2016), indicate that e-learning contributes to reduction in costs in relation to course delivery.

2.10   Theories or Models that can be used by Institutions for the Adoption of E-learning

Since e-learning is a technology, to ensure that it is properly adopted, institutions can use theoretical models such as Diffusion of Innovations Theory (DOI), Technology Acceptance Model (TAM), Technology-Organisation-Environment (TOE), and Unified Theory of Acceptance and Use of Technology (UTAUT). These frameworks are discussed as shown below.

2.10.1   Diffusion of Innovations Theory

The Diffusion of Innovations Theory (DOI) is a product of Rogers' doctoral studies in the diffusion of agricultural innovations in 1957 at Iowa State University, USA (Singhal, 2012). Rogers (2003) related innovation diffusion and/or adoption to three categories of factors, namely individual, innovation and social systems or organisational factors. According to this theory, an individual's tendency to adopt any innovation – such as e-learning – depends on personal characteristics such as age, gender, and level of training. The relative advantage of innovation influences the rate at which an individual adopts. The nature of the social system or organisational factors, influence an individual's tendency to adopt an innovation (Rogers, 2003). The theory has various names, depending on the author: Al-Hajri and Tatnall (2008) stick to Rogers' naming "Diffusion of Innovations Theory";, Hung, Hung, Tsai and Jiang (2010) treat the same subject as "Classical Innovation Theory", while Zheng (2011) prefers "Innovation Diffusion Theory" (IDT) or simply "Diffusion Theory", as used by Kelleher and Sweetser (2012).

Several researchers (Al-Hajri & Tatnall, 2008; Kok, Kee & Ping, 2011; Lin & Ho, 2009) have used DOI as the theoretical basis for their studies. Al-Hajri and Tatnall (2008, p. 59) conducted studies on the adoption of technological innovation of the Internet in Oman. Lin and Ho (2009) were interested in the adoption of Radio Frequency Identification (RFID) innovation

for logistics service providers in China. Kok, Kee and Ping (2011) researched on predictors of internet adoption in Malaysian audit firms. Rogers' theory contributes to understanding factors that influence the adoption of an innovation, and innovation as a decision-making process (Botha & Atikins, 2005).

A weakness of the DOI theory is that it does not consider the possibility of people accepting or rejecting an innovation. It would not ask how particular characteristics of an innovation would fit the adoption process (Al-Qeisi, 2009).

The DOI theory was used to operationalise organisational and individual factors that generally affect the adoption of e-learning.

2.10.2 Technology Acceptance Model

Another theory that can be employed to investigate IT adoption is the theory of Technology Acceptance Model (TAM), developed by Davis in 1989 (Kimwise, 2017; Oliveira & Martins, 2011). Davis describes a Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU) as the two determinants of user acceptance of technological innovations. It is assumed that these two factors affect an individual's behavioural intention (BI) to use a technology, which in turn affects actual use. He defined PEOU as the degree to which a potential user expects a given technology to be effortless, and PU as the potential user's subjective likelihood that using a specific technology will increase the user's job performance. Researchers who have used TAM include Chang and Tung (2008); Lee, Yoon and Lee (2009), and Lule, Omwansa and Waema (2012). Chang and Tung (2008) carried out an empirical investigation of students' behavioural intentions to use an online learning course website in Taiwan. Lee et al. (2009, p. 53) researched 'learners acceptance of e-learning in South Korea …', Lule, Omwansa and Waema (2012) used TAM to investigate the adoption of m-banking in Kenya'.

Without doubt, TAM is an attractive theory and extremely easy to understand (Korpelainen, 2011), while at the same time, it has its limitations when it comes to measureable results as it relies on respondents' self-reporting (Al-Qeisi, 2009; Kimwise, 2017).

Another limitation of the TAM is related to the type of respondents or the sample choice that is usually limited to a specific group (i.e. students or developed world) which makes generalisation difficult (Al-Qeisi, 2009; Bradley 2009; Kimwise, 2017; Korpelainen, 2011). The TAM theory considers only technological innovations (Bervell & Umar, 2017). Since e-learning

is a technological innovation, this theory was used in operationalisation of the dependent variable: adoption of e-learning.

2.10.3 Technology-Organisation-Environment Theory

The Technology-Organisation-Environment (TOE) framework is one of the profound theories of frameworks that organisations can use in the adoption of IT. This theory was developed by Tornatzky and Fleischer (1990) to describe determinants of user acceptance of technology such as computers and the Internet. According to Chuchuen and Chanvarasuth (2011) and Nyeko and Ogenmungu (2017), the TOE framework establishes relationships between innovation adoption to three categories of factors, namely characteristics of the technology, characteristics of the organisation, and the characteristics of the environment. In relation to the characteristics of the technology being adopted, the TOE framework assumes that adoption depends on perceived relative advantage, compatibility, complexity, trialability and observability of the technology in question (Awa, Ukoha, & Emecheta, 2012).

Regarding the 'organisational context', the TOE theoretical basis indicates that adoption of an innovation depends on organisational characteristics such as top management support, culture, and size (Awa et al., 2012) among other factors. In view of the 'environment context' as a factor of innovation adoption, the TOE relates to critical success factors and barriers in areas of operations (Awa et al, 2012). Some of the researchers who have used TOE include (Awa et al., 2012; Hung, Hung, Tsai & Jiang, 2010; Kok et al., 2011; Nyeko & Ogenmungu, 2017). Awa et al. (2012) integrated both TAM and TOE frameworks in explaining e-commerce adoption by small and medium-sized enterprises. Hung et al. (2010) empirically studied critical factors of hospital adoption on the customer relationship management (CRM) system by combining the TOE theory with the DOI theory. Kok et al. (2011) in their study on predictors of internet adoption in Malaysian audit firms combined both DOI and TOE.

Nyeko and Ogenmungu (2017) used this frame in assessing the determinants of e-learning adoption in higher learning institutions in Uganda. This theory supports the use of e-learning/ IT in an organisation since e-learning or IT is a technological innovation. However, the TOE theory such as TAM is biased on technological innovation only, yet not all innovations are technological (Kimwise, 2017). The TOE theory can explain how e-learning is adopted in learning institutions whereby the technology is perceived as e-learning; the organisation as the

university and the environment as the e-environment/infrastructure, such as hardware and software.

2.10.4 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Morris, Davis and Davis (2003) is one of the latest frameworks for innovation diffusion and/ or adoption studies. According to Al-Qeisi (2009), Gupta, Dusgupta and Gupta (2008), Williams, Rana, Dwivedi and Lal (2011), UTAUT was developed through a hybrid of eight dominant theories and models. The theories and models that make up UTAUT are; the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behaviour (TPB), the Combined Theory of Planned Behaviour-Technology Acceptance Model (C-TPB-TAM), the Model of PC Utilization (MPCU), the Innovation Diffusion Theory (IDT) of Rogers, and the Social Cognitive Theory (SCT) (Gupta, Dusgupta & Gupta, 2008).

The UTAUT relates innovation diffusion and/ or adoption to four essential independent variables, namely: performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating conditions (FC). Performance expectancy is defined as the extent to which an individual believes that using a particular technology will improve performance. Effort expectancy is defined as the extent of ease associated with using a particular technology. Social influence is defined as the extent to which an individual recognises how important others believe it is that he or she should use the new system. Facilitating conditions refer to the extent to which an individual believes that existing infrastructure can support the use of the technology. This theory supports the fact that the effect of essential independent variables is moderated by variables such as gender, age and experience.

Studies that have used UTAUT as a framework include the following: Gupta et al. (2008) used UTAUT for ensuring understanding the adoption of ICT in a government organisation in Egypt. El-Gayar, Moran and Hawkes (2011) used UTAUT in their study on students' acceptance of tablet PCs and the implications thereof for educational institutions. Similarly, Kasse and Balunywa (2013) used UTAUT in assessing e-learning utiliszation in universities in Uganda. The UTAUT is a comprehensive model and covers the majority of the constructs used in the IT adoption models (Al-Qeisi, 2009). Despite the fact that this theory is comprehensive, few

researchers have utilised it (Korpelainen, 2011; Williams et al., 2011). Since e-learning in this study partly considers individual characteristics, this theory is important in understanding the adoption of e-learning.

2.11 Challenges of E-Learning Information Systems

Much as e-learning has a number of benefits, its integration comes with the following challenges.

Poor infrastructure is considered as one of the biggest challenges in the integration of e-learning in higher education institutions, particularly in developing countries (Kwofie & Henten, 2011; Tarus & Gichoya, 2015). Such countries seem always to be hindered by unplanned or incomplete infrastructure, which affects the ability of their citizens to adopt e-learning facilities or services. E-learning is associated with technological obstacles such as obsolete hardware and software and low bandwidth, which strongly affect the adoption process (Al-adwan & Smedley, 2012). Being obsolete can become an impediment to the users of a given technology by causing compatibility issues. Learners may lack skills in using e-services (Barton, 2010; Bervell & Umar, 2017; Lee et al., 2009). Given the fact that developing countries have challenges of infrastructure and financial constraints to purchase e-learning technology in bulky, this limits the rate at which users of e-learning systems can gain experience.

Adoption of e-learning in institutions raises financial and strategic challenges (Barton, 2010). Sustaining social services such as education is quite expensive at present In addition, the intended users of technological innovations usually resist the implementation of such systems (Stoltenkamp & Kasuto, 2011). The lack of interaction between students and teachers affects both groups (Barton, 2010). The fact that in some instances e-learning is virtual, affects the whole process of interaction between teachers and students. In some instances, students have ended up dropping out of e-learning because they feel abandoned.

Challenges of e-learning ISs are a basis for understanding the causes of failure of such systems. The researcher adopted Heeks' (2002) IS model to understand the causes of failure of past e-learning ISs initiatives in universities in Uganda. From this IS model, the researcher derived the organisational and personal dimensions relevant to the study. This is so because the definition of e-learning was restricted to the interplay between organisational and individual characteristics. In addition, Tossy (2012) established that personal and organisational challenges

affected the advancement of e-learning IS in East Africa. Organisational factors are perceived as management factors while personal factors are perceived as individual ones. Thus, the management dimension is referred to as the organisational dimension while the personal dimension is referred to as the individual one in this research. These factors were derived from several sources (see Table 2.1).

Table 2. 1: Causes of Failure of Past E-Learning ISs Initiatives Selected for the Study

Dimension	Factors	Source
Management dimension (Organisational)	Structured approach that aids management of the e-learning environment being limited, empowerment by university management in relation to e-learning being inadequate, rules and regulations that aid e-learning being insufficient	Kasse and Balunywa (2013); García-Valcárcel & Tejedor (2009); Hardaker & Singh (2011); Li, Cashell, Jaffray & Moseley (2016); Al-Yaseen, Hourani & Al-Jaghoub (2012); UNESCO Institute for Statistics (2014)
Individual dimension (Personal)	Inability to use e-learning technology effectively, discomfort with e-learning technology, a discrepancy in knowledge on e-learning between teachers and students	Winch, Johnston, March, Ljungdahl & Holliday (2010); Brown (2002); Ssekakubo et al. (2011)

Teachers and students were required to indicate the extent to which the following factors hindered the progress of e-learning information systems in their universities:

Structured approach that aids the management of e-learning environment is limited.

Empowerment by university management in relation to e-learning being inadequate.

Rules and regulations that aid e-learning being insufficient.

Their inability to use e-learning technology effectively.

Their discomfort with e-learning technology.

The discrepancy in knowledge on e-learning between teachers and students.

CHAPTER THREE

INNOVATIONS AND ADOPTION OF E-LEARNING

3.1   Innovations

Innovations research has been of great interest in many fields of study such as business and management, technology, economics and engineering (Baregheh, Rowley & Sambrook, 2009). Innovations research has delved into the intricate nexus of the products, process, features and types of the innovation. This type of research can be conducted at organisational or individual levels (Damanpour, 1996). The term 'innovation' has been defined differently by several authors. Damanpour (1991) defines innovation as the development and adoption of something new by an organisation. Klein and Knight (2005), define innovation as a product or practice that is new to its developers or potential users, while Rogers (2003) states that an innovation is something perceived as new by an individual. Schaaper (2009), perceives innovation as an act of executing a new or significantly enhanced product, or process, a new marketing method or organisational practice. In the context of this study, innovation is regarded as technology- supported learning or e-learning.

Innovation can be perceived in relation to a product or a process. Product innovation is concerned with what is produced, while process innovation is concerned with how the product is produced (Fang & Lewis, 2012). Innovations can be identified according to their features. One of the features of innovations is that the extent of magnitude at which they spread in an organisation, could be incremental or radical (Damanpour, 1991). Another important feature of an innovation is that it is factor-based that is to say, innovation can stimulate or deter organisational activities (Tushman & Anderson, 1986). A number of scholars (such as Drucker, 1985; Gardener, 1988; Kislev & Damanpour, 1987; Olmstead, 1998; Rogers, 1957; Schaaper, 2009; Schori-Bachrach, 1973; Schumpeter, 1980 and Stoneman & Ireland, 1983) have researched the various types of innovations. The following chapter will concentrate on the Damanpour (1987) and Schaaper (2009) typologies.

Damanpour (1987) argues that innovations can be classified as technological, administrative and ancillary. The technological type is the innovation pertaining to a particular technology. Taking a critical analysis, technological innovations are organisational innovations

and organisational innovations could be technological in nature. Given the fact that e-learning environments are most likely technological, it is vital to discuss this typology.

Schaaper (2009) categorised innovation as per product, process, market and organisation. She argues that product innovation is concerned with hosting a good or service that is new or significantly enhanced in relation to its characteristics or intended users. For instance, the software can be improved in terms of user-friendliness. Furthermore, process innovation according to Schaaper (2009) is the execution of a new or significantly enhanced distribution method. This may include new or significant changes in the delivery of software. Coupled with the above, marketing innovation is one where a new marketing technique is implemented involving major changes in product design or packaging, product placement, product promotion or pricing. Ultimately, organisational innovation is the implementation of a new structural method in a firm's internal and external practices. This typology can also be used to contextualise e-learning as a product, so it is useful to this research.

Innovation can be adopted, hence one could refer to the adoption of innovation. Adoption of innovation has been of paramount interest to many researchers. Such adoption implies that the innovation is new to its users, and can be realised at the organisational or individual level (Rogers, 2003). Different researchers (such as Drent & Meelissen, 2008; Lee et al., 2009 and Rogers, 2003) have perceived the adoption of innovation differently.

Rogers (2003) defines the adoption of innovation as an individual's ability to make full use of innovation as the best alternative. He argues that the adoption of an innovation involves knowledge, persuasion, decision, implementation and confirmation stages. In the knowledge stage, an individual gets to know about the existence of innovation and how it functions. This implies that the more knolwgeable one becomes, the more one tends to use the innovation. The persuasion stage is dependent on the attitude of the user towards the innovation (i.e. how they feel working with a particular innovation). At the decision stage, an individual decides to use or reject an innovation. The confirmation stage is when the individual seeks reinforcement as far as the use of an innovation is concerned.

Rogers (2003) observes that individuals involved in the adoption process can be categorised as innovators, early adopters, early majority, late majority and laggards. The innovators are the first to adopt an innovation and usually have the highest social status, financial liquidity, are sociable and have contacts with scientific sources and innovators (Rogers, 2003).

The early adopters usually have the highest degree of opinion leadership, higher social status, financial liquidity, advanced education and more sociable than late adopters (Rogers, 2003). Rogers (2003) explains that the early majority have the propensity to adopt an innovation after a significantly longer period of time than the innovators and early adopters. These ones usually have an average social status, are in touch with early adopters and rarely hold positions of opinion leadership in systems.

Rogers (2003) conceptualises late majority as individuals who are sceptical toward innovation. He elaborates that laggards – the last individuals to adopt innovations – could be characterized as being rather traditional and resentful of change, has an average social status combined with little financial liquidity, have a local reach only and hold little or no opinion toward leadership positions. Drent and Meelissen (2008) conceptualise the adoption of innovation as the innovative use of ICT by teachers. Since e-learning is perceived as innovation in this research, it is expected that users of the e-learning systems have the knowledge of this system and have made a decision either to use this innovation or not. Lee et al. (2009), perceive the adoption of innovation as the intention to use e-learning facilities by learners. The and Usagawa (2018) indicate that more people become adopters of technological innovations if they own them.

3.2 Adoption

According to Nyeko and Ogenmungu (2017) and Thirtle and Ruttan (1987), adoption is the spread of a new practice among people, where people can be regarded as adoption stakeholders. Referring to the discussion of adoption researchers (such as Davis, 1989; Drent & Meelissen, 2008 and Rogers, 2003), the present study regards the concept of adoption as a process of change that includes the behavioral intention to use, the rational or intuitive innovative use as change of practice, and the most elaborate acceptance of e-learning by the most apparent stakeholders, such as the institutional organisational bodies, university lecturers and students alike.

The notion of success in adoption is an intricate phenomenon in innovations literature. A large number of success factors are actually not measurable (More, 2011). Adoption can be studied by looking at antecedents and characteristics, the adoption process and adoption outcomes (Kishore & Mclean, 1998). The notion of successful adoption can be studied at the

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process or the outcome level. At the process level, it can be referred to as success *of* adoption while at the outcome level it is termed as success *from* adoption. The success of adoption is when innovation is successfully adopted and used by most or all adopters. Success from innovation is the ability to realize the potential benefits of innovation by adopters. Success of adoption is a necessary requirement to achieve success from an innovation. In this particular study, successful adoption was perceived as the process of using e-learning which could be in the form of the intention to use, innovative use and acceptance.

3.2.1 Successful Adoption of E-learning by Stakeholders

The Stakeholder Analysis Theory by Wagner et al. (2008 cited in Aparicio, Bacao & Oliveira, 2016) upholds the view that stakeholders are individuals that directly or indirectly affect an organisation. Phillips, Freeman and Wicks (2003 cited in Aparicio et al., 2016) argue that Wagner's theory is a management theory that can be extended to other fields. Aparicio et al. (2016) highlight that e-learning system stakeholders include, students, educational institutions and teachers to mention but a few. Makerere University (2015) indicates that the integration of e-learning can be achieved through consequently implementing e-learning policies among organisational university bodies (for example University Council and Directorate of Quality Assurance), teaching staff and students. If the stake holders have a high intention, innovativeness and acceptance of e-learning facilities, then the adoption is successful. The next subsections explain the notions of intention to use, innovative use and acceptance of e-learning technology.

3.2.1.1 Intention to Use E-learning. This is sometimes referred to as behavioural intention to use e-learning. Ajzen (1991), argues that behavioural intention is measured according to the intention and predicted use of e-learning. In relation to the theory of planned behaviour (Ajzen & Fishbein, 1980), behavioural intention is a person's willingness to perform a given behaviour. It indicates a person's readiness to perform such behaviour. The higher the willingness, the greater the expectation of that behaviour. Researchers (such as Brown, 2002; Chang & Tung, 2008; Davis, 1989; Lee et al., 2009) have amplified the concept of behavioural intention to use. In this research, behavioural intention is termed as the intention to use e-learning. Teachers and students were examined in relation to the extent to which they intended to

use computers, CD-ROMs, web-based learning, video conferencing and LMS. Intention to use is important to assess users with marginal experience of e-learning.

3.2.1.2 Innovative Use of E-learning. Innovation results when there is an element of newness. This could be in form or approach (Damanpour & Gopalakrishnan, 2001; OECD, 2016). Innovations can be categorised as product or process innovations. Product innovations pertain to an item while process innovations pertain to a particular practice (Damanpour & Gopalakrishnan, 2001; OECD, 2016). In this research, innovation pertains to the adoption process of e-learning. Drent and Mellissen (2008) and OECD (2016) argue that the notion of innovative use of learning has not been carried out clearly. They further argue that while training institutions have focused on infrastructure, limited concern has been placed on pedagogy. Innovative ICT use implies that ICT supports vital educational objectives for the preparation of learners for knowledge use, society development including skills such as searching and accessing for information, cooperation communication and problem-solving (Drent & Mellissen, 2008; OECD, 2016). Innovative use in this research is perceived to occur when the academic staff use e-learning technologies to change their pedagogical practices. On the students' side, innovative use occurs when students change their learning practices using e-learning technologies. In the context of developing countries, where teachers and students are grappling with the use of new innovations, it was important to understand the extent to which they have used e-learning innovatively.

3.2.1.3 Acceptance of E-learning. User acceptance can be defined as the readiness within a user group to employ information technology to carry out designed tasks (Dillon & Morris, 1996). This concept in this research means that there is evidence of the use of e-learning. The value of e-learning may not be realized unless users accept it (Bervell & Umar, 2017; Lee et al., 2009). These researchers argue that TAM has been used widely to understand the acceptance of e-learning. Bervell and Umar (2017) and Lee et al. (2009) continue to argue that most of the studies on acceptance focus on students yet teacher acceptance is also of great concern for educational institutions. Scholars who have investigated the notion of user acceptance in detail include: Alharbi and Drew (2014); Bervell and Umar (2017); Davis (1989); Lee et al. (2009); and Yiong, Sam and Wah (2008). Acceptance was assessed by determining the extent to which

teachers and students accepted computers, CD-ROMs, web-based learning, video-conferencing and LMS technologies. The challenge of embracing technological innovations is common in coutries such as Uganda. Therefore, it is important to understand the level of acceptance of e-learning in universities in Uganda.

3.3   Past Studies on Factors of the Adoption of E-learning

Adoption of innovations can be studied from a technological, individual and organisational perspective (Rogers, 2003). The definition of e-learning is restricted to the interplay between the university learning environment (organisation) and individual (human-agent), past studies on individual and organisational characteristics were considered. Lee et al. (2009) observe that research on country-specific e-learning phenomena is of great importance globally. Alharbi and Drew (2014) indicate that more research is required in relation to ICT adoption in teaching and learning. Singh and Hardaker (2014) call for studies that can combine individual and organisational perspectives in relation to the acceptance of e-learning. While studying e-learning, it is important to understand the type of audience it can accommodate and whether or not it meets the needs of the users. This is because participants in the e-learning environment have varying backgrounds (Hrtonova, Kohout, Rohlikova & Zounek, 2015).

In developing countries where students have limited exposure to learning technologies (Brown, 2002), it is important to understand factors that can assist them to adopt e-learning. E-learning has roots from the developed world where students have uninterrupted access to electricity and their teachers as well. It would be important to understand the adoption of e-learning in the developing world where e-learning has limited roots. A similar study in relation to this study was carried by Kimwise, Maiga and Jehopio (2016) in Uganda. Their interest was mainly in technological factors such as compatibility, trialability and perceived usefulness, and perceived ease of use as determinants of behavioural intention to adopt e-learning. In their review, they revealed that limited research has been carried out on the adoption of e-learning in higher education institutions in Uganda. This implies that this study opens a way forward to closing the gap revealed by Kimwise et al. (2016).

3.3.1   Organisational Characteristics

The adoption of innovations such as e-learning takes place within organisations. It would be an interesting venture to understand the contribution of organisational characteristics to the adoption of e-learning. Bakkabulindi and Oyebade (2011) indicate that the ability to absorb change, culture, size and leaders' change management style are organisational characteristics that influence the adoption of an innovation. In this study, organisational characteristics were perceived as university learning environment characteristics. Ssekakubo et al. (2011) argue that the failure of e-learning systems has less to do with technological issues but more with organisational issues. Organisational factors can increase the explanatory power of adoption of e-learning applications (Adukaite, Zyl, Er & Cantoni, 2017).

Adoption of e-learning in organisations. Selim (2007) studied CSFs for e-learning acceptance among university students at the College of Business and Economics in the United Arab Emirates University. Using a survey and with the help of confirmatory factor models, the study aimed at categorizing the e-learning CSFs and specifying them in four categories. These were: instructor characteristics, student characteristics, technology and university support. The proposition of grouping e-learning into four categories, however, was not supported by the results. Findings revealed eight categories for e-learning CSFs, namely: instructor's attitude towards and control of technology; instructor's capacity (abilities, skills, and expertise) of teaching; student motivation and technical competency; student interactive collaboration; e-learning course content and structure; ease of on-campus internet access; effectiveness of information technology infrastructure; and university support of e-learning activities. With reference to organisational characteristics, his findings revealed that university support of e-learning activities is a CSF for the acceptance of e-learning among students.

Drent and Meelissen (2008) studied factors that stimulate teacher educators to use ICT innovatively in the Netherlands. This study specifically aimed at identifying exogenous and endogenous factors at both school level and teacher level that influence innovative use of ICT. They used questionnaires and an interview guide for data collection, and Partial Least Squares (PLS) technique for data analysis. Findings of their study indicate that school level endogenous factors, such as goals of school ICT policies, availability of time to experiment, reflect and interact with ICT, availability of financial support, and commitment of school management did

not affect innovative use of ICT among teachers. However, in their conclusion, they recommended further research on these factors. Tarus and Gichoya (2015) studied similar factors to those of Drent and Meelissen (2008) but in universities in Kenya. They found that such factors contribute to successful adoption of e-learning in the said unversities.

Barton (2010) studied social and cultural factors that impact on the adoption of e-learning in Asia and Australia. He was particularly interested in e-learning factors relating to social capital, attitudes and patterns of behaviour in leadership, entrepreneurialism, teaching, and to broader sets of attitudes that shape the general outlook. Using a case study approach, data collection was accomplished through the use of semi-structured interviews and observations. Findings of the study indicate that the adoption and uptake of e-learning technologies are strongly shaped by social and cultural aspects.

Hardaker and Singh (2011) studied the adoption and diffusion of e-learning in universities in the UK. Their study was propounded by Giddens Theory of Structuration adapted for technology by Orilowski (2000) to understand the role of individual (agency) and institutional mechanism (structure) that influence adoption and diffusion of e-learning. They used a qualitative exploratory case approach with the help of 36 semi-structured interviews between 2009 and 2010 at five universities in the UK. Thematic analysis from the interview indicated that the inability of management to control actions of lecturers leads to low adoption of e-learning in UK universities.

FitzPatrick (2012), carried out a study on the successful adoption of e-learning in an educational environment. The study was carried out among e-learning policy makers, education policy makers, e-learning instructors and students. He used interview guides and questionnaires for data collection. FitzPatrick shows that support and evaluation are important factors for e-learning adoption.

3.3.2   Individual Characteristics

While e-learning has a recognised position in society, it is important to understand those individual traits that affect its adoption are important to study. Buabeng-Andoh (2012) presents these factors as personal characteristics while according to Schiler (2003 cited in Buabeng-Andoh, 2012) educational level, age, gender, educational experience, experience with the computer for educational purpose and attitude towards computers are personal characteristics.

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Grunwald (2002) mentioned risk aversion, gender, potential adopter usage style, personal conviction, motivation, experience, self-efficacy, academic discipline and age as adopter traits. While the above researchers have described individual traits as personal or adopter characteristics, in this study they are perceived as human-agent characteristics. The human-agent is a teaching staff/lecturer or student. Zhang and Goel (2011), observe that less research has been carried out on individual characteristics affecting the adoption of e-learning. In addition, Kimiloglu, Ozturan and Kutlu (2017) indicate that personal factors are very important in the adoption of e-learning. However, there is limited research on these particular factors.

3.3.2.1 Adoption of e-learning among teachers. Specifically, Teo, Lee, Chai and Wong (2009), assessed the intention to use technology among pre-service teachers in Singapore and Malaysia. The study attempted to examine whether the Technology Acceptance Model (TAM) is a valid model to predict the intention to use (ITU) technology among pre-service teachers and also examine the validity of the TAM across the two sample cultures (Singapore and Malaysia). Their data were collected using a questionnaire and analysed using Structural Equation Modeling (SEM). Using TAM, their results indicated 8% and 53.7% of the intention to use a variable for the Singaporean and Malaysian samples respectively. Furthermore, the parameter estimates for path attitude toward computer use in relation to the intention to use was smaller for the Singaporean sample as compared to the Malaysian one. The results implied that attitude toward computer use was not as significant in the prediction of the intention of teachers to use computers in Singapore as compared to Malaysia. This study applied the TAM model to understand the adoption process.

Alharbi and Drew (2014) carried out a study on the adoption of e-learning in terms of behavioural intention to use LMS in Saudi Arabian public universities. They developed a theoretical framework using the Technology Acceptance Model. The predictive factors for behavioural intention to use the LMS included perceived ease of use, perceived usefulness, attitude toward usage and LMS usage experience. Their findings indicated that there is a positive relationship between attitude towards use and behavioural intention to use an LMS. A critical analysis of Drent and Meelissen (2008) also indicated that teacher-level endogenous dimension, namely: student-oriented pedagogical approach, positive ICT attitude and personal entrepreneurship were potential predictors of the innovative use of ICT.

Khasawneh (2015) studied the utilization of e-learning among academic staff in Jordanian universities. The most important challenge of the study was to fully understand the factors that affect ICT usage by applying the Decomposed Theory of Planned Behavior (DTPB). The predictor factors included Self-Efficacy (SE), Technology Facilitating Condition (TFC), Resources Facilitating Condition (RFC) and Government Facilitating Condition (GFC). Using a quantitative approach, their findings indicated that self-efficacy positively affects behavioural intention to use e-learning.

Hrtonova et al. (2015) carried out a study in the Czech Republic on acceptance of e-learning among teachers. They used survey design and collected data using a questionnaire. A sample of 228 teachers was obtained from 68 primary and secondary schools. Their findings revealed that the demographic factors such as age, gender and prior experience with e-learning had no statistically significant impact on the acceptance of e-learning.

Adukaite, Zyl, Er and Cantoni (2017), carried out a study among teachers on digital gamified learning in South Africa. Their study was interested but not limited to the impact of playfulness, curriculum fit and computer anxiety on the use of gamified technologies. Data were obtained from 209 respondents and analysed using Structural Equation Modelling (SEM) techniques. The available results indicated that the constructs of playfulness and curriculum fit correlated positively with behavioural intention to use the applications.

3.3.2.2 Adoption of e-Learning among students. Brown (2000), studied the adoption of e-learning among students in South-Africa. He examined how both individual and technological factors affect PEOU of web-based technologies. Using a quantitative approach based on a sample of 78 respondents, his results indicated that self-efficacy and computer anxiety are potential predictors of the adoption of e-learning. Chang and Tung (2008) carried out an empirical investigation on behavioural intentions to use online learning course websites among undergraduate students in Taiwan. They used the TAM and the IDT to come up with possible explanatory factors. Data were collected using a questionnaire. Findings of their study revealed that computer self-efficacy was among the critical factors for students' behavioural intentions to use online learning course websites with computer self-efficacy as the most important predictor.

Yiong, Sam and Wah (2008) researched acceptance of e-learning technology among distance learners at the Open University of Malaysia. They used a cross-sectional survey design

on a sample of 112 students and the students' data was collected using questionnaires. Their findings indicated that students had moderate levels of e-learning. Their study was limited to distance students as opposed to this present study, which considers all types of students in a university.

Ssekakubo, Suleman and Marsden (2011) carried out a study in relation to the adoption of LMS in Eastern and Southern Africa. Using an interview guide, they established that high ICT illiteracy rates among the student community and low comfort levels with technology led to low adoption of LMS. Becker, Newton and Sawang (2013) studied barriers to e-learning in Australia from a learner perspective. Using a quantitative methodology, their findings indicated that potential interruptions are a challenge to the adoption of e-learning among students in Australia.

Rhema and Miliszewska (2014) researched students' attitudes towards e-learning among engineering students in two Libyan universities. They assessed the impact of gender and age among other factors in students' attitude towards e-learning. Their findings revealed that female and male students held relatively similar positive attitudes towards e-learning. This implied that there was no significant difference between male and female students' attitudes towards the use of e-learning. Age did not have a significant effect on students' attitude towards e-learning. Selim's (2007), a study which was carried out among students in the United Arab Emirates, also amplified individual characteristics. He indicated that student motivation and technical competency and student interactive collaboration are correlated with students' acceptance of e-learning.

Ramírez-Correa, Arenas-Gaitán and Rondán-Cataluña (2015) studied gender behaviour with regard to the acceptance of e-learning among college students in Chile and Spain. They used the multi-group analysis technique and partial least squares to relate the difference between groups. The study indicated that a few statistically significant differences existed between males and females in relation to the adoption of an e-learning platform.

Chang, Hajiyev and Su (2017) studied university students' behavioural intention to use e-learning in Azerbaijan, assessing factors affecting university students' behavioural intention (BI) towards e-learning technology. The study applied the General Extended Technology Acceptance Model for E-Learning (GETAMEL). Data were collected from 714 both undergraduate and Masters' students selected using the convenient sampling technique. The responses were

analysed using Structural Equation Modeling (SEM). The results indicated that subjective norms impact positively on the behavioural intention to use e-learning the said students.

3.4 Factors of Adoption Relevant to the Study

This section elaborates on the goals of university e-learning policies, time to experiment with ICT, financial support and commitment of management, age, gender and level of education in relation to the adoption of e-learning.

3.4.1 Goal of University E-Learning Policies

A policy can be defined as an establishment of goals, values and resources in an organisation (Czerniewicz & Brown, 2009). Byungura, Hasson Masengesho and Karunaratne (2016) highlight that policies can be strategic or operational. Byungura et al. (2016) argue that strategic policies are national while operational policies are drafted at the institutional level. In this study, an e-learning policy is referred to as a set of rules that aid the integration of e-learning in universities. Opira (2010) argues that ICT policies should aim at motivating development. The Makerere University Council (2004) indicates that the goal of university e-learning policy is to train quality graduates through using modern educational technology and to increase access to university education through electronic education. This necessitates that teachers and students should be trained to acquire IT skills to use e-learning effectively. The said policy elaborates that it is within the mandate of the university management to train end-users of the e-learning system and also to ensure that different academic units set up e-learning laboratories. University management is also responsible for e-learning resources such as hardware and software.

In 2015, the Makerere University Council introduced an Open Distance E-learning Policy (ODeL). This policy provided a framework for classifying ODeL into diverse academic programmes at Makerere University. Among other issues, the policy postulates that it is the university management's mandate to provide access to higher education through different quality delivery modes and e-learning programmes in line with its vision and mission of training, researching and outreach. The university management is also responsible for providing financial support for e-learning programmes. Students and teaching staff are considered as understanding the introduced ODeL technology (Makerere University 2015).

Waterhouse and Rogers (2004) indicate a number of e-learning policies that are considered important to an institution. These include, but are not limited to student privacy, e-discussion, software standards and assignment policies. Henard and Roseveare (2012) argue that pointers for institutional policies and practices should establish teaching and learning. The goal of e-learning policy is appraised by assessing the extent to which it encourages lecturers' and students' use of TSL facilities and other services.

3.4.2   Time to Experiment with ICT

Time is a very vital aspect of technological innovation. Allocating time to respond to emails is vital to both teachers and students because it prevents frustrations (Waterhouse & Rogers, 2004). Individuals make little usage of e-learning because of limited time (Bingimlas, 2015; The and Usagawa, 2018). Teachers can set times at which students would be expected to hear from them (Waterhouse & Rogers, 2004). The digital divide between the developed and the developing world can be assessed in terms of e-resources and bandwidth among other parameters. In most developing countries, e-resources such as computers are limited, which affects the time users may experiment with ICT. In such a situation, it would be important to understand whether this factor contributes to the adoption of e-learning. Drent and Meelissen (2008) assessed the time aspect by looking at indicators such rate of experimenting, reflecting and interacting with ICT. This factor was captured by assessing the extent to which the availability of time to experiment with ICT encouraged lecturers' and students' use of TSL facilities and or services.

3.4.3   Financial Support

Finances are resources that support an organisation; therefore, institutions must provide such resources to be financially supported (Arabasz, Pirani & Fawcett, 2003). Organisational support can be in the form of finance and management commitment, among other avenues. Patterson (2007) argues that financial support varies in different educational institutions. Arabasz et al. (2003) observe that institutions in the USA are financially supported by different entities. For instance, the Commonwealth of Virginia passed a bond issue for classroom improvements of $4.5 million to renovate classrooms. It is therefore a foregone conclusion that technological advancement demands financial support. Mee (2007) observes that the purchase of ICT hardware

in an organisation is an indicator of such financial support. Smith, Rudd and Coghlan (2008) argue that ICT financial support can be in the form of purchasing hardware, software, procurement of technical support and maintenance of equipment. Universities in Africa have emerged from an exceptionally divided past (Czerniewicz & Brown, 2009). Institutional funding policy changes have been based on variations in cultures, these being contested, debated and researched (Bunting 2004). The e-learning policy framework of Makerere demands that management provides financial support for e-learning programmes. This variable was assessed by capturing the extent to which availability of financial support encouraged lecturers' and students' use of TSL facilities and or services.

3.4.4   Commitment of Management

Welle-Strand and Thune (2003) indicate that studies on the management of e-learning and the impact of management outcome in organisations are limited. FitzPatrick (2012) indicates that the commitment of management facilitates e-learning adoption. Management support has been non-existent in African institutions (Czerniewicz & Brown, 2009; Nabushawo et al. 2018). For example, in South Africa, staff consider themselves explicitly constrained in their ICT use due to a lack of management commitment (Czerniewicz & Brown, 2009). García-Valcárcel and Tejedor (2009) indicate that management should set up measures that should support both students and lecturers. Parlakkihc (2014) and Smith et al. (2008) argue that communication and training are important aspects of implementing change. Nabushawo et al. (2018) and Smith et al. (2008) point out that institutions can be committed through communication, training and provision of quality e-learning services to their stakeholders. Hence, the commitment of university management in this reseach has been perceived as communication, training and provision of quality services by university management. In developing countries where staff are constrained in their use of ICT due to lack of vision, it is important to understand the contribution of management on the adoption of e-learning. This variable was examined by assessing the extent to which the commitment of university management encouraged lecturers' and students' use of TSL facilities and or services.

3.4.5   Age

Parlakkihc (2014) cites age to be among demographic variables. He argues that age affects teachers' and students' use of information technologies. Dlodlo (2009) indicates that people have more access to technology at home from a younger age even in rural communities. Age has been used as a key moderating variable in the UTAUT (Venkatesh et al., 2003). Bakkabulindi and Namirembe (2011) support the view that the younger a person, the more the chances will be to adopt ICT. Flemming, Becker and Newton (2017) explain that age has no impact on future intention to use e-learning. Similarly, Kasse and Balunywa (2013) are of the opinion that the adoption of e-learning does not necessarily depend on age. Lena, Jimbara and Suyoto (2018), Pereira, Martins, Morgado and Fonseca (2018) and Plaza et al. (2018) indicate that the adoption of e-learning takes place at earlier ages. In this study, age has been measured according to a range of years or actual age in some instances. For instance, ages of 20 years and below are very young; age range between 21 years to 40 years are considered to be quite old, between 41 years to 50 years are considered to be old, and 51 years and above are considered to be very old.

3.4.6   Gender

Jackson and Scott (2002), defines gender as a classification between women and men rooted in both social institutions and social practices. Bakkabulindi (2007) states that gender implicates masculine or feminine dimensions. Burgess (1986) argues that gender can be studied descriptively as well as explanatorily. Okello (2000) asserts that clusters that govern the utilization of technological innovations are embedded in a Western technological culture which treats men and women differently. This culture favours men over women (i.e. more men were trained as technicians than women). Consequently, women have been left behind thus promoting male dominance.

The concept of gender is surrounded by stereotypes such as thinking that hard subjects like information technology and computer science are supposed to be pursued and taught by men. It is important to investigate whether this analogy holds water when it comes to the adoption of e-learning in a developing country like Uganda. Researchers such as (Altawallbeh, Thiam, Alshourah & Fong, 2015; Hrtonova et al., 2015; Yusuf & Balogun, 2011) revealed that there is no significant difference between men and women in the adoption of e-learning

technology. In their review, Suri and Sharma (2013) observe that in a few contexts, gender plays a significant role in the acceptance of the technology. Egbo, Okoyeuzu, Ifeanacho and Onwumere (2011) revealed that more female students are adopters of ICT than the male ones. On this variable, respondents were requested to indicate their gender so that gender was appraised on whether a lecturer or student was male or female.

3.4.7   Level of Education

Damanpour and Schneider (2006) reveal that education level is an individual factor. They continue to argue that education is an important aspect of the adoption of innovations. Long (2017) argues that levels of education create classes in society whereby some individuals become 'haves' and others 'have nots'. This, in turn, affects the job wages whereby the 'haves' end up with higher pay compared with their counterparts. In some instances, education is viewed as a management strategy that can ease the integration of specific innovations (Ferreira, Teixeira, & Dantas, 2015). Bezrukov, Ziyatdinova, Sanger, Ivanov and Zoltareva (2018) indicate that technological innovations accommodate people who have a relatively high degree of academic status. This component captures levels of education categorically by lecturers and students. Lecturers were assessed depending on their qualifications from Bachelor's degree level to post-doctoral level, while students were assessed considering the years of study (i.e. from year one to year four).

3.5   Interplay between University Learning Environments and Human Agents and their impact on the Adoption of E-learning

The preceding sections have indicated organisational and individual factors that can contribute to the adoption of e-learning. This section presents the review of the literature on the impact of organisational and individual factors on each other and how these factors affect the adoption of e-learning. The impact highlights both positive and negative effects which results in either adoption of e-learning or otherwise respectively.

3.5.1 Impact of University Learning Environments on Human Agents

Scholars and engineers of learning environments often wonder whether the learner (human agent) should adapt to the learning environment or whether the learning environment

should adapt to the learner (Lippman, 2013). Lippman observes that debatably this question is incorrect. It is better to ask: How do learning environments shape the human agent? In turn, how does the human agent impact learning environments? In his argument, the learning environment can be composed of the learner, other students and teachers and the physical environment. If lecturers are left out during the new developments in the learning environment, they tend to see the development as irrelevant to their work (Hardaker & Singh, 2011). The formal physical learning environment impacts on student learning outcome (Brooks, 2010). Singh, O'Donoghue and Worton (2005) argue that the structure of universities has changed. E-learning is now part and parcel of the university learning environment.

E-learning initiatives directly affect the future structure of universities at both strategic and tactical levels (Singh et al., 2005). At the strategic level, issues concerning face-to-face versus virtual environment are considered while the tactical level is concerned with the role of the lecturer, learning environment and materials. Interaction is a basic element in any educational process (Arlacia & Bravo, 2012). The learning environment can provide policies, time for interaction, financial support and commitment to the human agents. The learning environment and the human agent have to be in harmony with the university mission and pedagogical needs. University e-learning policy gives a structure on how an individual should teach, learn, assess and improve his/ her e-learning skills (Makerere University Council, 2004).

Czerniewicz and Brown (2009) and Maina and Njuki (2015) assert that institutional policies influence the way people adopt e-learning. The Makerere University Council (2004) and Makerere University (2015) highlight that e-learning policies boost pedagogical practices and improve end-user skills. Developing countries lack approved educational technology policies and strategies (Waiswa & Okello-Obura, 2014). If human agents are familiar with e-learning policies, chances are high that their intention, innovativeness and acceptance of e-learning will be high.

The time a user takes in interacting with ICT is an important issue in a learning environment (Moore, 1989; Salinas, 2004). Drent and Meelissen (2008) argued that time can be assessed according to experimenting, interacting and reflecting with ICT. Time impacts on the adoption of e-learning (Mumtaz, 2000) among individuals. The time one takes in engaging in e-learning activities plays an important role in the integration of e-learning in a given environment (Bingimlas, 2015; Kwofie & Henten, 2011). They argue that in situations where users cannot

create time to develop their IT skills, the adoption of e-learning is low. Developing countries have been reported to have limited e-resources which affect users' time to experiment with ICT. Time to experiment with ICT can raise a user's intention to use innovativeness and acceptance of e-learning technology.

Institutions are also meant to support individuals through financial support. E-learning comes with new support requirements. Arabasz et al. (2003) assert that financial support enhances the adoption of e-learning technology. This implies that if finances are inadequate, it deters the advancement of e-learning hence leading to low adoption rates. In cases where organisations often purchase e-learning technology for the users and offer maintenance services, the adoption rates tend to be high (Smith et al., 2008). As a way of exercising financial support, organisational management can acquire e-learning equipment and can procure technical support and maintenance of e-learning equipment (Smith et al., 2008). Selim (2007) indicates that university management support for e-learning activities among stakeholders aids acceptance of e-learning technology.

Hardaker and Singh (2011) assert that commitment affects individuals during the adoption of e-learning. They argue that the inability of management to control actions of individuals leads to low adoption of e-learning technology in universities. Hardaker and Singh (2011) augment their assertion that institutions should support and train e-learning services in different course units to ensure effective adoption such technology. Failure to train end-users on how to use e-learning negatively affects the integration of this technology (Kwofie & Henten, 2011). Mumtaz (2000) observed that providing individuals with adequate technological innovations and failure to train them leads to anxiety. She argues that training is a good predictor for the adoption of technology. Management should also ensure collaboration with users to enhance the adoption process (Hardaker & Singh, 2011); this can be achieved through the communication of available e-learning services. However, Hardaker and Singh (2011) argue that in situations where individuals have little collaboration with management, e-learning adoption is negative.

3.5.2 Impact of Human-Agent on University Learning Environments

According to Lippman (2013) human-agents depending on age, gender and level of education influence their living and learning environments. This can be through acting on

policies in place, taking time to participate in a particular environment, making use of resources and also participating in activities within a particular environment. Based on the literature in the previous sections, stakeholders use the e-learning policies within learning environments (Drent & Meelissen, 2008). They get acquainted with these policies, take time to practise with e-learning, use acquired e-learning facilities in the university environment and avail themselves to receive information from university management about e-learning technology. This implies that without stakeholders, university management cannot implement its e-learning policies and practices effectively.

Bakkabulindi and Namirembe (2011) and Maina and Nzuki (2015) indicate that age is an important factor in understanding the adoption of innovations in learning environments. Adewole-Odeshi (2014) amplifies that older people tend to have low interaction with the learning environment resulting in low adoption of technological innovations in such environments. Whenever a new technology is adopted in a country like Uganda, it finds a society with inequalities in terms of age, gender and level of education.

The relationship between gender and different environments has been testified (Lee & Pituch, 2002; Martin, 1991). An early study by Martin (1991) on gender differences in technology adoption and telephone use, found out that women's use of the telephone for socialisation purposes helped to expand its use in both residential and business areas. Zuvic-Butorac et al. (2011) found that female students concentrated on humanities and social sciences while their male counterparts were in engineering, natural science and ICT in a university setting. Ajumobi and Kyobe (2017) uphold that women are less favoured when it comes to the use of technological innovations. Bakkabulindi and Namirembe (2011) indicated that gender positively impacts on the university environment in relation to the adoption of innovations, whereby men are more adopters as compared to the women. Lee and Pituch (2002) suggested that gender should not be left out in IT adoption models.

Damanpour and Schneider (2006), reveal that the education level is an individual factor. They continue to argue that education is an important aspect of the adoption of innovations. Maina and Nzuki (2015) agree that the level of education impacts the learning environment during the adoption of innovations. Teachers' pedagogical knowledge and qualifications coupled with specific subject knowledge in a particular learning environment increase the adoption of e-learning technology (Khan, Rahman & Ahmed, 2010). In some instances, education is viewed as

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a management strategy that can ease the implementation of specific innovations in particular environments (Ferreira, Teixeira & Dantas, 2015). There seems to be little research on how the level of education impacts on the learning environment during the adoption of innovations; this study acted as a basis to fill the gap. A lecturer's academic qualification or student's year of study may impact the university learning environment.

While earlier studies have provided models and frameworks to study successful e-learning adoption, many have used the linear methods to determine the influence of the predictors. However, it is difficult to determine the influence of the predictors in a situation where there are interplays (Kyobe, Namirembe & Shongwe, 2015). In the following chapter the researcher introduces the concept of alignment and the configuration perspective which can attempt to provide a better way to understand this complex in e-learning adoption and how it can be measured to determine more accurately the predictors.

CHAPTER FOUR

ALIGNMENT AND CONCEPTUAL FRAMEWORK

4.1   The Concept of Alignment

Originally, the integration of IT in organisations was based on technological determinism assumptions that ignored the context of an organisation where IT was deployed (Middleton & Harper, 2004). Past IS researchers have acknowledged that IT revolutionary capability is dependent on a number of organisational aspects of which IT and these elements (leadership, structure and strategy) need to be aligned to achieve success (Middleton & Harper, 2004). The notion of alignment is at times referred to as strategic fit and has been used to understand and find solutions to organisational challenges (Camponovo & Pigneur, 2004). Performance of an organisation is influenced by the alignment of inputs to achieve the desired output. Alignment can refer to ensuring a balance or fit between strategy, organisation, processes, technology and people, such that the organisation achieves better results, for instance competitive advantage (Levy, Powell & Yetton, 2001).

Alignment has also been defined as the degree of coherence between competing priorities, the distribution system and infrastructure performance in an organisation (Janatifar, Bakhtiari, Daneshpajooh & Tahanian-Qomi, 2014). According to Venkatraman (1989), a guru in organisational theory, alignment is defined as a balance between related variables. It should be noted that the concept of alignment has several synonyms which include "balance", "coordination", "fit", "linkage" and "harmony" (Maes, Rijsenbrij, Truijens & Goedvolk, 2000). It is argued that in order for organisations to be successful, relationships among different components of an organisation must be balanced (Venkatraman, 1989). Venkatraman (1989) proposed six fit perspectives namely: Moderation, mediation, matching, profile deviation, covariation, and Gestalts.

Proponents of moderation fit posit that an interaction exists between the predictor and criterion variable which is dependent on another variable known as the moderator variable. Thus, the predictive potential of the predictor variable on the criterion variable is dependent on the moderator variable. Similarly to the moderation fit, the mediation perspective posits that there are intervening factors between antecedent and outcome variables. Mediation can be termed as the diffusion of the effect of the antecedent variable through one or more variables. These variables are known as intervening or moderator variables. Edwards and Lambert (2007) indicate

that mediation can either be direct or indirect, complete or partial. The direct effect does not involve mediator variables whereas the indirect effect is achieved through one or more mediator variables. Complete mediation is achieved when the highest outcome of the antecedent variable on the outcome variable is not significant (Venkatraman, 1990).

In other words, complete mediation of the total effect of an antecedent variable is diffused through one or more mediator variables (Edwards & Lambert, 2007). In path analysis, mediation relates to an indirect outcome of an independent variable on a dependent variable that passes through one or more mediator variables. The indirect outcome is obtained by multiplying the paths that constitute the outcome. The degree of the indirect outcome indicates the amount of mediation through the relevant mediator variables. In a match perspective, the fit is theoretically defined as the match between two related variables independent of any performance anchor (Venkatraman 1989). With reference to a Profile Deviation Analysis, the fit is perceived as adherence to an externally specified profile, which is identified as an ideal configuration to implement a strategy (Zajac, Kraatz & Bresser, 2000). Adherence to the ideal profile is expected to be related to higher performance while deviation from such a profile implies poor performance. This perspective is compatible with a number of closely related variables (Venkatraman, 1989).

The covariation perspective views fit as a pattern of internal consistency considering a set of theoretically related variables such as strategy, structure and processes (Venkatraman 1989). The Gestalts perspective applies when fit involves more than two variables. It is a multivariate perspective which is defined in terms of the extent of internal coherence among a set of theoretical characteristics (Venkatraman, 1989). The term Gestalts originates from the field of psychology (Jung, 1971). It is a German term that means: A systematised entity, which consists of distinguishable parts that are interdependent with certain features produced by their inclusion in the entity, and the entity has some features belonging to none of the parts (Gould & Kolb, 1964). The Gestalts perspective does not seek for linear relationships among variables.

In the following subsection, the Gestalts perspective is presented as the approach that has been adopted to investigate the factors for the adoption of e-learning.

4.2   Gestalts Fit Adopted for the Study

Venkatraman (1989) suggests that a researchers' choice for a particular perspective should be justified. He argued that the number of fit variables should guide the selection of particular fit perspectives. For instance, in studies involving two variables; moderation, mediation and matching fit can be applied. In instances where more than two variables are involved, profile deviation, covariation and Gestalts perspectives can be applied. In the present study the research adopted the Gestalts (or configuration) perspective of alignment. In the previous chapter, the researcher has shown that there are interplays between the university learning environment and human-agent. These form complex relationships that cannot be measured easily using linear approaches. Organisational Configurational theorists argue that the whole is best understood from a complete view, pattern or as an assemblage of interconnected elements (Miller, 1989).

They maintain that a configuration, pattern, or Gestalt represents a unique, tightly integrated set of elements within an organisation. They add that an organisation's performance does not depend on elements in their singular attributes, but rather on the "fit" or coherence among the elements (Miles, Snow, Meyer, & Coleman, 1978; Miller, 1989; Venkatraman, 1989). Therefore, when there is coherence or strong alignment between organisational elements such as strategy, process, structure, people and technology, it is expected that this would result in great organisational performance (Miles et al., 1978). In the present study, since it is found that adoption of e-learning results from the interplay between university learning environment and human agents, the researcher argues that when there is harmony/fit/alignment between these interplaying factors, one should expect to have successful e-learning adoption and that the stronger the level of this alignment, the greater will be the level of e-learning adoption.
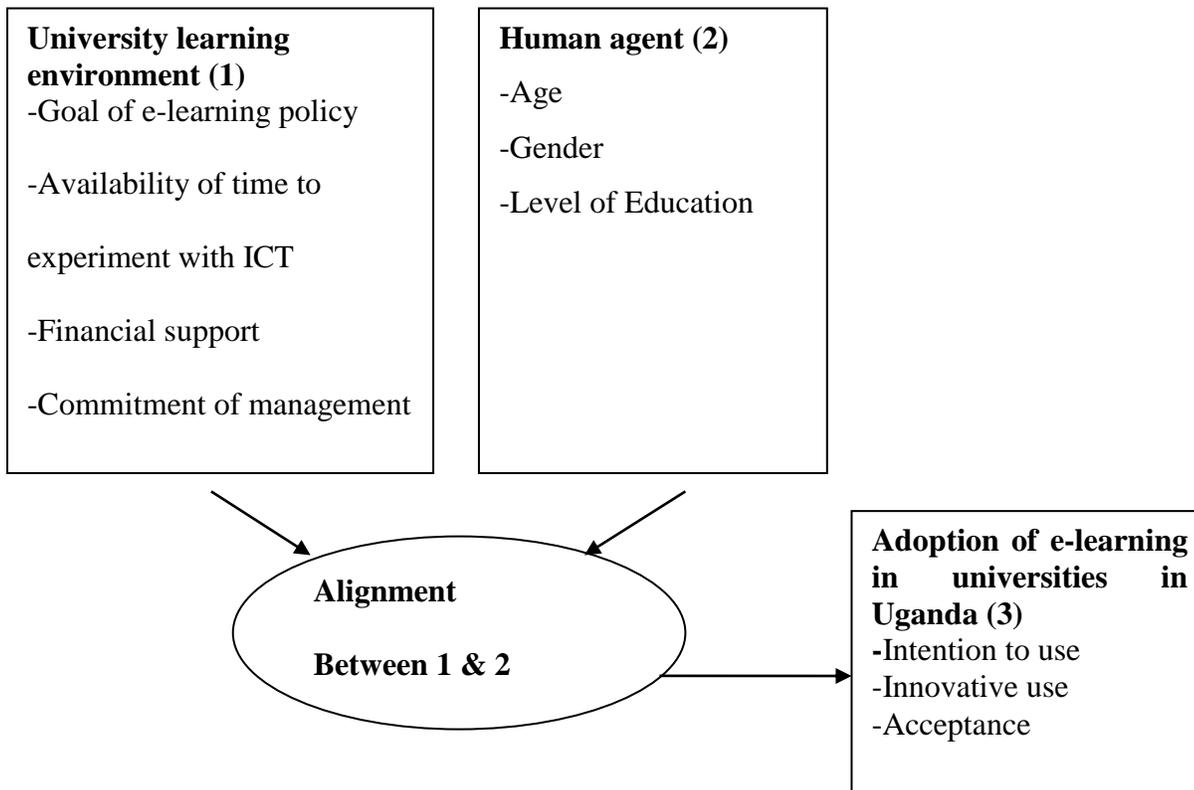
Figure 4. 1: Conceptual Framework of Predictors of Successful Adoption of E-Learning or Technology-

Supported Learning in Universities in Uganda

4.3   Hypotheses

It can, therefore, be hypothesised that: the greater the alignment between the university learning environment and human agent, the more the (i) intention to use, (ii) innovative use, and and (iii) acceptance of e-learning in universities will be.

As indicated in Figure 4.1, the fit perspective chosen for the present study is the Gestalts perspective. The researcher is interested in the degree of interactivity among a set of theoretical attributes as suggested by Drazine and Van de Ven (1985). This framework consists of three main elements, the university learning environment, the human-agent and the adoption of e-learning. Two interplaying variables were identified as organisational (university learning environment) and individual (human-agent) factors. These interplay to determine the level of adoption of e-learning in universities in Uganda.

The first and second elements of the framework are configurational variables. Such elements are perceived as factors that may influence the use of e-learning technology positively

or negatively. If the influence is positive, then the adoption is successful (great). If it is negative then the adoption is unsuccessful (weak). Below are the definitions of these variables. In the adoption framework; the third element is an outcome of the interaction or interplay between the first and second variables.

(i)   *University learning environment.* The university environment can be termed as the physical environment that affects student learning outcome (Brooks, 2010). Josianne and Dore (1998), argue that the pedagogical environment ought to integrate functions namely: information, communication, collaboration, production, scaffolding and management. They add that the learning environment encompasses components and activities within which learning happens. Sandberg (1994), on the other hand looks at the learning environment in the form of teacher roles which can be affected by the human agent using text book instructions. Singh, O'Donoghue and Worton (2005), argue that the emergence of technology in education has changed the nature of the learning environment. The university learning environment in this research encompases the goal of e-learning policy, availability of time to experiment with ICT and financial support, and also management commitment.

(ii)   *Human-agent.* This can be defined as an individual in the learning environment. Lippman (2013) feels that it is an important aspect to find out how the environment shapes the learner and how the learner also influences the environment. He perceives the learning environment to be composed of the learner, other students and teachers and the physical environment. Individual actors in the learning environment have their own preferences. For instance, lecturers prefer a learning environment in which ICT policies are not imposed on them (Hardaker & Singh, 2011) while students on the other hand may prefer face-to-face interactions (Hains-Wesson, 2011). In this particular research, this could either be a lecturer or a student characterised by age, gender and level of education.

(iii) Interaction/ interplay. This means that variables affect each other.

(iv) Alignment. This represents the level of coherence or fit between the two interplaying variables, and this level of coherence determines the extent of e-learning adoption (Miller, 1989).

(v) Adoption of e-learning. Adoption is regarded as the decision to use an innovation (Rogers, 2003). In this research adoption of e-learning was perceived as the intention to use, innovative use and acceptance of e-learning technology.

Table 4. 1*: Variables/ Constructs Employed in the Study*

Factors/constructs	Description	References
University learning environment	An environment which encompasses components and activities in which learning takes place.	Josianne & Dore (1998)
Human-agent	This can be referred to as an individual.	Hains-Wesson (2011) Hardaker & Singh (2011)
Adoption of e-learning	Adoption is the choice taken by an individual or institution to make use of an innovation.	Drent & Meelissen (2008) Rogers (2003)

The predictive framework for the advancement of e-learning programmes in universities in Uganda was developed from the findings linked to the conceptual framework and literature from past studies.

METHODOLOGY AND DESIGN

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1   Research Procedure

To understand and to build a concrete research methodology that can guide any study, it is important to understand the concept of research procedure. Mingers (2001) defines research procedure as a situation which consists of three distinct systems namely: research system, research content system and an intellectual resources system.

The research system is where researchers get engaged in a research situation. The research content system is the specific research sites, for instance an organisation or a university particular. This is a site where people interact through sharing knowledge and making use of technology. Intellectual resources system comprises of theoretical frameworks, research methods and methodologies that are relevant to the research situation.

Williams (2007) defines the research procedure as a way of collecting, evaluating and interpreting data with an aim of understanding a phenomenon. He further argues that the research procedure is systematic and encompasses the definition of objectives, managing data and reporting of the results in an established framework. Research arises from questions about a phenomenon.

In 2007 Saunders, Lewis and Thornhill explained the research procedure or process in six concentric layers. They emphasised the research philosophy as the first layer in the research process. The second layer concerns the research approach, while the third layer identifies the research strategy. The fourth layer suggests a choice of approach, the fifth specifies the time horizon, and finally, the sixth layer identifies the data collection and analysis.

To begin with, the research philosophy informs the study by giving the nature of knowledge (Bryman, 2012). The underlying assumptions of the research philosophy provide a background on how to carry out the research (Flick, 2011). Philosophical frameworks could either follow a positivist or interpretivist point of view (Bryman, 2012).

Research approaches are defined by either deductive or inductive approaches. The deductive approach involves testing hypotheses and theories i.e. it works from the basis of a general statement towards specific and logical conclusions (Bryman, 2012). The inductive

approach is the opposite of the deductive one, actually generating broader generalisations and theories from data collections and specific observations (Bryman, 2012).

A research strategy is a plan that guides a researcher on how to carry out the research (Saunders et al., 2007). The research strategy can include use of the methods such as experimental, survey, case study, grounded theory, ethnography, action research and archival research (Saunders et al., 2007). Experimental research is based on carrying out an experiment and is usually used in all research fields (Saunders et al., 2007). Surveys are the main strategies used in quantitative research and usually consider a sampling strategy. According to Bryman (2012), case study research is one in which interest is in a particular unit of study. Bryman (2012) adds that in case a study research, key features are identified from which generalization is drawn. Grounded theory is a strategy used in qualitative research which uses the inductive approach (May, 2011).

The ethnographic strategy involves staying among the respondents to get a clear picture of them. This can be used if one is studying the culture of a particular group of people (Bryman, 2012). Action research is based on practice in relation to a specific problem; this type of research is common in teaching and medical fields (Bryman, 2012). Lastly archival research strategy is one that uses existing materials for conducting research (Flick, 2011). Saunders et al. (2007) outlines mono-, mixed and multi-methods as choices that can be made for the methods. The mono-method uses a single research approach. The mixed-method uses two or more approaches, while the multi-method uses a variety of research approaches. The mixed-method uses an integrated methodology on a single data set (Flick, 2011) while the multi-method is partitioned into separated segments in relation to a specific data set (Feilzer, 2010). The time horizon could be cross-sectional or longitudinal.

The cross-section time frame is at a particular point in time (Flick, 2011), while the longitudinal spreads across a longer period of time (Goddard & Melville, 2004). Data collection methodology can incorporate primary and secondary methods. Primary data collection is a methodological approach in which data is derived from first-hand sources (Bryman, 2012) while secondary data collection is one in which data is derived from opinions of other researchers (Newman, 1998). Data collection methodology also contains a research design, a framework through which the research process is accomplished (Flick, 2011). This gives a platform for the selection of respondents and data analysed. Research designs can be descriptive, explanatory and

exploratory. The descriptive design reflects the experiences of respondents. This design can be related to the ethnographic strategy. However, it can also consider a quantitative framework (Bryman, 2012).

An explanatory design aims at reasoning the characteristics of a given social phenomenon (Saunders et al., 2007). Exploratory research is carried out to inquire about a particular phenomenon before actual research is done (Neuman, 2003). It should be noted that respondents are selected through a process known as sampling, which entails selecting a portion (sample) of the population to act as a representative. In quantitative research, a sample size is important (Flick, 2011). It is advisable that sample sizes that are statistically valid should be of a population of 30 respondents and above (Flick, 2011). Sampling techniques can either be non-probabilistic or probabilistic. Non-probabilistic techniques may include: convenient, purposive and snowballing (Creswell, 2013).

In the convenient sampling respondents are selected because they are accessible and within the same proximity as that of the researcher. Purposive sampling is based on expert judgement and is usually used in difficult situations to reach populations, while in snowballing respondents are chosen through a network. Among probabilistic techniques random sampling, stratified random sampling and cluster sampling may be used to select sample sizes (Newman, 1998). As the terms indicate, random sampling considers the selection of respondents randomly. Stratified sampling is a form of sampling when the selection of respondents is based on strata, whereas cluster sampling is based on cluster units.

Mingers (2001); Saunders et al. (2007) and Williams (2007) explain that research is the basis through which the study objectives are achieved. To Mingers (2001), the first step in a research project is to design a research methodology for that particular study. Research can be defined as an activity guided by positivist; deductive; quantitative, survey, mixed and cross-sectional designs; data quality control, data collection procedures, and data analysis techniques. In this particular study one research question was addressed: i.) What are the factors that predict successful adoption of e-learning in universities in Uganda? The research question was paramount in directing the researcher to the desired research methodology to achieve the study objectives.

5.2   A Synopsis of the Field of Information Systems (IS)

The field of IS has been in existence since the 1960s and is linked to computer science, management, organisational management, operations research and accounting disciplines (Hirschheim & Klein, 2011). These researchers argue that the IS field draws from different disciplines which makes it hard to tell what entails the IS discipline. However, Hirschheim and Klein also advise that IS research should focus on studying effective design, delivery, use, and impact of IT in organisations and society. Furthermore, they elaborate that the emergence of the IS field over the past years has led to a dramatic increase in various research communities which has consequently resulted in a great contribution to IS literature. Thus, in relation to the above researchers, the field of IS addresses a variety of problems and uses a variety of theories and methodological frameworks. For instance, the adoption of IS has been tackled from different perspectives such as the planned change approach. Currently, ICT is attached to different business areas such as e-learning due to the commercialisation of the Internet.

Lamp and Milton (2005) argue that the IS discipline is characterised by regular debates on what IS is, numerous reference fields, usually located in different university faculties, perceived to have weak theory, practice dominated and uses different research frameworks. Weber (2003 cited in Artz, 2013) noted in an editorial article in Management Information Systems Quarterly (MISQ); that relational database theory was the only theory unique to IS. Weber's (2003) perception has been criticised by Artz (2013); who argues that Weber's observation was short-sighted. Artz (2013) further argues that the field of IS is defined differently by scholars hence hampering the advancement in knowledge. This is because these definitions are fuzzy and have nothing in common with each other. This study is in agreement with Artz' critique against Weber (2003). However, it dismisses the fact the scholars should have the same definition of IS. This is so because having the same way of thinking would limit the diversity of knowledge. This research has, therefore, opted to define e-learning information systems as technology-supported learning (TSL) systems that result from the interplay between the university learning environment and individual.

Gregor (2005), on the other hand indicates that what makes IS unique to other fields is the use of artefacts in human-machine systems. An artefact can be defined as an entity or object, for example software that can be used to carry out certain tasks (Mimbi, 2013). Gregor (2005) indicates that the IS field is intersected by the knowledge of physical objects (machine) and

knowledge of human behaviour. He further argues that IS investigates the phenomena that emerge when people interact with machines. While Gregor's (2005) perception about the IS field is limited to artefacts, Benbasat and Zmud (2003) had already argued that the IS should incorporate reference fields as long as the focus is on IS. Unsuprisingly Chen and Fang (2013) postulate that one of the commendable research areas in the 21st century is the adoption of e-learning information systems in education. Dumay (2004) argues that although studies carried out in organisations cannot be defined as an exact science, they do use scientific methods and assumptions.

Existence of ISs in organisations cannot be without interaction among participants (Hirschheim & Klein, 2011). This view is in contrast with the views of hard scientists (such as computer scientists and engineers) who perceive organisations in technical terms (Forsythe, 1967; Dumay, 2004). It should however, be noted that there is no purely technical organisation. One can deduce that the existence of IS in organisations can be professed psychologically or sociologically. Psychologically, the present study looked at behaviours of individuals in the universities in Uganda in relation to the adoption of technology-supported learning (TSL) or e-learning. In relation to sociological aspects, the research focused on individuals (teachers and students) in universities in Uganda because organisations evolve around the interaction of individuals. Hence this research was carried out from a social science perspective.

5.3   Philosophical and Methodological Basis for Research Design

Developing an appropriate research design can either be achieved by identification of the pertinent epistemology first then the methodology, or vice versa. Epistemology can be defined as the way knowledge is acquired, valued and applied (Hirschheim, 1985). Proponents of the research design based on the identification of epistemology first, argue that people's assumptions and beliefs are central to their understanding of the world and the challenges they face (Gadamer, 1976; Weber, 1997). This notion is strengthened by Weber (1997) who argues that an individual who tries to understand a phenomenon of inquiry is viewed to operate within a set of assumptions and beliefs. Proponents of identifying methodology first then epistemology argue that approaches are applied when one tries primarily to attribute meaning to research inputs and outputs and how these are related to recognised epistemology (Crotty, 1998).

As a result, approaches are used to position the researcher's predisposition to the given epistemology. The present study tackled the research design by identifying the epistemological basis first and then the methodological one. The study, therefore, supports the view that the researcher's assumptions and beliefs are central in making sense of the real world and a basis for forming propositions (Weber, 1997). The formation of propositions is based on *a priori* knowledge, which is rooted in the work of the philosopher Immanuel Kant (1724-1803). According to the sociologists Burrell and Morgan, Kant reasons that:

> *A priori knowledge must precede any grasp or understanding of the sense data of empirical experience. He argued that there must be inherent, in-born organising principles within man's consciousness by which any and all sensitive data is structured, arranged and thus understood (quoted in Burrell & Morgan, 1979, p.227).*

According to Kant, research cannot commence without knowledge. He indicates that one must have knowledge about phenomena before an empirical inquiry and there must be guidelines upon which reality is structured, arranged and understood. This implies that the epistemology should precede the methodology. It is recommended that the development of a research project should be preceded by the epistemological stance then followed by the methodological one (Crotty, 1998; Gadamer, 1976). Having identified the research design for the study, the next section presents major philosophical foundations in social science.

5.4 Philosophical Foundations of the Nature of Social Science Research

Since this study was carried out from a social science perspective, it was inevitable to look at the nature of science in view of social scientists. Different practical philosophical research frameworks have been advanced on how to carry out research (for example Burrell & Morgan, 1979; Crotty, 1998; Mingers, 2011). Burrell and Morgan (1979) observe that research can be studied from an objective or subjective approach. The objectivist approach stems from natural sciences. Social scientists decided to use highly successful methods of the natural sciences to investigate social science phenomena. The subjectivists on the other hand argue that objectivism and subjectivism are different. Subjectivists uphold qualitative research techniques.

Burrell and Morgan (1979) point out that the nature of science can be tackled by looking at ontological, epistemological, human nature and methodological assumptions.

The above notion is supported by Flick (2011), who argues that the underlying philosophical research assumptions provide a background to carry out the research. The first assumption is about the nature of reality. Burrell and Morgan (1979) posit that the subjective ontological view is that of relativism, while the objective one is that of realism. Relativists believe that sense is created from multiple individuals; thus, the sense is produced artificially. On the other hand, objectivists believe that social reality is created independent of humans. In other words, the research is independent of the researcher. The second assumption is about the nature of knowledge, or epistemology. While subjectivists believe that knowledge is created inductively, objectivists believe that knowledge is created deductively through testing hypotheses (positivism). As a result, subjectivists, in this regard, are perceived as anti-positivists while objectivists are referred to as positivists.

The third assumption is about the perception of the researcher, not the researched (Burrell & Morgan, 1979). Subjectivists believe that humans should voluntarily participate in research while objectivists believe that human participation in research is determined by the external environment. The fourth assumption is about research methodology. In this regard, Burrell and Morgan (1979) indicate that research can be carried out ideographically or nomothetically. The ideographic inquiry requires an interpretivist approach while the nomothetic enquiry requires the positivist approach. Crotty's (1998) research framework assumes that the research process should involve epistemological, theoretical, methodological, and methods stand-points. According to Crotty, epistemology is about how knowledge is constructed and this can be accomplished through objectivism, constructionism, and subjectivism.

Objectivism assumes that meaning is created independently of the social actors (Crotty, 1998). This implies that individual objects create meaning by themselves. The constructionists assume that meaning is constructed by social interaction while subjectivists impose meaning on an object. Theoretically, researchers are expected to outline the assumptions underlying their research. For example, positivists are underpinned by objective assumptions such as methodologies inclined towards experimental and survey designs. The methodology is a practice of carrying out research in relation to the research setting and participants while considering the methods (Crotty, 1998). Methods are techniques used for data gatherings such as mono (such as

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Self-Administered Questionnaires (SAQs)) and multi (such as SAQs and interviews) and statistical analysis (Flick, 2011).

Mingers (2011) takes a different approach from that of Crotty (1998). Mingers philosophises that research should take a systemic/ holistic, critical and realistic, pluralist approach, including truth and recognizing a variety of knowledge. The systemic approach is concerned with perceiving the world as a whole; as reducing it into small chunks leads to the destruction of relationships. The holistic approach is more concerned with looking at the system as a whole. Mingers (2011) argues that critical-realism (critical and realistic) considers the distinction between interpretivism and positivism while the pluralistic approach is concerned with different methodological approaches to be used. Mingers argues that pluralism, which is the integration of different methods, should be considered while carrying out research because the world is multi-dimensional. He further explains that knowledge must be true. He posits that a variety of knowledge should be considered in the research process.

Mingers (2011) devised an ontological, epistemological, methodological and axiological research framework. In his view, ontology deals with what entities exist and the properties they have; epistemology deals with our relationships as human beings to the knowledge entities and what distinguishes true knowledge from belief or opinion. The methodology is concerned with the methods used to acquire true knowledge. Axiology deals with values, and ethical considerations (Mingers, 2003). The study was largely simulated using Mingers' (2011) view.

Table 5. 1: A Comparative Analysis of Burrell & Morgan's (1979), Crotty's (1998), and Mingers' (2011) Philosophical Research Frameworks

Research philosophy	Burrell & Morgan (1979)	Crotty (1998)	Mingers (2011)
Ontology	Yes	No	Yes
Epistemology	Yes	Yes	Yes
Human nature	Yes	No	No
Theoretical	No	Yes	No
Methodological	Yes	Yes	Yes

Methods	No	Yes	No
Axiology	No	No	Yes

"Yes" means that a particular philosophy is considered in the research framework and "No" means that a particular philosophy is not emphasized. From the above philosophical research frameworks, the study incorporates ontological, epistemological, methodological, methods and axiological foundations.

5.5   Research Philosophies in Information Systems Research

The most commonly used research philosophies in IS research include interpretivism, critical philosophy and positivism (Orlikowski & Baroudi, 1991). These research philosophies are discussed below.

5.5.1   Interpretivist Philosophy

The ontological locus of interpretivism is that of relativism. Proponents of relativism affirm that reality is subjective and depends on individual consciousness (Guba & Lincoln, 1994). Consciousness enables individuals to 'birth' meaning to the world mediated by their senses (Crotty, 1998). Thus, reality exists on an individual basis; which implies that there are as many realities as individuals (Crotty, 1998; Guba & Lincoln, 1994). Language directly shapes reality (Frowe, 2001). Therefore, the reality is constructed from the interplay between language and characteristics of an independent world. The interpretivism epistemology is subjective whereby a researcher becomes fully involved with the individual subject. Interpretivist research is introspective because it aims at identifying hidden social forces and structures.

This type of research uses strategies such as case studies, phenomenological technique and hermeneutics. Individual variables are identified through the interplay between researchers and the researched (Guba & Lincoln, 1994) with the researched as the pivot (Creswell, 2009). The interpretivists usually use grounded theory (Cohen, Manion & Morrison, 2007). The research questions used are broad to ensure that the researcher gets the necessary information from the researched. In the case of data collection, interpretivists may use interviews, open-ended questionnaires, focus group discussions and open-ended observations. Qualitative data is

generated by the interpretivists when they interact with the researched. This type of research can be considered reliable and valid if the evidence is provided. While this philosophy was not the pivot of the study, interviews were used as a follow up on questionnaires.

5.5.2 Critical Philosophy

Myers and Klein (2011) affirm that the position of critical philosophy deals with the social issues pertaining to freedom, power, social control, and values geared towards the development of information technology. This type of philosophy embeds research that can enhance understanding of information technology professionals and also improve practice. This is where structured contradictions are objectively known by removing tacit ideological biases (Lincoln & Guba, 2000). Lincoln and Guba (2000) argue that the purpose of this philosophy is to remove misconceptions so that people are empowered to change the world. Lincoln and Guba (2000) add that this approach involves research subjects so that misconceptions are identified and removed. Furthermore, Lincoln and Guba (2000) indicate that this approach is explicitly carried out and uses deductive and inductive reasoning. Research methods include field research, historical analysis (archival analysis) and dialectical analysis. The quality of this philosophy is ensured through historical perspective, erosion of ignorance, misapprehensions, and action stimulus.

There are three elements of critical research namely: insight, critique, and transformative redefinition (Myers & Klein, 2011). Insight aims at providing a broad understanding of the current situation before engaging in critical research. This could include a careful interpretive analysis and diagnosis of the social situation. The second element draws on critiquing to reveal a normative basis of the current research situation pertaining to the research site and forms legitimation that governs society. Critiquing cannot be separated from insight, that is to say; for one to critique, one must be insightful. Transformation deals with proposing improvements to human existence. Myers and Klein (2011) argue that critical research is built on the above principles. Thus, the principles of critical research include use of core concepts from critical theorists, taking a value position, revealing and challenging prevailing beliefs and social practices. In addition, there are also principles of individual emancipation, improvements in society and improvements in social theories. Since this research was not built on the principles of critical theorists, this philosophy was not applicable.

5.5.3 Positivism Philosophy

This philosophy was propounded by Auguste Comte (Crotty, 1998). The ontological locus of positivism is that of realism. Realism is of the view that the researched is independent of the researcher (Cohen et al., 2007). Making sense of the researched is mediated by language (Frowe, 2001). Positivist epistemology is grounded in objectivism which implies that the meaning resides in the researched (Crotty, 1998). Theoretically, a researcher is expected to outline the assumptions underlying their research (Crotty, 1998). Crotty (1998) observes that the theoretical research perspective of positivist that is underpinned by the objectivist approach is inclined towards methodologies such as experimental and survey designs. From Crotty (1998) perspective, it is believed that methodology is viewed as a way of carrying out research with reference to the research setting and participants while considering the methods. Evidence is sought through direct experience and observation. In essence, techniques such as random sampling are used (Scotland, 2012).

In addition, this philosophy attempts to generate laws which form a basis for prediction and generalisation (Scotland, 2012). Positivists control variables and generally use quantitative data (Scotland, 2012). Methods are means used for data gathering and analysis (Crotty, 1998). The positivist philosophy normally uses quantitative methods such as the SAQ for data collection and statistical data analysis (Flick, 2011). This philosophy is fit for the study because the research was carried out deductively with the aim of collecting quantitative data and analysing data using statistical techniques such as cluster analysis. Mingers (2011) suggests that axiological issues are important in positivist research.

5.6 Choice of Research Philosophy

It is advisable for researchers to identify a particular research philosophy for the study (Walsham, 1995). This is because the choice of a particular philosophy gives direction to the study. Choice of research philosophy is guided by the nature of the paradigm (Mimbi, 2013). A paradigm is a field or discipline of speciality (Kuhn, 2012). Kuhn (1996) elaborated that a paradigm comprises symbolic generalisations, shared commitments, beliefs in particular model, values and exemplars. Symbolic generalisations are rules that govern a given scientific discipline. Shared beliefs are customs common across a particular discipline, forexample theories used in a particular discipline. Values are standards that pertain to a particular scientific

discipline. Exemplars are particular scientific problems and the methodologies used to solve them. Guba (1990), adds that paradigms can be distinguished according to their ontological, epistemological and methodological perspectives.

Galliers (1992) indicates that the choice of research philosophy is dependent on a number of reasons. These include the nature of the study, whether it is theory building, theory extension or theory testing (Dobson, 2002) or the purpose of enquiry. Borrowing a leaf from the above authors, the research incorporated the nature and purpose of the study. Since the study intended to test theories stated as hypotheses, for a positivist approach which is deductive in nature was more suitable. The research aimed at identifying predictors of successful adoption of e-learning. With reference to the literature reviewed, the adoption of TSL, the university learning environment, and individual factors have been identified and measured quantitatively. Secondly, there is a relationship between the studied variables which justifies the positivist logic. For example, the interplay between the university learning environment and the human-agent are related to the adoption of e-learning.

According to (Davison & Martinsons, 2011, as cited in Mimbi, 2013; Mingers, 2001) quantitative data has inherent weaknesses. Given the preceding reason, a mixed research approach was adopted whereby qualitative data was also collected. The mixed research approach is vital in understanding research problems than a single approach (Greene, Caracelli, & Graham, 1989). Therefore, this study largely adopted the positivist paradigm which is quantitative and deductive in nature but with the incorporation of qualitative data. One can argue that the study was simulated along with the positivist research philosophy.

5.7   Deployed Philosophy for the Study

The researcher took on positivist philosophy considering ontological, epistemological, methodological perspectives as well as methods used and the axiological stand. Ontologically, the study took on an objective ontological view which is realistic in nature (Burrell & Morgan, 1979). Objectivists believe that social reality is created independent of humans. In other words, the research is independent of the researcher. In this case the researcher presented the self-administered questionnaires (SAQs) to the respondents and the respondents reacted independently. Epistemologically, the study considered the positivist approach, which is deductive in nature in which case, the hypotheses were tested (Chen & Hirschheim, 2004). In

order to test the hypotheses, the methodology was quantitative, survey and cross-sectional in nature. Crotty (1998) adds that the methodology, methods and review of epistemology are inter-related. The survey design for instance deals with scientific observation and testing of hypotheses. In such a design, the questionnaire method is suitable. The study also considered the mixed method approach whereby data was also collected by administering interviews to respondents since the use of a single approach has its own weakness. The methods included data quality control, collection and analysis techniques. The axiological debate considered ethical values of the University of Cape Town and the environment of the respondents.

CHAPTER SIX

RESEARCH DESIGN

6.1   Assessment of Predictors of Successful Adoption of E-learning through Perceptions

The aim of this study was to assess predictors of successful adoption of e-learning in universities in Uganda. This assessment was accomplished through perceptions, which are mental opinions about a public issue (Perrin & McFarland, 2011). They argue that perceptions can be studied using surveys. However, perceptions are challenged by non-responses and obscurantism among other issues (Schuman & Presser, 1980; Perrin & McFarland, 2011). Non-response may result from a lack of uniformity in questions, respondents may not know the answers or they may be careless while answering the questionnaire (Perrin & McFarland, 2011). Obscurantism may cause respondents not to understand, thus alternative responses may arise (Schuman & Presser, 1980). To address the above challenges, researchers may use the "uncertain" filter (Schuman & Presser, 1980), pre-tests (Schaeffer & Presser, 2003) and interview techniques (Perrin & McFarland, 2011). For this study, the researcher used interviews.

Bakkabulindi (2007) and Ngamau (2013) indicate that the adoption of technological innovations may depend on organizational or both individual characteristics among other factors. Individuals' perceptions of these characteristics are vital in explaining the adoption of technological innovations (Ngamau, 2013). These perceptions may be indicators of successful or unsuccessful adoption. Perceptual differences can also be rooted in individuals (Kundi et al., 2010). Thus this study therefore used lecturers' and students' perceptions to understand the contribution of organisational and individual factors in encouraging the use of e-learning facilities in universities in Uganda. To ensure that all objectives were effectively fulfilled, the researcher adopted quantitative, mixed and cross-sectional research designs.

6.2   Quantitative, Survey, Mixed and Cross-sectional Designs

Methodologically, as already stated, quantitative, survey, mixed and cross-sectional research designs were used (Greene et al., 1989; Kelley, Clark, Brown & Sitzia, 2003; Bakkabulindi, 2007; Creswell, 2013). The above designs are explained below.

6.2.1   Quantitative Research Design

The quantitative research design was chosen in this research because it is based on testing of theory and variables from which generalisations are made (Popper, 1980). In addition:

> *Quantitative research is, as the term suggests, concerned with the collection andanalysis of data in numeric form. It tends to emphasize relatively large-scale and representative sets of data, and is often, falsely in our view, presented or perceived as being about the gathering of `facts (Blaxter, Hughes & Tight, 1996, p. 61).*

Quantitative research can be descriptive, experimental or causal (Williams, 2007). Descriptive research is basic and seeks to assess phenomena in their current state. It involves the identification of attributes about a phenomenon through observation or exploration (Williams, 2007). It is not intended to show causal relationships between variables (Oppenheim, 1992). Experimental research investigates two groups of cases to reach a conclusion. This type of research is classified as pre-experimental, true experimental, and quasi-experimental (Williams, 2007). In the pre-experimental research, the independent variable is perceived to be constant or no random selection of a control group. In true experimental research, there is control of the experiment and 'validity' measure is a very important aspect. This type of approach usually uses structured models in data analyses.

The quasi-experimental design involves non-random selection of study respondents and may be carried out informally. Causal research design is intended to examine relationships between variables in a given population (Williams, 2007). The design is at times referred to as explanatory research design and can also be used to test a theory (Zikmund, Babin, Carr, & Griffin, 2012). Causal design is important in identifying reasons behind different processes as well as assessing the impacts of changes on existing processes. This design can be replicated if the need arises and it is associated with a greater level of validity as a result of efficient sampling techniques that are used in the selection of subjects. From the above designs, the researcher opted to use the causal design after mapping the objectives of the study to the designs. The present research aimed at identifying predictors of successful adoption of e-learning,

investigating causes of failure of past e-learning information systems initiatives and developing a predictive framework for the advancement of e-learning programmes in universities. Achieving the given objectives required an explanatory design that supported theory testing thus the causal research design was adopted for this study.

6.2.2 Survey Design

The field of IS favours the use of the survey design which is directly applied to the positivist paradigm (Mingers, 2003). The survey approach was chosen because it is the most appropriate method for the positivist paradigm which was adopted in the present study. To mention but a few, the following steps have been suggested to be part of a survey (Oppenheim, 1992): determining the study aims; review of relevant literature; conceptualisation of the study; determining the study design and assessing if it is possible to be carried out; determining hypotheses to be investigated and making the hypotheses in relation to the study situation. This includes identification of variables and how they are to be operationalised; designing research instruments; selection of the individuals to be approached, and planning sampling strategy.

The study sought to accomplish the following research aims or objectives:

i.   To identify predictors of successful adoption of e-learning in universities in Uganda.

ii.   To investigate the causes of the failure of past e-learning information systems initiatives in universities in Uganda.

iii.   To develop a predictive framework for e-learning programmes in universities.

Relevant literature was reviewed in relation to the concept of learning, the learning process and the challenges involved in traditional learning and adoption models in Chapter Two. In Chapter Three, the concept of innovations, adoption and theories that are used in the study were reviewed. The literature on the alignment concept has been discussed in Chapter Four.

The survey design was feasible for this study since the research was underpinned by the positivist epistemology which is deductive in nature. Indeed, the statement of the title in question, i.e., *E-learning in Universities in Uganda, Predictors of Successful Adoption* suggested an objectivist epistemology. The following explanatory variables; university learning environment and human-agent characteristics were investigated while the adoption of e-learning

was regarded as a response variable. From these variables, the study hypothesised that the greater the alignment between the university learning environment and human agent, the more the: (i) intention to use; (ii) innovative use; and (iii) acceptance of e-learning in universities will be.

6.2.2.1   Research site, population, sampling, and data collection tools.   The survey approach determines population, sampling means and data collection tools (Kelley et al., 2003; Oppenheim, 1992).

6.2.2.1.1 Research site.   One of the most important aspects of a survey design is the site from which data is to be collected. These sites (universities) were considered because they had indicators of low adoption of e-learning (Gwamba et al., 2018). In general, the researcher considered the parent population of all lecturers and students in the main headquarters of the public universities shown in the figure below.

Figure 8. 1: Location of the Main Headquarters of the Public Universities Selected for the Study

Source: My Google Maps (2016)
Key
        Makerere and Gulu Universities

6.2.2.1.2 Population. All lecturers and students in Makerere and Gulu universities. The target population included both teaching staff (lecturers) and undergraduate students of Makerere and Gulu Universities. Undergraduate students were considered because they numbered most

users of e-learning facilities compared to postgraduates (Kintu et al., 2017). Makerere University is well established (Nabushawo et al. 2018) while Gulu University is relatively new to knowledge and use of e-learning tools (Gulu University, 2017). Secondly, both of these universities offer similar courses in Agricultural Science, yet their e-learning adoption levels in these courses are low. Makerere University was established in 1922 while Gulu University in 2002 (Gulu University, 2017; The National Council of Higher Education, 2006).

6.2.2.1.3 Sampling (for quantitative data). This subsection considered the sampling strategy and determination of the sample size. In the sampling strategy, different sampling levels were indicated and the schemes that were used. After discussing the sampling strategy, the research indicated how the sample size was determined.

6.2.2.1.3.1 Sample strategy (for quantitative data). The Uganda National Council for Higher Education (2019) indicates that Uganda has over 30 universities, both public and private. Given the fact that considerable government funds have been invested in public universities to aid various developments (Gulu University, 2017; Uganda National Council of Higher Education, 2017; Mbabali, 2018, December 24), it was viable to conduct research about the public universities. At the first level of sampling, Makerere and Gulu universities were purposively chosen from the other universities because of the level of knowledge and use of e-learning technology in these universities. Coupled with the above, is the fact that these universities have tried to deploy e-learning in their functions and thus qualify to be representatives of public and private universities depending on their establishments (Gulu University Report, 2017; Gwamba et al., 2018).

The study aimed at identifying University Colleges, Schools, Faculties and Departments in relation to the adoption of e-learning technology. Selection of the College, School, Faculty and Department was done using purposive sampling because of the low levels of adoption of e-learning technology (Gulu University, 2017; Makerere University Report, 2017). Within the departmental set-ups, the number of teaching staff (lecturers) and students were determined using simple random sampling because students and lecturers are the main users of e-learning facilities at this level (Bervell & Umar, 2017). Determination of sample size was aided by Krejcie and Morgan (1970) Tool see Table 8.2. For instance, from a population of 75 lecturers in

Makerere University in the three departments of the School of Agricultural Sciences, the target sample size was 63 as per Table 8.2. Table 8.1 indicates the sampling strategy adopted for this study.

Table 6.1: Sampling Strategy and Adoption Levels of E-learning across Makerere and Gulu universities

	High Adoption		Low Adoption	
	Makerere	**Gulu**	**Makerere**	**Gulu**
Purposive sampling	College of Computing and Information Sciences (Excluded)	Faculty of Science (Excluded)	College Agriculture and Environmental Studies (Included)	Faculty of Agriculture and environment (Included)
Purposive sampling	School of Computing and Informatics Technology (Excluded)	Department of computer science (Excluded)	School of Agricultural Sciences (Included)	Department of Agricultural studies (Included)
Simple random sampling			Three Departmental set-ups	One Departmental set-up

Source: Makerere University Report (2017); Gulu University, 2017.

6.2.2.1.3.2 Determination of sample size (i.e. quantitatively). After establishing the population of participants, their sample sizes were determined using Krejcie and Morgan's (1970) Tool (see Appendix 1). A sample is a portion that acts as a representative of a whole (Onwuegbuzie & Collins, 2007). It should be noted that the sample size for a population of 33 is not indicated and thus a researcher would either opt for 28 or 32 as the minimum sample required. At first the researcher had opted for a minimum sample of 28, but managed to collect data from 32 respondents among lecturers in Gulu University. Thus, the researcher opted for the sample size of 32. Krejcie and Morgan (1970) indicate that sample sizes can vary from minimum to maximum. Makerere and Gulu universities were purposively selected from other universities mainly based on the level of knowledge and use of e-learning technology in these two universities. Both lecturers and students were selected randomly since they are the main users of

the e-learning technologies in their departments. Table 6.2 indicates the universities, population, targeted sample size and sampling techniques used.

Table 6.2: Quantitative Sample Sizes of Teaching Staff and Students' from Agricultural Units in Makerere and Gulu universities with Sampling Techniques Used

Category	Population	Targeted size	Sampling techniques
Makerere University			Purposive
Lecturers	75	63	Simple random
Students	172	118	Simple random
Gulu University			Purposive
Lecturers	33	32	Simple random
Students	181	123	Simple random

Source: Makerere University Admissions Board (2017); Makerere University Appointments Board (2017; Gulu University Appointments Board (2017); Gulu University Admissions Board (2017).

Table 6. 3: Response Rate

Category	Intended	Attained	Percentage
Makerere University			
Lecturers	63	41	65%
Students	118	79	67%
Gulu University			
Lecturers	32	32	100%
Students	123	105	85%
Grand Total	**336**	**257**	**76%**

Table 6.4 indicates that both lecturers and students from Gulu University were willing to fill in the questionnaires as opposed to their counterparts in Makerere. Lecturers in Gulu scored a percentage response of 100 while those in Makerere scored 65. On the other hand students in Gulu had a percentage response of 85 while their colleagues in Makerere had 67.

6.2.2.1.4 Data collection instrument 1. Survey design uses questionnaires, which are data collection tools (Oppenheim, 1992). Oppenheim (1992) also shows that questionnaires may include mail, self- and group-administered ones. Mail questionnaires are usually sent through the post office, self-administered questionnaires (SAQs) are presented to the respondent by the

interviewer, while group ones are presented to a group of respondents. Furthermore, a questionnaire may include attitude scales. Saunders et al. (2007) indicate that questionnaires are one of the most suitable instruments for collecting quantitative data. The SAQs were used because they require little time, they do not require extended writing, are low-cost, make group comparisons easy, and are useful for testing specific hypotheses and require less interviewer training (Oppenheim, 1992).

Additionally, the SAQs (see Appendices 2 and 3) were used because the sample population was literate (Trochim, 2006). The SAQs had cover letters; descriptive variables, dependent variable, and independent variable sections, structured as shown in the tables below. The development of the SAQ to measure factors that predict successful adoption of e-learning in universities in Uganda was achieved by reviewing the literature to identify constructs and variables. The SAQ constructs and variables were mainly measured by using a five-point Likert scale. The Likert scale was chosen because it produces valid measurements (Harris & Salomone, 1981). Descriptive variables of the SAQ were 2(A.1), 2(A.2), 2(A.3) and 4(A.4) respectively.

The SAQ consisted of five main constructs, namely: Adoption of e-learning/ TSL, University Learning Environment, Human-Agent, Management Dimension and Individual Dimension. Adoption of TSL consisted of Intention to Use, (INTU1-INTU5), Innovative Use, (INU1 – INU3) and Acceptance, (ACC1-ACC5) variables. University Learning Environment was operationalised as Goal of University e-learning Policy, (GUELP1); Availability of Time to Experiment with ICT, (ATIEXICT1); Availability of Financial Support, (AFS1) and Commitment of Management, (COMAN1) as variables. Human-Agent was operationalised according to Age, (AGE1– AGE5); Gender, (GEN1– GEN2); and Level of Education, (LEDUC1- LEDUC5). To investigate the causes of failure of past TSL ISs initiatives, the management and individual dimensions were incorporated. The management dimension was broken down into: Structured Approach that Aids Management of E-Learning Environment being limited, (STRUL1); Empowerment by University Management being inadequate, (EMPI1) and Rules and Regulations that Aid E-Learning being insufficient (RUREI1). The individual dimension comprised Inability to Use E-Learning, (IUSE1); Discomfort with E-Learning, (DIS1) and Discrepancy in Knowledge on E-learning Between Teachers and Students (DIPKEL1).

Table 6.4: Development of SAQ to Measure Factors that Predict Successful Adoption of E-Learning in Universities in Uganda

SAQ Constructs		No. of Variables	References
Descriptive Information		Refer to Table 6	Refer to Table 6
Dependent Variable	Adoption of Technology Supported Learning	5(INTU1–INTU5)	Brown (2002); Chang & Tung (2008); Davis (2009); Lee et al. (2009)
		3(INU1 – INU3)	Drent & Meelissen (2008)
		5(ACC1 – ACC5)	Alharbi & Drew (2014); Lee et al. (2009)
Adoption of TSL	Intention to Use	5(INTU1–INTU5)	Brown (2002); Chang & Tung (2008)
	Innovative Use	3(INU1 – INU3)	Drent & Meelissen (2008)
	Acceptance	5(ACC1 – ACC5)	Alharbi & Drew (2014); Davis (1989); Lee et al. (2009); Yiong, Sam & Wah (2008)
Independent Variables	University Learning Environment	Refer to Table 6	Refer to Table 6
	Human-Agent	Refer to Table 6	Refer to Table 6
	Management Dimension	Refer to Table 6	Refer to Table 6
	Individual Dimension	Refer to Table 6	Refer to Table 6

Table 6.5: Development of the SAQ to Measure Factors that Predict Successful Adoption of E-Learning in Universities in Uganda (continued)

SAQ 1 Constructs		No. of Variables	References
Descriptive Information	Section 1	1(EMAIL1)	
		1(LPTO1)	
		1(ELLAB1)	
		1(UNI1 – UNI2)	
University Learning Environment	Goal of University E-learning Policy	1(GUNIELP1)	Czerniewicz & Brown, (2009); Drent & Meelissen (2008); Duze (2009); Orlokowski

			(1992)
	Availability of Time to Experiment with ICT	1(ATIEXICT1)	Bugos, Nelson & Dixon, (2009); Drent & Meelissen (2008); Liang & Bonk, (2009)
	Availability of Financial Support	1(AFS1)	Drent & Meelissen (2008)
	Commitment of Management	3(COMAN1)	Drent & Meelissen (2008); Vance (2006); Weihrich (1993)
Human-Agent	Age	5(AGE1–AGE5)	Rogers (2003)
	Gender	3(GEN1–GEN3)	Bakkabulindi & Namirembe (2011); Holy Bible (n.d)
	Level of Education	5(LEDUC1–LEDUC5)	Esplen and Jolly (2006)
Management Dimension	Structured Approach that Aids Management of E-Learning Environment being Limited	1(STRUL1)	Kasse & Balunywa (2013)
	Empowerment by University Management in Relation to E-learning	1(EMPI1)	Hardaker & Singh (2011)
	Rules and Regulations that Aid E-Learning being Insufficient	1(RUREI1)	UNESCO Institute for Statistics (2014)
Individual Dimension	Inability to Use E-Learning	1(IUSE1)	Winch et al. (2010)
	Discomfort with E-Learning	1(DIS1)	Brown (2002)
	The discrepancy in Knowledge on E-Learning between Teachers and Students	1(DIPKEL1)	Ssekakubo et al. (2011)

The researcher selected factors that predicted the intention to use, innovative use and acceptance of e-learning to develop a predictive framework for e-learning programmes in universities.

6.2.3 Mixed Design

This design combines both quantitative and qualitative techniques (Greene et al., 1989). Given the fact that each technique has its own weaknesses, the mixed design has been advocated by several scholars (such as Greene et al., 1989 and Spratt et al., 2004). This particular study was largely quantitative with a little qualitative approach using interviews as a follow-up. The following sub-section discussed the interview method, sampling strategy, process of disseminating the interview among other important issues.

6.2.4 Interview Method

The interview method is used in qualitative research design. Qualitative research attempts to understand a phenomenon in its natural setting mostly in educational environments and processes (Denzin & Lincoln, 2003). Qualitative data can be collected using observations, interviews, document review and researcher's impressions and reactions (Myers, 2009). The interview method was adopted in this study as a means of compensating for the limitations of the quantitative design to enhance the rigour of the research findings (Mingers, 2001). Qualitative data aims at exploring issues about a given problem if very little is known about it (Domegan & Fleming, 2007). Myers (2009) argues that qualitative research is useful in understanding respondents and their social and cultural contexts in which they exist. This design was very vital in capturing subjective data by use of active probes to collect latent opinions (Perrin & McFarland, 2011). In qualitative research, different knowledge claims, enquiry, data collection and analysis approaches are employed (Creswell, 2003). Thus, this method was meant to compensate for the irregularities in the quantitative method.

6.2.4.1 Interview instrument. Interviews can be categorised as structured, unstructured and semi-structured (Stuckey, 2013). The structured interview questions are asked in a way that the data required is controlled. An unstructured interview is the opposite of the structured and usually uses narratives. The semi-structured interview uses an interview protocol to guide the researcher and allows the researcher to engage the participant so that the required data is solicited. In this case, the interviewee asked questions depending on an underlying structure to some extent. These semi-structured interviews are used when a researcher wants to know the

information they are interested in; wants to take an account of a face value and when there are open questions that address specific issues (Martin, 2016). Interviews allow a researcher to probe the respondent (Stuckey, 2013).

The technique of carrying out interviews is based on studying examples and consulting research experts. The researcher engaged with the main steps of developing a sequential questionnaire. Additionally the researcher has been attentive to avoiding jargon and leading questions to fulfil content validity.

6.2.4.2 Sampling (for qualitative data). Similarly, to the sampling sub-section in the survey discourse, this subsection considered the sampling strategy and determination of the sample size.

6.2.4.2.1 **Sampling strategy (for qualitative data).** The process of sampling is vital to both quantitative and qualitative studies (Onwuegbuzie & Collins, 2007). While developing sampling strategies, it is important to understand the time orientation that is whether sample selection will take place concurrently or sequentially and then the relationship between quantitative and qualitative samples (i.e. are the samples identical or not). Sample schemes can be random or non-random; Onwuegbuzie and Collins (2007) indicate that many researchers commonly use random sampling for quantitative and non-random sampling for qualitative studies. The researcher used purposive sampling in a non-random, identical and concurrent way. Thus, this study applied purposive sampling for qualitative data to complement simple random sampling.

There are several typologies of purposive sampling; these include: maximum variation, homogeneous, typical case, extreme/deviant case, critical case, total population and expert sampling (Etikan, Musa & Alkassim, 2016). According to Etikan et al. (2016), maximum variation sampling is characterised by collecting data about respondents with different characteristics. They also conceptualise homogeneous sampling, as sampling concerned about collecting data from respondents with similar characteristics. In their description of typical case type, they argue that it involves setting a bar to the distinctive characteristics of the respondent. They further elaborate that the extreme case type focuses on respondents with unusual characteristics. 'Critical case' is perceived to be commonly used at the beginning of the research where there isa need to gain an in-depth understanding of a study and funds are limited. In this

case, a limited number of participants are selected. Total population sampling is one where the entire population that meets the requirements is used. This typology is best applied when the entire population is small.

Expert sampling calls for experts in that particular field, hence the sample is composed of experts only. Given the fact that the research involved students and lecturers from two public universities, purposive sampling used given the attribute of homogeneity. Purposive sampling helps to understand the theoretical framework and is mainly dependent on the experience and willingness of people to participate.

6.2.4.2.2 Determination of sample size (for qualitative data). In either study the researcher must determine the size of the sample and the mode of selection. Brannen (2012) indicates that there is no rule of thumb in determining participants in qualitative studies. Determining the number of participants in qualitative research depends on a number of reasons. Determining interviews at the inception of the project is a complex issue. Adler and Adler (2012) suggest that samples sizes in qualitative research can vary from 1, 100 or more depending on the time a project lasts. They suggest that between 12 and 60 participants can be chosen for qualitative studies. However, the choice of interviewees can also depend on the methodological and epistemological perspectives (Adler & Adler, 2012). Becker (2012) argues that it is important for the researcher to understand the purpose of the study and come up with the number of interviewees. For this reason, he upholds that the number of interviewees changes as researchers learn more.

Mason (2012) advises that the desired outcome should be the basis of choosing a fewer or greater number. She indicates that the quality of analysis of an interview and the time taken are paramount issues (Mason, 2012). Additionally, Mason (2012) posits that qualitative studies should develop convincing narratives based on richness, complexity and detail rather than statistical reasoning. Doucet and Charmaz (2012) argue that researchers should get a clear understanding of the research environment to successfully answer the question of how many. That is to say, they need to know what constitutes excellency rather than adequacy; evidence that satisfies their supervisors, peers and readers and then make decisions on the sample size. Flick (2012) indicates that the time needed to complete the research project is an important issue. He laments that there is a time lag in finding and keeping in touch with participants and the

institutional demands of the ethics committees. He suggests that while other factors, such as methodological and epistemological issues are on many levels most guiding, time is the central factor in determining the number of interviews.

Guest, Bruce and Johnson (2006) indicate that 12 participants can be appropriate for thematic analysis in relatively homogenous studies. The research used Guest et al.'s (2006) approach by interviewing 12 participants. This is because the quality of an interview is based on the trained ability of the researcher, time and politics within the project. The researcher chose three participants from each category of respondents, amounting to 12 respondents, which is the appropriate number for thematic analysis in relatively homogeneous studies. The qualitative sample size refers to six lecturers, three from Makerere University and three from Gulu University, and six students, again three from Makerere University and three from Gulu University.

Table 6.6: Qualitative Sample Sizes of Teaching Staff and Students from Agricultural Units in Makerere and Gulu universities

Category	Population	Sampling techniques
Makerere University:		Purposive homogeneous
Lecturers	3	Purposive homogeneous
Students	3	Purposive homogeneous
Gulu University:		Purposive homogeneous
Lecturers	3	Purposive homogeneous
Students	3	Purposive homogeneous

Table 6. 7: Summary of Respondent Profile of Teaching Staff and Students from Agricultural Units from Makerere and Gulu universities

University	Title
Makerere University	Professor
Makerere University	Senior lecturer
Makerere University	Assistant lecturer
Makerere University	Student leader
Makerere University	Student
Makerere University	Student leader
Gulu University	Professor
Gulu University	Senior lecturer
Gulu University	Assistant lecturer
Gulu University	Student leader

Gulu University	Student
Gulu University	Student leader

6.2.5 Cross-sectional Design

It is important to demarcate the time frame in which any project should be carried out. The cross-sectional design is meant to demarcate the time frame (Flick, 2011). It is argued that cross-sectional studies take place at a particular point in time (Creswell, 2013; Flick, 2011). The advantage of cross-sectional study design is that it permits researchers to compare many different variables at the same time. One could, for example, look at the possession of an email address and personal laptops across universities. This research, therefore, used a cross-sectional design.

6.3 Methods

Methods used included data quality control, collection and analysis techniques. These included data quality techniques such as validity and reliability of SAQ.

6.3.1 Data Quality Control Techniques

Data quality control was used as a technique to ensure the quality of the data collected. Thus, it was accomplished through validity and reliability techniques.

6.3.1.1 Validity control. Validity is the extent to which an instrument measures what it is supposed to measure (Oppenheim, 1992). The researcher addressed the issue of validity quantitatively and qualitatively in sub-sub section 6.3.1.1.1 and 6.3.1.1.2 respectively.

6.3.1.1.1 Quantitative validity control. Two main forms of validity that have been reported: internal and external validity (Bhattacherjee, 2012). To ensure internal validity is achieved, the researcher omitted extraneous variables so that changes in the response to variables is caused by the hypothesised explanatory variables. If a cause happens, then effect also happens. Thus, a cause must appear before effect, and so there is no alternative explanation. In this case extraneous variables were excluded from the questionnaire. In addition, the developed constructs in the questionnaire were enriched by past e-learning literature. External validity was achieved

by making generalisations from the sample to the population or other people, organisations, contexts or time. For example, the results from this study were generalised to other universities.

6.3.1.1.2 Qualitative validity control. Oppenheim (1992) earlier indicated that there are four main forms of validity that have been reported; these include content, concurrent, predictive and construct validity (Oppenheim, 1992). Content validity is concerned with assessing whether items in an instrument are well balanced. Concurrent validity is assessing how well, the test correlates items in the instrument. Predictive validity assesses how the test forecasts some future criterion (independent variable) while the construct one is concerned with how well a test is related to theoretical assumptions about an abstract construct. The researcher opted for content validity whereby research experts who are conversant with research method practices were consulted to check whether the questions in context could get the data needed to support the research (Ozkan & Koseler, 2009; Sun et al., 2008). In addition, the developed question concepts were derived from past studies or researchers (i.e. literature review).

6.3.1.2 Reliability control. *Reliability is termed as consistency (Oppenheim, 1992).* Reliability of a research instrument is a very vital aspect of research (Kim, 2009). Numerous IS scholars have used internal consistency as a measure of reliability in their quantitative studies (Mimbi, 2013). The randomisation of questionnaire items is one of the approaches suggested by Straub, Gefen and Boudreau (2005) that is used to prevent respondents from leading responses. Nevertheless, it is acclaimed that the internal consistency of the instrument should be measured to indicate how suitable the instrument is to gather data that can generate reliable results. Reliability of the research instrument was accomplished by computing Cronbach's alpha (Cronbach 1951) to establish the reliability of the SAQ via Statistica Version 13.3. The Cronbach's alpha is a Coefficient alpha (α) that estimates the item-specific variance in a uni-directional test (Cortina, 1993). Straub et al. (2005) commend Cronbach's alpha test over other reliability tests in IS research. Tavakol and Dennick (2011) indicate that the acceptable Cronbach's alpha coefficients should range between 0.7 to 0.95 to provide a good measure of internal consistency. Nunnally and Bernstein (1994) indicate that an alpha of 0.6 threshold is deemed high enough for exploratory studies like the present one.

Table 6.8: Reliability Measure Using Cronbach's Alpha

Construct	Cronbach's alpha coefficient (lecturer SAQ)	Cronbach's alpha coefficient (student SAQ))
Intention to use	0.69	0.64
Innovative use	0.86	0.67
Acceptance	0.60	0.70
University Learning Environment	0.77	0.73
Management Dimension	0.76	0.68
Individual Dimension	0.76	0.68

6.3.2 Primary Data Collection Method

Data collection was accomplished through the mixed-method approach (Saunders et al. 2007). Primary data collection was mainly accomplished through the use of two SAQs; one for teachers (lecturers) and one for students. SAQs are normally used where the sample population is literate (Trochim, 2006), thus suitable for this particular study. As a follow-up on data that was collected through SAQs, the researcher also used interview protocols (i.e. one for teaching staff/ lecturers and the other for students). The researcher carried out this exercise by using research assistants where necessary.

6.3.2.1 Questionnaire process. The process required the researcher to introduce herself to the management at both agricultural units. For intsnace, the researcher established contact with the secretary in the dean's office, and as an ethical requirement, requested the dean to support her research at the public educational facility.

6.3.2.2 Interview process. Based on the permissions granted by the various authorities, the researcher introduced herself to the participants and addressed the objectives of her research. After presenting the questionnaire and the consent forms to the participants (see Appendices 8 and 9 for the statements of consent) and having given sufficient time for questions and answers, the researcher asked the respondents to carefully read and return the signed consent form within two weeks. During the presentation, the respondents were assured of ethics concerns such as confidentiality, voluntarism and presentation of findings.

All interviews were face-to-face encounters based on individual appointments with all respondents. Since the researcher was not financially stable, the interviews were taken manually. The researcher ensured that she was part of the research process using her trained abilities such as taking notes, being a good listener, engaging respondents and ensuring integrity (by being non-biased). The above argument was supported by Polsky (1998 [1967]:119) that:

> *Successful field research depends on the investigator's trained abilities to look at people, listen to them, think and feel with them, talk with them rather than at them. It does not depend fundamentally on some impersonal apparatus, such as a camera or tape-recorder….*

The way an interview is administered matters. In this study, the researcher used key informant interviews that were semi-structured in nature. Key informants included professors, senior lecturers and lecturers among teaching staff, and student leaders and students among students.

6.3.3 Data Analysis

Prior to data analysis, data were collected and cleaned by removing errors or inconsistencies. Data analysis was carried out using quantitative and qualitative analyses techniques since the study was based on mixed research design (see sub-sub-sections 6.3.3.1 and 6.3.3.2 respectively). The researcher first analysed quantitative responses, then qualitative ones from the lecturers, and then carried out an integrative analysis. The integrative analysis was vital in ensuring that the qualitative responses complemented the quantitative ones. This was the procedure followed, quantitative, qualitative and integrative analyses of the responses from students. Analysis of lecturer and student responses was carried out separately to have a clear understanding of each category of the respondents given the fact that these respondents have different roles in the adoption of e-learning technologies. Chapters Seven and Eight elaborate on lecturers' and students' analyses respectively. However, in Chapter Eight a comprehensive analysis strategy is used by combining the key results of the two categories of respondents. For instance, the results of lectures and students are put together to create a common platform for

advancing e-learning programmes. The following two sub-sections (i.e. 6.3.3.1 and 6.3.3.2 respectively) expound on how quantitative and qualitative analyses were carried out.

6.3.3.1 Quantitative data analysis. Data analysis was carried out by using descriptive and inferential tools via Statistica software version 13.3. Descriptive tools used for basic interpretations of data such as percentages, population means and standard deviations (SDs) were used for data analysis (Gay & Airasian, 2003). In this study, descriptive analysis was accomplished through using percentages, population means and standard deviations. Inferential analysis tools usually use samples to draw generalizations about populations (Gay & Airasians, 2003) and these may include t-tests, analysis of variance (ANOVA) using F-tests and sample means. For this study F-tests and standardised sample means were used.

Since there are interplays the researcher cannot measure the relationship between these variables using a linear approach. That is why the researcher decided to use the configuration/Gestalts approach. With this perspective, it is best to express alignment (the relationship) as a Gestalt, or a configuration, and measure it that way. Expressing alignment as a Gestalt or configuration implies that alignment is perceived as patterns. The configuration theory or Gestalts concepts tell us that a combination of variables (or patterns) that is well-aligned or coherent, or fit, will give the best results (Venkatraman, 1989). This research is trying to find that combination of the university learning environment and human agent that is more aligned or more coherent. Cluster analysis technique was used as an exploratory statistical technique to re-arrange data in patterns (Fonseca, 2013). The elements in the patterns are meant to have similar characteristics (Puni & Stewart, 1983). Cluster analysis assisted in identifying different patterns or configurations and also showed the best combined, in other words more coherent.

Cluster analysis can either use hierarchical or non-hierarchical algorithms (Ketchen & Shook, 1996). The hierarchical algorithm is based on a tree-like structure whereby elements can be added or deleted either using agglomerative and divisive methods (Ketchen & Shook, 1996). This algorithm has a poor cluster assignment resulting from a single traversing of the data set (Ketchen & Shook, 1996). The non-hierarchical algorithm uses K-means. This algorithm iterates through a dataset to partition it into a pre-specified number of patterns (i.e. in the current study, 6) to arrive at an optimal solution (Ketchen & Shook, 1996). This algorithm has a number of advantages, namely: being less affected by outlier elements, ability to optimize solution within-

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cluster homogeneity and heterogeneity and useful when propositions are pre-set. Given the benefits of non-hierarchical algorithms that were suitable for the collected data sets in question, the K-means algorithm was used to obtain responses of the university learning environment and human agents. These responses were appropriate to explain the predictors of successful adoption of e-learning among the respondents. This form of clustering reduced the number of observations by grouping them into smaller clusters (Burns & Burns, 2008). Data were carefully selected to ensure that there were no outliers and standardised before invoking the K-means algorithm.

6.3.3.2 Qualitative data analysis. Thematic analysis technique was used for qualitative data. This technique is used for uncovering themes or patterns in the data (Braun & Clarke, 2006). There are two types of thematic analyses namely: Inductive thematic analysis and deductive (theoretical) thematic analysis. Inductive thematic analysis is characterised by having themes strongly linked to the data however, the identified themes may not be correlated to the questions poised to the participants. This type of analysis is at times referred to as a bottom-up approach. Deductive thematic analysis is one in which the themes identified are dependent on the theoretical interest of the researcher in relation to what is being researched. This type of analysis is more researcher-driven and is at times referred to as a top-down approach (Braun & Clarke, 2006). Choice of qualitative thematic analysis technique depends on the coding approach the researcher intends to use (Braun & Clarke, 2006).

Braun and Clarke (2006) claim that if coding is carried out on specific questions or questions in relation to the research question, then the deductive technique is appropriate. Nonetheless, if the researcher prefers coding the data without a specific research question (that is to say the research question develops from the coding process) then the inductive thematic technique is suitable. Braun and Clarke (2006) suggest six steps that can be followed to ensure thorough thematic analysis but in a flexible way. These include familiarisation with the data, generating initial codes, searching, reviewing, defining and naming themes and producing the report/ reporting the analysis. As per this study, the interviews were taken manually, researcher familiarised herself with the data, coded, identified, reviewed, defined and named themes deductively in relation to the research question. The researcher analysed the data in detail with the aim of identifying features that gave the data that particular form and meaning since the area of e-learning is widely researched. While a number of themes emerged, the researcher made sure

that the most important themes were retained (Ryan & Bernard, 2003). The researcher identified over four main themes relating to factors that lead to successful adoption of e-learning. For practical thematic analysis, see section 7.4 and 8.4.

6.4   Ethical Issues

Prior to data collection, the researcher sought permission from the Ethics in Research committee from the University of Cape Town as well as permission from relevant authorities to undertake the research in the chosen public universities. Relevant authorities such as the Makerere University School of Social Science Research Ethics Committee and Uganda National Council for Science and Technology were contacted. The researcher considered the ethical values of the respondents and the environment in which they existed. MacDonald and Headlam (1986) maintain that the ethics of social research rotate around key six principles which are outlined as follows:

(i) Research should be designed, reviewed and undertaken to ensure integrity and quality.

(ii) Research staff and subjects must be informed fully about the purpose, methods and intended possible uses of the research, what their participation in the research entails and what risks, if any, are involved.

(iii) Confidentiality of information supplied by research subjects and the anonymity of respondents must be respected.

(iv) Research participants must participate in a voluntary way, free from any coercion.

(v) Harm to research participants must be avoided.

(vi)The independence of research must be clear, and any conflicts of interest or partiality must be explicit.

The views of the respondents were kept confidential and the respondents participated voluntarily (Babbie, 1990; MacDonald & Headlam, 1986). Research findings were presented anonymously. The questionnaires and interview protocols, samples of letters for ethical clearance, and consent forms are presented in the Appendices 2 to 9 respectively.

Table 6.9: Summary of Research Design

Component	Choice
Domain	Predictors of successful e-learning adoption
Research Strategy	Mixed methods: Largely quantitative, qualitative
Data collection instrument	SAQ, semi-structured interview
Data analysis	Statistical analysis: Frequency tables, cross-tabulations, t-tests, ANOVA and cluster analysis Deductive thematic analysis
Unit of analysis	Teaching staff and students
Subject	E-learning in universities in Uganda: Predictors of a successful adoption.

PART IV

RESULTS & DISCUSSIONS

CHAPTER SEVEN

FINDINGS AND DISCUSSION (LECTURERS' RESPONSES)

7.1   Descriptive Analysis

In order to gain a synopsis of the findings which results in clear understanding of the data collected, descriptive analysis is vital (Howard & Brown, 2000). The first presentation on descriptive analysis is a frequency table about the background information of lecturers (see Table 7.1).

Table 7. 1: Frequency Table Showing Background Information about Lecturers

Age Groups of Lecturers	Frequency	Percent
20 years and below	0	0.0
Between 21 and 30 years	12	16.4
Between 31 and 40 years	20	27.4
Between 41 and 50 years	27	37.0
51 years old and above	14	19.2
Total	**73**	**100.0**
Gender of Lecturers	**Frequency**	**Percent**
Male	59	81.0
Female	14	19.0
Total	**73**	**100.0**
Level of Education of Lecturers	**Frequency**	**Percent**
Bachelor's Degree	1	1.4
Postgraduate Degree	1	1.4
Master's Degree	28	38.4
Doctorate of Philosophy (PhD)	32	43.8
Post-doctorate Degree	11	15.0
Total	**73**	**100.0**
Possession of Email Address, Personal Laptop and Functionality of E-learning Laboratories in Universities.	**Frequency**	**Percent**
Do you have an email address?	73	100.0
Do you possess a personal laptop?	72	98.6
Do you have functional e-labs in your	52	71.2

Do not possess	Frequency	Percent
university?		
Do not possess	**Frequency**	**Percent**
Email address	0	0.0
Personal laptop	1	1.4
E-labs in your university	21	28.8
N: B E=Electronic E-lab=Electronic learning laboratory		
University to which Lecturers are Affiliated to	**Frequency**	**Percent**
Makerere University	41	56.0
Gulu University	32	44.0
Total	**73**	**100.0**

According to Table 7.1, most lecturers were between 41 and 50 years old (i.e. 27 or 37.0%), followed by the age group 31 to 40 years old (i.e. 20 or 27.4%). 81.0%, thus the majority of the respondents are male, while only 19.0% were female lecturers. Zuvic-Butorac et al. (2011) revealed that most science subjects are dominated by men as opposed to women. This may explain why there were predominantly more male respondents among Agricultural Science teachers. Most of the lecturers were PhD holders (i.e. 32 or 43.8%), followed by a smaller group of master's degree holders (i.e. 11 or 15%). It felt obvious that all lecturers would be familiar with using emails and therefore possess email addresses. Again, among lecturers the possession of laptops was widespread and almost 100 per cent (98.6%). The majority of the respondents (52 or 71.2%) confirmed that their universities had functional e-laboratories.

Descriptive analysis of means and standard deviations (SDs) for selected research variables was carried out as shown in Table 7.2. All data was simulated a long a Likert scale of 5 with research scales, for example, 1= Very little or no intention to use TSL (Technology Supported Learning) and 5= Very much intention to use TSL. Furthermore, descriptive analysis of the human agent presenting modal age, gender and level of education was presented in Table 7.3.

Table 7. 2: Descriptive Statistics for Selected Research Variables (n=73)

Variable		Mean[*]	Min	Max	Std. Dev.
Intention to Use					
ITU1	Computers	4.74	1	5	0.782
ITU2	CD-ROMs	3.07	1	5	1.557

ITU3	Web-based learning	4.14	1	5	1.058
ITU4	Video conferencing	3.71	1	5	1.448
ITU5	University e-learning environments	3.92	1	5	1.331
Innovative Use					
INU1	It enables me to prepare teaching materials	4.03	1	5	1.364
INU2	It enables me to make presentations in text, audio and visual	3.71	1	5	1.338
INU3	It enables me to interact with my students	3.42	1	5	1.413
Acceptance					
ACC1	Computers	4.81	1	5	0.616
ACC2	CD-ROMs	2.88	1	5	1.433
ACC3	Web-based learning	3.81	1	5	1.126
ACC4	Video conferencing	3.42	1	5	1.374
ACC5	University e-learning environments	3.63	1	5	1.429
University Learning Environment					
GUELP1	Goal of university e-learning policy	3.03	1	5	1.433
ATIEXICT1	Availability of time to experiment with ICT	3.12	1	5	1.258
AFS1	Availability of financial support	3.15	1	5	1.647
COMAN1	Commitment of management	3.18	1	5	1.362
Management Dimension					
STRUL1	Structured approach that aids management of e-learning environment being limited	4.01	1	5	1.047
EMPI1	Empowerment by university management in relation to e-learning (e.g. staff training) being inadequate	3.81	1	5	1.221
RUREI1	Rules and regulations (e.g. email discussion policies) that aid e-learning being insufficient	3.47	1	5	1.303
Individual Dimension					
IUSE1	Your inability to use e-learning technology effectively	3.15	1	5	1.469
DIS1	Your discomfort with e-learning technology	2.34			1.334
DIPKEL1	The discrepancy in knowledge on e-learning between teachers and students	3.03	1	5	1.404

* A score of 3.50 indicate that: the person has and there was "e.g. intention to use TSL or e-learning, encouragement on use of TSL facilities and "hindrance to the progress of TSL ISs" on the five-point Likert scale of 1(Very little or no: intention to use TSL, encouragement on use of TSL facilities, and hindrance to the progress of TSL ISs) and 5(Very much: intention to use TSL, greatest encouragement on use of TSL facilities and very much hindrance to the progress of TSL ISs).

Note: The university e-learning environments are software environments for example blackboard while the university learning environment is broader and encompasses the goal of university e-learning policy and availability of time to experiment with ICT among others.

The lecturers had 'very much' intention to use computers (ITU1=4.74) (see Table 7.2). They also had 'much' intention to use web-based learning (i.e. ITU3=4.14) among other variables. The lecturers could use e-learning facilities to prepare notes (INU1=4.03) and make presentations in text, audio and visual (INU2=3.71) to a 'much' extent. They indicated 'very much' acceptance for computers (ACC1=4.81) and 'much' acceptance for other facilities, for example web-based learning (ACC3=3.81). The same lecturers seemed to perceive that the university learning environment has a 'fair' role in encouraging their use of e-learning facilities/services (for example commitment of university management, COMAN1).

Besides the limited structured approach (STRUL1=4.01), the lecturers also perceived that inadequate empowerment (EMPI1=3.81) presented 'much' hindrance to the progress of the e-learning information systems in their universities. They seem to perceive that most of the individual factors have a 'fair' role in hindering the progress of e-learning ISs. For instance, the inability to use e-learning technology effectively (IUSE1=3.15). Table 7.3 shows the most frequent characteristics of a human-agent in the whole population (i.e. n=73).

Table 7. 3: Human-Agent   (n=73)

AGE	Most frequent age of lecturers	44 Years
GEN	Most frequent gender of lecturers	Male
LEDUC	Most frequent qualifications of lecturers	PhD

This paragraph gives a chronological presentation of the different sections after the descriptive analysis one. Section 7.2 is about cluster analysis results and section 7.3 explains thematic analysis results. This is because the researcher first analysed the quantitative data separately then the qualitative one to fit the mixed research design adopted for this study. Thereafter, an integrative analysis in section 7.4 is carried out. The integrative analysis is aimed at complimenting quantitative data with the qualitative one, see section 6.3.3 for similar details.

7.2   Cluster Analysis

Cluster analysis is a technique used to group responses into patterns (Ketchen & Shook, 1996). Ketchen and Shook (1996) indicate two main techniques of clustering, namely: hierarchical and non-hierarchical. In section 6.3.3.1, paragraphs 2 and 3, these clustering

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techniques are explained indicating the superiority of the non-hierarchical over the hierarchical. The non-hierarchical technique uses the K-means algorithm that is not greatly affected by outliers, provides the most effective solutions within-cluster homogeneity and heterogeneity and is appropriate for pre-set propositions. Due to the superiority of the K-means clustering algorithm over the hierarchical one which traverses a given data set once, the researcher opted to use the K-means clustering algorithm. For instance, the K-means algorithm was simulated six times on different cluster sets to get a cluster set with a significant outcome. The above algorithm was used on responses to questions that measure the interplaying variables (i.e. university learning environment and human agent). The said responses were suitable for explaining the predictors of successful adoption of e-learning among lecturers.

Standardisation was necessary to level the variations in the scales used for quantitative data collection. Standardised variables have a mean of 0 and a standard deviation of 1. A standard score indicates how many standard deviations the observed value or data point is above or below the mean value of what is measured. Hence, if a standard score is less than 0, the observation is less than the mean; a standard score equal to 0 represents an observation equal to the mean, a standard score greater than 0 indicates an observation greater than the mean. For instance, a standard score that is equal to 1 represents an observation that is 1 standard deviation greater than the mean (StatTrek.com, 2019), (See Table 7.4 and 7.5 for cluster results of lecturers). Table 7.4 indicates the measurement of the university learning environment and adoption of e-learning in universities in Uganda while Table 7.5 shows the Human-Agent results.

Table 7. 4: Cluster Analysis and Analysis of Variance for Lecturers

Variable		Cluster				ANOVA	p value
		1 (n=26)	2 (n=20)	3 (n=16)	4 (n=11)	F	
Adoption of e-learning in University							
	Intention to Use TSL						
ITU1	Computers	**0.28**	**0.08**	-0.63	**0.10**	3.12	0.03
ITU2	CD-ROMs	**0.45**	-0.56	-0.32	**0.42**	6.12	0.00
ITU3	Web-based learning	**0.34**	-0.18	-0.54	**0.30**	3.45	0.02
ITU4	Video conferencing	**0.28**	-0.01	-0.54	**0.14**	2.39	0.08
ITU5	University e-learning environments e.g. MUELE and Black-Board	**0.35**	**0.32**	-0.92	-0.07	8.27	0.00

	Innovative Use of TSL						
INU1	It enables me to prepare teaching materials	**0.46**	**0.49**	-1.30	-0.09	25.14	0.00
INU2	It enables me to make presentations in text, audio and visual	**0.53**	**0.29**	-1.19	-0.06	17.94	0.00
INU3	It enables me to interact with my students	**0.16**	**0.62**	-0.88	-0.24	9.62	0.00
	Acceptance of TSL						
ACC1	Computers	**0.31**	**0.23**	-1.01	**0.31**	9.40	0.00
ACC2	CD-ROMs	**0.43**	-0.47	-0.22	**0.15**	3.88	0.01
ACC3	Web-based learning	-0.14	**0.21**	-0.44	**0.57**	2.93	0.04
ACC4	Video conferencing	**0.19**	**0.13**	-0.72	**0.35**	4.12	0.00
ACC5	University e-learning environments e.g. MUELE and Black-Board	**0.07**	**0.61**	-1.09	**0.32**	14.59	0.00
University Learning Environment							
GUELP1	Goal of university e-learning policy	**0.28**	**0.33**	-0.72	-0.21	4.99	0.00
ATIEXICT1	Availability of time to experiment with ICT	**0.57**	**0.06**	-0.64	-0.53	7.91	0.00
AFS1	Availability of financial support	**0.39**	**0.36**	-0.66	-0.64	7.85	0.00
COMAN1	Commitment of management	**0.28**	**0.44**	-0.70	-0.45	6.64	0.00

Note: Positive values are indicated in bold while negative ones are not in bold. The university e-learning environments are software environments for example blackboard while the university learning environment is broader and encompasses the goal of university e-learning policy and availability of time to experiment with ICT among others.

Among the six simulations that were carried out on the lecturer data set, the fourth simulation produced sufficient results as shown in the table above. Only intention to use video conferencing had a p-value greater than 0.05 hence was not considered for further analysis and discussion. Thus, while considering lecturers' levels of adoption, a total of 12 items were considered not 13 since intention to use video conferencing facilities was excluded. Further presentation of cluster analysis is in the integrative analysis section. Table 7.5 indicates the measurement of the human-agent across the four clusters.

Table 7. 5: Human-Agent per Cluster

		Cluster 1	Cluster2	Cluster 3	Cluster 4	ANOVA F	p
Human-Agent							
AGE	Most frequent age of lecturers	48 Years	34 Years	46 Years	29 Years	18.91	0.00
GEN	Most frequent gender of lecturers	Male	Male	Male	Female	19.09	0.00
LEDUC	Most frequent qualifications of	PhD	Masters	PhD	Masters	13.32	0.00

lecturers						

Validating Clusters. Cluster validation is a way of ensuring that clusters generated by an algorithm have quality (Handl, Knowles & Kell, 2005). Cluster validation was achieved through the use of One-Way Analysis of Variance and confirming F-tests based on Fabi, Raymond and Lacoursiere (2009). One Way Analysis of Variance was used to assess equality of means across different cluster groups and uniqueness of each cluster while F-tests were used to prove the significance of variance among means across groups of cluster variables see Tables 7.4 and 7.5.

7.3   Results of Thematic Analysis of Lecturers Responses

Thematic analysis in this section is carried out on lecturers' responses. The thematic analysis of lecturers is presented with the aim of giving a clear and logical picture of the adoption of e-learning in universities in Uganda. The analysis was aided by Braun and Clarke (2006)'s six thematic analysis steps namely: familiarisation, generating initial codes, searching, reviewing, defining and naming themes and producing a report. The researcher has presented Tables 7.6 (about background information) and 7.7 (about the summary of themes) within the text because they are small in size. The rest of the Tables can be found in Appendices 10 to 13 respectively because of their large size.

Before thematic analysis, background information is presented (see Table 7.6.: Letter 'L' denotes lecturer). The data comprised individual data items (i.e. individual lecturer interviews) from which initial ideas or extracts were made. The researcher first familiarised herself with the data items and devised with the initial ideas by reading and re-reading the data. The researcher then captured features of interest (initial data codes) in an organised way across the entire data set (see Appendix 10). The researcher then searched or identified themes by grouping data relevant to a potential theme (see Appendix 11), then reviewed the themes to verify whether these themes are related to the coded extracts and the entire data set to form a thematic map (see Appendix 12).

Thereafter, the researcher refined the details of each theme and the analysis story by generating clear definitions and naming each theme. Thematisation was carried out until the researcher reached a saturation point (see Appendix 13). Finally, a summarised tabular report of the analysis was presented with overall themes and main themes considered including a number

of lecturers who contributed to a particular main theme (see Table 7.7). While the research question was posed on the factors that lead to successful adoption of e-learning in universities in Uganda, there was the need to understand what comprises the adoption process in these universities, the nature of the factors that aid adoption of e-learning in universities in Uganda. It was also important to know that users of these e-learning information technologies are part of e-learning ISs which systems are negatively impacted by certain factors. Thus, it was vital for the researcher to have a qualitative assessment of the causes of failure of past e-learning ISs initiatives as well.

Since the qualitative data were meant to complement the quantitative ones, the researcher used integrative analysis whereby the qualitative results were integrated with the quantitative ones in the next section after thematic analysis. Thus, the qualitative assessment was flexible in nature but related to the main research question. The analysis was suitable for the six-step approach of Braun and Clarke (2006) who advise that thematic analysis is flexible in nature but not static. From thematic analysis data, item sources, extracts, codes, constructs, themes, data and literature sources were provided in tables (see Appendices 10-13 and Table 7.7). Given the nature and purpose of the qualitative results, the researcher employed quantisation based on the prevalence of the theme lines across the data set (see Table, 7.7). The first presentation of qualitative analysis of lecturers' responses is about background information (see Table 7.6).

Table 7. 6: Background Information about Lecturers who provided Qualitative Responses

Background Information	Number of lecturers…
31 – 40 years	2
41 – 50 years	2
21 – 30 years	1
51 years and above	1
Male	5
Female	1
Bachelors degree	1
Masters degree	1
PhD	4
Possession of email address	6
Possession of personal laptops	6
Possession of functional e-learning laboratories in your university	4
Not sure whether their university possesses functional e-learning laboratories or not	2

| Makerere University | 3 |
| Gulu University | 3 |

Prior to codification of data, the researcher first familiarised herself with the data through reading and re-reading data items to come up with initial ideas. Appendix 9 is about the codification of data indicating data item source, data extracts and initial codes.

Table 7.7: Summary of Overall Themes and Main Themes Considered and Number of Lecturers who Contributed to a Particular Main Theme

Nature of adoption	Number of lecturers…
Already used computers.	6
Out datedness.	5
Awareness and use of web-based learning.	4
Lack of facilities.	5
Poor e-learning environments.	3
Lack of awareness of e-learning environments.	3
Knowledge and ability.	6
Skill in hyperlinks.	2
Lack of motivation.	1
Alternative communication channels e.g. email, Facebook and WhatsApp respectively	5; 2 and 1
Nature of learning environment	
E-learning policy.	6
Interest and value to use of e-learning.	4
Barriers – lack of financial resources to purchase hardware/software and training.	4
Lack of management commitment.	5
Management factors	
Enabling and impeding factors.	4
Financial constraints.	3
Lack of rules and regulations.	5
Poor priotisation.	4
Individual factors	
Negative attitude	2

Note: Overall themes are in bold while main themes are not in bold in the first column. Different occurrences on the number of lecturers… in a single theme are separated by a semi-colon (';') or the statement 'and'. The main themes resulted from the questions in the interview protocol while the overall theme was comprehensive in nature.

7.4   Integrative Analysis of both Qualitative and Quantitative Findings

This integrative analysis is based on lecturers as a unit of analysis incorporating qualitative results to complement the quantitative ones. This has been done with the aim of giving a clear understanding of the adoption of e-learning among lecturers. The researcher first presents an integrative analysis of qualitative with cluster results and then causes of failure of past e-learning ISs initiatives revealed in the qualitative and quantitative analysis of the lecturers' responses. Evidence from lecturers that are not presented in the main text can be found in Appendices 10 to 13 respectively.

7.4.1 Cluster 1 Analysis

Cluster 1 results indicate the greatest alignment between the configurational variables and therefore attained positive or successful adoption of e-learning (see Table 7.4). For instance, lecturers in Cluster 1 had much intention to use CD-ROMs (ITU1=0.45) (see Table 7.4). This is also confirmed by Lecturer L3, who revealed that CD-ROMs are used when necessary. Ajzen and Fishbein (1980) argue that one's intention to perform an action indicates readiness for that action. This may also contribute to the 'much' intention to use CD-ROM technology by these lecturers. Lecturers in this cluster also indicated that they had 'very much' innovative use of TSL. They could make presentations in text, audio and visual (INU2=0.53) (see Table 7.4). Thematic analysis results confirmed that lecturers had the knowledge and ability to use TSL (see Table 7.11). The lecturers also had 'much' acceptance of CD-ROMs (ACC2=0.43, see Table 7.4) probably because they are a means of accessing information as revealed by a Lecturer L3.

However, these respondents had negative acceptance of web-based services (ACC3=-0.14) (see Table 7.4). The 'little' acceptance of web-based services by these lecturers seemed to be due to the limited bandwidth to use and lack of knowledge about web-based services, as revealed by Lecturers L4 and L2 respectively.

All lecturers in this cluster perceived that the university learning environment encourages their use of e-learning facilities/services. All responses on university learning environment had above-average scores (see Table 7.4), but with some higher than others. For example, positive scores were revealed on: the goal of university e-learning policy (GUELP1=0.28), time to

experiment with ICT (ATIEXICT1=0.57), financial support (AFS1=0.39) and commitment of university management (COMAN= 0.28). The highest positive score in the university learning environment (i.e. ATIEXICT1=0.57) could imply that these lecturers can interact with ICT confidently, as revealed by a Lecturer L1. The second-ranking score in the said environment (i.e. AFS1=0.39) seems to be congruent to qualitative results by interviewee L6, who hinted that: there is a possibility of other lecturers being financially supported.

Responses on the human agent indicated that a typical lecturer in Cluster 1 was 48 years old, male by gender and at PhD level (see Table 7.5). The cluster results on gender and level of education are consistent with the interview results (see Table 7.6) whereby the majority of the interviewees were male and had PhD degrees. Khan et al. (2010) argues that teachers' pedagogical proficiency and qualifications attached to particular subject knowledge affects the adoption of e-learning. These lecturers could be adopters because of the knowledge and qualifications they possess. Unsurprisingly, Cluster 1 had the highest number of respondents with PhD and postdoctoral qualifications among the four clusters (i.e. n=16 and n=8 respectively).

Cluster 1 (n=26) had the highest number of respondents as well as the highest number of male lecturers among all the four clusters (see Table 7.4). These male lecturers could be the best adopters probably because they are more knowledgeable about e-learning technology compared to their counterparts in clusters 2 and 3. This is confirmed by their positive scores on the intention to use e-learning technology compared to cluster 2 and 3 male lecturers. The majority (18 or 69.2%) of the lecturers were from Makerere University (see Table 7.8). Gwamba et al. (2018) indicate that Makerere University has long-time experience with e-learning tools. Since Cluster 1 is dominated by lecturers from Makerere University, the long-time experience with e-learning tools could explain the high adoption levels in this cluster.

Table 7. 8: Cluster 1 – Profile of Lecturers

University	No. of Res	Percent	Age Group[*]					Gender		Level of Education[**]				
			1	2	3	4	5	M	F	1	2	3	4	5
Makerere	18	69.2	0	0	1	8	9	16	2	0	0	0	11	7
Gulu	8	30.8	0	0	2	5	1	8	0	0	0	2	5	1
Total	**26**	**100.0**	**0**	**0**	**3**	**13**	**10**	**24**	**2**	**0**	**0**	**2**	**16**	**8**
No. Res=Number of Respondents; M =Male; F=Female														

[*]*Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above*
***Key: 1= Bachelor's Degree; 2= Postgraduate Degree; 3= Masters Degree; 4= Doctorate of Philosophy (PhD); 5= Post-doctorate Degree*

Among the 26 respondents in this cluster, 24(92.3%) were male respondents while 2(7.7%) were female (see Table 7.8). Regarding the distribution of lecturers in relation to the level of education, 61.5% had Doctorate of Philosophy degrees (PhDs), followed by those with postdoctoral qualification by 30.8%; 7.7% were Master's degree holders.

Table 7.9: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Lecturers in Cluster 1

	Email address	Personal laptop	Functional e-learning labs in universities
Possess	26 (100.0%)	26 (100.0%)	19 (73.1 %)
Don't Possess	0 (0.0%)	0 (0.0%)	7 (26.9%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

All lecturers from the two universities had emails and laptops (see Table 7.10). Among all the 19 respondents who agreed that e-learning laboratories exist within their universities, 14 lecturers at Makerere University while five lectured at Gulu University (see Table 7.10).

Table 7.10: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 1

University	Number of Lecturers		
	Email address	Personal laptop	Functional e-labs in your university

Makerere	18	18	14
Gulu	8	8	5
Total	**26**	**26**	**19**

All these respondents had emails and laptops and a majority revealed that their universities had functional e-learning laboratories (see Tables 7.9 and 7.10). The results seem to suggest that these respondents use such ICTs to enhance the learning process. This is in line with The and Usagawa (2018) who uphold that ownership of technological innovations can increase their use.

7.4.2 Cluster 2 Analysis

This cluster is second in rank in relation to the adoption of e-learning because it attained moderate alignment between the configurational variables (see Table 7.4). As can be seen in the Table, the adoption levels of these lecturers are neither high nor low. It is unsurprising that they had high levels of adoption in comparison to their counterparts in Clusters 3 and 4. For instance, lecturers in Cluster 2 had standard positive scores on the innovative use of e-learning (for example INU=0.49) as opposed to those in Clusters 3 and 4. This implies that lecturers in Cluster 2 seem to use e-learning technologies to support their pedagogical practices, other than those of Clusters 3 and 4. Unlike lecturers in Cluster 1, these lecturers had much acceptance of web-based technology (ACC3=0.21) (see Table 7.4). It seems that these lecturers had realised the value of such e-learning technologies. However, the same lecturers indicated 'little' acceptance of CD-ROM technology (ACC2= -0.47). This could be due to the out-datedness of CD-ROM technology as reflected in the interview results presented in Table 7.7. It seems these lecturers were adopters because they seemed to be updated in the use of e-learning technology.

Cluster 2 respondents perceived that the university learning environment greatly encourages their ability to use e-learning facilities. All responses pertained to the university learning environment were above average (see Table 7.4). The scores on the goal of university e-learning policy (GUELP1=0.33), time to experiment with ICT (ATIEXICT1=0.06), financial support (AFS1=0.36) and commitment of university management (COMAN= 0.44) were positive. Qualitative response on the goal of e-learning policy by Lecturer L2 confirmed that the organisation has an e-learning policy. Regarding time to experiment with ICT, Lecturer L4 revealed that this depends on the interest and value attached by an individual to e-learning

technology. Evidence from L6 confirms that there is the encouragement of the lecturers to use e-learning facilities. Lecturer L6 stated that: *"…Some lecturers may be financially supported… my Dean tries to provide funds to acquire LCD projectors and Whiteboard markers"*.

On average, lecturers in Cluster 2 were aged 34 years, male by gender and held master's degree qualifications (see Table 7.5). These results are somehow similar to the qualitative ones in Table 7.6, whereby the majority of the interviewees were male lecturers with only one Master's degree holder. A comparison of human agent results of this cluster with the rest of the other cluster results (see Table 7.5) seem to suggest that the human agent had no impact on the adoption levels of e-learning in this cluster (see Table 7.6).

The majority (14 or 70.0%) of the respondents in Cluster 2 were from Gulu University, while 6(30.0%) were from Makerere University (see Table 7.11). It should be noted that Gulu University has minimum experience with the adoption of e-learning technology compared to Makerere University (Gulu University, 2017; Gwamba et al., 2018). This could explain the lower adoption levels of the respeondents in this cluster compared to those of Cluster 1 respondents where most of the lecturers were from Makerere University.

Table 7.11: Cluster 2 – Profile of Lecturers

University	No. of Res	Percent	Age Group*					Gender		Level of Education**				
			1	2	3	4	5	M	F	1	2	3	4	5
Makerere	6	30.0	0	3	1	2	0	5	1	0	1	4	1	0
Gulu	14	70.0	0	3	10	1	0	14	0	1	0	11	1	1
Total	**20**	**100.0**	**0**	**6**	**11**	**3**	**0**	**19**	**1**	**1**	**1**	**15**	**2**	**1**
No. Res=Number of Respondents; M =Male; F=Female														

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
***Key: 1= Bachelor's Degree; 2= Postgraduate Degree; 3= Masters Degree; 4= Doctorate of Philosophy (PhD); 5=Post-doctorate Degree*

Among the 20 respondents in this cluster, 19(95.0 %) were male respondents while 1(5.0% were female, see Table 7.11). The majority of the respondents (i.e. 15(75.0%)) were Master's degree holders, followed by those with PhD qualifications equivalent to 10.0% and each of the remaining educational levels contributed 5.0%.

Table 7.12: Possession of Email Address, Personal Laptops including Functional E-learning Laboratories in Universities and Number of Lecturers in Cluster 2

	Email address	Personal laptop	Functional e-labs in your university
Possess	20 (100.0%)	20 (100.0%)	14 (70.0%)
Don't Possess	0 (0.0%)	(0.0%)	6 (30.0%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

Out of the 20 respondents who had emails and laptops in each case, 14 were from Gulu University while six were from Makerere University. In relation to the possession of functional e-learning laboratories, nine lecturers were from Gulu University while five were from Makerere University, see Table 7.13.

Table 7.13: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 2

University	Number of Lecturers		
	Email address	Personal laptop	Functional e-learning labs in universities
Makerere	6	6	5
Gulu	14	14	9
Total	**20**	**20**	**14**

All respondents in this cluster had emails and laptops (see Tables 7.12 and 7.13). Most of the lecturers in Cluster 2 agreed that their universities had functional e-learning laboratories. Of the 20 respondents, 14(i.e. 70.0%) agreed that their universities had functional e-learning laboratories (see Table 7.13). While these findings seem to be similar to those of Cluster 1 members, lecturers in this cluster seem to have less knowledge on the use of these ICTs compared to Cluster 1. This is confirmed by the results in Table 7.4 whereby Cluster 1 members had a higher intention to use e-learning technology than Cluster 2 members. This phenomenon is supported by Rogers (2003) who indicated that people with more knowledge about a given innovation have a higher propensity for its use than those with lesser knowledge.

7.4.3 Cluster 3 Analysis

There was no adoption of e-learning among cluster 3 lecturers see Table 7.4. This was because there was no alignment between the configurational variables. This justifies the negative responses to the adoption of e-learning in this cluster (see Table 7.4). The lecturers in this cluster revealed that they had no: intention to use, innovative use or acceptance of e-learning technology. For instance, they had no intention to use e-learning environments (ITU5= -0.92), they could not confidently interact with their students using e-learning facilities (INU3= -0.88) and they did not show acceptance of the e-learning environments (ACC5= -1.09). The results are similar to the main themes in Table 7.7 which indicated that lecturers lack awareness of e-learning environments and the motivation to use e-learning technology.

The lecturers in cluster 3 also perceived that the goal of university policy, time to experiment with ICT, financial support and commitment of university management do not encourage their use of e-learning facilities. Negative standard scores were revealed for these variables, suggesting that the respondents actual responses on these questions were below average (i.e. GUELP1= -0.72, ATIEXICT1= -0.64, AFS1= -0.64 and COMAN1= -0.70 respectively). In an interview, Lecturer, L 4 confirmed that: *"I am not familiar with the e-learning policy and its goal at [this university]"*. Lecturer L4 also confirmed that: *"There isn't sufficient time to experiment with ICT…"*. Furthermore, the interviewed lecturers confirmed that the university management does not provide financial support and lacks the commitment to encourage the use of e-learning facilities (see Appendix 10 and Table 7.7).

A typical lecturer in this cluster was aged 46 years, male by gender and with PhD qualifications (see Table 7.5). The results on gender and level of education are consistent with the qualitative ones in Table 7.6 whereby the majority of the interviewees were male and PhD holders. While Cluster 3 seems to have similar human agent characteristics to those of Cluster 1, the adoption levels of these clusters have a distinct variance. Rogers (2003) expressed among other reasons, the opinion that non-adopters (laggards) are usually traditional and resentful of change. Cluster 3 members could be non-adopters because of their old-fashioned and resistance to change.

Bakkabulindi and Namirembe (2011) earlier confirmed that young people are better adopters of ICT than the older ones. This implies that the advanced age of these lecturers could well contribute to their inability to adopt e-learning technology. While these respondents seemed

to be highly educated, they may have held negative attitudes towards e-learning information systems. Such attitudes could explain their inability to adopt e-learning technology despite their advanced qualifications. This is confirmed from the qualitative results whereby the majority of the respondents were PhD holders (see Table 7.6); also, negative attitudes were registered as causes of failure of past e-learning information systems initiatives in Table 7.7.

The majority (10 or 62.5%) of the lecturers in this cluster were from Makerere University while minority (6 or 37.5%) were from Gulu University (see Table 7.14).

Table 7.14: Cluster 3 – Profile of Lecturers

University	No. of Res	Percent	Age Group*					Gender		Level of Education**				
			1	2	3	4	5	M	F	1	2	3	4	5
Makerere	10	62.5	0	0	1	7	2	8	2	0	0	2	6	2
Gulu	6	37.5	0	1	1	3	1	6	0	0	0	3	3	0
Total	**16**	**100.0**	**0**	**1**	**2**	**10**	**3**	**14**	**2**	**0**	**0**	**5**	**9**	**2**
No. Res=Number of Respondents; M =Male; F=Female														

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
**Key: 1= Bachelor's Degree; 2= Postgraduate Degree; 3= Masters Degree; 4= Doctorate of Philosophy (PhD); 5= Post-doctorate Degree

Among the 16 respondents in this cluster, 14(87.5 %) were male respondents while 2(12.5 %) were female (see Table 9.18). Most of the lecturers in this cluster — 9(56.0 %)— were PhD holders, followed by those with Master's degrees equivalent to 5(31.0 %), then by those with post-doctoral — 2(13.0%).

Table 7.15: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Lecturers in Cluster 3

	Email address	Personal laptop	Functional e-labs in your university
Possess	16 (100.0%)	15 (94.0%)	12 (75.0%)
Don't Possess	0 (0.0%)	1 (6.0%)	4 (25.0%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

Among the 16 lecturers who had emails in the two universities, ten were from Makerere University while six were from Gulu University (see Table 7.16). In view of the 15 lecturers

who had laptops across universities, ten were from Makerere University while five were from Gulu University (see Table 7.16). Out of the 12 lecturers who indicated that their universities had functional e-learning laboratories, seven were from Makerere University while five were from Gulu University (see Table 7.16).

Table 7.16: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 3

University	Number of Lecturers		
	Email address	Personal laptop	Functional e-learning labs in universities
Makerere	10	10	7
Gulu	6	5	5
Total	16	15	12

All lecturers in cluster 3 from both universities had emails. Only one lecturer never possessed a laptop. The majority (12 or 75.0%) of the lecturers in this cluster also felt that their universities had functional e-learning laboratories (see Table 7.15). The results of possession of ICTs are not so very different from Clusters 1, 2 and 4. While possession of ICTs may seem to increase the adoption of e-learning technology as indicated by The and Usagawa (2018) this is not the case with this cluster. While these lecturers had these ICTs, they were not in a position to use them to enhance the learning process because of the challenges involved in the integration of ICTs in the learning process. Past researchers such as Barton (2010), Al-adwan and Smedley (2012) and Stoltenkamp and Kasuto (2011), among others, have highlighted such challenges respectively. These may include obsoleteness of ICTs, financial constraints and resistance to change. It is not surprising that out datedness, financial constraints and negative attitudes have been registered as main themes from the lecturer responses in Table 7.7.

7.4.4 Cluster 4 Analysis

This cluster is ranked as the second last in relation to the adoption of e-learning among the four clusters. This means that there is a quite weak alignment between the configurational variables resulting in quite low adoption levels. Lecturers in this cluster had 'much' intention to use CD-ROM technology (ITU2=0.42) but 'little' intention to use university e-learning

environments (ITU5= -0.07). Lecturer L3 confirmed that CD-ROMs may be used when required, while the main theme, *"poor e-learning environments"* (see Table 7.7) is an indicator that such environments are insufficient. Findings also indicate that lecturers in this cluster have little innovative use of e-learning facilities compared to cluster 1 and 2 members. For example, (INU3= -0.24) revealed that these lecturers found it hard to interact with their students using e-learning facilities. Lecturers in Cluster 4 revealed high responses on the acceptance of TSL. For instance, the lecturers indicated 'very much' acceptance of web-based learning (ACC3=0.57). The finding is supported by the main theme *"Awareness and use of web-based learning"* indicating that such technology has been embraced (see Table 7.7).

These lecturers perceived that the university learning environment does not encourage their use of e-learning facilities. For example, there is no encouragement in the form of financial support to promote the use of e-learning facilities (AFS1=-0.64). Interviewees indicated that their universities lack financial resources to purchase e-learning facilities such as hardware and to train them on how to use such facilities (see Appendix 10 and Table 7.7).

Cluster 4 lecturers were 29 years old on average, female by gender and had Master's degrees (see Table 7.5). These lecturers seem to be adopters because of their gender. This cluster out-ranked all three clusters in relation to female respondents. The e-learning adoption levels of Cluster 4 respondents can best be explained by their gender. Egbo et al. (2011) confirms that more female respondents are adopters of technological innovations than their male counterparts. This could suggest that age and level of education did not contribute to the adoption levels in this cluster.

Cluster 4 had the least number (n=11) of respondents among the four clusters (see Table 7.4). The majority (7 or 63.6%) of the respondents lectured at Makerere University while the minority (4 or 36.4%) lectured at Gulu University see Table 7.17.

Table 7.17: Cluster 4 – Profile of Lecturers

University	No. of Res	Percent	Age Group*					Gender		Level of Education**				
			1	2	3	4	5	M	F	1	2	3	4	5
Makerere	7	63.6	0	1	4	1	1	1	6	0	0	3	4	0
Gulu	4	36.4	0	4	0	0	0	1	3	0	0	3	1	0
Total	**11**	**100.0**	**0**	**5**	**4**	**1**	**1**	**2**	**9**	**0**	**0**	**6**	**5**	**0**
No. of Res=Number of Respondents; M =Male; F=Female														

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
***Key: 1= Bachelor's Degree; 2= Postgraduate Degree; 3= Masters Degree; 4= Doctorate of Philosophy (PhD); 5= Post-doctorate Degree*

Among the 11 respondents 9(81.8%) were female while 2(18.2%) were male (see Table 7.17). Above-average of 6(54.5%) of the lecturers were Master's degree holders while 5(45.5%) were PhD holders.

Table 7.18: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Lecturers in Cluster 4

	Email address	Personal laptop	Functional e-learning labs in universities
Possess	11 (100.0%)	11 (100.0%)	7 (63.6%)
Don't Possess	0 (0.0%)	0 (0.0%)	4 (36.4%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

Seven of the lecturers who had emails were from Makerere University while four were from Gulu University (see Table 7.19). The respondents registered the same distribution for laptops as that of emails in the said universities (see Table 7.19). Five of the respondents who were in favour of their university possessing e-learning laboratories were from Makerere University while two were from Gulu University.

Table 7.19: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 4

University	Number of Lecturers		
	Email	Laptop	Functional e-learning laboratory

Makerere	7	7	5
Gulu	4	4	2
Total	**11**	**11**	**7**

All respondents in this cluster had emails and laptops. Among the 11 lecturers, 7(63.6%) in this cluster indicated that their universities had functional e-learning laboratories while 4 (36.4%) indicated otherwise (see Table 7.18). The possession of these ICTs could imply that these lecturers have marginal ability to use ICTs for learning. This is confirmed by their somewhat low adoption levels in Table 7.4, which is an indicator that these ICTs were seldom used by these lecturers to support the learning process. Although these lecturers had marginal knowledge about the use of e-learning technology, they were better adopters than their counterparts in Cluster 3 (see Table 7.4).

The causes of the failures of past e-learning information systems initiatives are due to management and individual factors. This observation is consistent with Heeks (2002) model for the setbacks of ISs in the development world. It should be noted that causes which are managerial in nature are sometimes considered to be organisational. Thus, the causes of failure of past e-learning ISs initiatives may also be organisational in the present case. Lecturers perceived that the limited structured approach and inadequate staff empowerment hinder the progress of e-learning ISs in Uganda to a much extent. The mean scores for both items were (STRUL1=4.01 and EMPI1=3.81) respectively (see Table 7.2). The corresponding qualitative results on the limited structured approach were similar to the quantitative ones. L2 said: *"There is nothing in place that facilitates e-learning".* In addition, L6 felt that the structure in place is 'fiction' based on boardroom decisions and poorly implemented. The findings on empowerment are also correlated with the qualitative ones whereby L2 confirmed that: *"The staff are not empowered since they are not provided with e-learning resources"*.

The qualitative results revealed that negative attitudes are individual factors that can hinder the advancement of e-learning information systems in universities.

CHAPTER EIGHT

FINDINGS AND DISCUSSION (STUDENTS' RESPONSES)

8.1   Descriptive Analysis

This chapter employs descriptive analysis to obtain a general picture of the findings thus gaining an insight into the data collected (Howard & Brown, 2000). Descriptive analysis of background information is presented in the form of frequencies (see Tables 8.1).

Table 8. 1: Frequency Table Showing Background Information of Students

Age groups of students	Frequency	Percent
20 years old and below	30	16.3
Between 21 years and 30 years old	151	82.1
Between 31 years and 40 years old	2	1.1
Between 41 and 50 years old	0	0.0
51 years old and above	1	0.5
Total	**184**	**100.0**
Gender of Students	**Frequency**	**Percent**
M	118	64.1
F	66	35.9
Total	**184**	**100.0**
M=Male while F=Female		
Level of Education of Lecturers	**Frequency**	**Percent**
Year 1	58	32.0
Year 2	76	41.0
Year 3	22	12.0
Year 4	28	15.0
Total	**184**	**100.0**
Possession of Email Address, Personal Laptop and Functionality E-learning Laboratories in Universities.	**Frequency**	**Percent**
Do you have an email address?	173	94.0
Do you possess a personal laptop?	71	38.6
Do you have functional e-labs in your university?	109	59.2
Do not possess	**Frequency**	**Percent**
Email address	11	6.0
Personal laptop	113	61.4
E-labs in your university	75	40.8
N: B E=electronic E-lab=electronic learning laboratory		
University to which students are affiliated	**Frequency**	**Percent**
Makerere University	79	42.9

| Gulu University | 105 | 57.1 | |
| **Total** | **184** | **100.0** | |

The majority (151 or 82.1%) of the students were aged between 21 and 30 years old (see Table 8.1). This Table indicates that the majority (118 or 64.1%) of the student respondents were male while (66 or 35.9%) were female respondents. This is in line with Zuvic-Butorac et al. (2011), who found that female students concentrated on humanities and Social Sciences, while their male counterparts were in engineering, natural science and ICT. Most (76 or 41.0%) of the students were in their second year of study, followed by those of first-year (i.e. 58 or 32.0%) (see Table 8.1). In relation to the possession of email, the majority of the students (i.e. 94.0%) had emails. Few (71 or 38.6%) students had laptops. This is because these students may not be in position to afford such gadgets. Most (109 or 59.2%) of the respondents revealed that there are functional e-laboratories in their universities. Table 8.1 indicates that most of the students (105 or 57.1%) were affiliated to Gulu University. For descriptive analysis of means and standard deviations (SDs) for selected research variables see Table 8.2. All the data simulations were based on a Likert scale of 5 with similar research scales used for the lecturer data set. Descriptive analysis of the human agent presenting modal age, gender and level of education of the whole population of students (i.e. n=184) is shown in Table 8.3.

Table 8.2: Descriptive Statistics for Selected Research Variables (n=184)

Variable		Mean[*]	Min	Max	Std. Dev.
Intention to Use					
ITU1	Computers	4.45	1	5	0.979
ITU2	CD-ROMs	2.83	1	5	1.468
ITU3	Web-based learning	3.84	1	5	1.344
ITU4	Video conferencing	3.59	1	5	1.449
ITU5	University e-learning environments e.g. MUELE and Black-Board	3.66	1	5	1.425
Innovative Use					
INU1	I am able to expound on what lecturers have provided to me in class using the Internet	3.79	1	5	1.334
INU2	I am able to make presentations in text, audio and visual	3.80	1	5	1.424
INU3	I am able to communicate with other students through online discussions, emails, wikis, and WhatsApp	3.71	1	5	1.496
Acceptance					
ACC1	Computers	4.52	1	5	0.941
ACC2	CD-ROMs	2.96	1	5	1.536

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ACC3	Web-based learning	3.75	1	5	1.388
ACC4	Video conferencing	3.59	1	5	1.376
ACC5	University e-learning environments e.g. MUELE and Black-Board	3.61	1	5	1.536
University Learning Environment					
GUELP1	Goal of university e-learning policy	2.97	1	5	1.408
ATIEXICT1	Availability of time to experiment with ICT	3.22	1	5	1.366
AFS1	Availability of financial support	2.73	1	5	1.544
COMAN1	Commitment of management	3.04	1	5	1.362
Management Dimension					
STRUL1	Structured approach that aids management of e-learning environment being limited	3.68	1	5	1.418
EMPI1	Empowerment by university management in relation to e-learning (e.g. student training) being inadequate	3.72	1	5	1.270
RUREI1	Rules and regulations (e.g. email discussion policies) that aid e-learning being insufficient	3.16	1	5	1.501
Individual Dimension					
IUSE1	Your inability to use e-learning technology effectively	2.89	1	5	1.448
DIS1	Your discomfort with e-learning technology	2.52	1	5	1.445
DIPKEL1	The discrepancy in knowledge on e-learning between teachers and students	2.96	1	5	1.369

* A score of 3.50 indicate that: the person has and there was "e.g. intention to use TSL or e-learning, encouragement on use of TSL facilities and "hindrance to the progress of TSL ISs" on the five-point Likert scale of 1(Very little or no: intention to use TSL, encouragement on use of TSL facilities, and hindrance to the progress of TSL ISs) and 5(Very much: intention to use TSL, greatest encouragement on use of TSL facilities and very much hindrance to the progress of TSL ISs).
Note: The university e-learning environments are software environments for example blackboard while the university learning environment is broader and encompasses the goal of university e-learning policy and availability of time to experiment with ICT among others.

Students mainly had 'much' intention to use e-learning technologies. For instance, they had 'much' intention to use computers (ACC1=4.52). The students indicated 'much' innovative use of e-learning technologies (for instance, they were able to make presentations in text, audio and video, INU2=3.80). They indicated that the university learning environment 'fairly' encouraged their use of e-learning facilities (for instance, availability of time to experiment with ICT, ATIEXICT1=3.22).

The students perceived that inadequate empowerment (EMPI1=3.72) and limited structured approach (STRUL1=3.68) contributed to 'much' hindrance to the progress of e-learning information systems in their respective universities. They seemed to believe that individual factors have a 'fair' role in hindering the progress of e-learning information systems.

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For instance, the discrepancy in knowledge on e-learning between teachers and students (DIPKEL1=2.96). See Table 8.3 for most frequent characteristics of the human-agent in the whole student population (i.e. n=184).

Table 8. 3: Human-Agent (n=184)

AGE	Most frequent age of students	25 Years
GEN	Most frequent gender of students	Male
LEDUC	Most frequent year of study of students	Year 2

This paragraph gives a chronology of the different sections that precede the descriptive analysis one. (Refer to Sections 7.1 and 6.3.3 for details of the rationale for the presentation and analysis in this subsection). Students' quantitative data was first analysed then the qualitative one. Section 8.2 gives students' cluster findings, followed by Section 8.3 that explains students' thematic analysis results. Section 8.4 integrates students' qualitative data with the quantitative one. Section 8.5 uses a comprehensive strategy to combine both lecturer and student results.

8.2   Cluster Analysis

The same algorithm (i.e. K-means clustering algorithm), software (i.e. Statistica Software version 13.3) and standardisation approach used for the lecturer respondents were deployed for student data analysis. Among several simulations that were carried out (i.e.1, 2, 3, 4, 5 and 6), only the sixth (6) one showed real results. All p values in the 6 simulations yielded p values less than 0.05 (see Table 8.4). Table 8.4 indicates the measurement of the university learning environment and adoption of e-learning in universities in Uganda across the six student clusters. Table 8.5 shows the measurement of the human agent across the said clusters.

Table 8. 4: Cluster Analysis and Analysis of Variance for Students

Variable		Cluster						ANOVA	p
		1 (n=37)	2 (n=38)	3 (n=19)	4 (n=42)	5 (n=24)	6 (n=24)	F	value
	Intention to Use TSL								
ITU1	Computers	**0.11**	**0.24**	**0.02**	**0.32**	**0.48**	-1.61	24.4	0.00
ITU2	CD-ROMs	-0.07	-0.74	**0.33**	**0.69**	-0.14	-0.05	11.09	0.00

ITU3	Web-based learning	-1.01	**0.37**	**0.35**	**0.58**	**0.39**	-0.72	25.02	0.00
ITU4	Video conferencing	-0.84	**0.31**	**0.31**	**0.59**	**0.31**	-0.79	18.93	0.00
ITU5	University e-learning environments	-0.56	**0.22**	-0.06	**0.59**	**0.29**	-0.78	11.59	0.00
	Innovative Use of TSL								
INU1	..expound on …	-0.25	**0.51**	-0.24	**0.65**	-0.13	-1.22	20.75	0.00
INU2	..text, audio and visual	**0.14**	**0.29**	-1.42	**0.49**	**0.52**	-0.92	26.71	0.00
INU3	…interact with....students	-0.51	**0.44**	-1.28	**0.61**	**0.49**	-0.45	24.49	0.00
	Acceptance of TSL								
ACC1	Computers	**0.23**	**0.23**	**0.07**	**0.39**	**0.34**	-1.79	34.39	0.00
ACC2	CD-ROMs	-0.21	-0.85	**0.50**	**0.92**	**0.18**	-0.52	25.79	0.00
ACC3	Web-based learning	-0.87	**0.41**	**0.07**	**0.64**	**0.33**	-0.81	22.19	0.00
ACC4	Video conferencing	-1.00	**0.27**	**0.29**	**0.67**	**0.57**	-0.86	31.69	0.00
ACC5	University e-learning environments	-0.65	**0.01**	-0.13	**0.64**	**0.66**	-0.69	15.29	0.00
	University Learning Environment								
GUELP1	Goal of university e-learning policy	**0.04**	**0.32**	-0.24	**0.78**	-0.99	-0.75	20.78	0.00
ATIEXICT1	..Time to experiment with ICT	**0.19**	-0.51	-0.69	**0.89**	-0.09	-0.40	16.36	0.00
AFS1	Availability of financial support	**0.12**	-0.51	-0.44	**1.05**	-0.53	-0.36	22.28	0.00
COMAN1	Commitment of management	**0.01**	-0.17	-0.57	**0.74**	-0.18	-0.39	8.35	0.00

Note: Positive values are indicated in bold while negative ones are not in bold. The university e-learning environments are software environments for example blackboard while the university learning environment is broader and encompasses the goal of university e-learning policy and availability of time to experiment with ICT among others.

Table 8.5: Human-Agent per Cluster

		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	ANOVA F	p
AGE	Most frequent age of students	26 Years	25 Years	25 Years	25 Years	26 Years	24 Years	3.56	0.00
GEN	Most frequent gender of students	Male	Equal number	Female	Male	Male	Male	4.26	0.00

			of male and female						
LEDUC	Most frequent year of study of students	Year 2	Year 2	Year 1	Year 2	Year 4	Year 1	40.9	0.00

Validating Clusters. Similarly to lecturer clusters, to ensure quality in the clusters generated, cluster validation was used (Handl et al., 2005). This was achieved by applying One-Way Analysis of Variance and confirming F-tests (Fabi et al., 2009). One-Way Analysis of Variance assessed the equality of means across the various cluster sets and uniqueness of each cluster. The F-tests, on the other hand proved the significance of variance among means across sets of cluster variables (see Tables 8.4 and 8.5).

8.3   Results of Thematic Analysis of Students' Responses

The presentation of students' results is also carried out with the aim of giving a clear and logical picture of the adoption of e-learning in universities in Uganda. The researcher first presented demographic characteristics see Table 8.6. The same approach used in lecturers' thematic analysis was the same used for students based on a recap of the Braun and Clarke (2006)'s six thematic analysis steps. For the rest of the thematic analysis results see Appendices 14 to 17.

Table 8. 6: Background Information about Students who provided Qualitative Responses

Background Information	Number of students
21 – 30 years.	6
Male	4
Female	2
Year 2	2
Year 3	2
Year 1	1
Year 4	1
Possession of email address	6

Possession of personal laptops	2
Possession of functional e-learning laboratories in your university	3
Do not possess laptops	4
Do not possess functional e-learning laboratories in your university	1
Not sure whether their university possess functional e-learning laboratories or not	2
Makerere University	3
Gulu University	3

Table 8.7: Summary of Overall Themes and Main Themes Considered and Number of Students who contributed to a Particular Theme

Nature of adoption	Number of students
Computer technology is the current trend.	5
CD-ROMs are rarely used even when they are convenient	2
Web-based learning is preferred	4
Video conferencing is invaluable	4
E-learning software is needed	3
Ability to use Internet and software applications such as MS Word, Excel, PowerPoint and Publisher	6
Integration of audio and visual technology in research and learning	4
Wide use of online media	6
Competence in computer use - knowledge and skills	5
Rare use of CD-ROMs	6
Awareness of web-based learning	4
Limited video conference technology	3
Limited use of e-learning software	3
Nature of learning environment	
E-learning policy not effectively implemented	6
Limited use of IT facilities	6
Barriers include a lack of financial support.	5
Indirect financial support in the form of payment for wireless technology in a limited range	1
Lack of commitment by University management	4
Managerial factors that cause the failure of e-learning ISs	
Absence of structures that aid e-learning	5
Lack of technical staff	6
Ineffective rules and regulations	3
No funding, no clear framework and poor management	4
Individual factors that cause the failure of e-learning ISs	
Lack of interest	6
Resistance to innovation and adoption	3

Overall themes are in bold while main themes are not in bold in the first column.

8.4 Integrative Analysis of Results

Integrative analysis of student responses was carried out using quantitative results complemented by the qualitative ones. This was carried out in order to give a clear understanding of the adoption of e-learning among students. Evidence from students that is not in the main text can be found in Appendices 14 to 17.

8.4.1 Cluster 1 Analysis

Cluster 1 respondents registered a 'quite weak' alignment between the configurational variables and thus attained quite a low adoption (see Table 8.4). This is why this Cluster 1 was ranked third in performance as far as the adoption of e-learning is concerned. Students in Cluster 1 registered negative standard scores on most of the adoption levels. For instance, the students had 'no' intention to use web-based learning (ITU3= -1.01) (see Table 8.4). This was confirmed by Student S5, who revealed that she did not understand web-based learning. From the same Table, results also indicate that students were unable to interact with their colleagues using e-learning facilities (INU3= -0.51). This implies that these students have not improved their learning practices using e-learning technologies. Additionally, students in this cluster registered negative standard scores on the acceptance of e-learning facilities. For instance, students did not indicate the acceptance of video conferencing facilities (ACC4= -1.00) (see Table 8.4). This could be due to a shortage of such facilities, as revealed by Student S1.

However, these students revealed a positive standard score on the intention to use computers (ITU1=0.11). This is consistent with Student S1, who commented that: *"I have the intention to use computers for academic purposes"*. A positive standard score on the innovative use was also revealed on students' ability to incorporate text, audio and visual technology. This indicates that these students had basic skills in the use of e-learning technology. Furthermore, the students in this cluster registered a positive standard score on the acceptance of computers (ACC1=0.23). This is supported by Students, S1, S2 and S6, who revealed that they use computers because of the current education trend which demands them to be computer literate, for academic purposes and they are easy to work with.

Students in this cluster felt that the goal of university e-learning policy (GUELP1= 0.04), time to experiment with ICT (ATIEXICT1= 0.19), availability of financial support (AFS1= 0.12)

and commitment of university management (COMAN1= 0. 01) encouraged their ability to use e-learning facilities or services (see Table 8.4).

Qualitative results from Students, S1, S4, S3 and S4 respectively had the following implications on the university learning environment: The goal of the e-learning policy encourages the use of e-learning facilities at a minimal level. Students practise with ICT and also believe that the university indirectly supports them financially by providing limited wireless fidelity. The university management is supportive by designing sessions on how to use computers.

A typical student in this cluster was 26 years old, male by gender and in his second year of study (see Table 8.6). While this human agent has similar characteristics with those of Cluster 6, they have tried to adopt e-learning technologies compared Cluster 6 students.

Among the 37 respondents, 20(54.1%) were from Makerere, while 17(45.9%) were from Gulu University (see Table 8.8).

Table 8.8: Cluster 1 – Profile of Students

University	No. of Res	Percent	Age Group[*]					Gender		Level of Education[**]			
			1	2	3	4	5	M	F	1	2	3	4
Makerere	20	54.1	1	17	1	0	1	18	2	3	13	3	1
Gulu	17	45.9	0	17	0	0	0	15	2	2	5	6	4
Total	**37.0**	**100.0**	1	34	1	0	1	**33**	**4**	5	18	9	5
No. of Res=Number of Respondents; M =Male; F=Female													

[*]*Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above*
***Key: 1= First year; 2= Second year; 3= Third year; 4= Fourth year*

The majority (33 or 89.0%) of the respondents were male while 4(11.0%) were female. Almost on average (18 or 49.0%) of the respondents in this cluster were year 2 students (see Table 8.8). The quantitative results are in line with the qualitative results whereby the majority of the students interviewed were male and also in their second year of study (see Table 8.6).

Table 8.9: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Students in Cluster 1

	Email address	Personal laptop	Functional e-learning labs in universities
Possess	35 (95.0%)	10 (27.0%)	20 (54.1%)
Don't Possess	2 (5.0%)	27 (73.0%)	17 (45.9%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets

Results from the two universities revealed that among the 35 students who had emails, 20 came from Makerere University while 15 were from Gulu University (see Table 8.10). Both universities had equal scores in relation to ownership of laptops. Among the 20 students who answered in favour of the existence of functional e-learning laboratories, 13 were from Makerere University while seven were from Gulu University.

Table 8.10: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 1

University	Number of Students		
	Email address	Personal laptop	Functional e-labs in your university
Makerere	20	5	13
Gulu	15	5	7
Total	**35**	**10**	**20**

The majority (35 or 95.0%) of the respondents in this cluster had emails, few (10 or 27.0 %) had laptops and above average (20 or 54.1%) were in favour of the view that their universities had functional e-learning laboratories (see Table 8.9). Qualitative results revealed that all the students had emails, few had laptops and while on average, the majority of these students believed that their universities had functional e-learning laboratories (see Table 8.6).

8.4.2 Cluster 2 Analysis

Cluster 2 registered 'moderate' alignment between the configurational variables in question (see Tables 8.4 and 8.5), thus ranking second as far as adoption of e-learning is concerned. For example, respondents in this cluster revealed 'much' intention to use web-based

learning (ITU3= 0.37). This was confirmed by Student S1, who revealed that: *"Web-based learning offers more information"*. Respondents in this cluster were 'very much' capable of expounding on what lecturers had provided to them in class using the Internet (ITU1= 0.51). This was through "surfing" the Internet, using the Google search engine as revealed by student S1. Respondents in this cluster registered 'much' acceptance of web-based learning (ACC3= 0.41). This is because web-based learning can be used for research work and expounding on what is taught in class by lecturers as revealed by Student S 1.

In relation to the university learning environment, respondents in this cluster agreed that the goal of university e-learning policy (GUELP1= 0.32) encourages their use of e-learning facilities. The quantitative results suggest that e-discussions can compel students to use e-learning facilities, as revealed by Student S3.

On average, students in this cluster were aged 25 years, the number of male students was equivalent to that of female ones and they were in their second year of study (see Table 8.5). These students could be better adopters than those of Cluster 1 because they seemed to have an equal gender distribution. Such distribution may account for an unequal educational technology use among Cluster 1 and 2 members who enjoyed a similar learning experience (see Table 8.5). Students of this cluster seemed to be better adopters than those of Clusters 1, 3 and 6 because of their ability to make use of the e-learning policy to their advantage (see Table 8.5).

Among the 38 respondents in this cluster, 25(65.8%) were from Gulu University while 13(34.2%) were from Makerere University (see Table 8.11).

Table 8.11: Cluster 2 – Profile of Students

University	No. of Res	Percent	Age Group*					Gender		Level of Education**			
			1	2	3	4	5	M	F	1	2	3	4
Makerere	13	34.2	3	10	0	0	0	6	7	4	8	1	0
Gulu	25	65.8	6	19	0	0	0	13	12	5	19	0	1
Total	**38**	**100.0**	**9**	**29**	**0**	**0**	**0**	**19**	**19**	**9**	**27**	**1**	**1**
No. of Res=Number of Respondents; M =Male; F=Female													

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
**Key: 1= First year; 2= Second year; 3= Third year; 4= Fourth year*

In this cluster, the majority (27 or 71.1%) of the students in their second year of study (see Table 8.11). This cluster had the highest (n=27) number of second-year students across the six clusters. The students in this cluster were better adopters than those of 3 and 6. This is because Cluster 2 students were more experienced in the use of e-learning technology than those in the said clusters. Qualitative results on the level of education in Table 8.6 were consistent with the quantitative ones whereby the majority of the interviewees were in their second year of study.

Table 8.12: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Students in Cluster 2

	Email address	Personal laptop	Functional e-learning labs in universities
Possess	37 (97.4%)	17 (44.7%)	18 (47.4%)
Don't Possess	1 (2.6%)	21 (55.3%)	20 (52.6%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

Table 8.13 indicates that Gulu University contributed bigger numbers (i.e. 24 and 12 respectively) of students with emails and laptops. The same table also revealed that Makerere University contributes a larger number (11) of students who believed that their university had functional e-learning laboratories.

Table 8.13: Possession of Emails Address, Personal Laptop including Functional E-learning Laboratories across Universities about Students in Cluster 2

University	Number of Students		
	Email address	Personal laptop	Functional e-labs in your university
Makerere	13	5	11
Gulu	24	12	7
Total	**37**	**17**	**18**

Among the 38 respondents, 37(97.4%) had emails, 17(44.7%) had laptops while 18(47.4%) believed that their universities were in possession of functional e-learning laboratories (see Table 8.12). Qualitative results on possession of emails are 'closely' similar to the

quantitative ones, whereby all interviewees had emails. Qualitative results on the possession of laptops are similar to the quantitative ones whereby few interviewees had laptops (see Table 8.6). For functional e-learning laboratories, qualitative results in Table 8.6 revealed three categories of opinion, namely: "average possession", "do not possess" and "not sure" which are dissimilar to the quantitative results.

8.4.3 Cluster 3 Analysis

The cluster showed 'low' alignment between the configuration variables thus resulting in low adoption levels. This cluster was registered as the fifth, as far as adoption of e-learning is concerned. The students in this cluster had 'much' intention to use TSL (for example the intention to use web-based learning, ITU3=0.35) (see Table 8.4). This is because web-based learning offers more information as revealed Student S1. However, respondents in this cluster had no innovative use of e-learning technologies (for example could not make presentations in text, audio and video, INU2= -1.42) see Table 8.4. This is an indicator that these students cannot use e-learning technology to improve their learning capabilities. The same students registered 'very much' acceptance of CD-ROMs (e.g. ACC2=0.50) (see Table 8.4). CD-ROM technology is accepted because it is cheap and stores information, as revealed by Students S1 and S3 respectively.

Students in this cluster perceived that the university learning environment never contributed to their use of e-learning facilities in any way, as reflected in the below-average scores (see Table 8.4). For example, students had no time to experiment with ICT (ATIEXICT1= -0.69). This could be because students never practise with ICT due to the fact that the course is "hectic" and the IT laboratories are usually closed over the weekend, as revealed by Student S1.

The most frequent age, gender and level of education of a student is 25 years, female and first-year respectively (see Table 8.5). These could be lower adopters of e-learning than members of clusters 2 and 5 because of their gender. This is because male respondents are known to be better adopters of technological innovations than their female counterparts (Bakkabulindi & Namirembe, 2011). Another plausible reason for the adoption levels in cluster 3 compared to clusters 2 and 1 could be the lack of innovative use of e-learning technology (see Table 8.4).

This cluster had the least number (n=19) of respondents among the six clusters. The majority (14 or 73.7%) of the students in this cluster were from Gulu University, while 5(26.3%) were from Makerere University see Table 8.14.

Table 8.14: Cluster 3 – Profile of Students

University	No. of Res	Percent	Age Group*					Gender		Level of Education**			
			1	2	3	4	5	M	F	1	2	3	4
Makerere	5	26.3	2	3	0	0	0	2	3	4	1	0	0
Gulu	14	73.7	1	13	0	0	0	6	8	7	6	1	0
Total	19	100.0	3	16	0	0	0	8	11	11	7	1	0
No. of Res=Number of Respondents; M =Male; F=Female													

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
***Key: 1= First year; 2= Second year; 3= Third year; 4= Fourth year*

Among the 19 respondents in Cluster 3, 8(42.1%) were male students while 11(57.9%) were female (see Table 8.14). Quantitative results on gender are not in line with the qualitative results whereby the majority of the interviewees were male (see Table 8.6). Most (11 or 57.9%) of the respondents from this cluster were first-year students (see Table 8.14). The preceding quantitative results are not in line with the qualitative results in Table 8.6, whereby only one interviewee was in the first year of study.

Table 8.15: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Students in Cluster 3

	Email address	Personal Laptop	Functional e-learning labs in universities
Possess	19 (100.0%)	5 (26.3%)	13 (68.4%)
Don't Possess	0 (0.0%)	14 (73.7%)	6 (31.6%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

The findings from Table 8.16 revealing that among the 19 respondents, the majority were from Gulu University, argued in favour of the possession of emails, laptops and functional e-learning laboratory in their universities. Results regarding ownership of emails, laptops and

functional e-learning laboratories in relation to Gulu University were equivalent to 14, 4 and 13 respectively.

Table 8.16: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 3

University	Number of Students		
	Email address	Personal laptop	Functional e-labs in your university
Makerere	5	1	5
Gulu	14	4	8
Total	19	5	13

All the 19 respondents in this cluster had emails. This could also increase the level interaction between these students in the learning process. The majority (14 or 73.7%) of the respondents in this cluster never had laptops, while the majority (13 or 68.4%) believed that their universities had functional e-learning laboratories (see Table 8.15). Qualitative results on emails and laptops are congruent to the quantitative results whereby all interviewees had emails and a few of them possessed laptops (see Table 8.6). The low laptop levels seem to minimise the adoption levels of these students as well. This may imply that these students may have limited time to practise with such technology. Unsurprisingly, time to experiment with e-learning indicated low scores in this cluster. Qualitative results on functional laboratories indicate varying responses, namely: "on average", "do not possess" and "not sure" (see Table 8.6), thus they do not parallel the quantitative results.

8.4.4 Cluster 4 Analysis

This cluster had the 'greatest' alignment between the configurational variables, hence had 'greatest' adoption of e-learning. Cluster 4 members therefore emerged as the best adopters of e-learning among the six clusters (see Table 8.4). This cluster had above-average scores on all adoption levels of e-learning. For instance, they registered 'very much' intention to use CD-ROMs (ITU2=0.69). They also had 'very much' capability to expound on what lecturers have provided to them in class using the Internet (INU1=0.65). This is because CD-ROMs are cheap as confirmed by Students S1 and S6. They also had 'very much' acceptance of CD-ROMs

(ACC2=0.92). This could be attributed to the fact that CD-ROMs can be used to store information as revealed by Students S1 and S3. These students were able to expound on what is taught in class through "surfing" the Internet using search engines (such as Google), as indicated by Student S1.

Students in this cluster perceived that the university learning environment encouraged their use of e-learning facilities. This is because students had above-average scores on the university environment (see Table 8.3). The goal of university e-learning policy scored (GUELP1= 0.78), availability of time to experiment with ICT scored (ATIEXICT1= 0.89), availability of financial support (AFS1= 0.05) and commitment of university management (COMAN= 0.74). For instance, during the interview process, Student S3 revealed that: *"... a discussion policy, for example, may improve adoption of e-learning because once e-discussions are made they can compel one to use the e-learning facilities".* Results from the interview process, unlike the ones in this cluster, revealed, however, that, the majority of the respondents never found time to practise with e-learning facilities. Quantitative findings in this cluster on financial availability could be related to those of Student S 3, who indicated that there was indirect financial support by their university through the provision of wireless technology. On the issue of management commitment, findings are in line with those of student, S 4, who felt that university management was committed because they designed computer literacy sessions for them.

The typical student in this cluster was 25 years old, male by gender and in year 2 of study the (see Table 8.5).

This cluster (n=42) had the majority of the respondents among the six clusters. Most of the respondents in this cluster (23 or 54.8%) belonged to Makerere University while 19(45.2%) belonged to Gulu University (see Table 8.17).

Table 8.17: Cluster 4 – Profile of Students

University	No. of Res	Percent	Age Group*					Gender		Level of Education**			
			1	2	3	4	5	M	F	1	2	3	4
Makerere	23	54.8	2	21	0	0	0	15	8	4	18	1	0
Gulu	19	45.2	7	12	0	0	0	12	7	12	0	5	2
Total	42	100.0	9	33	0	0	0	27	15	16	18	6	2
No. of Res=Number of Respondents; M =Male; F=Female													

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
**Key: 1= First year; 2= Second year; 3= Third year; 4= Fourth year*

The majority (33 or 78.6%) of the students in this cluster belonged to the second age group (see Table 8.17). The majority (27 or 64.3%) of the respondents in this cluster were male while a minority (15 or 35.7%) were female (see Table 8.17). Qualitative results in Table 8.6 on gender are consistent with the quantitative results whereby male interviewees numbered more than the female ones. Respondents in this cluster were distributed across all education levels. The qualitative results in Table 8.6 on level of education are congruent with the quantitative results where by the interviewees were chosen from all years of study.

Table 8.18: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Students in Cluster 4

	Email address	Personal laptop	Functional e-learning labs in universities
Possess	40 (95.0%)	18 (42.9%)	28 (66.7%)
Don't Possess	2 (5.0%)	24 (57.1%)	14 (33.3%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

All respondents in this cluster from Makerere University had emails. The majority (17) of the respondents from Gulu had emails. Few (i.e. 10 and 8 respectively) students from Makerere and Gulu universities had laptops. Findings further revealed that most (13) of the respondents in this cluster from Makerere University admitted that their university had functional e-learning laboratories. The majority (15) of the respondents from Gulu University indicated that their university had functional e-learning laboratories (see Table 8.19).

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Table 8.19: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 4

University	Number of Students		
	Email	Laptop	Functional e-labs in your university
Makerere	23	10	13
Gulu	17	8	15
Total	**40**	**18**	**28**

The majority (40 or 95.0%) of the students in Cluster 4 had emails, few (18 or 42.9%) had laptops and the majority (28 or 66.7%) 'agreed' that their universities possess functional e-learning laboratories (see Table 8.18). Qualitative results in Table 8.6 on possession of emails were almost similar to the quantitative results whereby all interviewees had emails. In view of had of laptops, qualitative results in Table 8.6 are parallel to the quantitative results whereby 'few' interviewees had laptops. For the possession of functional e-learning laboratories, the qualitative results in Table 8.6 were not consistent with the quantitative results whereby the interviewees revealed three responses: "average possession", "do not possess" and "not sure".

8.4.5 Cluster 5 Analysis

The alignment of the configurational variables seemed to be 'weaker' than that of Cluster 1 (see Table 8.4), thus, this cluster was ranked fourth. Students in this cluster had indicated 'much' intention to use computers (ITU1=0.48) (see Table 8.4). Qualitative results from Students S1, S2, S5 and S6, respectively revealed that students intended to use computers for academic purposes, as they were fast, suitable for simplifying work, and such technology is the current trend in education. 'Innovative use' results also revealed that students had 'very much' make presentations in text, audio and video (INU2=0.52) (see Table 8.4). Quantitative results on 'innovative use' in relation to making presentations in text audio and video technologies were consistent with the qualitative results of Student S5. This student commented that: *"...in addition to the use of applications such as MS Word, Excel, and PowerPoint, I can also use audio and visual technology".* In addition, acceptance of TSL also revealed very much acceptance of e-learning software environments (ACC5=0.66) (see Table 8.4).

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These respondents however, perceived that the university learning environment did not encourage their use of e-learning facilities. For instance, the goal of university e-learning policy registered a negative standard score (i.e. GUELP1= -0.99) (see Table 8.4). It seems that these respondents believed that the e-learning policy was not effectively implemented in the university as revealed by Student, S4.

A normal student in this cluster was 26 years old, male by gender and in year 4 of the study (see Table 8.5).

This cluster had 24 respondents in total. The majority (22 or 91.7%) of the students belonged to Gulu University while 2(8.3%) belonged to Makerere University (see Table 8.20).

Table 8.20: Cluster 5 – Profile of Students

University	No. of Res	Percent	Age Group[*]					Gender		Level of Education[**]			
			1	2	3	4	5	M	F	1	2	3	4
Makerere	2	8.3	0	2	0	0	0	2	0	0	0	1	1
Gulu	22	91.7	0	22	0	0	0	16	6	0	0	3	19
Total	**24**	**100.0**	**0**	**24**	**0**	**0**	**0**	**18**	**6**	**0**	**0**	**4**	**20**
No. of Res=Number of Respondents; M =Male; F=Female													

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
***Key: 1= First year; 2= Second year; 3= Third year; 4= Fourth year*

The majority (18 or 75.0%) of the respondents were male while a minority (6 or 25.0%) were female. Quantitative results on gender are consistent with the qualitative ones whereby the majority of the interviewees were male while the minority were female. The majority (83.3%) of the respondents in this cluster were in their fourth year of study while a minority (16.7%) were in their third year of study (see Table 8.20). These could be better adopters than Clusters 3 and 6 because of their long-time experience with e-learning, as reflected in their year of study compared to the said clusters (see Tables 8.4 and 8.5).

Table 8.21: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Students in Cluster 5

	Email address	Personal laptop	Functional e-learning labs in universities

Possess	24 (100.0%)	15 (62.5%)	18 (75.0%)
Don't Possess	0 (0.0%)	9 (37.5%)	6 (25.0%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

The findings in Table 8.22 revealed that the majority of the respondents in possession of ICTs and in support of the existence of functional e-learning laboratories belonged to Gulu University. Among the 24 respondents in possession of email and laptops, 22 and 13 respondents respectively belonged to Gulu University. Similarly, the majority (16) of the respondents arguing in favour of the existence of functional e-learning laboratories in their university, belonged to Gulu University.

Table 8.22: Possession of E-mail address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 5

University	Number of Students		
	Email address	**Personal laptop**	**Functional e-labs in your University**
Makerere	2	2	2
Gulu	22	13	16
Total	**24**	**15**	**18**

All (24) of the respondents in this cluster had emails, the majority (18 or 75.0%) had laptops and more (18 or 75.0%) indicated that their universities had functional e-learning laboratories (see Table 8.21). This cluster had a high distribution of ICTs across the six clusters. Thus, these students could be adopters because of the possession of such technologies. The and Usagawa (2018) highlight that possession of technological innovations increases the adoption of such innovations and aids the design of effective e-learning systems.

8.4.6 Cluster 6 Analysis

Similarly to Cluster 5, this cluster had 24 respondents (see Table 10.4). However, members in this cluster are coincidentally ranked as non-adopters of e-learning among the six clusters (see Tables 8.4 and 8.5). This is because there is no alignment between the

configurational variables, resulting in no adoption of e-learning. These respondents were not willing to use IT, could not modify their learning capabilities using IT, and had not realised the value of IT tools. All 24 respondents in this cluster 'concurred' that the university learning environment never encouraged their use of e-learning facilities. This could imply that students were not involved at all during the adoption of e-learning technology.

On average, students in this cluster were 26 years old, male by gender and in year 1 of the study (see Table 8.5). Being in their first-year of study could imply that they had little experience with the adoption of e-learning.

The majority of the respondents (16 or 66.7%) were from Makerere University while 'few' (8 or 33.3%) were from Gulu University (see Table 8.23). While the majority of these students were from Makerere University, they were in their first year of study. First-year students normally have little experience with e-learning compared to students in the second, third and fourth years of study.

Table 8. 23: Cluster 6 – Profile of Students

University	No. of Res	Percent	Age Group*					Gender		Level of Education**			
			1	2	3	4	5	M	F	1	2	3	4
Makerere	16	66.7	7	8	1	0	0	8	8	13	2	1	0
Gulu	8	33.3	1	7	0	0	0	5	3	4	4	0	0
Total	**24**	**100.0**	8	15	1	0	0	**13**	**11**	17	6	1	0
No. of Res=Number of Respondents; M =Male; F=Female													

Key: 1= 20 years old and below; 2= between 21 years and 30 years old; 3= between 31 years and 40 years old; 4= between 41 and 50 years old; 5=51 years old and above
**Key: 1= First year; 2= Second year; 3= Third year; 4= Fourth year

'Above-average' (13 or 54.2%) of the respondents were male while 'few' (8 or 45.8%) were female. The majority (17 or 70.8%) of the respondents in this cluster were first-year students (see Table 8.23). Quantitative results on gender were similar to the qualitative results whereby the majority of the interviewees were male. For the level of education, quantitative results were not aligned to the qualitative results because the majority of the interviewees were in either their second or third year of study.

Table 8.24: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories in Universities and Number of Students in Cluster 6

	Email address	Personal laptop	Functional e-learning labs in universities
Possess	18 (75.0%)	6 (25.0%)	12 (50.0%)
Don't Possess	6 (25.0%)	18 (75.0%)	12 (50.0%)

Note: Numbers of respondents are shown while their corresponding percentages are in brackets.

Among the 18 respondents who had emails, 15 belonged to Makerere University while 3 belonged to Gulu University. The majority (4) of the students who had laptops in this cluster belonged to Gulu University. On the issue of the existence of functional e-learning laboratories, the majority (8) of the respondents belonged to Makerere University (see Table 8.25).

Table 8.25: Possession of Email Address, Personal Laptop including Functional E-learning Laboratories across Universities in Cluster 6

University	Number of Students		
	Email address	Personal laptop	Functional e-labs in your university
Makerere	15	2	8
Gulu	3	4	4
Total	**18**	**6**	**12**

Seventy-five percent (18) of the respondents in this cluster had email, only 6(25.0%) had laptops, while 12(50.0%) were in support of the existence of functional e-learning laboratories in their university (see Table 8.24). Quantitative results on emails were almost similar to the qualitative ones whereby all interviewees had emails. In relation to ownership of laptops, quantitative results are parallel to the qualitative results whereby 'few' of the interviewees had laptops. Quantitative findings on possession of functional e-learning laboratories are partly in line with the qualitative ones whereby on average, the interviewees revealed that their universities had functional e-learning laboratories.

Similarly to the lecturer scenario, the causes of failure of past e-learning ISs initiatives claimed by students were management and individual factors. Students believed that the inadequate empowerment in relation to e-learning and limited structured approach were the

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causes of failure of past e-learning ISs initiatives in universities in Uganda. Both of these causes are affiliated to the management (organisational) dimension. The mean scores on these items were (EMPI1=3.72) and (STRUL1=3.68) respectively (see Table 8.2). Students attested during the interview process that there were no technical personnel to assist them and no special training sessions. Their qualitative views on the limited structured approach also indicated that there was an absence of structures (see Table 8.7). Thus, quantitative results were in line with the qualitative results on the inadequate empowerment and limited structured approach among students.

Qualitative results revealed that lack of interest and resistance to innovation and adoption are causes of failure of past e-learning ISs initiatives.

8.5 Summary of Findings

This chapter has provided a summary combining lecturers' and students' results together into a predictive framework for advancing e-learning programmes in Universities in Uganda. The university learning environment predictors included: acquaintance with the goal of university e-learning policy and availability of time to experiment with ICT. A typical lecturer was 48 years, male by gender with PhD qualification, while a typical student was 25 years old, male by gender and in the second year of study. The findings revealed that in the Ugandan context, adoption of e-learning is achieved in the later years of the students' education and lecturers' career. This is not consistent with competitive institutions and requires further attention. Figure 8.1. presents the predictive framework for the advancement of e-learning programmes in universities in Uganda.

University Learning Environment Success Factors	Human-Agent Success Factors
University Learning Environment Success Factors	**Human-Agent Success Factors**

University Learning Environment Success Factors

Acquaintance with goal of university e-learning policy/e-learning policy

Availability of time to experiment with ICT

Availability of IT infrastructure, e-learning laboratories, etc.

Financial support for both lecturers and students in relation to e-learning

Commitment of university management through training both lecturers and students

Collaboration with partners and other institutions; Competitive pressure

Human-Agent Success Factors

Age

Level of Education

Possession of email, personal laptops

Interest and value attached to use of e-learning technology

Positive attitude

Support from administrators

Support from partners

Support from other institutions

Interplay between university learning environment and human agent success factors

Adoption of Technology-Supported Learning

Intention to use Technology-Supported Learning

Innovative use of Technology Supported Learning

For instance, lecturers have knowledge and ability to use e-learning facilities. Students have the ability to use Internet and software applications such as MS Word, Excel, PowerPoint and Publisher

Acceptance of Technology Supported Learning

Students and Lecturers are confident and widely use technology in learning, teaching and research

Figure 8.1

Diagrammatic Predictive Framework for Advancement of E-learning Programmes

in Universities in Uganda

While the findings of this study confirm that age and level of education will influence the adoption of e-learning in Uganda, in the Ugandan case successful adoption is achieved at a later age for both lecturers and students (i.e. 48 years and 25 years respectively). This is not consistent with the ideal and what is reported in competitive institutions. Pereira et al. (2018) and Plaza et al. (2018) indicate that in developed countries such as Estonia, Luxembourg and the USA, adoption of e-learning technology takes place as early as five years. In the predictive framework the researcher predicts that effective e-learning will be achieved at earlier years than those reported in the present study. The findings of this study also indicate that gender will have an influence – i.e., success is achieved when adopters are males. This could also be due to the larger representation of males than females in the sample. However, these results are not consistent with what is done in competitive institutions. Yusuf and Balogun (2011) also found no significant difference between male and female student-teachers' attitudes to the use of ICT in learning. In order to achieve success in the adoption of e-learning technology, both males and females must be encouraged to make use of such technology if e-learning programmes are to be advanced in the University. Ajumobi and Kyobe (2017) indicate that females are always disadvantaged in using technological innovations and this should be discouraged. The quantitative findings in the predictive framework have been complemented with the qualitative ones.

The interview results revealed for instance, that if students are acquainted with the e-learning policies in the university environment then they can make use of e-learning facilities. In addition, possession of functional e-learning laboratories by universities enhances the successful adoption of e-learning technology by the lecturers and students. Other human-agent predictive factors of successful adoption of e-learning were ownership of emails and attitude of the lecturers and students. Those found to have positive attitude embraced e-learning and those that did not, did not do so. This is consistent with findings reported elsewhere by Fakinlede, Yusuf, Adegbija and Oputa (2014). Fakinlede et al. (2014) report that students with positive attitude to e-learning even had their own learning skills they could leverage online and as such were eager to adopt e-learning.

In order to enhance the predictive framework, there are factors not measured in the present study but have been found to be key influences of e-learning adoption in Africa. These

have been integrated in the predictive framework. For instance, collaboration with partners and other institutions (Ansong, Boateng & Boateng, 2016); and learning collaboratively. Gambari and Yusuf (2015) found that using technology that supports learning together (Student Team Achievement Division (STAD) and Learning Together Model (LTM) yields better results than those taught using individualized computer instruction (ICI).

PART V

CONCLUSION, CONTRIBUTIONS, RECOMMENDATIONS, LIMITATIONS AND FUTURE RESEARCH

CHAPTER NINE

CONCLUSION, RESEARCH CONTRIBUTIONS, LIMITATIONS AND FUTURE RESEARCH

9.1   Conclusion

E-learning is one of the ways that can be used to enhance the contemporary knowledge society and national economic development. Countries globally need to ensure the successful adoption of this innovation. Unsuccessful adoption of e-learning can be associated with basic usage such as sending notes via email, teaching with the use of PowerPoint presentations and posting notes to the learning management systems. Uganda like any other developing country is characterised with low adoption levels of e-learning and it needs to adopt e-learning successfully. Given the ability of e-learning technology in enhancing teaching and learning, many countries have implemented this technology (Gwamba et al., 2018). Evidence suggests that the adoption process of e-learning is not only a technical matter, but also a social one (Kundi, et al., 2010; Kattoua et al. (2016)). Integration of e-learning ISs varies from place to place (Bon, 2010; Gwamba et al. 2018). This indicates that even the factors for adoption or causes of failure of these systems vary from place to place.

Despite, the transformation already achieved to e-learning technology, developing countries are still faced with e-learning challenges (Gwamba et al. (2018). Therefore, there is need to match organisational and individual aspects with the different adoption levels to comprehend and measure the factors for successful adoption of e-learning in universities.

9.1.1 Conclusion on Research Question

The investigation into *"What are the factors that predict successful adoption of e-learning in universities in Uganda"* is based on the Gestalts perspective of alignment. The present study identified the university environment and human-agent characteristics as factors that contribute to successful adoption of e-learning when properly aligned. Findings of cluster

analysis verified that the two elements support each other to aid e-learning. Thus, it can be deduced that the primary question posed in this study has been answered to a great extent.

9.1.2 Conclusion on Objectives

While several studies (such as those by Barton, 2010, FitzPatrick, 2012, and Selim, 2007) have tried to measure the factors that lead to successful adoption of e-learning using linear models, such models cannot measure the 'interplay' aspect because of its complex nature. As a way of filling this research gap, the researcher in the first place had as a research objective to identify predictors of successful adoption of e-learning in universities in Uganda. This objective was achieved using the Gestalts approach based on K-means cluster, thematic and integrative analyses. Secondly, an investigation of the causes of the failure of e-learning information systems in universities in Uganda was carried out based on descriptive statistics, thematic and integrative analyses. From both lecturer and student results the researcher developed the predictive framework (see section 8.5).

Cluster and thematic techniques were used to analyse the data and measure the perceptions of 257 university teaching staff (lecturers) and students. In relation to lecturers and students, four and six clusters representing different patterns emerged respectively. Among lecturers, Cluster 1 attained the most adequate level of alignment between the university learning environment and the human agent. The ideal alignment pattern from lecturer results for this cluster revealed that: For instance, the interplay between the availability of time to experiment with ICT and lecturers aged 48 years, increases lecturers' acceptance of e-learning technologies in universities in Uganda (see Cluster 1 results from lecturers in Tables 7.4 and 7.5). The ideal alignment pattern from students' results also indicates that: For instance, the interplay between the availability of time to experiment and students aged 25 years, increases students' acceptance of e-learning technologies in universities in Uganda (see cluster 4 results from students in Tables 8.4 and 8.5). However, the results also reveal major concerns that lecturers and students in Uganda are really slow in adopting e-learning technology. Lena et al. (2018), Pereira et al. (2018), and Plaza et al. (2018) indicate that adoption of e-learning should be done at an early school age.

In conclusion, the university learning environment and human-agent contribute to successful adoption of e-learning among teaching staff in universities in Uganda but only when

they are close to retirement. It is vividly perceived that acquaintance with the goal of university e-learning policy, availing time to experiment with ICT, financial support and commitment of management, coupled with human agent enhance the adoption of e-learning among teaching staff in universities but at later stages of their career. Plaza et al. opine that in competitive institutions, adoption of TSL takes place at earlier ages. With reference to students, Cluster 4 attained the greatest alignment among the six clusters. This implies that the university learning environment and human agent factors are predictors of successful adoption of e-learning but when students are leaving campus. The same factors stated among lecturers, seem to contribute to adoption of e-learning among students. Thus, alignment of the configurational variables continuously may lead to advancement of e-learning technology within universities but more effectively at earlier stages in their career or learning stages.

The results also show wide variations in perceptions about the adoption of e-learning and university learning environment in Cluster 1 and Cluster 3 from lecturers. This is because Cluster 1 lecturers, as opposed to those in Cluster 3, were ready to use ICT, were innovative and had embraced e-learning services. Another plausible reason for the variations in the said clusters was the support by the university learning environment, for example Cluster 1 lecturers are able to experiment with ICT confidently, more so than their counterparts in Cluster 3. Thus, respondents in Cluster 1 as opposed to those in cluster 3 attained successful adoption of e-learning (see Table 8.4). The variations indicate an e-learning paradox among teaching staff in universities, while those in Cluster 1 indicate successful adoption, Cluster 3 lecturers indicate otherwise.

The above findings were dissimilar to those by Drent and Meelissen (2008) who revealed that university learning characteristics such as financial support and commitment of management do not impact on the adoption of e-learning among teachers. The adoption level of e-learning in Cluster 1 is an indicator that lecturers have the intention, can innovatively use and accept e-learning facilities. However, results in Cluster 1 from lecturers should be interpreted with caution because of the unequal distribution in gender and the sample population across the universities. For instance, 24(92.3%) of the respondents were male lecturers while 18(69.2%) of the respondents belonged to Makerere. In relation to students, findings indicated variations in perceptions about the adoption of e-learning, university environment and human agent in Clusters 4 and 6.

Cluster 4 students' findings as opposed to those of Cluster 6, are associated with high levels of adoption and positive perceptions related to the ability of the university environment to encourage e-learning and the human-agent. This is because students in Cluster 4 as opposed to those in Cluster 6 are ready to use, innovative and have embraced e-learning facilities. Another reason for the variations is that the students in Cluster 4 as opposed to those in Cluster 6 believe in the support of the university learning environment. For instance, these students believe that they can confidently interact with ICT. In addition, being in their second year of study, Cluster 4 students have more experience, compared to those students in Cluster 6 who are in their first year of study. Similarly to lecturer results, the student variations indicate an e-learning paradox as well as in universities, while those in cluster 4 indicated successful adoption, Cluster 6 students indicate the reverse.

Qualitative findings indicated that CD-ROMs are outdated, bulky and expensive to use on apple laptops. Surprisingly both lecturers and students in the best performing clusters still use them. Additionally, findings indicate that there are no facilities of video conferencing and university e-learning environments. Thus, lecturers and students are left with the option of using Skype and WhatsApp services as a way of imitating video conferencing technology.

The second objective of the study was to investigate the causes of failure of past e-learning ISs initiatives. Findings suggest that the main causes of e-learning ISs failure are limited structured approach and inadequate empowerment in relation to the management dimension among lecturers and students. Kasse and Balunywa (2013) uphold that limited structure hinders the advancement of e-learning ISs thus their argument is in line with the findings. García-Valcárcel and Tejedor (2009), ascertain that lack of empowerment in the form of pedagogical training in ICTs, hinders the progress of e-learning ISs. Qualitative results revealed that financial constraints, lack of: rules and regulations and technical staff among others are management factors that cause failure of e-learning ISs (see Tables 7.7 and 8.7). The individual causes of past failure of e-learning ISs initiatives included negative attitudes, lack of interest and resistance to innovation and adoption (see Tables 7.7 and 8.7). Heeks (2002) suggests that such causes hinder the development of ISs in developing countries. Stoltenkamp and Kasuto (2011) indicate that most organizations are usually faced with resistance in the implementation of technological innovations. From the findings and literature the predictive framework that is used to enhance e-

learning in universities has been developed (see, section 8.5). The following sub-sections is the reflection on the alignment concept.

9.1.3 Conclusion on Alignment Concept

The alignment concept is reaffirmed reflecting on the four clusters from lecturers and then on the six clusters from students (see Tables 7.4 and 7.5 for lecturers and 8.4 and 8.5 for students). Cluster 1 lecturers indicated positive values in (11/12) areas of the adoption of e-learning and in (4/4) areas of the university learning environment. Cluster 4 registered students with positive values in (13/13) areas of the adoption of e-learning. This cluster 4 also revealed positive values in (4/4) areas of the university learning environment. The results suggest cluster 1 lecturers and cluster 4 students obtained an adequate level of alignment between the university learning environment and the human agent (Venkatraman, 1989). One can therefore accept that the greater the alignment between the university learning environment and human agent, the more the intention to use, innovative use and acceptance of e-learning in universities will be. However, the results reveal that the adoption of e-learning takes place at older ages. This implies that the level of e-learning adoption is at a slow pace in universities in Uganda.

Cluster 3 lecturers and cluster 6 students indicated negative values. The lecturers indicated negative values in (0/12) areas of the adoption of e-learning and in (0/4) areas of the learning environment. Their advanced age and resentfulness to change contribute to non-adoption of e-learning facilities. Cluster 6 students indicated negative values in (0/13) areas of the adoption of e-learning and in (0/4) areas of the university learning environment. Cluster 6 indicates low adoption levels as a result of the interplay between the weak university environment and the inexperienced human-agent. Thus, clusters 3 and cluster 6 from lecturers and students respectively have not attained any level of alignment between the configurational variables and the cluster results support none of the hypotheses.

9.2   Research Contributions
9.2.1   Theoretical Contribution

To gain a clear understanding of the adoption of e-learning, a theoretical contribution was made to the field of ISs by integrating abstract and middle-range theories. Giddens' structuration theory was adopted as an abstract theory and integrated with middle-range theories such as the

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Diffusion of Innovations Theory (DOI). This approach assisted by overcoming the shortfalls of each theoretical dimension. For instance, Giddens' Structuration theory was a powerful conceptualisation tool that was invoked as the DOI. The process involved a rigorous review of literature on the subject while highlighting gaps and developing concepts (theorisation). From the concepts, a conceptual framework was developed. The conceptual framework included the university learning environment, human agent and adoption of e-learning (see Figure 4.1). While the researcher has come across several techniques (such as Regression Analysis and Structured Equation Modelling) that have been used to measure the adoption of e-learning, the Gestalts technique has not been used to measure the factors that predict successful adoption of e-learning in universities in Uganda. This technique has been used in this study and it revealed combinations of the university learning environment and human agent that result in the successful adoption of e-learning.

The factors were measured by determining the level of alignment between the university learning environment and the human-agent. Respondents in Cluster 1 among lecturers indicated a high level of alignment as opposed to those in cluster 2, 3 and 4. Cluster 4 students revealed high adoption levels as opposed to Clusters 2, 3, 4, 5 and 6. Findings revealed that the lead Clusters, 1 and 4 from lecturers and students respectively achieved adequate alignment. While the university learning environment is a potential predictor in the said clusters, the human agent does so at a slow pace. This technique, therefore, provides a good basis to measure complex interactions between organisational and individual level characteristics and adoption of e-learning.

This study was timely because the level of adoption of e-learning in Uganda is in its infancy; the study provided an understanding of the prospects or challenges of e-learning projects. This study further established that successful adoption of e-learning in universities requires inclusiveness of both lecturers and students.

Perceptions were not only vital in measuring the factors for successful adoption of e-learning but also the causes of failure of past e-learning ISs initiatives. These perceptions were vital in indicating the role of organisational and individual characteristics in the development of e-learning ISs. This resonates with the recommendation of Bakkabulindi (2007) that studies on perceptions are important in enriching organisational policies and communities in which they are carried out. For example, this study raised a number of issues that necessitate policy reforms,

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such as respondents being unfamiliar with e-learning policies, lack of commitment of university management, lack of some e-learning facilities, limited structured approach and inadequate empowerment of lecturers and students.

This study has been propounded by theories from different disciplines such as sociology, IT innovations, management and education. For instance, the conceptual framework was enhanced by social, IT innovations and management theories (refer to chapter 3, 4 and 5). This implies that the study has taken a multi-disciplinary approach. Mimbi (2013) citing (Heeks & Bailur, 2007) asserts that IS researchers are advised to be multidisciplinary in order to offer new knowledge. The most interesting theorization aspect was the ability of the researcher to integrate Giddens' Grand Structuration theory with middle age range theories such as Rogers Diffusion of Innovations theory.

9.2.2   Methodological Contribution

To accomplish this study, the researcher used the k-means clustering technique to distinguish perceptions of the different groups established. This study proves that it is possible to measure predictors of successful adoption of e-learning, in an environment where these predictors interplay, by adopting clustering techniques.

A wide range of data analysis strategies was used in the study. These included quantitative, qualitative and integrative strategies. Greene et al. (1989) and Spratt et al. (2004) indicate that mixed design is important in eliminating weaknesses that may be associated with using a single approach. The study therefore employed a qualitative approach as way of fixing the weaknesses associated with the quantitative one. The mixed design approach also revealed more clearly the factors that contribute to successful adoption of e-learning technology. For instance, the researcher obtained a clear picture that lecturers were unfamiliar with the e-learning policy during the interview process (see Appendix 10).

9.2.3 Practical Contribution

Successful adoption of e-learning is dependent on the interplay between factors like the university learning environment and human agents. Since there is an interplay of factors, it means that there is need for alignment in order to achieve success.

The findings of this study reveal one problem in universities in Uganda. Alignment of the factors influencing e-learning appears to be achieved in later years in the student school levels and in the lecturers' academic career. There is a need to encourage the adoption of e-learning to take place as early as possible. Lena et al. (2018), Pereira et al. (2018), and Plaza et al. (2018) indicate that adoption of ICTs by individuals in learning institutions usually takes place in earlier school ages while still at primary level. Introducing e-learning at an early age would assist in contextualising online courses to a level where they are appreciated. In addition, it should be noted that the findings of the present study suggest that gender has an influence on the adoption of e-learning. This is however not correct when one considers results reported from other studies. Gender has an influence in the present study because the sample was mainly dominated by male respondents. However, this does not rule out the fact that in many developing countries, adoption of technology is still dominated by males (Ajumobi & Kyobe, 2017) attribute this to the exposure to technology males tend to have than females. Encouraging the use of e-learning facilities by both males and females would be vital. Odewumi, Yusuf and Oputa (2018) uphold that the use of information and communications technology should be encouraged in facilitating learning irrespective of their gender one's gender.

There are many technologies people use today in learning which appear not to be in place in Uganda such as video conferencing, social networking, podcasts, blogs and wikis and MOOCs (Kintu et al., 2017; Kithsiri et al., 2018). Universities in Uganda can integrate such technologies to be competitive.

Findings reveal that there is a need for the transformation of universities in Uganda to improve the adoption levels. For instance, availability and publicity of e-learning policy is important to familiarise the users with this policy. There is need to revise the time-table to make room for teachers and students to practice with ICTs. The and Usagawa (2018) indicate that time taken by individuals while experimenting with ICT plays a significant role in the learning environment. Also, financial support is important to ensure the availability of e-learning services for teachers and students. Management should be involved in championing e-learning to ensure effective use of this technology. Nabushawo et al. (2018) suggest that the commitment of management can be through collaboration and training of users of e-learning ISs.

Given the fact that most African countries share similar problems such as limited structured approach and inadequate empowerment that can cause the failure of e-learning ISs,

this study provides a basis for preventing such problems. Cross and Adam (2007) and Gwamba et al. (2018) highlight that institutions of higher learning in Africa lack vision or strategy on the integration of ICTs and they are usually driven by particular projects. In addition, the present study can be used by policy makers in developing e-learning policies for the education industry. For example, by understanding the successful adoption of e-learning in universities, educational technology policies can be put in place or enriched. These can be policies geared towards adequate preparations for the integration and use of e-learning technology.

The knowledge from this research can be used by educational technology departments to bridge the gap between adopters and non-adopters of e-learning technology. This can be done through avenues such as training, funding and offering technical support.

Designers of learning management systems could use these findings to identify organisational and individual features for improving the quality of information systems. This, in turn, may lead to the effective use of e-learning information systems.

The findings of this study can be a useful guide for effective integration of e-learning technologies. The study also reveals the need for management to familiarise themselves with the e-learning policy if they are to direct the implementation of e-learning strategies effectively.

The study pays heed to Alkharang and Ghinea (2013), who suggest that models of the adoption of e-learning should be unique to a particular situation. It is, therefore, important to understand the situation at hand in a particular organisation. For example, stakeholder analysis, organisational politics, culture, social and economic aspects should be considered and these have been integrated into the Predictive Framework presented in this study. It should be noted that management involvement alone cannot be sufficient in the adoption of e-learning in a given institution. Successful adoption of e-learning in universities may require these institutions to take into consideration the weaknesses, challenges or problems that may befall them. Thus, a basis for adequate preparations for the integration of e-learning technology.

This study can be regarded as a benchmark for successful adoption of e-learning to some extent. The researcher developed the predictive framework for the advancement of e-learning programmes in universities in Uganda (see section 8.5). The predictive framework was comprehensive in nature. It includes findings from the present study and those reported from other international studies which are deemed relevant for e-learning in the developing country environment. The university learning environment has been extended to include for instance,

collaboration with partners and other institutions from literature. In addition, the human agent has been extended to include for instance, support from administrators still from literature.

9.2.4   Recommendation for Practice

Since the adoption of e-learning facilities takes place at a slow pace (i.e. more often with individuals in advanced years), there is a need to encourage adoption of e-learning facilities as early as possible if universities are to remain competitive. This can be done by introducing e-learning at primary level or contextualising online courses at a level which both students and lecturers can appreciate. There is also need to encourage the adoption of information technology irrespective of gender. This can be done by motivating both males and females to use information technology.

Results from the low performing clusters indicated that university environment characteristics are not in favour of lecturers and students as far as adoption of e-learning is concerned. While ensuring the successful adoption of e-learning, universities should strengthen their management capabilities as well as stakeholders. There is a need to familiarise the respondents with e-learning policy, give lecturers and students time to experiment with ICT and support them financially in relation to using e-learning services among other issues. For instance, Lecturer L4 indicated that the time taken to interact with ICT and value attached in using ICT can encourage one's adoption of e-learning facilities. In the process of strengthening management capabilities, universities can find proper guidelines for the integration of e-learning technology.

The university management should also put into action the research results of this study. This can be through encouraging both lecturers and students in Makerere and Gulu universities to use up-to-date storage facilities such as flash disks and cloud computing services such as Google drive instead of CD-ROMs. Another way can be done through training of both teachers and students on how to use e-learning facilities as a means to have access to the online courses available in universities. In addition, there is a need to lobby for funds from donors to support the e-learning cause. Furthermore, the application of change management techniques would be vital in preventing negative attitudes and resistance to adopt e-learning facilities. Findings suggest that the implementation of e-learning in universities in Uganda should be based on the so-called

developing world models to suit the situation at hand. This does not only capture community characteristics but also ensures adequate preparation in the integration of e-learning technology.

The predictive framework is an eye-opener on how the university learning environment and human agent characteristics can be aligned to encourage adoption of e-learning. For instance, if the lecturers are familiar or acquainted with the goal of the university e-learning policy at an early career age irrespective of their gender, then the chances of adoption will be high.

9.3   Limitations of the Study

Similar to other academic researches, this research encountered limitations. The clustering technique can be used in a longitudinal study since this study was a cross-sectional one. The study included two public universities from the Central and Northern Uganda, but can be extended to include other public universities and private universities in Uganda. It can as well be extended across different universities in East Africa, Africa or even the other parts of the world. The study looked at the contribution of organisational and individual factors in the successful adoption of e-learning. It would be much more interesting to incorporate the contribution of other factors which may be vital in the adoption of e-learning. Rogers (2003) indicated that there are several factors (such as organisational, individual and technological ones) that contribute to the adoption of innovations. While the study was interested in individual characteristics for the interplay, it concentrated on aspects of age, gender and level of education. Therefore, other individual characteristics such as individual attitude, teaching style and learning style can be considered. It should be noted that the sample population was limited to lecturers and undergraduate students; it probably would be interesting to draw conclusions even on postgraduate students including administrative staff members.

While the study looked at the adoption of e-learning facilities such as computers, CD-ROMs, web-based, video conferencing and LMS, there are several technologies that have not been mentioned that are used in some Ugandan learning setting. These may include video conferencing, social networking, podcasts, blogs, wikis, OPACs, MOOCs, smart boards among others.

Development of the predictive framework was partly done using factors from the literature that were not empirically tested. For instance, collaboration with partners and other

institutions such factors can be tested empirically in the Ugandan context. Having discussed the limitations of the study above, the next section presents suggestions for future research.

9.4   Future Research

Since the adoption of e-learning among lecturers and students is achieved at advanced ages in the Ugandan context, further research can be carried out on strategies that can be used to encourage adoption of e-learning at earlier ages. It has been noted that the adoption of e-learning is common among male teachers and students as opposed to their female counterparts. Thus, further research can be done on finding strategies that can encourage the adoption of e-learning among female lecturers and students in universities. Technological innovations and the use of these innovations amidst several factors usually changes over time. Thus, further research may be necessary to empirically investigate the role of other factors in the adoption of e-learning. Since the conceptual framework adopted in this study has been used at a particular point in time, there is a need to test this framework longitudinally. Cluster 3 among lecturers revealed low levels of adoption e-learning and weak factors of the university environment which undermine the advancement of e-learning programmes. On the other hand, among students, Cluster 6 as well, revealed low adoption levels, weak university environment and the weak human-agent. Such factors can best be examined in longitudinal studies based on wider sample size.

Some of the respondents indicated that the university learning environment did not contribute to their adoption of e-learning. For example, some respondents indicated that they were not familiar with the goal of the e-learning policy. Further research examining e-learning policy development and implementation will be necessary.

Another issue of concern for further study is the assessment of other dimensions of the causes of failure of past e-learning ISs initiatives so as to understand better alignment of e-learning ISs in universities. In addition, more research is needed to understand the means of overcoming obstacles to ISs implementation to form better alignment of such systems.

Further research may also be needed to test the conceptual framework by increasing the indicators of the variables while observing the same idea on which elements of the framework are developed. For example, there are various indicators of the adoption of e-learning developed by several organisations (for example UNICEF) which can be used to assess successful adoption of e-learning.

While the framework used is based on universities in Uganda and it has looked at only two public universities, it could be extended to other public or private universities in Uganda. In addition further research can be extended to universities in developing countries using the same idea because they may have varying e-learning conditions.

Besides the above-stated technology-supported learning (TSL) facilities, there are other facilities that could be researched, such as mobile phones, OPACs, MOOCs, smart boards among others. This is so because different facilities provide different functionality in the learning process. For instance, Naismith et al. (2006) indicate that, mobile devices are fit for different contexts and thus can be used in such contexts to foster the learning process.

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Appendix 1-Krejcie & Morgan's (1970) Tool for Determining Samples Sizes (S^1) for Finite Population (N)

N	S^1		N	S^1		N	S^1		N	S^1		N	S^1
10	10		100	80		280	162		800	260		2800	338
15	14		110	86		290	165		850	265		3000	341
20	19		120	92		300	169		900	269		3500	346
25	24		130	97		320	175		950	274		4000	351
30	28		140	103		340	181		1000	278		4500	354
35	32		150	108		360	186		1100	285		5000	357
40	36		160	113		380	191		1200	291		6000	361
45	40		170	118		400	196		1300	297		7000	364
50	44		180	123		420	201		1400	302		8000	367
55	48		190	127		440	205		1500	306		9000	368
60	52		200	132		460	210		1600	310		10000	370
65	56		210	136		480	214		1700	313		15000	375
70	59		220	140		500	217		1800	317		20000	377
75	63		230	144		550	226		1900	320		30000	379
80	66		240	148		600	234		2000	322		40000	380
85	70		250	152		650	242		2200	327		50000	381
90	73		260	155		700	248		2400	331		75000	382
95	76		270	159		750	254		2600	335		100000	384

Source: Gay and Airasian (2003, p. 113)

N.B: While the above table represents sample with capital "S" the researcher chose to view it as "S^l" to ensure that there was no confusuion between "S" for students and the one for sample size.

Appendix 2-Questionnaire for Lecturers

Department of Information Systems,
University of Cape Town
Private Bag, Rondebosch, 7701
South Africa

Dear Prof / Dr / Mr / Mrs / Ms,

Re: A survey of e-learning in universities in Uganda: Predictors of successful adoption

I am carrying out a study on e-learning in universities in Uganda as part of an educational research. The purpose of the study to develop a predictive framework that will guide universities in the advancement of e-learning programmes. E-learning can be perceived as technology supported learning, resulting from the interplay between the university learning environment and individual (human agent). The questionnaire below is for Teaching Staff (including full-time Administrators e.g. VCs, academic deans, directors and heads of department who engage in teaching. It is presumed that teaching Staff are likely to implement ICT (e.g. e-learning services) to enhance their work. It is against that background that you have been selected to participate in the research by completing this questionnaire. Hence it could be very helpful if you assist me by answering the attached questionnaire as per the instructions provided at the beginning of the given sections. Please provide the most appropriate answer in your opinion by ticking against it. Your responses will be kept confidential since the questionnaire is anonymous. Please endeavor to fill the questionnaire within 15 to 20 minutes and return it to ………………………………… in your Department /Institute /Faculty/ School/ College. Thanking you so much for your cooperation.

Yours faithfully,

Part 1: Descriptive Information
Section 1: Individual Profile
This section is a descriptive one and comprises general about respondent.
Please place a tick at the most appropriate answer of your own choice.

EMAIL1. Do you have an e-mail address?   LPTO1. Do you possess a personal laptop?
          1. Yes   2. No   1. Yes   2. No
ELLAB1. Do you have functional e-learning laboratories in your university?
          1. Yes   2. No

UNI. What university are you pertained to? UNI1. Makerere University UNI2. Gulu University

Esther Namirembe (Researcher)

Part 2: Adoption of technology supported learning (TSL)/ e-learning (i.e. intention to use, innovative use and acceptance) of TSL. Please note that this section distinguishes intention to use (section 1), innovative use (section 2), and acceptance (section 3) of TSL. In other words, your intention to use or innovative use may not coincide with how frequently you accept it. That is why we need answers to all the three sections.

Please indicate the extent to which you have the intention to use the following TSL facility: your respective answers are to range from a minimum of 1 (for very little or no intention to use) to a maximum of 5 (for very much intention to use). Please place a tick at the most appropriate answer of your own choice.

1	**Section 1: Intention to Use**					
INTU1	Computers	1	2	3	4	5
INTU2	CD-ROMs	1	2	3	4	5
INTU3	Web based learning	1	2	3	4	5
INTU4	Video conferencing	1	2	3	4	5
INTU5	University e-learning environments e.g. MUELE and Black-Board	1	2	3	4	5

Please indicate the extent to which you innovatively use TSL: your respective answers are to range from a minimum of 1 (for very little or no innovative use) to a maximum of 5 (for very much innovative use). Please place a tick at the most appropriate answer of your own choice

2	**Section 2: Innovative Use**					
INU1	It enables me to prepare teaching materials	1	2	3	4	5
INU2	It enables me to make presentations in text, audio, and visual	1	2	3	4	5
INU3	It enabled me to interact with my students	1	2	3	4	5

Part 2: Please indicate the extent to which you have accepted the following TSL facility: your respective answers are to range from a minimum of 1 (for very little or no acceptance) to a maximum of 5 (for very much acceptance). Please place a tick at the most appropriate answer of your own choice.

3	**Section 3: Acceptance**					
ACC1	Computers	1	2	3	4	5
ACC2	CD-ROMs	1	2	3	4	5
ACC3	Web based learning	1	2	3	4	5
ACC4	Video conferencing	1	2	3	4	5
ACC5	University e-learning environments e.g. MUELE and Black-Board	1	2	3	4	5

Part 3: University Learning Environment and Human Agent						
Please indicate the extent to which the following factors encourage your use of TSL facilities/ services: your respective answers are to range from a minimum of 1 (for very little or no encouragement on use) to a maximum of 5 (for greatest encouragement on use)						
1	**Section 1: University Learning Environment**					
GUELP1	Goal of university e-learning policy	1	2	3	4	5
ATIEXICT1	Availability of time to experiment with ICT	1	2	3	4	5
AFS1	Availability of financial support	1	2	3	4	5
COMAN1	Commitment of management	1	2	3	4	5

Please answer the questions below by placing a tick on the most appropriate answer

2	**Section 2: Human Agent**

2.1 Please indicate your age range

AGE1	20 years and below
AGE2	21-30 years
AGE3	31-40 years
AGE4	41-50 years
AGE5	51 years and above

2.3 Please indicate your Level of education

LEDUC1	Bachelors Degree
LEDUC2	Postgraduate Diploma
LEDUC3	Masters Degree
LEDUC4	PhD
LEDUC5	Post-Doctoral

2.2 Please indicate your gender

GEN 1=	Male
GEN 2=	Female

Part 4: Please indicate the extent to which the following factors hinder the progress of TSL information systems in your university: your respective answers are to range from a minimum of 1 (for very little or no hindrance) to a maximum of 5 (for very much hindrance). Please place a tick at the most appropriate answer of your own choice.

1	**Section 1: Management Dimension**					
STRUL1	Structured approach that aids management of e-learning environment being limited	1	2	3	4	5
EMPI1	Empowerment by university management in relation to e-learning (e.g. staff training) being inadequate	1	2	3	4	5
RUREINS1	Rules and regulations (e.g. email discussion policies) that aid e-learning being insufficient	1	2	3	4	5
2	**Section 2: Individual Dimension**					
IUSE1	Your inability to use e-learning technology effectively	1	2	3	4	5
DIS1	Your discomfort with e-learning technology	1	2	3	4	5
DIPKEL1	The discrepancy in knowledge on e-learning between teachers and students	1	2	3	4	5

Appendix 3-Questionnaire for Students

Department of Information Systems,
University of Cape Town
Private Bag, Rondebosch, 7701
South Africa

Dear Mr / Mrs / Ms,

Re: A survey of e-learning in universities in Uganda: Predictors of successful adoption

I am carrying out a study on e-learning in universities in Uganda as part of an educational research. The purpose of

the study to develop a predictive framework that will guide universities in advancement of e-learning programmes.

E-learning can be perceived as technology supported learning, resulting from the interplay between the university

learning environment and individual (human agent). The questionnaire below is for students. It is presumed that

students use e-learning services. It is against that background that you have been selected to participate in the

research by completing this questionnaire. Hence it could be very helpful if you assist me by answering the attached

questionnaire as per the instructions provided at the beginning of the given sections. Please provide the most

appropriate answer in your opinion by ticking against it. Your responses will be kept confidential since the

questionnaire is anonymous. Please endeavour to fill the questionnaire within 15 to 20 minutes and return it to

………………………………… in your Department /Institute /Faculty/ School/ College. Thanking you so much for

your cooperation.

Yours faithfully,

Esther Namirembe (Researcher)

Part 1: Descriptive information
Section 1: Individual profile
This section is a descriptive one and comprises general about respondent.
Please place a tick at the most appropriate answer of your own choice.

EMAIL1. Do you have an e-mail address?   LPTO1. Do you possess a personal laptop?
      1. Yes   2. No   1. Yes   2. No
ELLAB1. Do you have functional e-learning laboratories in your university?
      1. Yes 2. No

UNI. What university are you pertained to?
UNI1. Makerere University
UNI2. Gulu University

Part 2: Adoption of technology supported learning (TSL)/ e-learning (i.e. intention to use, innovative use and acceptance) of TSL. Please note that this section distinguishes intention to use (section 1), innovative use (section 2), and acceptance (section 3) of TSL. In other words, your intention to use or innovative use may not coincide with how frequently you accept it. That is why we need answers to all the three sections.

Please indicate the extent to which you have the intention to use the following TSL facility: your respective answers are to range from a minimum of 1 (for very little or no intention to use) to a maximum of 5 (for very much intention to use). Please place a tick at the most appropriate answer of your own choice.

1	Section 1: Intention to Use					
INTU1	Computers	1	2	3	4	5
INTU2	CD-ROMs	1	2	3	4	5
INTU3	Web based learning	1	2	3	4	5
INTU4	Video conferencing	1	2	3	4	5
INTU5	University e-learning environments e.g. MUELE and Black-Board	1	2	3	4	5

Please indicate the extent to which you innovatively use TSL: your respective answers are to range from a minimum of 1 (for very little or no innovative use) to a maximum of 5 (for very little or no innovative use). Please place a tick at the most appropriate answer of your own choice

2	Section 2: Innovative Use					
INU1	I am able to expound on what lecturers have provided to me in class using the Internet	1	2	3	4	5
INU2	It enables me to make presentations in text, audio, and visual	1	2	3	4	5
INU3	It enabled me to interact with fellow students	1	2	3	4	5

Part 2: Please indicate the extent to which you have accepted the following TSL facility: your respective answers are to range from a minimum of 1 (for very little or no acceptance) to a maximum of 5 (for very much acceptance). Please place a tick at the most appropriate answer of your own choice.

3	Section 3: Acceptance					
ACC1	Computers	1	2	3	4	5
ACC2	CD-ROMs	1	2	3	4	5
ACC3	Web based learning	1	2	3	4	5
ACC4	Video conferencing	1	2	3	4	5
ACC5	University e-learning environments e.g. MUELE and Black-Board	1	2	3	4	5

Part 3: University learning environment and human agent						
Please indicate the extent to which the following factors encourage your use of TSL facilities/ services: your respective answers are to range from a minimum of 1 (for very little or no encouragement on use) to a maximum of 5 (for greatest encouragement on use)						
1	**Section 1: University learning environment**					
GUELP1	Goal of e-learning policy	1	2	3	4	5
ATIEXICT1	Availability of time to experiment with ICT	1	2	3	4	5
AFS1	Availability of financial support	1	2	3	4	5
COMAN1	Commitment of management	1	2	3	4	5
Please answer the questions below by placing a tick on the most appropriate answer						
2	**Section 2: Human-agent**					

2.1 Please indicate your age
AGE1   20 years and below
AGE2   21-30 years
AGE3   31-40 years
AGE4   41-50 years
AGE5   51 years and above

2.2 Please indicate your gender
GEN 1=   Male
GEN 2=   Female

2.3 Please indicate your level of education
LEDUC1   Year 1
LEDUC2   Year 2
LEDUC3   Year 3
LEDUC4   Year 4

Part 4: Please indicate the extent to which the following factors hinder the progress of TSL information systems in your university: your respective answers are to range from a minimum of 1 (for very little or no hindrance) to a maximum of 5 (for very much hindrance). Please place a tick at the most appropriate answer of your own choice.						
1	**Section 1: Management Dimension**					
STRUL1	Structured approach that aids management of e-learning environment being limited	1	2	3	4	5
EMPI1	Empowerment by university management in relation to e-learning (e.g. student training) being inadequate	1	2	3	4	5
RUREINS	Rules and regulations (e.g. email discussion policies) that aid e-learning being insufficient	1	2	3	4	5
2	**Section 2: Individual Dimension**					
IUSE1	Your inability to use e-learning technology effectively	1	2	3	4	5
DIS1	Your discomfort with e-learning technology	1	2	3	4	5

DIPKEL1	The discrepancy in knowledge on e-learning between teachers and students	1	2	3	4	5

Appendix 4-Key Informant Interview Protocol for Lecturers

Department of Information Systems,
University of Cape Town
Private Bag, Rondebosch, 7701
South Africa

Part 1: Descriptive information
Section 1: Individual profile
This section is a descriptive one and comprises general about respondent.
Please place a tick at the most appropriate answer of your own choice.

EMAIL1. Do you have an e-mail address?   LPTO1. Do you possess a personal laptop?
    1. Yes   2. No   1. Yes   2. No
ELLAB1. Do you have functional e-learning laboratories in your university?
    1. Yes   2. No

UNI. What university are you pertained to?
UNI1. Makerere University
UNI2. Gulu University

Part 2: Adoption of TSL
Section 1: Intention to Use TSL
Do you have any intention to use computers? Please explain

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Do you have any intention to use CD-ROMs? Please explain

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Do you have any intention to use web-based learning? Please explain

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Do you have any intention to use video conferencing? Please explain

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Do you have any intention to use university e-learning environment? Please explain

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Section 2: Innovative Use of TSL
Are you able to prepare teaching materials using TSL technology? Please explain

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Are you able to make text, audio and visual presentations? Please explain

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Are you able to interact with students online? Please explain

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Section 3: Acceptance of TSL
Have you embraced computers? Please explain

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 Have you embraced CD-ROMs? Please explain

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Have you embraced web-based learning? Please explain

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Have you embraced video conferencing? Please explain

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Have you embraced university e-learning environment? Please explain

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Part 3: University Learning Environment and Human Agent
Section 1: University Learning Environment
Does the goal of university e-learning policy encourage your use of TSL facilities/ services?
Please explain
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Does availability of time to experiment with e-learning encourage your use of TSL facilities/
services? Please explain
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Does financial support encourage your use of TSL facilities/ services? Please explain

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Does management commitment encourage your use of TSL facilities/ services? Please explain
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Section 2: Human Agent
Please indicate your age range
20 years and below
21 to 30 years
31 years to 40 years
41 to 50 years
51 years and above

Please indicate your gender

Male
Female

Please indicate your level of education
Bachelor Degree
Postgraduate Diploma
Masters
PhD
Post-doctoral

Part 4: Causes of Failure of E-learning Information Systems
Section 1: Management Dimension
Does the limited structured approach that aids management of e-learning hinder progress of the
e-learning information system in your university? Please explain
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Does the inadequate empowerment by university management in relation to e-learning hinder
progress of e-learning information systems in your university? Please explain
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Do insufficient rules and regulations hinder progress of e-learning information systems in your
university? Please explain
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If their other management causes that you know of that hinder progress of e-learning information
systems in your university mention them and provide an explanation.
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Section 1: Individual Dimension
Does your inability to use TSL effectively hinder progress of e-learning information systems in
your university? Please explain
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Does your discomfort with e-learning technology hinder progress of e-learning information
systems in your university? Please explain

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Does the discrepancy in knowledge between teachers and students hinder progress of e-learning information systems in your university? Please explain

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If their other individual causes that you know of that hinder progress of e-learning information systems in your university mention them and provide an explanation.

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Appendix 5-Key Informant Interview Protocol for Students

Department of Information Systems,
University of Cape Town
Private Bag, Rondebosch, 7701
South Africa

Part 1: Descriptive information
Section 1: Individual profile
This section is a descriptive one and comprises general about respondent.
Please place a tick at the most appropriate answer of your own choice.
EMAIL1. Do you have an e-mail address?   LPTO1. Do you possess a personal laptop?
1. Yes   2. No   1. Yes   2. No
ELLAB1. Do you have functional e-learning laboratories in your university?
1. Yes   2. No
UNI. What university are you pertained to?
UNI1. Makerere University
UNI2. Gulu University

Part 2: Adoption of TSL
Section 1: Intention to Use TSL

Do you have any intention to use computers? Please explain

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Do you have any intention to use CD-ROMs? Please explain

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Do you have any intention to use web-based learning? Please explain

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Do you have any intention to use video conferencing? Please explain

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………………………………
Do you have any intention to use university e-learning environment? Please explain

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Section 2: Innovative Use of TSL
Are you able to expound on what lecturers have provided to me in class using Internet? Please explain

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Are you able to make text, audio and visual presentations? Please explain

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Are you able to communicate with other students through online discussions, email, wikis, whatsApp?

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Section 3: Acceptance of TSL
Have you embraced computers? Please explain

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 Have you embraced CD-ROMs? Please explain

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Have you embraced web-based learning? Please explain

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Have you embraced video conferencing? Please explain

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Have you embraced university e-learning environment? Please explain

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Part 3: University Learning Environment and Human Agent
Section 1: University Learning Environment
Does the goal of university e-learning policy encourage your use of TSL facilities/ services?
Please explain
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Does availability of time to experiment with e-learning encourage your use of TSL facilities/
services? Please explain
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Does financial support encourage your use of TSL facilities/ services? Please explain
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………………………………
Does management commitment encourage your use of TSL facilities/ services? Please explain
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………………………………

Section 2: Human Agent
Please indicate your age range
20 years and below
21 to 30 years
31 years to 40 years

205

41 to 50 years
51 years and above

Please indicate your gender
Male
Female

Please indicate your level of education
Year   1
Year   2
Year   3
Year   4

Part 4: Causes of Failure of E-learning Information Systems
Section 1: Management Dimension
Does the limited structured approach that aids management of e-learning hinder progress of the e-learning information system in your university? Please explain
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Does the inadequate empowerment by university management in relation to e-learning hinder progress of e-learning information systems in your university? Please explain
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Do insufficient rules and regulations hinder progress of e-learning information systems in your university? Please explain
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If their other management causes that you know of that hinder progress of e-learning information systems in your university mention them and provide an explanation.
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Section 1: Individual Dimension
Does your inability to use TSL effectively hinder progress of e-learning information systems in your university? Please explain
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Does your discomfort with e-learning technology hinder progress of e-learning information systems in your university? Please explain

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Does the discrepancy in knowledge between teachers and students hinder progress of e-learning information systems in your university? Please explain

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If their other individual causes that you know of that hinder progress of e-learning information systems in your university mention them and provide an explanation.

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Appendix 6-Approval Letter from Ethics in Research Committeee UCT Faculty of Commerce

Faculty of Commerce

Private Bag X3, Rondebosch, 7701
2.26 Leslie Commerce Building, Upper Campus
Tel: +27 (0) 21 650 4375/ 5748 Fax: +27 (0) 21 650 4369
E-mail: com-faculty@uct.ac.za
Internet: www.uct.ac.za

@Commerce_UCT   UCT Commerce Faculty Office

04/09/2017

Ms Esther Namirembe
Department of Information System
University of Cape Town

REF: REC2017/009/001

Dear Esther Namirembe

Project: E-learning in universities in Uganda: Predictors of successful adoption

It is a pleasure to inform you that the EiRC has **formally approved** the above-mentioned study.

Approval is granted for the period of 12 months. Should you require an extension or make any substantial changes to the research methodology which could affect the experiences of participants, you must submit a revised protocol to the Committee for approval.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Your sincerely

"Our
Mission is to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society."

Signature Removed

Michael Harber CA(SA)
Chair of UCT Commerce Faculty Ethics in Research Committee (Acting)
MCom (Financial Management)
College of Accounting
Leslie Commerce Building | Office 5.16
University of Cape Town

Tel: (021) 650-2272
Email: michael.harber@uct.ac.za

UNIVERSITY OF CAPE TOWN
0 8 JAN 2018
FACULTY OF COMMERCE

Appendix 7-Approval Letter from Makerere University School of Social Sciences Research Ethics Committee

MAKERERE **UNIVERSITY**

P .O. Box 7062,
Kampala, Uganda
Cables: MAKUNIKA

Tel: 256-41-545040/0712 207926
Fax: 256-41-530185
E-mail: makssrec@gmail.com

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES
SCHOOL OF SOCIAL SCIENCES
RESEARCH ETHICS COMMITTEE

Your Ref:
Our Ref: MAKSS REC 09.17.086

8th January 2018

Esther Namirembe
P O Box 9328
Kampala, Uganda
PhD Student
Principal Investigator (MAKSS REC 09.17.086)
Tel: 0751 800122
Email: frixie2002us@yahoo.com

Initial – Full Board
Re: Approval of Protocol titled: "E-learning in Universities in Uganda: Predictors of successful adoption"
This is to inform you that, the Makerere University School of Social Sciences Research Ethics Committee (MAKSS REC) granted approval to the above referenced study. The MAKSS REC reviewed the proposal using the full board review on 4th October 2017. This has been done in line with the investigator's subsequent letter addressing comments and suggestions.

Your study protocol number with MAKSS REC is **MAKSS REC 09.17.086**. Please be sure to reference this number in any correspondence with MAKSS REC. Note that, the initial approval date for your proposal by **MAKSS REC was 4th October 2017**. This is an annual approval and therefore; approval expires on 3rd October 2018. **You should use stamped consent forms and study tools/instruments while executing your field activities at all times.** However, continued approval is conditional upon your compliance with the following requirements.

Continued Review
In order to continue on this study (including data analysis) beyond the expiration date, Makerere University School of Social Sciences (MAKSS REC) must re-approve the protocol after conducting a substantive meaningful, continuing review. This means that you must submit a continuing report Form as a request for continuing review. To avoid a lapse, you should submit the request six (6) to eight (8) weeks before the lapse date. Please use the forms supplied by our office.

1

Valid Thru:
0 3 OCT 2018

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Please also note the following:
- No other consent form(s), questionnaires and or advertisement documents should be used. The Consent form(s) must be signed by each subject prior to initiation of my protocol procedures. In addition, each research participant should be given a copy of the signed consent form.

Amendments

During the approval period, if you propose any changes to the protocol such as its funding source, recruiting materials or consent documents, you must seek Makerere University School of Social Sciences Research and Ethics Committee (MAKSS REC) for approval before implementing it.

Please summarise the proposed change and the rationale for it in a letter to the Makerere University School of Social Sciences Research and Ethics Committee. In addition, submit three (3) copies of an updated version of your original protocol application- one showing all proposed changes in bold or "track changes" and the other without bold or track changes.

Reporting

Among other events which must be reported in writing to the Makerere University School of Social Sciences Research and Ethics Committee include:
  i. Suspension or termination of the protocol by you or the grantor.
  ii. Unexpected problems involving risk to participants or others.
  iii. Adverse events, including unanticipated or anticipated but severe physical harm to participants.

Do not hesitate to contact us if you have any questions. Thank you for your cooperation and commitment to the protection of human subjects in research.

The legal requirement in Uganda is that, all research activities must be registered with the National Council for Science and Technology. The forms for this registration can be obtained from their website www.unsct.go.ug

Please contact the Administrator of Makerere University School of Social Sciences Research and Ethics Committee at makssrec@gmail.com OR bijulied@yahoo.co.uk or telephone number +256 712 207926 if you counter any problem.

Yours sincerely,

Signature Removed

Dr. Stella Neema
Chairperson
Makerere University School of Social Sciences Research and Ethics Committee

c.c.: The Executive Secretary, Uganda National Council for Science and Technology

Valid Thru:
03 OCT 2018

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Appendix 8-Statement of Consent for the Questionnaires

 I hereby consent Esther Namirembe to conduct a survey on e-learning in universities in Uganda. I am aware that participation is voluntary and that participants may choose to withdraw from this study at any time, should they choose to do so.

I also give Esther Namirembe permission for the results of this study to be used in the write up of the study.

Name:…………………………………………….

Signature of participant:

 ……………………………………………………   Date: …………

Name:…………………………………………….

Signature of person obtaining consent:

 ……………………………………………………   Date: ………….

Appendix 9-Statement of Consent for the Interview Protocals

I hereby consent Esther Namirembe to conduct an interview on e-learning in universities in Uganda. I am aware that participation is voluntary and that participants may choose to withdraw from this study at any time, should they choose to do so.

I also give Esther Namirembe permission for the results of this study to be used in the write up of the study.

Name:…………………………………………………

Signature of participant:

……………………………………………………   Date: …………

Name:………………………………………………….

Signature of person obtaining consent:

……………………………………………………   Date: ………….

Appendix 10- Codification of Data Indicating Data Item Source, Data Extracts and Initial Codes (from lecturers)

Data item source	Data Extract	Initial Codes
ITU1 L4 and L1	*"I use computers to prepare notes for lectures". "I used a computer as a masters' student to write up my final report".*	Lecturers use computers for preparing notes and research work.
ITU2 L1 and L3	*"Instead of CD-ROMs, I use flash disks to transfer and keep data because CD-ROMs are outdated". "I may use CD-ROMs when it becomes necessary".*	CD-ROMs are only used when required.
ITU3 L1 and L4	*"Web based learning is a current trend in education.* *. As I do research, I also use it as my main source of information". ".It is easy to use web-based video content and illustration especially via You-Tube".*	Web-based learning is a current development in education as a source of information and easy to use with applications such as You-Tube.
ITU4 L4	*"There are no video conferencing facilities".*	No video-conferencing facilities.
ITU5 L4 and L3	*"E-learning environments are an opportunity for students to engage with learning material before class". "I am not aware of blackboard e-learning environment".*	Opportunity offered by e-learning environments.
INU1 L5	*"I normally prepare lecture notes especially in programs such as Microsoft Word and PowerPoint".*	Expertise in using Microsoft Word and PowerPoint
INU2 L1, L3 and L5, L6	*"Yes, I do. At times, after developing my PowerPoint lecture slides, I also use hyperlinks to connect to interesting videos and photos to make students understand". "Yeah, audio depending on the topic of interest e.g. voice recording, I can shoot a picture [and] I can get links and make PowerPoint presentations". "I can use text but not incorporate audio and visual feature". "I do not have the facilities. I would love teaching with information technology [but] I am not motivated to work with it''.*	Expertise in using hyperlinks
INU3 L3	*"Yeah, I can interact with my students via email, Facebook and sometimes via WhatsApp".*	Email, Facebook and WhatsApp Internet applications are used by lecturers
ACC1 L2	*"Yes, as I already mentioned, a computer is my whole life, I do not see life continuing without it".*	Computer dependent.

ACC2 L1, L6, L3	*"I use CD-ROMs to a small extent because I have not found much use of them". "No. I still have my PhD on CD-ROM but they are outdated. They have to improve them to be useful. Using CD-ROMs on gadgets such as Apple is too expensive, it costs about 250 dollars".* *"Yap, it is one way to access information".*	CD-ROMs are only used when required.
ACC3 L1, L3, L4, L2	*"Yes, it is my main source of literature". "Once in a while I follow online courses, it's one way of learning without being in a physical space to teach and improve my knowledge".* Limited bandwidth affects usage of web-based learning. *"No, [I am] not knowledgeable about web-based learning".*	Web-based learning is a source of literature and knowledge it is however, by bandwidth
ACC4 L2, L3, L6, L5	*"We have no facilities for videoconferencing. I can only Skype". "I use Skype for conducting meeting with partners. These partners have projects which impact on lessons". "I have tried Skype, but for learning [I am restricted by] the bandwidth and even the facilities". "I appreciate it, but there are no facilities".*	Video-conferencing technology not available.
ACC5 L4	*"I am aware about e-learning environments, but the limited bandwidth and unpreparedness of students to use such environments are still a problem".*	E-learning environments not fully embraced
GUELP1 L4, L2	*"I am not familiar with the e-learning policy and its goal at [this university]". "I know there is an e-learning policy but I do not know much about it".*	Unfamiliar with e-learning policy.
ATIEXICT1 L1, L4	*"Through experimentation I can use ICT facilities confidently". "There isn't sufficient time to experiment with ICT. I think that the interest and value attached by an individual to e-learning [technology] are stronger elements that encourage its use".*	Individual interest and value can encourage one's use of e-learning facilities.
AFS1 L1, L5, L6	*"The university management does not [financially] support us in anyway". "I bought software and hardware by myself. Upgrading of software and hardware is done individually". "I have been in this university as a crop scientist for 15 years, but I have not had any financial support as far as e-learning is concerned. Some lecturers may be financially supported to adopt e-learning technology".*	No financial support for adoption of e-learning.

CONMAN1 L5, L6	*"I think university management is not really concerned about the e-learning cause. Individuals usually earn projects where they get money for gender or graduate based training"*. *"There is no form of management commitment as such. However, my dean tries to provide funds to acquire LCD projectors and Whiteboard markers. We can also access MakAir network but slightly."*	Little commitment for adoption of e-learning from University management
STRUL L2, L5, L6, L1	*"There is nothing in place that facilitates e-learning"*. There seem to be no coordination between teachers and students as far as e-learning is concerned. *"The structure in place is fiction guided by boardroom decisions and is poorly implemented"*. *"No to some extent; students are encouraged to send work to emails"*.	Little commitment for adoption of e-learning from University management
EMPI L1, L2, L4, L3, L5	*"Financial constraint"*. *"The staff are not empowered since they are not provided with e-learning resources"*. *"The University does not empower lecturers and students enough. For example, graduate students cannot access relevant e-journals because the university does not make subscriptions"*. *"Lecturers and students are not trained to use e-learning information systems"*. *"I always move around to inquire about use of certain technology and no one [can help]"*.	Barriers to e-learning
RUREI L4, L2	*"I am not aware of any rules and regulations that guide the use of e-learning at [this university]. Therefore, I think that lack of such formalities hinders progress of e-learning information systems because you are not mandated to use e-learning"*. *"Permission to use university computer laboratories is limited from 9 a.m. to 1 p.m. and then from 2p.m. to 5pm"*.	Barriers to e-learning
Other causes L1, L2, L4, L5, L6	Financial constraints, failure to prioritise e-learning (i.e. e-learning has no budget) is another big hindrance. *"Lack of a central managerial system that is [used] to oversee the use of e-learning facilities"*. *"It took a year for me to get a desktop after I wrote to the main administration"*. *"I do not think lecturers are still committed as they used to be e.g. they no longer teach students how to use software"*. Failure to train both students and lecturers. Failure to consider students as clients.	Barriers to e-learning
IUSE L1	*"No. I am capable of using e-learning technology"*.	awareness

DIS L4, L1, L3	*"I am very comfortable with e-learning technology because my higher education was provided by the same [means]". "No, I am comfortable with it". "Design of messages and size of screens can discourage my use of e-learning technology".*	knowledge and skills
DIPKEL L1, L4, L6, L5	*"Not as such". "Yes, but only in cases where the teacher is not familiar with the use of technologies. It should be noted that students are not as ready to engage with material online". "Well, you get a shock. But I do not think so. These days no. They are not a shock anymore. If students have better knowledge of e-learning ISs than me, it would be an embarrassment". "Students may be more knowledgeable in e-learning technology if they have time to practice and appreciate it''.*	Not really
Other causes L5, L6	Attitude where by some people perceive e-learning negatively. Failure to create individual time for practicing with e-learning technology. A difference in style of teaching (i.e. some lecturers prefer giving notes only while others may give notes and also incorporate voice). Changing from an abstract to a realistic tool is not easy.	Barrier to e-learning.

Appendix 11-Grouping of Codes or Thematisation Indicating Construct, Description of Construct, Grouping of Codes and Data Source (from lecturers)

Construct	Description	Grouping Code (Thematisation)	Codes	Data source
Adoption of e-learning	Intention to use, innovative use and acceptance of e-learning technologies	Form of e-learning use	Lecturers had earlier on used computers	L4 and L1
			Lecturers have expertise in use of e-learning tools	L5, L1, L3
			Lecturers have embraced e-learning technology	L2
		Why lecturers have not used e-learning technologies	Existence of other facilities such as flash-disks	L1 and L3
			Absence of facilities e.g. video conferencing ones	L4
			Lack of awareness of software environments	L3
			Absence of facilities and motivation	L6
			CD-ROMs are not used because lecturers have not found much use of them, they are expensive and out-dated	L1 and L6
			Lack of knowledge	L3
			Limited bandwidth	L4, L5
			Students' are not prepared to use university e-learning environments	L4
		Why lecturers have used e-learning technologies	Expertise and ability to interact with students through Email, Facebook and WhatsApp and students can interact with material through e-learning environments	L4, L3 and L5

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			CD-ROMs are used sparingly	L3
			Web-based learning is a current development in education as a source of information and an easy to use application	L1 and L4
University Learning Environment	Goal of e-learning policy, time taken while experimenting with ICT, availability of financial support and commitment of university management	Lecturers' familiarity with e-learning policy.	Not acquainted with e-learning policy.	L4 and L2
		Practicing with ICT	Individual interest and value can encourage one's use of e-learning facilities.	L1
		No university support	Lack of management support	L1, L5 and L6
		Not really committed	Lack of commitment	L5 and L6
Causes of failure of e-learning ISs	They include management and individual causes	Management causes	Barriers	L2, L5 & L6, L1.
			financial resources, lack of training	L1, L2 & L4, L3, L5
			Lack of regulations.	L4, L2
			poor prioritisation, bureaucratic tendencies and lack of commitment	L1 & L5, L2, L4, L5, L6.
		Individual causes	Poor design	L4, L1 & L3
			Negative attitudes	L5, L6

Appendix 12-Overall and Sub-themes Grouped by Construct (from lecturers)

Construct	Overall theme	Description	Sub-themes	Data source
Adoption of e-learning	Nature of adoption	This is concerned with plan, skills exhibited and embracing of e-learning technologies. The adoption process is unveiled giving a hint on why lecturers may use or not use these technologies and the type of technologies used.	Already used computers	L4 and L1
			Out datedness	L1, L3
			Awareness and use of web-based learning	L1, L4
			Lack of facilities	L4, L1
			Poor e-learning environments	L4, L3
			Knowledge and Ability	L5
			Skill in using hyperlinks	L1
			Lack of motivation	L6
			Alternative communication channels	L3
University learning environment	Nature of the learning environment	Indicates extent to which the university environment supports use of e-learning facilities/ services or not	E-learning policy.	L4, L2
			Interest and value to use of e-learning	L1, L4
			Barriers – lack of financial resources to purchase hardware/software and training	L1, L5, L6
			Lack of management commitment	L5, L6, L4, L2
Causes of failure of e-learning ISs	Factors	These are management factors	Enabling and impeding factors	L2, L5, L6 L1
			Financial constraints	L1, L2 and L4, L3
			lack of rules and regulations	L4 L2
			Poor prioritisation	L2, L4, L5

			and L6
		These are individual factors	Negative Attitudes	L5, L6

Appendix 13-Overall theme, main sub-themes (main themes) considered and source of literature (from lecturers)

Overall theme	Main sub-theme (main themes considered)	Literature source
Nature of adoption	Already used computers.	Brown, 2002; Chang and Tung, 2008; Davis, 1989; Kahiigi (2013); Lee et al., 2009
	Out datedness.	Kasse and Balunywa (2013)
	Awareness and use of web-based learning.	Kasse and Balunywa (2013)
	Lack of facilities.	Kasse and Balunywa (2013)
	Poor e-learning environments.	Kitutyi and Tusubira (2013)
	Knowledge and ability.	Drent and Millissen (2008); Kahiigi (2013)
	Skill in hyperlinks.	Drent and Millissen (2008); Kahiigi (2013)
	Lack of motivation.	Drent and Millissen, 2008; Kahiigi (2013)
	Alternative communication channels e.g. email, Facebook and WhatsApp respectively.	Drent and Millissen, (2008); Kahiigi (2013)
Nature of learning environment	E-learning policy.	Drent and Meelissen (2008)
	Interest and value to use of e-learning.	Alkharang (2014); Drent and Meelissen (2008)
	Barriers – lack of financial resources to purchase hardware/software and training.	Drent and Meelissen (2008)
	Lack of management commitment.	Drent and Meelissen (2008); Hardaker and Singh (2011)
Managerial factors that cause failure of e-learning ISs	Enabling and impeding factors.	Kasse and Balunywa (2013)
	Financial constraints.	Kasse and Balunywa (2013)
	lack of rules and regulations	Kasse and Balunywa (2013)
	Poor prioritisation	Kasse and Balunywa (2013)
Individual factors that cause failure of e-learning ISs	Negative Attitudes	Ssekakubo et al. (2011); Alkharang (2014)

Appendix 14-Codification of Data Indicating Data Item Source, Data Extracts and Initial Codes (from students)

Data item source	Data Extract	Initial Codes
ITU1 S1, S2, S5 and S6	*"I have the intention to use computers for academic purposes". "I use a computer because it is fast." "I use computers as a way of simplifying my work". "Computer technology is the current trend in education".*	Computer technology is the current trend.
ITU2 S4, S1 and S6	*"...CD-ROMs are bulky, I use flash disks and google drive". "...CD-ROMs are cheap". "… I use CD-ROMs for storing my information".*	CD-ROMs are rarely used even when they are convenient
ITU3 S1, S3, S4, S5	*"Web based learning offers more information". "...some topics cannot be well explained by the lecturers…". "Internet enhances the processes of doing research". "I would wish to but I do not know". "I do not understand web based learning".*	Web-based learning is preferred
ITU4 S1, S6, S5, S4	*"I would be glad to share experience with the rest of the students in other parts of the world whom we share the same course". "...because learning is more enticing with visual aids". "I have little hope of using such facilities". "I do not desire to use this type of technology because of lack of expertise".*	Video conferencing is invaluable
ITU5 S1, S3, S5, S2 and S6	*"When the e-learning software environment is implemented, our lecturers would upload lecture notes for us". "If I use the e-learning environment, it will improve on my IT skills and ease my work". "If I am within the university I can use the e-learning software environment". "I do not know about any existence of such environments in their universities".*	E-learning software is needed
INU1 S1, S2, S3, S4, S5 and S6	*"We 'surf' the Internet by use of search engines such as Google". "We use wireless technology based on our personal data if we are off-campus". "We are encouraged to use portable document formats (PDFs) instead of Wikipedia because PDFs usually contain researched information". "We mainly use applications such as MS Word, Excel, PowerPoint and Publisher".*	Students have skills to use the Internet and other software applications
INU2 S1, S5, S6 and S3	*"Well, we normally use MS Word when given assignments and research". "...in addition to use of applications such as MS Word, Excel, and PowerPoint, I can also use audio and visual technology". "Yes, I use...publisher". "...our lecturers encourage us to make research and make presentations using PowerPoint since it has more animations to explain*	There is innovative integration of audio and visual technology in research and learning

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	some points and the work is summarized on the screen".	
INU3 S3	*"I mostly interact with my colleagues through WhatsApp, agriculture elites group and also rarely through email where few students ask me to send documents or hand-outs. Facebook is more of leisure and non-academic because I view pictures".*	Wide use of online media
ACC1 S1, S2, S6	*"The trend of education now is that, it is almost compulsory that students must be computer literate". "Yes, I like using computers for typing my coursework and also carrying out research using Internet". "Yes, they are easy to work with".*	Competence in computer use - knowledge and skills
ACC2 S5, S1, S3	Majority of the respondents never relied on this technology because of reasons already mentioned. CD-ROM technology is outdated. The few who used this type of technology did so because it is cheap and stores information.	Rare use of CD-ROMs
ACC3 S1, S3, S5 and S6	*"I use web-based learning for research and expounding on what is taught in class by lecturers". "Web-based learning has been resourceful in my professional research". "I am not aware of this type of technology".*	Awareness of web-based learning
ACC4 S1, S3, S5	*"I would love to use video-conference technology for academic purposes but there is shortage of such facilities". "Yes, I replicate video-conference learning through WhatsApp but it uses more MBs hence more expensive". "No".*	Limited video conference technology
ACC5 S1, S3, S4, S5 and S6	*"I have not been able to utilize the e-learning software environment because it is almost not there. Both lecturers and students are ready to use e-learning software environments but management has not provided such facilities". "Our lecturers put reference books and assignments on class emails but not on any other system". "We never used the e-learning software environments in our units".*	Limited use of e-learning software

GUELP1 S1, S3, S4, S5, S6	*"The goal of the e-learning policy has minimal encouragement on my use of e-learning facilities". "... a discussion policy, for example, may improve adoption of e-learning because once e-discussions are made they can compel one to use the e-learning facilities". "The e-learning policy is not effectively implemented in the university, it is just on paper". "I do not know" "I have not heard anything on the e-learning policy and I do not know how it operates".*	e-learning policy not effectively implemented
ATIEXICT1 S1, S3 and S4	*"Not at all because the course is hectic. On weekends when we intend to explore with ICT, our IT laboratories are usually closed". "If we practiced or experimented with ICT, we would be encouraged to use e-learning facilities".*	Limited use of IT facilities
AFS1 S1, S2, S5, S6, S3	*"They are not supporting us financially". "No, no, no [!!!] it is not there". "They do not give the money directly but they put limited wireless with in a limited range. For example, Library, Schools of agriculture and law".*	Barriers include lack of financial support
CONMAN1 S1, S2, S3, S5, S6, S4	*"University management is not committed at all. We have lecturers and computer laboratories and there is no time for practice". "Management is not supportive towards e-learning adoption, e-learning is theoretical but not practical". "I do not know". "I think they do because they design sessions on how to use computers".*	Lack of commitment by University management
STRUL S1, S2, S4, S6	*"...the e-learning unit is not coordinated to the extent that its services do not match with the teaching schedule". "...sometimes lecturers may collide and we do not have hands on". "There is no structure in place that aids management of e-learning". "...the university does not explain the policies. They have also failed to make 'MAKAIR' [Wi Fi] available [within the whole university]". "Arrangement of e-learning facilities is poor".*	Absence of structures that aid e-learning.
EMPI S1, S3, S6	*"There is no time to access facilities, no technical personnel to attend to us, no maintenance of computers and no special training sessions to offer". "No special seminars and training on e-learning". "There is no awareness and training on how to use e-learning ISs".*	Lack of technical staff
RUREI S1	*"What hinders e-learning ISs is because we work in the dark and we do not know much about the rules and regulations".*	Ineffective rules and regulations
Other causes S1, S3, S4, S6	Poor liaison with the government, inability to lobby for funds from donors, lack transparency by university management and poor implementation of	Others include funding, clear framework and poor management

	rules and regulations. There is no clear e-learning framework by government that can be adopted by public universities, failure to implement research findings about e-learning in public universities, and failure to make a mandatory policy for students in IT related fields such as those in CoCis and CEDAT to acquire laptops. Poor planning in relation to e-learning and failure to create e-learning awareness in the university community.	
IUSE S1, S3 and S4, S2, S5 and S6	While half of the students disagreed that their inability to use e-learning technology effectively may not be a hindrance to the progress of e-learning ISs, others suggested otherwise. *"I can use computers and in any case my inability does not prevent others". "Of course, it can hinder. If I have limited IT skills then it would limit my ability to use e-learning ISs".*	N/A
IUSE S1, S3 and S4, S2, S5 and S6	While half of the students disagreed that their inability to use e-learning technology effectively may not be a hindrance to the progress of e-learning ISs, others suggested otherwise. *"I can use computers and in any case my inability does not prevent others". "Of course, it can hinder. If I have limited IT skills then it would limit my ability to use e-learning ISs".*	N/A
DIS S1, S2, S4, S5 and S6, S3	*"I am comfortable with it". "We help the old professors in setting up projectors". "Yes, to a small extent it reduces the level of my concentration whereby I would spend time downloading music instead of attending to my class work".*	N/A
DIPKEL S1, S3 and S5, S2, S4 and S6	*"I do not think so, what hinders is the shortage of facilities not discrepancies" "Yes, because if lecturers do not know much about e-learning of course they cannot encourage us to use e-learning technology for their assignments".*	Lack of interest
Other causes S1, S3 and S4	*"The course is demanding ...I do not have time to 'dilly dull' with computers";* lack of affordability of computers/ laptops and resistance by certain individuals to adopt e-learning.	Resistance to innovation and adoption

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Appendix 15-Grouping of Codes or Thematisation Indicating Construct, Description of Construct, Grouping of Codes and Data Source (from students)

Construct	Description	Grouping Code (Thematisation)	Codes	Data source
Adoption of e-learning	Intention to use, innovative use and acceptance of e-learning technologies	Form of e-learning use	Need for e-learning	S1, S2, S5 and S6
			Knowledge and Skills	S1, S5, S6, S3
			Availability of e-learning technology	S1, S2, S3
		Why students have not used e-learning technologies	Rare use of CD-ROMs	S4
			Lack of knowledge	S5
			Inability	S6
			Limited video-conference facilities	S5
			Lack of expertise	S4
			Limited support for E-learning environment	S1
			Lack of awareness	S2 and S6
			Outdated technology	S5
			Lack of resources to host video conference learning	S3
			lack of interest	S5
			Ineffective implementation	S1, S3, S4, S5 and S6
		Why students have used e-learning technologies	Requisite technology in education	S1, S2
			Convenience	S2
			Trend	S5
			Advantages of Web-based learning	S1
University Learning Environment	Goal of e-learning policy, time taken while experimenting	Students familiarity with e-learning policy	Awareness of e-learning policy	S1, S3, S4
			Ineffective implementation	S5, S4
		Practicing with ICT	Limited facilities	S1

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	with ICT, availability of financial support and commitment of university management	University support	Lack of financial support	S1, S2, S5 and S6
		University commitment to e-learning cause	Lack of commitment	S1, S2, S3 and S5 S6
Causes of failure of e-learning ISs	They include management and individual causes	Management causes	Absence of structures that aid e-learning	S1, S2, S4, S6
			Lack of technical staff	S1, S3, S6
			Ineffective rules and regulations	S1
			Others include funding, clear framework and poor management	S1, S3, S4, S6
		Individual causes	Lack of interest	S1, S3, S5, S2, S4 and S6
			Resistance to innovation and adoption Resistance to innovation and adoption	S1, S3 and S4

Appendix 16-Overall and Sub-themes Grouped by Construct (from students)

Construct	Overall theme	Description	Sub-themes	Data source
Adoption of e-learning	Nature of adoption	This is concerned with plan, skills exhibited and embracing of e-learning technologies. The adoption process is unveiled giving a hint on why lecturers may use or not use these technologies and the type of technologies used.	Computer technology is the current trend	S1, S2, S5 and S6
			CD-ROMs are rarely used even when they are convenient	S4, S1 and S6
			Web-based learning is preferred	S1, S3, S4, S5
			Video conferencing is invaluable Video conferencing is invaluable	S1, S6, S5, S4
			E-learning software is needed	S1, S3, S5, S2 and S6
			Ability to use Internet and software applications such as MS Word, Excel, PowerPoint and Publisher	S1, S2, S3, S4, S5 and S6
			Integration of audio and visual technology in research and learning	S1, S5, S6 and S3
			Wide use of online media	S3
			Competence in computer use - knowledge and skills Competence in computer use - knowledge and skills	S1, S2, S6
			Rare use of CD-ROMs	S5, S1, S3
			Awareness of web-based learning	S1, S3, S5 and S6
			Limited video conference technology	S1, S3, S5
			Limited use of e-learning software	S1, S3, S4, S5 and S6
University learning environment	Nature of the learning environment	Indicates extent to which the university environment supports use of e-	E-learning policy not effectively implemented	S1, S3, S4, S5, S6
			Limited use of IT facilities	S1, S3 and S4

			learning facilities/ services or not	Barriers include lack of financial support	S1, S2, S5, S6, S3
				Indirect financial support in form of payment for wireless technology in a limited range	S3
				Lack of commitment by University management	S1, S2, S3, S5, S6
Causes of failure of e-learning ISs	Factors	These are management factors		Absence of structures that aid e-learning	S1, S2, S4, S6
				Lack of technical staff	S1, S3, S6
				Ineffective rules and regulations	S1
				No funding, no clear framework and poor management	S1, S3, S4, S6
		These are individual factors		Lack of interest	S1, S3, S5, S2, S4 and S6
				Resistance to innovation and adoption	S1, S3 and S4

Appendix 17-Overall theme, main sub-themes (main themes) considered and source of literature (from students)

Overall theme	Main sub-theme (main themes considered)	Literature source
Nature of adoption	Computer technology is the current trend	Brown, 2002; Chang and Tung, 2008; Davis, 1989; Kahiigi (2013); Lee et al., 2009
	CD-ROMs are rarely used even when they are convenient	Kasse and Balunywa (2013)
	Web-based learning is preferred	Kasse and Balunywa (2013)
	Video conferencing is invaluable Video conferencing is invaluable	Kasse and Balunywa (2013)
	E-learning software is needed	Kitutyi and Tusubira (2013)
	Ability to use Internet and software applications such as MS Word, Excel, PowerPoint and Publisher	Drent and Millissen (2008); Kahiigi (2013)
	Integration of audio and visual technology in research and learning	Drent and Millissen (2008); Kahiigi (2013)
	Wide use of online media	Drent and Millissen, 2008; Kahiigi (2013)
	Competence in computer use - knowledge and skills	Drent and Millissen, (2008); Kahiigi (2013)
	Rare use of CD-ROMs	Kasse and Balunywa (2013)
	Awareness of web-based learning	Kasse and Balunywa (2013)
	Limited video conference technology	Kasse and Balunywa (2013)
	Limited use of e-learning software	Kitutyi and Tusubira (2013)
Nature of learning environment	E-learning policy not effectively implemented	Drent and Meelissen (2008)
	Limited use of IT facilities	Alkharang (2014); Drent and Meelissen (2008)
	Barriers include lack of financial support	Drent and Meelissen (2008)
	Indirect financial support in form of payment for wireless technology in a limited range	Drent and Meelissen (2008); Hardaker and Singh (2011)
	Lack of commitment by University management	Hardaker and Singh (2011)
Managerial factors that cause	Absence of structures that aid e-learning	Kasse and Balunywa (2013)

failure of e-learning ISs	Lack of technical staff	Kasse and Balunywa (2013)
	Ineffective rules and regulations	Kasse and Balunywa (2013)
	No funding, no clear framework and poor management	Kasse and Balunywa (2013)
Individual factors that cause failure of e-learning ISs	Lack of interest	Ssekakubo et al. (2011); Alkharang (2014)
	Resistance to innovation and adoption	Ssekakubo et al. (2011); Alkharang (2014)