AN ANALYSIS OF ACADEMIC STAFF EXPERIENCES WITH E-LEARNING AND THEIR EFFECT ON ITS UPTAKE IN UNIVERSAL SECONDARY EDUCATION SCHOOLS IN KAMPALA

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UGANDA CHRISTIAN UNIVERSITY

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DECLARATION

I, **Nantagya Grace Ssebanakitta**, do hereby declare that this dissertation entitled, **"*An Analysis of Academic Staff Experiences with E-Learning Uptake in Universal Secondary Education Schools in Kampala Capital City*"** is my own work and any reference to other scholarly works has been acknowledged.

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APPROVAL

This PhD study titled, ***"An Analysis of Academic Staff Experiences with E-Learning Uptake in Universal Secondary Education Schools in Kampala Capital City"*** is hereby approved to be submitted for examination under our supervision as the University Supervisors.

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DEDICATION

This dissertation is dedicated to the loving memory of my parents, the late Gilbert Bukulu Ssewabunda and late Violet Buganzi Bugezza, in appreciation of the educational foundation they set for me, and without which I would never have even dreamt about pursuing my academic career to the PhD level. May their souls rest in eternal peace.

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LIST OF ACRONYMS

A' Level:	Advanced Level of Education
AI:	Artificial Intelligence
CDROMs:	Compact Disc Read-Only Memory
ECT:	Expectation-Confirmation Theory
E-learning:	Electronic learning
ICEF:	International Consultants for Education and Fairs
ICT:	Information and Communications Technology
MOOCs:	Massive Open Online Courses
NPA:	National Planning Authority
O' Level:	Ordinary Level of Education
PLATO:	Programmed Logic for Automatic Teaching Operations
PLE:	Primary Leaving Examinations
PC:	Personal Computer
PTA:	Parents and Teachers Association
RCDF:	Rural Communications Development Fund
TAM:	Technology Acceptance Model
TPB:	Theory of Planned Behaviour
TRA:	Theory of Reasoned Action
UACE:	Uganda Advanced Certificate of Education
UCC:	Uganda Communications Commission
UCE:	Uganda Certificate of Education
UCU:	Uganda Christian University
UCUSAF:	Uganda Communications Universal Access and Services Fund
UPE:	Universal Primary Education
UNEB:	Uganda National Examinations Board
USE:	Universal Secondary Education
UTAUT:	Unified Theory of Acceptance and Use of Technology
VLEs:	Virtual Learning Environments

ABSTRACT

This study examined teachers' experiences with e-learning and their influence on its uptake in Uganda's Universal Secondary Education (USE) schools, with a view of developing a Strategic E-Learning Implementation Framework (SEIF). Specifically analysed was the instructional engagement, satisfaction, challenges, and coping strategies experienced by teachers in the process of facilitating e-learning uptake in USE schools. Grounded in Connectivism, Technology-Mediated Learning Theory (TMLT), and the Unified Theory of Acceptance and Use of Technology (UTAUT), the study explored how teachers' individual, infrastructural, institutional and systemic experiences shape e-learning uptake in resource-constrained secondary education environments. The study employed a convergent parallel mixed methods design to simultaneously collect and analytically triangulate quantitative and qualitative data. The quantitative strand involved a structured questionnaire administered to 393 teachers selected from 10 USE schools in Kampala Capital City using stratified sampling, considering gender, subject specialization, qualifications, years of experience, and technological proficiency. The qualitative component focused on using a semi-structured interview to interview 10 purposively selected headteachers. Ethical clearance was obtained from the Uganda Christian University Research Ethics Committee (UCUREC). Descriptive and inferential statistical analyses were employed to assess teachers' instructional engagement, satisfaction, and institutional experiences with e-learning and their effect on its uptake. Exploratory factor analysis and multiple regression techniques were used to examine underlying dimensions and predictors of e-learning uptake. Thematic analysis of the qualitative data complemented quantitative findings to provide an in-depth contextual understanding of these experiences. The results revealed that teachers experienced suboptimal instructional engagement and satisfaction with digital platforms such as Zoom, WhatsApp, and Google Classroom because of the challenges they experienced and ineffective coping strategies they applied to cope with them. E-learning uptake was below expectation. These experiences were significant predictors of e-learning uptake. The challenges teachers faced with e-learning included negative attitude, unstable electricity, poor internet access, insufficient ICT tools, and weak administrative and leadership responsiveness. Teacher

instructional engagement, satisfaction and institutional challenges were more significant predictors of e-learning uptake than individual motivation or reflection. Therefore, efforts to improve e-learning in USE schools in Kampala Capital City should pay more attention on addressing institutional constraints while without neglecting teachers' individual satisfaction and motivation to engage instructionally in facilitating e-learning uptake. The study contributes to the existing literature by integrating four theoretical frameworks and generating new empirical insights from an under-researched context, thereby developing a Strategic E-Learning Implementation Framework (SEIF). Based on this framework, the study offers actionable recommendations for policymakers, school leaders, and development partners to address structural gaps and support scalable, sustainable e-learning implementation in Uganda's secondary education sector.

CHAPTER ONE
INTRODUCTION

1.0 Introduction

This study analyses the instructional engagement, satisfaction, challenges and coping strategies teachers experience with e-learning and their effect on its uptake in USE schools in Kampala Capital City. The study was inspired by the observation that e-learning was rapidly rising due to technological progress and growing global recognition of its role in expanding access to education (Peck, 2025), but its uptake was still low in African countries such as Uganda and their specific areas like Kampala Capital City. Research on causes of low e-learning uptake in Africa has tended to focus on higher education guided mostly by one theory (Kisanjara & Maguya, 2024), especially in Uganda (Komuhangi et al., 2022), even where experiences with e-learning have been explored as causes (Atukunda et al., 2024). Where e-learning has been studied in Ugandan secondary schools, focus has been on its platform testing and barriers to its adoption (Walekhwa et al., 2022; Kyomuhendo et al., 2024). Research on e-learning experiences as causes of low uptake at lower school-levels is not in the context of Uganda (Karimi et al., 2023; Matete et al., 2023). How teachers' e-learning experiences affect its uptake is hence still understudied in Ugandan secondary schools, especially from an integrated lens of connectivism, TMLT and UTAUT. This study filled this gap. This chapter covers the background, problem, objectives, research questions, hypotheses, justification, significance, scope and conceptual framework.

1.1 Background to the Study

This section is developed using four perspectives. The first is the historical background providing the progressive development of e-learning right from its instructional roots in distance education. The second is the theoretical background, which identifies the theories that underpinned the study. The third is the conceptual background that defines the key concepts and the fourth is the contextual background that explains the study's motivation and geographic focus.

1.1.1 Historical Background

Understanding e-learning uptake and its optimization has evolved into a prominent stream of educational research rooted in distance education (Masalimova et al.,

2022). Prior research traces the conceptual origins of e-learning to pre-electronic distance education, which began with instructors using physical intermediaries such as transporters to send learning materials and assignments to students and receiving answered scripts from students for to assess their learning (Masalimova et al., 2022). Distance education evolved into correspondence education after the invention of postal services (Moore, 2023). Advancement from correspondence education to e-learning was triggered by technological advancements that started in the 18th-century (Fidanian, 2020; Almajali et al., 2022).

The advancement alluded to above began with the delivery of instructional content over radio invented in 1896, progressing into televised instruction after the invention of television in 1927 (Tamm, 2019; Barclay, 2021). Delivery and uptake of e-learning progressed to the use of networked computers enabled by PLATO developed in 1960 (Belousova et al., 2019). Further technological innovation led to the invention of the Internet-supported Web-based asynchronous e-learning from the 1980s (Cope & Kalantzis, 2023), which progressed into synchronous digital e-learning now evolving into AI-driven learning (Seo et al., 2021; Tanjga, 2023). Previous research has highlighted how these technological developments occurred in tandem with increasing e-learning uptake, thereby significantly expanding access to education at all levels of schooling (Abu-Ali, 2024; Bashir & Lapshun, 2024, 2025; Gavrus et al., 2025; Peck, 2025). E-learning uptake has been encouraged to achieve SDG 4 (1), which seeks to achieve universal access to education for all children of school-going age by 2030 regardless of their gender.

E-learning uptake has been rising from less than 500,000 students facilitated by less than 100 teachers in the early 2000s to the extent that 49% of all students in school worldwide completed their courses in 2024 with significant support from electronic education (Peck, 2025). Currently, an estimated 180 million students are globally enrolled for different e-learning courses in order to acquire new knowledge and skills, and to shape their attitudes facilitated by more than 1 million instructors (Peck, 2025). This estimate represents a 900% increase in e-learning uptake globally since 2000; and with 70% of students showing preference for e-learning and 96% of the graduates recommending it compared to traditional classroom teaching, this

uptake is projected to increase by 57 million more students instructed by over 2 million teachers by 2027 (Peck, 2025).

E-learning uptake is unfortunately still low in African countries, with the total access estimated to reach 32-50 million students by 2029 compared to less than 5 million students who were enrolled for this learning in 2015 (Statista, 2024). This estimate is based on the rapid rate of internet penetration and increased access to electric and computerised devices that support e-learning in African countries such as Algeria, Botswana, Egypt, Kenya, Mauritius, Namibia, Rwanda, Seychelles, Tunisia, South Africa, Tanzania, and most importantly for this study, Uganda (Matsh, 2024; International Consultants for Education and Fairs [ICEF], 2025). While Uganda has been investing in ICT infrastructural development and availability in USE schools in pursuit of universal access to education by all Ugandans of school-going age as envisioned in Vision 2024, but e-learning uptake has remained low, estimated at less than 1,000,000 students at all schooling levels in Uganda (Namatovu & Kyambade, 2025).

The low uptake of e-learning in African countries as attracted research to establish the underlying causes and how they can best be addressed. Much of this research has been conducted from the design perspective, thereby identifying instructional design weaknesses and strategies for addressing them to improve e-learning effectiveness (Debattista, 2018; Karthik et al., 2019; Al-Gerafi et al., 2024). Other researchers have taken a management perspective, thereby identifying administrative challenges to e-learning adoption and how they can be remedied to improve its uptake (Ahmad et al., 2023; Barikzai et al., 2024). Others have analysed how acceptance of e-learning can be accelerated by improving the necessary infrastructure and support systems in schools (Siron et al., 2020; Qiao et al., 2021). A scrutiny of the themes covered by these studies suggests that prior research has paid limited attention to the lived experiences of educators with e-learning, especially in African secondary schools.

Yet teachers' e-learning experiences play a key role in determining their interest in online teaching as well as their motivation to implement it and their effectiveness

in facilitating students' learning and subsequently, realisation of national curricular and educational goals (Dolighan, 2023; Karimi et al., 2023; Ong & Quek, 2023). For this reason, researchers that have shown interest in understanding instructors' e-learning experiences have focused on higher education or secondary schools outside Uganda (Atukunda et al., 2024; Karimi et al., 2023; Matete et al., 2023).

The analysis of previous research on teachers' e-learning experiences also reveals most of the studies have been underpinned by one theory. Jailani et al. (2023), for instance, explored only the connectivist view of these experiences while Puja (2024) analysed them based on only the TMLT theory. Furthermore, Marmoah et al. (2024) discussed teachers' e-learning experiences from the UTAUT perspective. Therefore, extant research depicts a theoretical dearth about how the integrated lens of connectivism, TMLT and UTAUT underpins teachers' e-learning experiences and their impact on its uptake.

In addition, while previous research has analysed teachers' experiences in different contextual perspectives, the context of educational institutions in Africa, particularly that of Uganda's secondary schools has not attracted much attention. This gap is illustrated by different studies. Ramadani and Xhaferi (2020), for instance, explored teachers' experiences with e-learning, but the context was high schools of Kumanovo in northern North Macedonia. Marmoah et al. (2024) and Puja (2024) analysed similar experiences for school teachers in Indonesia. Karimi et al. (2023) analysed these experiences for educators in Afghanistan. Yet Ganji et al. (2024) analysed them in the context of Iranian teachers. Where these experiences have been analysed in African educational institutions, focus has been on higher education (see for instance Maphalala & Mpofu, 2018; Matete et al., 2023).

Even in Uganda, research on teachers' experiences has focused on higher education (see Bada et al., 2020; Eton & Chance, 2022; Atukunda et al., 2024). Moreover, regardless of the context, not much attention has been paid to the analysis of how teachers' e-learning experiences affect its uptake. Even the studies that have analysed e-learning uptake have not delved into how it is influenced by these experiences because their focus has been on its trend analysis (Bashir & Lapshun,

2025; Peck, 2025). Consequently, extant scholarship depicts theoretical, contextual and correlational gaps regarding the nature of academic staff experiences with e-learning and their effect on its uptake in Uganda's secondary schools. In short, there is a dearth of research on how teachers' e-learning experiences influences its uptake from the integrated lens of connectivism, TMLT and UTAUT and in the context of Uganda's USE schools, which no previous research has covered.

This is the case despite the fact that e-learning has been implemented in these schools for a number of years. Indeed, after its pioneering adoption in Uganda by Makerere University in the early 2000s, e-learning began to be introduced in other educational institutions, including secondary schools (Kyomuhendo et al., 2024). The adoption increased suddenly in 2020 following the closure of classroom-based education as an intervention recommended by the World Health Organisation to prevent the spread of the Covid-19 pandemic (Atukunda et al., 2024). This closure necessitated switching to e-learning as the only alternative mode of instruction (Kengoma et al., 2025). Much of the existing research in Uganda has however concentrated on implementation challenges, with almost no study conducted on instructors' experiences with e-learning (see for instance Walekhwa et al., 2022; Kyomuhendo et al., 2024). This study therefore, filled these gaps following the theoretical background provided in the next section.

1.1.2 Theoretical Background

The study was guided by a combination of three theories, namely: connectivism, TMLT and UTAUT, each filling the other's weaknesses to facilitate this study to achieve its aim. The use of these studies implies that study built on previous research by extending the theoretical grounding of teachers' experiences with e-learning uptake from being underpinned by one or two theories applied in most of the prior studies to being guided by an integrated perspective of these three theories. The integration is such that each of these three theories is applied to fill the gaps of the other, thereby providing a comprehensive guide for explaining teachers' lived experiences with e-learning uptake. More about this integration is explained in section 2.1 of Chapter 2. It suffices to note that connectivism was used to explain teachers' experiences with their interlinking of different digital tools to form a

network as a source of teaching knowledge and to deliver it to students (Siemens, 2005; Jailani et al., 2023). TMLT guided analysing how teachers experienced instructional interaction facilitated by digital tools (Bower, 2019). UTAUT underpinned the analysis of teachers' experiences in the form of behavioural and institutional factors influencing their use of e-learning (Venkatesh et al., 2003). The combination of these theories facilitated a comprehensive analysis of teachers' experiences with e-learning as conceptualised in the next section.

1.1.3 Conceptual Background

The study analysed two central concepts, which included e-learning uptake as the dependent variable and teachers' e-learning experiences as the independent variable. E-learning uptake referred to students' acquisition of knowledge, skills and shaping of their attitudes through electronic educational content delivered through teachers' instructional experiences (Fallery & Rodhain, 2011; O'Neill, 2024). E-learning uptake included synchronous and asynchronous acquisition of knowledge, skills and attitudes through their teachers' lesson planning, content delivery to and evaluation using digital platforms such as radio, television, social media and mobile apps (O'Neill, 2024).

Teachers' e-learning experiences refer to instructors' perceived encounters, reflections, gratification, challenges and ways of juggling with digital devices and platforms that facilitate electronic teaching (Mörtsell, 2024). These experiences were conceptualised in this study as teachers' perceived instructional engagement in, satisfaction with, reflections on challenges faced with e-learning and coping strategies for dealing with them. Instructional engagement referred to teachers' perceived efforts and time spent cognitively, behaviourally and technologically on teaching through asynchronous and synchronous e-learning (Bilocura et al., 2023; Li & Xue, 2023). Satisfaction referred to teachers' perceived contentment with the quality of e-learning devices, platforms and process (preparing, delivering learning content and assessing students (Nikou & Maslov, 2023). Reflections referred to personal factors (attitude, ease of use, confidence) and institutional factors (infrastructure, support systems) that influence e-learning (Atukunda et al., 2024).

1.1.4 Contextual Background

The study was conducted in USE schools in Kampala Capital City of Uganda. Uptake of e-learning began in Uganda at the beginning of the 2000s pioneered by Makerere University. Guided by Uganda Vision 2040 and its E-learning Policy, 2002-2004, Makerere University introduced Virtual Learning Environments (VLEs) to support delivery of blended learning in its Distance Education Programme (Baguma & Wolters, 2021). A decade later, other educational institutions, including mostly public and private universities and some secondary and primary schools came on board to increase access to education as envisioned in Uganda Vision 2040 (Baguma & Wolters, 2021; Kengoma et al., 2025). The increase in access to ICT devices such as laptops, smartphones and tablets resulting from their ubiquity enhanced e-learning uptake blended with or as an alternative to the physical face-to-face classroom teaching (Kyakulumbye & Katono, 2013; Kyakulumbye et al., 2013, 2019; Eton & Chance, 2022).

The closure of all educational institutions in Uganda on 30th March 2020 as a measure recommended by the World Health Organisation to mitigate the spread of Covid-19 gave impetus to the uptake of e-learning at all levels of schooling in Uganda (Eze et al., 2024). Certainly, school closure made it impossible for over 15 million students and 548,000 teachers to get access to classroom learning and teaching, respectively, thereby compelling every closed educational institution to resort to e-learning as the only alternative (Atukunda et al., 2024). Government of Uganda also improvised a programme involving selecting expert instructors at all levels of schooling to start delivering lessons via the different channels of e-learning, which included radio, television, and synchronous and asynchronous online instruction (Namatovu & Arinaitwe, 2024). This improvisation was meant to translate into a sudden boost in e-learning uptake from less than a total of 500,000 students to all the 15 million students facilitated by all the 548,000 teachers. Unfortunately, uptake was less than 20% of these numbers (Sanyu, 2023).

The study was particularly conducted in Kampala Capital City because the encouraged e-learning concentrated in this area due to the fact that it enjoyed the digital infrastructure and access to ICT devices compared to other parts of Uganda

(Kemp, 2024; UCC, 2024). In addition, Kampala Capital City is located in Kampala Capital City that had the highest concentration of USE schools (55.6%) and the greatest access to internet-enabled devices and digital platforms. Furthermore, although the Ugandan government had made commendable efforts to improve educational access, physical classroom space remained limited compared to the sudden increase in enrolment resulting from the introduction of UPE and USE. This scenario prompted agencies such as UCUSAF to promote e-learning as a solution to the access gap (Ministry of Education and Sports, 2024a).

The promotion e-learning in Uganda in general and in Kampala Capital City has been associated with challenges, particularly those faced by teachers. However, the identified challenges have been those related to instructional design, e-learning infrastructural expansion, and policy formulation and implementation (Walekhwa et al., 2022; Kyomuhendo et al., 2024). Teachers' lived experiences with the promoted e-learning have not been studied, especially in the context of USE schools. This context thus provided fertile ground for investigating teachers' lived e-learning experiences in under-resourced yet digitally favoured settings.

1.2 Statement of the Problem

Optimal e-learning uptake by students has been globally and locally acknowledged as a vital tool for increasing educational access (Bashir & Lapshun, 2025; Perk, 2025). However, e-learning uptake has remained suboptimal or low in USE schools in Uganda, particularly in Kampala Capital City (Kituyi et al., 2024; Namatovu & Arinaitwe, 2024; Namatovu & Kyambade, 2025), where it stands at less than 20% of the 1 million students expected to benefit from it (Sanyu, 2023). Teachers' e-learning experiences play a role in optimising e-learning uptake (Nikou & Maslov, 2023). Prior studies have however, not paid much attention to these experiences in Uganda's secondary schools as their focus has been on attributing low uptake of e-learning to its infrastructural, administrative and cost-related barriers (Walekhwa et al., 2022; Kyomuhendo et al., 2024).

Consequently, there is a dearth of research on Uganda's secondary teachers' e-learning experiences and their influence on its uptake. Teachers' e-learning

experiences and their effect on e-learning uptake have particularly not been analysed in the context of USE schools and from a combined lens of connectivism, TMLT and UTAUT. The lack of this analysis reveals a research gap, which has left it unclear as to whether teachers' e-learning experiences contribute to its low uptake. If this research gap continues unaddressed, e-learning uptake will continue to be low and all the investments Uganda has made to encourage educational technology will remain inconsequential, without any understanding of whether the situation can be improved by looking into teachers' experiences. Therefore, this study filled this gap by analysing teachers' e-learning experiences, including teachers' perceived instructional engagement in different types of e-learning, satisfaction with, challenges faced, coping strategies used to deal with the challenges, and their impact on e-learning in USE schools in Kampala Capital City.

1.3 Objectives of the Study

The objectives of the study were the following:

1.3.1 General Objective

The general objective of the study was to develop a Strategic E-Learning Implementation Framework (SEIF) based on an analysis of teachers' e-learning experiences and their effect on its uptake in USE schools in Kampala Capital City.

1.3.2 Specific Objectives

The study achieved the following specific objectives:

1. To determine the influence of teachers' instructional engagement with different types of e-learning on e-learning uptake in USE schools in Kampala Capital City.
2. To assess the influence of teachers' satisfaction with e-learning instructional experiences on its uptake in Kampala Capital City.
3. To examine the effect of teachers' perceived challenges to e-learning on its uptake in Kampala Capital City.
4. To investigate the influence of strategies teachers employ to cope with challenges experienced with e-learning uptake on its uptake.

1.4 Research Questions

The following were the research questions answered in this study:

1. What is the extent of teacher instructional engagement with the different types of e-learning platforms available in USE schools in Kampala Capital City?
2. How satisfied are the teachers in Kampala USE schools with e-learning experiences?
3. What factors do teachers in Kampala USE schools perceive to challenge e-learning uptake?
4. What strategies do teachers use to cope with challenges to e-learning uptake in Kampala USE schools?

1.5 Research Hypotheses

The following were the research hypotheses verified in this study:

H_1: Teachers' instructional engagement in e-learning has a significant effect on its uptake in USE schools in Kampala Capital City.

H_2: Teachers' satisfaction with e-learning has a significant effect on e-learning uptake in USE schools in Kampala Capital City.

H_3: Teachers' perceived challenges to e-learning have a significant effect on its uptake in USE schools in Kampala Capital City.

H_4: Teachers' coping strategies with e-learning have a significant effect on its uptake in USE schools in Kampala Capital City.

1.6 Justification for the Study

The study aligned with Sustainable Development Goal 4(1) and Uganda's Vision 2040, which prioritized equitable access to secondary education (OECD, 2017; NPA, 2020). With limited physical classroom infrastructure, particularly in USE schools, e-learning was promoted as a viable alternative. Investment in e-learning infrastructure and training has been increasing over the years, but e-learning uptake has remained low. This suggests that there are other factors that need to be unearthed and addressed to ensure that that this uptake improves in tandem with increases in investment in e-leaning infrastructure and training. It is in this sense that a study that this study, which seeks to provide an understanding of teachers' experiences and their effect on this uptake is needed to establish whether these experiences are among such factors.

Given the instructional centrality of teachers in e-learning, understanding their experiences with it is important. It provides an appreciation of which experiences are negative so that they can be dealt with and which ones are positive so that they can be encouraged to improve e-learning uptake. Providing this understanding is particularly needed in a situation where these experiences are underexplored. It is for this reason that this study was urgently needed.

1.7 Significance of the Study

Theoretically, the study contributes to scholarship by generating new knowledge about teachers' experiences (instructional engagement, satisfaction, reflections on challenges and remedying strategies) and their effect on e-learning uptake through a multi-theoretical lens combining constructivism, connectivism, technology-mediated learning and UTAUT. This new knowledge is provided in the form of an integrative framework that deepens the understanding of how various models explain user interaction with educational technologies, and what needs to be done to optimise this interaction. This framework is provided in the context of teachers in USE schools, but can be used by educational researchers, academics and students as a basis for conducting further research on e-learning and related areas.

Practically, the findings of the study provide educational policymakers and planners in the Ministry of Education and Sports with the opportunity to appreciate how to improve e-learning in a way that optimises instructors' instructional engagement, satisfaction with and reflective reflection on e-learning in USE schools. This opportunity is in the form of providing these policymakers and planners with empirical knowledge about the nature of each of these experiences and how it challenges e-learning uptake. This knowledge provides cues about what to do to improve e-learning uptake. In this sense, the government of Uganda can benefit from the study by using it as a basis for improving e-learning, thereby improving the realisation of its objective of expanding access to education.

The recommendations this study makes to headteachers, particularly those in USE schools in Kampala Capital City can help them appreciate the steps to take, including

internal training necessary improve teachers' experiences with e-learning as a basis for improving its uptake in at school level.

The teachers, particularly those in USE schools in Kampala can use the study to appreciate which training or personal reflection to take in order to do away with personal experiences in the form of attitudes and opinions that constrain the instructional role they are expected to play in optimising e-learning uptake

The students, particularly those in USE schools in Kampala Capital City can benefit from this study if its recommendations are implemented to improve teachers' experiences that constrain e-learning uptake. The students can benefit by having the instructional side of e-learning improved, thereby translating into improved teaching-learning experiences and subsequent e-learning uptake and its outcomes

The parents can also benefit from the study by having their children exposed to better quality e-learning, which translates into better learning outcomes from USE schools in Kampala Capital City.

1.8 Scope of the Study

The content, geographical, and time scope of the study were as follows:

1.8.1 Content Scope

The study focused on teachers' e-learning experiences, including instructional engagement and satisfaction, and their reflections on the challenges and coping strategies and their influence on the e-learning uptake. The study was situated within the field of educational technology.

1.8.2 Geographical Scope

The study was conducted in Kampala City owing to its being the most ICT-favoured area in Uganda. The high concentration of USE schools, internet connectivity, and access to digital tools made Kampala the most suitable location for the study.

1.8.3 Time Scope

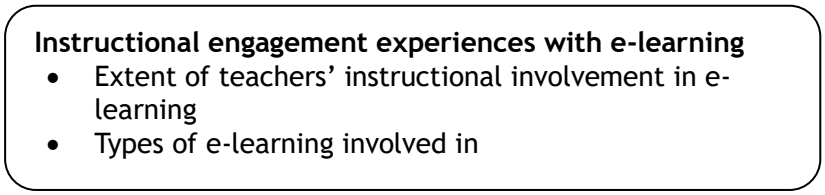
The study covered the period from 2007, when the USE policy was introduced, to 2025, the year of the study's completion. This period included the time for data collection, which occurred during a four-month period in 2025.

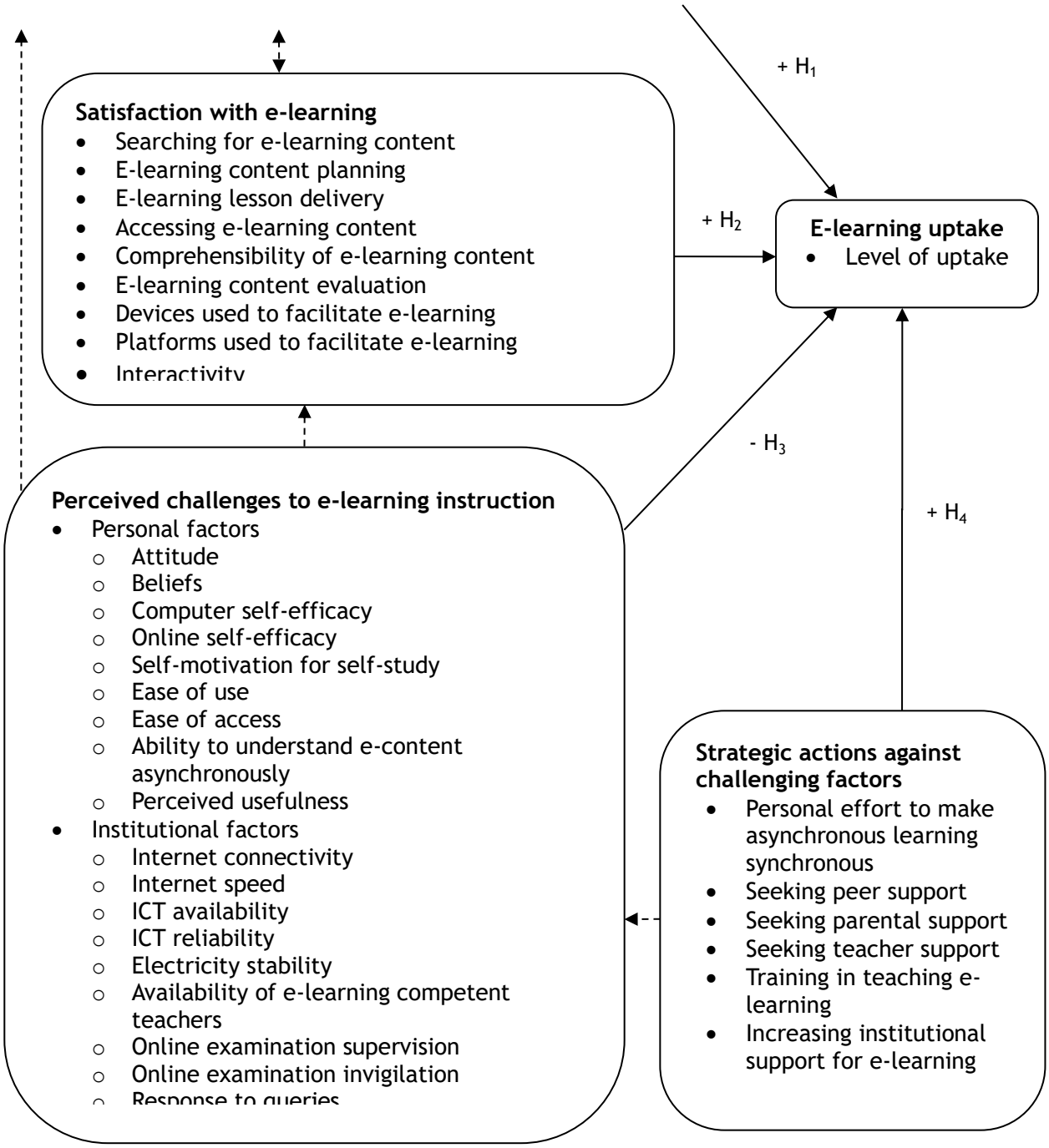
1.8 Conceptual Framework

Based on different studies (Panyajamorn et al., 2018; Coman et al., 2020; Yekefallah et al., 2021; Moustakas & Robrade, 2022; Xu & Xue, 2023; Alterkait & Alduaij, 2024; Atukunda et al., 2024) the study was conceptualised as shown in Figure 1.1 below. As illustrated in this Figure, the study was conceptualized based on specific indicators identified from the combined perspective of three theoretical frameworks: connectivism, TMLT, and UTAUT and literature reviewed in Chapter 2. In this framework, e-learning uptake was treated as the dependent variable, assessed through its reported level by both teachers. Teachers' experiences—specifically their instructional engagement, satisfaction, reflections on access challenges, and the actions taken to mitigate these challenges—were conceptualized as independent variables. This framework was grounded in the assumption that each of these experiential dimensions significantly contributed to the level of e-learning uptake.

Figure 1.1 illustrates that instructional engagement with e-learning was conceptualized as the various types of e-learning in which teachers were involved, alongside the degree of instructional and learning involvement demonstrated in each type (Dubey et al., 2023). This involvement was assumed to influence e-learning uptake positively and was analyzed in terms of indicators such as active participation, expressed interest, commitment, emotional and cognitive attachment, and the degree of studious effort and instructional support from stakeholders. Specifically, it included the motivation and facilitation provided by teachers, headteachers, and others toward encouraging uptake of e-learning.

Figure 1.1: Conceptual Framework: E-learning Experiences and level of Uptake





Source: Developed by the Researcher, 2025

The framework also indicated that satisfaction with e-learning was another key experiential factor influencing uptake positively. Satisfaction was assessed based on participants' judgments of their involvement in various e-learning processes, including content discovery, lesson planning, instructional delivery, content accessibility, comprehensibility, assessment, and interactivity. It also encompassed the usability of e-learning devices and platforms (Coman et al., 2020; Yekefallah et al., 2021; Xu & Xue, 2023; Alterkait & Alduaij, 2024).

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Notably, Figure 1.1 depicts a bidirectional relationship between instructional engagement and satisfaction. This interaction implied that the extent of instructional engagement in e-learning was partially contingent upon the degree of satisfaction experienced, and conversely, satisfaction was influenced by the depth

of instructional engagement. This dual relationship was hypothesized to affect e-learning uptake and was examined through the study's formulated hypothesis.

The conceptual framework further identified reflections on access challenges as another experiential dimension assumed to influence e-learning uptake negatively. These reflections were based on participants' evaluations of both personal and institutional barriers—such as inadequate ICT skills, poor attitudes, limited internet access, device unavailability, and power instability (Panyajamorn et al., 2018; Moustakas & Robrade, 2022; Atukunda et al., 2024). These reflective insights were also assumed to shape the level of satisfaction and instructional engagement by either discouraging or reinforcing e-learning participation. The interconnections among these experiences were tested analytically in relation to the central hypothesis.

Reflections on access challenges were investigated not only in terms of teachers' perceptions of personal factors, but also in terms of their evaluations of institutional barriers to e-learning uptake. The personal factors analysed included attitudes, beliefs, computer self-efficacy, online self-efficacy, self-motivation for independent study, ease of access, ease of use, perceived usefulness, and the ability to understand asynchronous digital content (Barua et al., 2020; Atukunda et al., 2024). Institutional factors included the quality and consistency of internet connectivity, availability and reliability of ICT infrastructure, electricity stability, and the responsiveness of school administrations to teacher and student inquiries regarding e-learning (Chandra & Bagdi, 2021; Atukunda et al., 2024).

The conceptual framework also incorporated strategic actions that teachers employed to address these barriers. These actions were assumed to moderate the relationship between identified challenges and e-learning uptake and were thus represented in the framework by a dotted arrow from challenges to uptake. The actions analyzed included self-initiated efforts to enhance e-learning instructional engagement (such as additional self-study), seeking peer support, pursuing digital literacy training, and formally requesting institutional provisions like ICT tools, improved bandwidth, and access to compatible e-learning platforms (Bada et al., 2020; Obidile, 2023).

These actions were conceptualized not only as a direct means of enhancing e-learning uptake, but also as influences on satisfaction and instructional engagement. For instance, a teacher's dissatisfaction with a particular e-learning platform could prompt actions such as seeking training or switching platforms, which would in turn influence future instructional engagement. Conversely, instructional engagement and satisfaction themselves could prompt or shape action, thereby forming a feedback cycle of experience and adaptation. This feedback loop was represented in the conceptual framework as an arrow linking satisfaction to strategic actions, completing the cyclical model of user experience. The interrelationships among instructional engagement, satisfaction, reflections, and actions were examined through hypothesis testing to illuminate how these factors collectively influenced e-learning uptakes.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter provided the review of theoretical and empirical literature with the aim of identifying gaps that this study sought to fill. The review was conducted systematically using the PRISMA approach as explained in Appendix J.

2.1 Theoretical Literature Review

This study was anchored in three theories that collectively provided a robust lens through which teachers' e-learning experiences and their effect on its uptake were investigated in Universal Secondary Education (USE) schools in Kampala Capital City. These theories included, Connectivism (Siemens, 2005; Downes, 2005), TMLT (Bower, 2019), and the (UTAUT) (Venkatesh et al., 2003). The selection of these theories responded to both the complexity of e-learning adoption and the diverse institutional factors embedded in the study's conceptual framework—teacher factors, student factors, technology factors, and instructional design factors.

2.1.1 Connectivism Theory of Learning

Connectivism, advanced by Siemens (2005) and Downes (2005), asserts that learning occurs across networks of information, people, and digital platforms. This assertion applies to e-learning as a process by which knowledge is sourced, acquired and distributed or shared by networking multiple nodes such as teachers, peers and students using technological devices and platforms (Verstraeten et al., 2025). Connectivism advances a view that knowledge and skills can be acquired from and transmitted through spaces that transcend far beyond personal and social realms, and created by linking one's electronic device and platform to a distributed technological network (Jailani et al., 2023). In this study, connectivism guided an investigation of how teachers experienced their instructional engagement in e-learning by connecting accessible and interoperable technological devices and platforms to the internet and networks of electronic information they wanted to plan and deliver lesson content and to evaluate students. The experiences were investigated in the form of how easy and fast teachers found connecting accessible

devices and platforms to internet and networks of the knowledge they needed to plan and deliver learning content to students and to evaluate them asynchronously and synchronously (Leon et al., 2025).

The theory of connectivism has, however, been criticized for focusing on only how instructors and learners connect to networked knowledge or information technology without explaining the actual use of this technology after one's connection to it. In addition, connectivism does not delve into the factors influencing the actual use and the experiences characterizing it (Cleary, 2021; Liu & Li, 2021; Mohammedeen et al., 2023). These gaps were filled in this study by complementing connectivism with the TMLT and UTAUT as explained below.

2.1.2 Technology-Mediated Learning Theory

This theory was developed by Bower (2019) to explain how electronic and digital technologies have no own intentions, but can be used as means of instruction and learning. The theory asserts that teachers can use technologies to communicate and exchange educational content with learners. It postulates that these technologies are used as means for online search or offline retrieval of information needed to determine learning content, develop lesson plans, deliver lessons, evaluate learners, and transmit feedback to students (Masagazi et al., 2024; Mayer & Schwemmle, 2023; Vladova et al., 2021; Bower, 2019). Clearly, this theory explains how technologies are actually used by instructors to facilitate e-learning uptake. It therefore guided exploring teachers' instructional engagement experiences with e-learning. TMLT has, however, been criticised for being technology-centric, explaining how technologies are used in e-learning without delving into the factors influencing this use; yet encounters with these factors are integral to the experiences teachers encounter in the process of e-learning uptake (Vladova et al., 2021; Mayer & Schwemmle, 2023). This criticism was circumvented in this study by complementing TMLT with UTAUT.

2.1.3 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT was proposed by Venkatesh et al. (2003) by combining the principles and postulations of the technology acceptance model, the theory of reasoned action, and the theory of planned behaviour. Combining these three theories implies that

UTAUT was developed to explain how different factors, including subjective beliefs, intentions, behaviour, performance and effort expectation, social influence, and enabling factors influence individuals' use of new technology (Rahmaningtyas et al., 2020; Abbad, 2021; Rusman *et al.*, 2023). This way, UTAUT identifies factors that characterise technology users' experiences (Venkatesh et al., 2012; Rudhumbu, 2022; Raffaghelli et al., 2022; Marikyan & Papagiannidis, 2023). In this study, this theory was applied to analyse the personal, social and institutional factors that defined teachers' experiences with e-learning uptake.

As shown in Figure 1.1, the analysed personal experiences included teachers' satisfaction with e-learning as well as their personal challenges to e-learning, including teachers' attitude, beliefs, efforts, self-confidence, willingness to engage in e-learning, ease of using e-learning devices, ease of e-learning access, comprehensibility and complexity of e-learning content (Duggal, 2022; Perera & Abeysekera, 2022; Semlambo et al., 2022). E-learning experiences with respect to institutional factors were analysed in the form of teachers' satisfaction with and reflections on internet connectivity, speed, availability and accessibility as well as reliability of ICT devices, stability of electricity provided by their schools, and response to queries (Atukunda et al., 2024)

In general, this study was underpinned by a combined perspective of three theories, which included connectivism and TMLT and UTAUT. Connectivism was used to analyse how teachers' engagement experiences in the form of how easy and fast teachers found connecting accessible devices and platforms to the internet and networks of the knowledge they needed to plan and deliver learning content to students and to evaluate learners asynchronously and synchronously. The TMLT guided the analysis teachers' instructional engagement with e-learning in the form of actual use of accessible technological devices and platforms to facilitate their lesson planning, delivery and student evaluation. Therefore, connectivism and TMLT guided the achievement of the first objective of the study. The UTAUT guided the analysis of teachers' experiences in the form of teachers' satisfaction and reflections on the personal and institutional factors that influenced e-learning uptake. The reflections were explored in terms of teachers' perception of e-learning usefulness, ease of use,

influence of peers and school leadership, infrastructural support and ICT access. Therefore, UTAUT guided the attainment of the second, third, fourth and fifth objective of the study. Overall, these three theories provided a combined framework that enabled the study to analyse and establish the nature of teachers' experiences (perceived instructional engagement in different types of e-learning, satisfaction with, challenges faced, coping strategies used to deal with the challenges) by going beyond the use of only one theory. They were hence applied to fill the gaps identified in the empirical literature presented in the next section.

2.2 Review of Empirical Research

This section reviews empirical studies on how teachers experience e-learning in form of their instructional engagement in and satisfaction with it as well as their reflections on the factors challenging its uptake and strategies applied to cope with these factors. Accordingly, the literature is organised according to the themes derived from the objectives of the study.

2.2.1 Instructional Engagement Experiences with E-learning

Different studies have been conducted on e-learning instructional engagement experiences, but emphasis has largely been on students' experiences (Fadilah, 2016; Bergdahl et al., 2020; Bernacki *at al.*, 2020; Heemskerk et al., 2020; Tomović, 2021; Lin et al., 2022; Bergdahl, 2022; Nyathi & Sibanda, 2022; Hutchinson, 2023; Li & Xue, 2023; Dubey et al., 2023; Turk et al., 2024). Previous research therefore, suggests that teachers' instructional engagement experiences with e-learning are relatively understudied. Indeed, comparatively few studies have been conducted on the e-learning instructional engagement experiences of teachers in different contexts, which moreover, do not include that of the academic staff in USE schools as illustrated henceforward.

To begin with, Bilocura et al.'s (2023) survey found that e-learning instructional engagement experiences can be behavioural, social, cognitive, and technological. These researchers drew on Lee et al.'s (2019) definitions to analyse cognitive instructional engagement as the acquisition of knowledge and its application to generate more knowledge through e-learning, and to explore behavioural

instructional engagement as the preparedness, efforts, and positive qualities exhibited in e-learning. They further applied Elumalai et al.'s (2020) description to explore social instructional engagement as the sustained online interaction with the significant others, and used Günüç and Kuzu (2014) conception to analysis technological instructional engagement as the ability to have full access to e-learning materials and necessary technological resources and to manipulate them to optimise e-learning.

Bilocura et al.'s (2023) findings indicate that social instructional engagement experiences involving learning through online consulting, collaborating, teamworking, networking, and cooperating with teachers' significant others through mobile phones. The findings indicate further that social instructional engagement experiences were the most productive in terms of e-learning uptake and technological instructional engagement experiences were the least productive as they were characterised by unstable internet connection, which kept teachers going offline frequently during online classes. Essentially similar appear in Ramos et al.'s (2025) study on the relationship among pre-service teachers' e-learning readiness, learning instructional engagement, and learning performance in hyflex learning environments.

Nonetheless, Bilocura et al. (2023) and Ramos et al. (2025) conducted their studies using a quantitative approach only. Therefore, these studies were methodologically lacking in terms of in-depth analysis, which the qualitative approach offers (Creswell & Creswell, 2018). In addition, these studies were conducted in the context of Philippine pre-service teachers. Therefore, they were contextually lacking in terms of instructional engagement experiences of in-service teachers. The present study was thus needed to fill not only this methodological gap by applying mixed methods as explained in the next chapter, but also the contextual gap by investigating the nature of in-service teachers' instructional engagement in e-learning and its effect on its uptake in the context of USE schools in Uganda.

Bilocura et al.'s (2023) definitions, however, were used in this study to analyse in-service teachers' cognitive instructional engagement in terms of their online search

for teaching content and its application in online lessons delivered to students. Social instructional engagement was analysed in terms of in-service teachers' cooperation, teamworking and collaboration with fellow teachers to improve their teaching via e-learning. Behavioural and technological instructional engagement experiences were analysed in the same way Bilocura et al. (2023) explored them.

Similarly, Welmer et al. (2025) conducted a study to explore faculty members' experiences in promoting active student instructional engagement in online doctoral courses. The findings of this study indicate that facilitating students' e-learning was associated with positive experiences that included instructors engaging in self-directed learning about the content to deliver to students and its updating, spending time for reflection on this content, flexibility in terms of adjusting content delivery time, and online social interaction through group discussions as a catalyst for learning. It was also associated with positive instructor experiences involving enabling student interaction through a safe and structured online environment, and using digital tools to create varied instructional engagement.

In the same vein, Marty-Dugas et al. (2024) found that instructors whose e-learning experience was characterised by enthusiasm enjoyed delivery of online lectures and their vocal enthusiasm attracted student instructional engagement, learning, and memorisation of delivered learning content, thereby increasing e-learning uptake. Similarly, Rinaldi (2025) explored teacher perception of their experiences regarding how they engaged students in e-learning. The findings revealed that teachers enjoyed their instructional engagement with students online, especially when they used online social networking through personal connections and relationship building to cultivate a positive online teaching-learning atmosphere. The enjoyment the teachers felt inspired students to attend online classes attentively, thereby increasing their e-learning uptake.

Marty-Dugas et al.'s (2024) and Welmer et al.'s (2025) studies were however, conducted in higher education focusing on faculty experiences with instructing undergraduate Psychology students at the University of Waterloo and doctoral students, respectively. Rinaldi (2025) conducted the study in state-wide public elementary virtual school in the south-eastern United States. Therefore, these

studies were not in the context of secondary schools, let alone those in USE schools in Uganda. Moreover, while Marty-Dugas et al. (2024) and Rinaldi (2025) applied only the quantitative approach, Welmer et al.'s (2025) study was conducted using only a qualitative approach. Furthermore, none of these scholars applied a combined perspective of constructivism, connectivism, TMLT and UTAUT.

Moreover, while the studies reviewed above suggest a positive relationship between teachers' e-learning instructional engagement experiences, Ren's (2023) study suggest otherwise. Ren's (2023) findings indicate that apart from the positive experience related to flexibility in instructional engagement as e-learning sessions could be altered to suit each instructor and targeted learners' convenience, other teachers' e-learning experiences encountered were negative and adversely impacted e-learning uptake. The other experiences were characterised by difficulties in online access and preparation of content for delivering to students online due to technical complications with course design, difficulties in contacting students online, unpredictability of emotional instructional engagement and lack of experience regarding use of hi-tech devices such as smartphones. To note however, is that Ren's (2023) study depicts methodological and contextual gaps as it took only a qualitative approach and was also in the context of higher education. It also depicts conceptual limitations as it focused on instructional engagement, leaving other concepts such as instructors' satisfaction and reflections unexplored.

In addition to the preceding studies, an earlier study by Hassan and Atan (2012) described instructional engagement experiences with e-learning as actions that include teachers instructionally interacting online with students. These researchers found that these actions include teachers interacting with students through exchanging emails, short messages, WhatsApp messages, teleconferencing, webinar, skyping, and other means of online and virtual teaching with students paying attention and seeking clarification on lesson content being delivered live or recorded online or via broadcast media. These researchers found that through these experiences teachers enabled learners to acquire knowledge and skills from e-learning. However, while Hassan and Atan (2012) discussed e-learning experiences of instructors, they focused on instructional engagement in higher educational institutions, not secondary schools.

Likewise Park and Kim (2020) conducted a survey to analyse instructors' e-learning instructional engagement experiences associated with perceived presence in online classes. The findings from Partial Least Squares indicate that instructors prefer using video-based interactive online communication with students because it is similar to the face-to-face teacher-student interaction in a physical classroom environment. Park and Kim (2020) explained that instructors favoured this experience because it made them feel present as well as the presence of learners in the teaching-learning compared to the non-interactive online course content delivery.

In support, different scholars have shown that instructors prefer the synchronous type of e-learning experiences, which involve teachers delivering scheduled, real-time course content in a videoed virtual interaction with students, to asynchronous classes in which instructors deliver course modules, materials, pre-recorded lectures and assignments to learners without any real-time interaction with their teachers (Fabriz et al., 2021; Fernandez et al., 2022; Alfares, 2024; Hung et al., 2024; Ng et al., 2024; Bouchrika, 2025). Research has also shown that teachers prefer e-learning experiences typified by real-time collaborative or interactive types of e-learning, which include online live discussions, virtual field trips, group projects and lab work live online quizzes, live video-lectures, and personalized online instructor and peer review and feedback (Encarnacion et al., 2021; Zarifsanaiey et al., 2024).

In contrast, there are teachers that prefer e-learning instructional engagement experiences involving in asynchronous self-paced study based on online search for content and watching pre-recorded teacher instructors and downloadable modules, course descriptions and references on how to improve e-learning instruction (Memari, 2020; Martin et al., 2021; El-Sabagh, 2021; Alfares, 2024; Bouchrika, 2025). These experiences with the different types of e-learning were however, identified and discussed in the context of students in universities. The question then which was answered in this present study was whether the same experiences were encountered by students in secondary schools.

Furthermore, Falola et al. (2022) identified the various forms of instructors' experiences, which included online searching and researching for instructional content, virtual instructive interaction with learners, online supervision of research students, online publication of research output, and online assessment of students through marking online coursework. Falola et al. (2022) however, discussed these experiences in the context of Nigerian private universities, but not that of secondary schools, let alone the USE schools in Uganda. These scholars' focus was also on only faculty members and hence, did not delve into the level of instructional engagement that students experience with e-learning. This present study was thus necessary to establish not only the extent to instructors' e-learning instructional engagement experiences these researchers identified featured in secondary schools, particularly the USE schools in Kampala Capital City.

Generally, the reviewed literature indicates that different studies have been conducted on e-learning instructional engagement experiences involving instructors facilitating students' online education. However, these studies were all not conducted in the context of secondary schools, let alone the USE schools in Kampala Capital City. Therefore, this present study covered this context by answering the first research question and verifying H_1.

2.2.2 Satisfaction with E-learning Experiences

A number of scholars have shown interest in analysing instructors' satisfaction with e-learning uptake. In particular, Ghenghesh et al. (2018) analysed instructors' satisfaction experiences with e-learning. The findings revealed that teachers were more satisfied with e-learning experiences (online learning instructional activities and student feedback) associated with continuing student than with those associated with students in the preparatory year. Ghenghesh et al. (2018) however, related teachers' satisfaction with that of students, but not to e-learning uptake. Moreover, their study was conducted using only the quantitative approach and in the context of teachers in the Faculty of Informatics and Computer Science at the British University in Egypt. Therefore, the study depicts methodological and contextual gaps.

Similarly, Xu and Xue (2023) conducted a study to examine satisfaction with online education among students, faculty, and parents before and after the COVID-19 outbreak. In the specific context of faculty, the findings revealed higher levels of faculty satisfaction with e-learning after than before COVID-19 because real-time video interaction with and feedback from students had improved greatly during the pandemic. Xu and Xue (2023) however, was in the context of higher education and relied on only secondary data collected from six academic electronic databases using Comprehensive Meta-Analysis (CMA) software. Their study was therefore lacking in terms of firsthand deeper insight into this satisfaction — a gap which the present study filled using primary qualitative interview data.

Likewise, Mutambara and Chibisa (2023) analysed rural-based universities' faculty members' satisfaction with e-learning in developing countries. The findings revealed that most of the lecturers were highly satisfied with e-learning, particularly with the confirmed cognitive presence, confirmed social presence, confirmed teaching presence, confirmed institutional support, confirmed system quality, confirmed ease of use, and confirmed usefulness associated with it. Mutambara and Chibisa (2023) however, applied only the quantitative survey approach guided by a combination of the expectation confirmation model (ECM) and the technology acceptance model (TAM), but not integrated lens of of constructivism, connectivism, TMLT theory, and UTAUT.

Furthermore, Saleh et al. (2022) conducted an analysis of teachers' satisfaction with online learning during the covid-19 pandemic. Their findings indicate that lecturers were moderately with e-learning, particularly with the new regulations that specified the proportion of with courses that were fully offered online that of courses that were provided in a blended manner. The lecturers were however, dissatisfied not only with the pass and fail regulation the Ministry of Education prescribed during the pandemic period but also with the challenging connection and interconnection of the e-learning supporting devices and their user-unfriendliness. Saleh et al.'s (2022) findings were however, only quantitative and in the context of lectures of University of Petra in Jordan. Therefore, the findings left the question of whether the same satisfaction was experienced by secondary school teachers or not,

pending an empirical answer. This present study was hence needed to provide this answer in the context of USE schools in Uganda.

More to that, Elshami et al.'s (2021) study explored satisfaction with online learning in the new normal that emerged after Covid-19, using the perspective of faculty and students. Relevant to this present was the faculty perspective, which showed that 74.3% of the lecturers were highly satisfied with e-learning, especially with the enthusiasm students demonstrated for it. They were however, dissatisfied with the work overload that e-learning added to their classroom-based teaching in terms of more time taken to prepare online teaching content and assessment materials. These researchers however, analysed satisfaction guided by the social cognitive theory, interaction equivalency theorem, and social integration theory, but not UTAUT applied in this present study to explore satisfaction as one of the personal factors determining e-learning. Moreover, their research was in the context of higher education, not secondary education.

Further still, Atukunda et al. (2024) investigated user satisfaction with e-learning from the perspectives of students, instructors, and e-learning officers and heads of departments of information technology. Findings indicated that students' and instructors' satisfaction with the usability of e-learning devices and platforms, support strategies of e-learning available in the selected educational institutions, and with the ease of use, ease of access, system reliability, electric stability and institutions' response to queries varied between moderate and low. Therefore, this satisfaction was generally below expectation, pointing to a need to improve it by optimizing e-learning experiences more contenting to teachers and students.

Atukunda et al.'s (2024) research, however, involved students pursuing diploma, bachelors, and masters programmes and instructors teaching at the university level. This effectively suggested that this research was conducted in higher education institutions, but not in the context of secondary schools in general and the USE schools in Kampala Capital City in particular. This present study was hence needed to validate Atukunda et al.'s (2024) findings in the context of these schools, more so

because they were in contrast with the conclusions reached by Leek and Rojek (2022).

In summary, the literature reviewed in this section suggests that different studies have established varying and contrasting levels of satisfaction experienced by teachers with e-learning. Most of the studies however, analysed the experienced satisfaction in the context of higher education, and are therefore deficient in the context of secondary education in general and that of USE schools in Uganda in particular. Consequently, this present study addressed this deficiency by answering the second research question and verifying the H_2.

2.2.3 Reflections on Challenges to E-learning Uptake

Numerous studies explored how educators and learners reflected upon the challenges affecting the adoption and efficacy of e-learning platforms. Scholars such as Kisanjara et al. (2019), Bada et al. (2020), Torun (2020), Barrot et al. (2021), Fabian et al. (2022), Chimbunde (2023), and Lopes et al. (2023) provided extensive evidence of these challenges. However, a review of these works reveals that the bulk of existing scholarship was primarily conducted in higher education contexts, particularly universities, thus leaving secondary school settings and specifically USE schools in Uganda largely underexplored.

In particular, Bada et al. (2020) investigated instructors' reflections at Makerere University and identified the factors they perceived as obstacles. These include unstable learning management systems, frequent technical breakdowns that disrupted synchronous teaching, and poor-quality internet connectivity, which Matete et al. (2023) referred to as unstable internet. These scholars indicate that teachers perceived these factors as significant constraints to instructional engagement and satisfaction with e-learning. They also found that instructors highlighted a lack of institutional and pedagogical capacity to create localized e-content, in addition to expressing concerns about unreliable virtual assessments due to the lack of standardized national e-learning policies.

Bada et al.'s (2020) study however, relied primarily on qualitative reflections without triangulation with quantitative. Their research was also not based on any theory and was hence, lacking in terms of theoretical underpinning by models such as connectivism, TMLT and UTAUT. The study also did not delve into teachers' reflections on personal factors such as digital competence needed to effectively use the available e-learning technology infrastructure and instructional design.

The reflections established by Bada et al. (2020) were echoed by Kisanjara et al. (2019) and Maune (2023), who also identified inadequate internet infrastructure, high data costs, and insufficient access to devices as core challenges. Chimbunde (2023) and Lopes et al. (2023) identified erratic power supply, ineffective digital environments, and low teacher motivation as other challenging factors. These factors were however, identified in the context of higher education in Zimbabwe and Nigeria, raising the question about their presence in Uganda's secondary schools in general and government-aided USE schools in particular. This present study answered this question by investigating teachers' Perceived challenges to e-learning instruction uptake in USE schools in Kampala Capital City of Uganda.

Moreover, emerging literature began to point to new forms of challenges arising from technological advancements (Oulamine et al., 2025; Barikzai et al., 2024). For example, while adaptive learning platforms and AI tutors gained traction globally, their lack of local customization and absence in the curriculum design of Ugandan secondary schools presented a new digital divide. This constituted an emerging topic gap that received little attention in the literature on African education systems. The literature reviewed did not address how secondary school teachers perceived the relevance and usability of newer educational technologies such as gamified learning systems or AI-assisted instructional design tools.

2.2.4 Strategic Actions for Coping with Challenges to E-Learning Uptake

Research evidence showed that several strategic actions had been proposed to mitigate the challenges to e-learning uptake (Liu et al., 2019; Wang et al., 2019; Yuan et al., 2021; Chew, 2022; Yuyun, 2023; Roque-Hernández et al., 2024; Suen & Hung, 2024; Turk et al., 2024). These strategies, although useful, were largely

examined within the context of universities and had not been adequately explored at the secondary school level, particularly within Universal Secondary Education (USE) schools in Uganda—indicating a contextual and empirical gap. This study addressed this neglected area by investigating the strategic actions adopted by teachers in USE schools in Kampala Capital City to enhance e-learning uptake.

Turk et al. (2024), using a mixed-methods design in U.S. higher education identified different strategies such as forming peer discussion groups, initiating virtual consultations, and adopting multimodal learning techniques (e.g., combining video, audio, and text formats). While insightful, these findings did not reflect the e-learning realities of secondary school learners in resource-constrained settings, a geographical and demographic gap this study sought to address.

In addition, through a systematic literature review, Roque-Hernández et al. (2024), identified the importance of online instructor interaction as a key strategy to address asynchronous learning difficulties. However, their focus on students in Mexican universities and omission of teacher perspectives indicated a participant scope gap. This present study examined teacher strategic actions, thus offering a more holistic understanding. Suen and Hung (2024) and Wang et al. (2022) emphasized the use of synchronous video tools like Zoom, Skype, and webinars to supplement asynchronous modes and deal with their challenges such as delays in communication and real-time interaction with students. Indeed, these scholars observed that real-time visibility and emotional expression enhanced instructional engagement. Their study was however, conducted in Asian universities and was hence, lacking in the context of Uganda's USE schools — a contextual gap filled in this study.

Chew (2022) and Yuyun (2023) found that virtual instructor presence affected e-learning engagement experiences positively, thereby promoting deeper instructional engagement. This finding suggests that the use of synchronous teaching improves teachers' engagement experience with e-learning uptake, but was established in the context of Indonesian universities and hence, remains unverified in the context of

secondary schools in sub-Saharan Africa. This is therefore the gap, which this study filled in the context of USE school teachers.

The studies by Stevens and Borup (2015), Kartel et al. (2022), and Andrada and Barrot (2025) emphasise the role of parental support in enhancing e-learning engagement and satisfaction experiences through supporting the provision of necessary internet services and ICT devices. However, these studies were limited to elementary schools in Arab and European countries. As to whether their findings apply to the context of African secondary schools, particularly the Ugandan USE schools, was necessary to fill. Teacher training is another commonly cited strategy to improve teacher engagement and satisfaction with e-learning uptake. Bada et al. (2020), Eze et al. (2020), and Nyemike et al. (2022) highlighted the need for pedagogical and technological upskilling for instructors. However, these studies focused on university lecturers, ignoring secondary school teachers—an evident institutional and occupational gap. This study investigated the extent of teacher training in ICT and e-learning practices in USE schools, linking directly to institutional and teacher factors within the conceptual framework.

Institutional support in terms of infrastructure and reduced ICT costs was also emphasized (Pavela et al., 2015; Kibuku et al., 2020; Abera et al., 2023). However, these proposals often presumed adequate government and school-level resources, which may not have applied to public secondary schools in Uganda. As such, the study evaluated institutional readiness and resource allocation towards e-learning, explicitly addressing institutional and technological gaps.

2.2.5 Effect of E-learning Experiences on its Uptake

Current research reveals a mixed view on how teachers' e-learning experiences affect its uptake. Scholars such as Bada et al. (2020) indicate that teachers whose experiences are characterised by good e-learning pedagogical skills, positive attitude and positive acceptance of e-learning and its usefulness encouraged its uptake, and the reverse was also true.

Similarly, the studies of Karimi et al. (2023) and Maphalala and Mpofu (2018) showed that teachers whose engagement experiences were characterised by favourable attitude toward e-learning improved e-learning uptake by increasing virtual group discussions, student assignment and interactive instruction. This effect was however, established in the context of Kabul University lecturers in Afghanistan, leaving the question of whether the same effect applied to USE school teachers in Uganda pending answer. This present study provided this answer.

In addition, Mokgosi and Maile (2025) conducted a study on teachers' perspectives on the implementation of e-learning in secondary schools. Their findings revealed that teachers' engagement with e-learning in the form of ease of using its facilitating devices and platforms and their satisfaction with the proficiency and usefulness of these devices and platforms had a positive effect on e-learning uptake. These researchers however, analysed the perceived of teachers in secondary schools of Gauteng province in South Africa. As to whether the same findings are valid in the context of USE schools in Uganda was necessary to clarify.

Furthermore, Li and Wang (2024) found that teacher engagement experience in the form of teacher presence in the online teaching-learning situation has a significant and positive effect on e-learning uptake in science and engineering. Likewise, Su et al. (2024) established that instructors' engagement and satisfaction experiences in terms of how they searched online, delivered learning content, found it easy to use ICT devices and platforms, and how they interacted with students online had a positive influence on e-learning uptake. Su et al.'s (2024) focus was however, on comparing engagement and satisfaction experiences with e-learning between teachers and students in Chinese universities. Moreover, their study was purely qualitative and therefore, lacking in terms of generalisability. It is in this sense that the present study investigated whether the same influence was valid in the context of USE schools in Kampala, Uganda's capital city.

2.3 Summary of Literature

This chapter reviewed and synthesized theoretical and empirical literature to justify the need for the present study on e-learning uptake in USE schools. The review

adopted a combined theoretical lens of constructivism, connectivism, Technology-Mediated Learning Framework and the UTAUT. This multidimensional perspective was applied because prior research had rarely combined these theoretical frameworks to holistically explain both the pedagogical and technological dimensions of e-learning uptake, particularly within secondary education contexts. This constituted a significant theoretical gap, which the current study addressed by operationalizing these theories in understanding institutional, teacher, student, and technological factors that shaped e-learning experiences.

The review also identified several methodological gaps. Previous studies predominantly employed either qualitative or quantitative designs or systematic reviews (e.g., PRISMA) focused mainly on higher education (e.g., Liu et al., 2019; Wang et al., 2022; Suen & Hung, 2024). Few studies adopted mixed methods, and where this was done, it was limited to university settings in Western or Asian contexts. Consequently, there was limited methodological insight into how mixed methods research could offer a nuanced understanding of both staff and student experiences within resource-constrained secondary school environments in Sub-Saharan Africa. This study therefore **employed** a convergent parallel mixed method design to triangulate findings from teachers and students and bridge this gap.

In terms of conceptual gaps, while constructs such as satisfaction, instructional engagement, instructional support, and technological barriers had been widely examined, they were rarely contextualized within the Ugandan secondary school setting. More importantly, existing literature did not sufficiently investigate these constructs using the integrated theoretical framework and subsequent conceptual framework adopted in this study, particularly in relation to:

- Teacher factors (e.g., digital pedagogical skills, instructional design competencies)
- Technology factors (e.g., availability, usability, and reliability of e-learning platforms)
- Instructional design factors (e.g., adaptability, interactivity, multimodal delivery)

This study explicitly addressed these gaps by designing instruments aligned to these constructs and analyzing how they influenced e-learning uptake in secondary education. Additionally, the literature presented contradictory evidence regarding the effectiveness of asynchronous versus synchronous e-learning. While some studies argued that asynchronous learning offered flexibility and convenience, others suggested synchronous modes promoted higher instructional engagement due to real-time interaction (Chew, 2022; Yuyun, 2023). These inconsistencies warranted further empirical investigation, particularly in contexts like Uganda's secondary schools, where infrastructural and pedagogical realities might have mediated these relationships. This study therefore explored these contradictions and provided context-sensitive insights.

Several neglected or underexplored areas were also identified. These included the role of parental support for e-learning instructional engagement, especially in low-income households whose facilitation of access to e-learning is generally low; and the impact of school leadership on digital adoption. Moreover, no research had examined how instructional design elements (e.g., feedback strategies, interactive tools, multimodal resources) were perceived by teachers in Ugandan secondary schools as factors influencing e-learning uptake. The present study investigated these dimensions to generate evidence-based recommendations tailored to these neglected areas.

Furthermore, the literature showed gaps in data and evidence. There was limited availability of disaggregated data that reflected e-learning adoption trends at the secondary level. Most data sources came from higher education or international contexts that may not have been directly applicable to USE schools. The current study contributed original primary data from both academic staff and students, ensuring diverse and context-relevant evidence.

Finally, emerging technologies such as mobile learning, AI-driven tutoring systems, and low-tech adaptive platforms remained underrepresented in the literature despite their potential to enhance e-learning accessibility in low-resource contexts like Uganda. This study explored teacher and student awareness, use, and

perceptions of these emerging technologies, providing insights into how these innovations might be integrated into the Ugandan secondary school e-learning ecosystem.

The gaps identified—spanning theoretical, methodological, conceptual, and empirical domains—affirmed the need for this study. The next chapter detailed the methodological approach adopted to address these gaps systematically.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

The research gap identified in the previous chapter was addressed using the methodology discussed in this chapter. The UCU format for this chapter begins with the research design, but it is felt prudent to start by explaining the research philosophy and approach, which informed the choice of research design. Thereafter, the chapter explains the research design, sources of information, study area, study population, sample size and sampling techniques, variable measurement, data collection procedures and instruments, data quality control measures, data processing and analysis techniques, ethical considerations, and methodological limitations.

3.1 Research Philosophy

A research philosophy refers to the worldview or set of general assumptions that guided this study concerning the nature of reality (ontology) and knowledge (epistemology) (Saunders et al., 2016, 2019; Takahashi & Araujo, 2020). Ontology pertains to assumptions held by the researcher about the nature of the reality defining the phenomenon under investigation and its existence (Creswell & Creswell, 2018). Epistemology is concern with the nature of knowledge and how it can be acquired and interpreted (Creswell & Creswell, 2018; King, 2022). Existing literature identifies various philosophies, including critical realism, interpretivism, positivism, post-positivism, and pragmatism (Saunders, 2015; Tombs & Pugsley, 2020; Mbanaso et al., 2023). This study was guided by the pragmatic philosophy.

3.1.1 Pragmatism

Pragmatism assumes that reality exists in both objective and subjective forms (Saunders et al., 2019; King, 2022). In this study, this meant that the experiences of teachers with e-learning uptake were both objective and measurable through quantitative data and subjective, hence explainable qualitatively through interviews with headteachers. This ontological position justified the use of mixed methods to capture a comprehensive understanding of e-learning uptake. Epistemologically,

pragmatism assumes that knowledge can be both objective —existing independently of the researcher — and subjective — constructed through interpretation (Kivunja & Kuyini, 2017; Mbanaso et al., 2023). Accordingly, objective data were collected from teachers using structured questionnaires, while subjective insights were gathered from headteachers through semi-structured interviews.

This approach supported the collection of complementary forms of data to deepen the understanding of the e-learning uptake phenomenon (Lincoln et al., 2018). Pragmatism also encourages methodological pluralism, enabling researchers to combine elements of multiple philosophies to suit the research purpose (Brierley, 2017; Lincoln et al., 2018). In this study, pragmatism facilitated the complementary application of positivism and interpretivism, as discussed below.

3.1.1.1 Positivism

Positivism informed the collection and analysis of quantitative data from teachers. These data were gathered through close-ended questionnaires designed using 5-point Likert scales used to measure the variables such as instructional engagement, satisfaction, challenges faced, and the coping strategies adopted by teachers. The analysis of this data contributed to verifying the study's first hypotheses (H_1, H_2, H_3 and H_4).

3.1.1.2 Interpretivism

Interpretivism guided the collection of qualitative data from headteachers to gain in-depth insights into institutional factors influencing e-learning uptake. As instructional supervisors and administrators, headteachers were well-positioned to articulate contextual realities and systemic challenges. Together, the positivist and interpretivist stances allowed the study to adopt both inductive and deductive reasoning in analyzing the data.

3.2 Research Approach

This study employed a mixed methods research approach, integrating both quantitative and qualitative techniques to explore the multifaceted nature of teachers' experiences with e-learning uptake in Universal Secondary Education (USE)

schools in Kampala Capital City. The quantitative strand provided measurable patterns, while the qualitative strand offered contextual depth (Creswell & Creswell, 2023; Plano Clark & Ivankova, 2021). The triangulation of data increased the study's trustworthiness and ensured a well-rounded understanding of the research problem (Tashakkori et al., 2020; Fetters, 2020).

3.3 Study Design

A convergent parallel mixed methods design was adopted as it allowed for the simultaneous collection of quantitative and qualitative data. Structured questionnaires were administered to teachers, while semi-structured interviews were conducted with headteachers. The findings from both strands were analysed separately and merged during interpretation to produce comprehensive insights into e-learning instructional engagement, satisfaction, and response strategies. This design also addressed methodological limitations in prior studies that used either qualitative or quantitative methods exclusively (Creswell & Plano Clark, 2018; Fetters, 2020). The use of this design was consistent with the pragmatic paradigm that underpinned the study (Bryman, 2016; Shannon-Baker, 2016).

3.4 Sources of Information

The study relied exclusively on primary data sources, including teachers and headteachers in USE schools in Kampala City. According to Taherdoost (2021) and Ajayi (2023), primary data originates directly from respondents, ensuring originality and relevance. Secondary sources such as documents and archival data were not used.

3.5 Area of Study

The study was conducted in Kampala City, Uganda's capital, located in the Central Region. Kampala hosts 22 government-aided secondary schools, 10 of which have implemented USE since 2007 (KCCA, 2019). These schools support both O' Level and A' Level transitions and play a critical role in widening educational access (Huylebroeck&Titeca, 2015; Omoeva & Gale, 2016; Wodon, 2020). Kampala City was chosen because of its high concentration of USE schools and accessibility to study participants. The 10 USE schools had an estimated enrolment of 393 teachers (KCCA

Education Office Report, 2024; Ministry of Education and Sports, 2024b). Kampala is also the most developed region in Uganda in terms of ICT infrastructure, internet connectivity, and electricity access (UCC, 2024).

According to the 2024 National Housing and Population Census, Kampala's internet connectivity stood at 100%, compared to the national average of 29.1%. Moreover, over 95% of Kampala's population (estimated at 1,875,834) had access to a digital communication device (UCC, 2022). These attributes suggested that Kampala offered a conducive environment for examining e-learning uptake.

3.6 Population and Sampling Techniques

3.6.1 Target Population

The target population comprised all headteachers and teachers in USE schools in Uganda. Headteachers and teachers were included in the target population because of their direct involvement with e-learning as its implementers and supervisors of these implementers, respectively. Specifically, Teachers were included to provide data on instructional experiences with e-learning uptake (Ministry of Education and Sports, 2024b). Headteachers were selected to gain a deeper insight into teacher experiences with e-learning, especially those emerging from institutional attributes from the supervisors' perspective.

3.6.2 Study Population

The study population consisted of the headteachers and teachers in the 10 USE schools located in Kampala Capital City. As of 2024, there were 10 USE schools in Kampala Capital City with a combined teaching staff of 1,817 teachers (Ministry of Education and Sports, 2024a).

3.6.3 Sample Size Determination

Given the convergent mixed methods design, separate subsamples were selected for qualitative and quantitative data collection.

3.6.3.1 Subsample for Qualitative Data (Headteachers)

The qualitative sample comprised all the 10 headteachers of USE schools in Kampala Capital City. All the headteachers were interviewed because they were few in

number and easily accessible. The interviews were structured to elicit rich, context-specific information aligned with the study objectives. Ongoing analysis during data collection ensured that thematic saturation was reached, justifying the adequacy of the sample (Guest et al., 2020; Saunders et al., 2018).

3.6.3.2 Subsample for Quantitative Data (teachers)

The sample size for quantitative data was determined statistically to ensure that it was representative of the target population, since the study was conducted in Kampala Capital City. Slovin's formula given below was applied to calculate the appropriate number of teacher from the target population.

$$n = \frac{N}{1 + N(e)^2}$$

n = Sample size that is desired

N = Target population (given in the target population as 21,817)

e = Margin of error (at 95% Confidence Interval, i.e., *e* = 5% or 0.05)

$$\text{Therefore, } n = \frac{1817}{[1 + 1817(0.05)^2]} = 327.83040 \approx 328$$

Since 328 teachers were the expected minimum sample size, any sample size greater than it was acceptable (Creswell & Creswell, 2018). Consequently, the actual sample size was 393 teachers and exceeded the expected sample size as a result of the willingness and enthusiasm teachers showed to participate in the study. The response rate was therefore, 119.8%.

3.6.4 Sampling

Sampling refers to the process through which data sources were selected (Creswell & Creswell, 2018). As the study relied on human respondents, the sampling strategy was applied as follows:

3.6.4.1 Selection of Schools

Universal sampling was employed to select all 10 USE schools in Kampala City. This technique is appropriate for small populations, allowing each unit an equal chance

of selection (Kamalloo et al., 2022; Abbas et al., 2023). All selected schools were expected to implement e-learning interventions promoted under Uganda's UCUSAF programme, which includes equipping ICT laboratories, enhancing internet access, distributing digital devices and instructional content, and training teachers in ICT-integrated pedagogy (Partridge, 2023; Kituyi et al., 2024; Ministry of Education and Sports, 2024; UCC, 2024).

3.6.4.2 Selection of Headteachers

Following the selection of schools, headteachers were purposively sampled to form the qualitative subsample. This sampling technique was used to intentionally select key informants who could provide in-depth insights into institutional factors affecting e-learning uptake. The data collected from headteachers complemented the quantitative findings from teachers, particularly regarding systemic challenges and school-level interventions (Campbell et al., 2020; Nyimbili & Nyimbili, 2024; Stratton, 2024).

3.6.4.3 Selection of Teachers

Teachers were selected using a method designed to support both quantitative data collection and representativeness. The quantitative strand of the study involved a statistically derived sample of teachers from USE schools in Kampala City. As established in Section 3.7.3.2, Slovin's formula indicated that a minimum of 327 teachers were needed to ensure statistical representativeness of the total teacher population in Kampala Capital City. However, 393 teachers were selected using stratified random sampling to ensure their representativeness even in terms of their attributes that were relevant to this study. These attributes included teachers' subject specialization, gender, professional qualifications, proficiency in technology use for instruction, and years of experience. This stratification ensured that diverse teacher profiles were covered in the sample. The approach aligns with best practices in educational survey research, promoting reliability and contextual applicability (Tan & Lee, 2023).

3.7 Measurement Levels

The study employed various levels of measurement to match the structure and intent of the survey instrument. Categorical variables such as gender, school type

(government or private-aided), and subject taught were measured at the nominal level, facilitating simple classification and frequency analysis. Ordinal measurements were used for ranked variables, such as teachers' perceptions of challenges, satisfaction with ICT usage, and self-assessed competence in digital learning. Although these responses reflect an order, the intervals between categories were not assumed to be equal. Interval and ratio measurements captured continuous variables, including frequency of e-learning platform usage, years of teaching experience, and time spent creating or using digital content. These variables allowed for more advanced statistical analyses. Employing a multi-level measurement strategy improved the validity, granularity, and analytical robustness of the findings, consistent with recommendations by Tan and Lee (2023).

3.8 Procedure for Data Collection

The data collection procedure comprised a series of carefully planned steps that adhered to acceptable research standards (Busetto et al., 2020; Ali, 2023). A mixed-mode data collection strategy was employed, combining face-to-face key informant interviews with headteachers and self-administered, field-based structured questionnaires for teachers. This approach was selected to leverage the strengths of both quantitative and qualitative methods (Creswell & Creswell, 2018).

The process commenced with obtaining ethical clearance from the Uganda Christian University Research Ethics Committee (UCUREC), which approved the Community Instructional engagement Plan, Risk Management Plan, and Consent Form. Based on this clearance, the Uganda National Council for Science and Technology (UNCST) granted official approval to conduct the research, as documented in Appendix G. Subsequently, the researcher visited each of the selected USE schools in Kampala City. Contact with headteachers was established either through publicly available phone numbers or physical visits to school offices. Upon securing permission to access teachers, the researcher introduced the study, presented the clearance forms and letters from UCUREC and UNCST, and sought informed consent from each teacher. Consent was obtained using a verbal explanation and written documents, including the Consent Form (Appendix D) and the Statement of Consent (Appendix E).

To manage the administration of a large number of questionnaires, two trained data collectors were engaged. These assistants were briefed on ethical procedures, respondent instructional engagement techniques, and appropriate questionnaire delivery. Each data collector was provided with a personalized introductory letter from the principal researcher, accompanied by the official documents from UCUREC and UNCST. Teachers who consented to participate signed the consent form and were given a questionnaire. They were encouraged to complete it immediately if time permitted or within two days for later collection. This process continued until all 393 questionnaires were distributed. Given that participants were qualified teachers, it was assumed they possessed the literacy skills required to complete the instrument independently (Thattamparambil, 2020).

Once the quantitative data were collected, attention turned to the qualitative phase. Headteachers were re-contacted by phone or in person to schedule interviews. Because the study's purpose had already been explained, consent was sought for participation in key informant interviews. These were guided by a semi-structured interview schedule designed to elicit in-depth insights.

The interviews were conducted in a flexible, face-to-face, and conversational manner to allow participants to respond comprehensively. The researcher used probing techniques to clarify responses and explore underlying themes (Ruslin et al., 2022). Each interview was recorded using a smartphone and audio recorder, with prior consent from the participants. In total, ten individual interviews were successfully completed.

3.9 Data Collection Instruments

Data collection instruments refer to the tools used to gather **data** (Creswell & Creswell, 2018; Bordens & Abbott, 2018). In this study, two main data collection instruments were used: a semi-structured interview schedule and a structured questionnaire, as described below.

3.9.1 Semi-Structured Interview Schedule

The semi-structured interview schedule was designed by the researcher and employed to collect in-depth data from the ten headteachers. This instrument allowed for flexibility in question phrasing, paraphrasing, and probing, which enhanced the richness of the data (Creswell, 2014). It enabled respondents to express their views comprehensively, thus providing detailed insights into institutional factors that influenced teachers' e-learning uptake (Creswell & Creswell, 2018). The interview schedule included questions covering headteachers' background information and issues raised by teachers regarding institutional influences on their e-learning experiences. **All interviews were conducted in English**, as the participants were professionals proficient in the language. Each session lasted between 45 minutes to one hour.

3.9.2 Self-administered Structured Questionnaire

The structured questionnaire was designed by the researcher and used to collect quantitative data from teachers. It comprised close-ended items measured using an appropriate Likert scale, aimed at revealing respondents' perceptions on variables such as instructional engagement with e-learning, satisfaction, and perceived challenges (Cheung, 2021). This tool proved efficient for gathering a large volume of data within a relatively short time frame, making it both practical and cost-effective (Ranganathan & Caduff, 2023). The questionnaire was self-administered, capitalizing on the participants' literacy levels as trained educators.

3.10 Data Quality/ Error Control

Data quality was assured by evaluating the validity and reliability of the quantitative data collection instrument and establishing the trustworthiness of the qualitative data and findings, as detailed below.

3.10.1 Validity and Reliability of Quantitative Data

3.10.1.1 Validity of Items used to collect Quantitative Data

Validity refers to the extent to which the questionnaire accurately measured the intended variables (Vakili, 2018). In this study, validity was assessed using both content validity and confirmatory factor analysis. Content validity involved expert evaluation to determine whether the questionnaire items aligned with theoretical

constructs (Aithal & Aithal, 2020; Azraii et al., 2021). Three experts in e-learning were consulted to review the items, marking each as relevant (R) or irrelevant (IR). Based on their evaluations, the Content Validity Index (CVI) was calculated using the following formula:

$$\textit{Content Validity Index (CVI)} = \frac{\textit{All items in research instrument rated relevant (R)}}{\textit{Total number of the rated items (R + IR)}}$$

The CVI was computed as shown in Table 3.1 below

Table 3.1: Computation of Content Validity Index for Questionnaire

Expert assessors of the Questionnaire	Assessment and number of items		Computation of Content Validity Index (CVI)	
	R	*IR*	*R + IR*	*CVI = R ÷ (R+IR)*
Assessor 1	93	8	101	
Assessor 2	94	7	101	
Assessor 3	93	8	101	
Total	280	14	303	280 ÷ 303 = .924

The content validity index (CVI) in Table 3.3 was 0.924 and was greater than 0.7 which, according to Yusoff (2019) and Madadizadeh and Bahariniya (2023), should be the minimum value for acceptable validity. Therefore, most of the items in the designed questionnaire were valid. All the items that were assessed as irrelevant (IR) were eliminated from the questionnaire before administering it to the selected teachers.

3.10.1.2 Pilot-testing the questionnaire

In addition to preliminary validation, a pilot study involving ten teachers from USE schools in Kampala (excluded from the main study sample) was conducted. Their responses were entered into SPSS (Version 25). Confirmatory factor analysis using the principal component method was performed to establish construct validity. This approach, as supported by Rodríguez-Santero et al. (2020), involved extracting factor loadings that indicate how strongly each item correlates with the variable it was intended to measure. Questionnaire items with factor loadings greater than

0.5—deemed the minimum threshold for acceptability—were retained. Those with lower values were eliminated as they did not accurately represent the intended constructs (Rodríguez-Santero et al., 2020; Sajadi et al., 2024). For the details of the factor analysis outcomes, see appendix K.

3.10.1.3 Reliability of Items used to collect Quantitative Data

Reliability was assessed using the Cronbach's alpha method to determine internal consistency. Using the SPSS program (Version 25) and pilot study data, Cronbach's alpha coefficients were calculated. A threshold of 0.7 was used, in accordance with Estremera (2024), to confirm that the questionnaire items were reliable. Items or scales falling below this threshold were revised or removed to enhance overall reliability. The computed Cronbach Alpha coefficients are summarised in Table 3.2.

Table 3.2: Cronbach Alpha coefficients for items measuring specific variables

	Academic staff Questionnaire	
Variable	Number of items	Cronbach Alpha coefficient
Instructional engagement experienced with e-learning	23	.701
Satisfaction experienced with e-learning	23	.705
Reflective experiences with factors challenging e-learning	33	.714
Experiences with actions taken to deal with the factors	8	.711
Level of e-learning uptake	6	.727
Overall Alpha coefficient	**93**	**.707**

For details, see Appendix I

The Cronbach Alpha coefficients in Table 3.12 were greater than 0.7, which should be the minimum acceptable threshold (Estremera, 2024). Therefore, the items in the questionnaire were reliable enough to collect dependable data. It should be noted that being slightly above 0.7 suggests that the internal consistency of the measuring scales was at the minimum and therefore, generally weak.

3.10.2 Trustworthiness of Qualitative Data

The trustworthiness of the qualitative data and findings was evaluated using four key criteria: credibility, transferability, dependability, and confirmability (Forero et al., 2015; Mattick et al., 2018; Stahl & King, 2020; Hayashi et al., 2021).

3.10.2.1 Credibility

Refers to the extent to which the findings of a qualitative study are accurate in reflecting the reality that characterises the phenomenon being investigated, not according to the researcher's subjective interpretation, but in its actual context (Stahl & King, 2020). Credibility asserts that what the findings say about a phenomenon should be similar in context to the findings of another study conducted on the same phenomenon in the same context (Forero et al., 2015).

To ensure credibility, the semi-structured interview schedule was designed based on theoretical indicators from Chapter Two. Each interview question was linked to a specific theoretical indicator, ensuring that the responses captured authentic representations of headteachers' experiences. Data analysis and interpretation were guided by analytical memos written during data coding. These memos helped preserve insights and aided triangulation with quantitative data to enhance consistency and validity (Alele& Malau-Aduli, 2023).

3.10.2.2 Transferability

Refers to the extent to which findings are applicable to contexts other than their own context (Stahl & King, 2020). Findings were compared with theories and studies reviewed in Chapter Two to establish their broader applicability. The degree of alignment supported generalisation to similar educational contexts (Stahl & King, 2020).

3.10.2.3 Dependability

The criterion was met by sharing the designed semi-structured interview schedule with the researcher's supervisor and two peers who will be knowledgeable about e-learning uptake experiences. The interview schedule was reviewed by the researcher's supervisor and two peers with expertise in e-learning. Based on their feedback, items were revised, removed, or added to strengthen reliability. Peer debriefing was conducted to ensure that data interpretations aligned with research objectives (Holmes & Mellanby, 2022; Simoni et al., 2019).

3.10.2.4 Confirmability

Member checking was used to verify the accuracy of findings. Draft results were shared with selected headteachers, who confirmed the alignment of findings with their perspectives and the data they had provided (Candela, 2019; McKim, 2023).

3.11 Data Processing and Analysis

Data processing involves compiling, checking, and organising data to enable logical analysis (Vaughan et al., 2021). Data analysis refers to generating results from the organised data using appropriate methods (Creswell & Creswell, 2018). In this study, both qualitative interview data and quantitative questionnaire data were collected. The manner in which these data were processed and analysed is described in the following subsections.

3.11.1 Quantitative Data Processing

Quantitative data were processed by compiling all the completed teacher questionnaires and checking them for completeness. Following the guidance of Wang et al. (2024), questionnaires in which more than 50% of the items were unanswered were excluded from the dataset, and as Nasir et al. (2016) and Klier et al. (2024) advised, to minimise the impact of missing data on subsequent analysis.

The remaining questionnaires were sorted based on the respondent categories. Data were entered into Python 3.13.3, where coding, error-checking, and cleaning procedures—such as removing outliers and missing values—were performed. The data distributions were reviewed to identify anomalies and ensure consistency. Once processed, the data were subjected to both descriptive and inferential statistical analysis.

3.11.2 Quantitative Data Analysis

Descriptive statistics such as means, medians, and standard deviations were computed to summarise variables. The applied inferential statistical methods included Mann-Whitney U test, which was applied to determine differences for binary teacher attributes such as gender and Kruskal-Wallis H test, which was used to determine differences for three or more teachers' attributes such as academic qualifications. Factor analysis was applied to identify significant measures of

teachers' e-learning experiences. Factor analysis was further conducted to assess the validity of items that measured each variable (Kamal et al., 2022). Pearson correlation was applied to determine how e-learning experiences related with e-learning uptake, and multiple linear regression analysis was used to establish how these experiences predicted this uptake. A professional statistician was engaged to conduct this quantitative analysis using Python 3.13.3.

3.11.3 Model Selection

Model selection was based on the nature of the data and characteristics of the outcome variables. For binary variables, such as access to e-learning platforms, logistic regression was employed. For continuous variables like satisfaction scores, multiple linear regression was used. Model fit was assessed using R^2, AIC, and Variance Inflation Factor (VIF) to check for multicollinearity. Given the hierarchical structure of the data—teachers nested within schools—multilevel modelling was used, in line with best practices in educational research (Kigongo & Nalubega, 2023).

3.11.4 Processing and Analysis of Qualitative Data

Several qualitative data analysis techniques are documented in literature, including content analysis, narrative analysis, discourse analysis, and thematic analysis (Ravindran, 2019). This study applied thematic analysis due to its suitability for distilling meaningful patterns from qualitative data (Renjith et al., 2021; Im et al., 2023). Other methods were excluded to avoid the verbosity and redundancy often associated with quoting every participant extensively (Ali et al., 2024). Among the various thematic analysis frameworks, Yin's (2015) five-step approach was adopted. Braun and Clarke's (2016) six-step method was not used due to its reliance on time-consuming mapping processes. Template analysis was also avoided, as it is better suited to comparative studies (King et al., 2018).

Yin's Five-Step Thematic Analysis Process

1. **Compiling**: All audio-recorded interviews were transcribed verbatim while also noting important meanings.
2. **Disassembling**: The transcribed data were segmented into meaningful codes.

3. **Reassembling**: Codes were grouped into themes that reflected key concepts relevant to the research questions.
4. **Interpreting**: The identified themes were analysed to derive insights into headteachers' experiences with e-learning uptake.
5. **Concluding**: The final step involved summarising key findings and relating them to the research objectives and theoretical framework.

3.12 Ethical Considerations

Ethical considerations refer to universally recognized principles that guide researchers in protecting intellectual property rights and respecting the rights of study participants, thereby ensuring the authenticity and integrity of findings (Nii-Laryeafio&Ogbewe, 2023). In this study, all ethical protocols were followed, including obtaining the necessary ethical clearance, seeking institutional authorisation, and protecting participant rights in accordance with established research standards (Saunders et al., 2016; Kang & Hwang, 2021).

To uphold intellectual property rights, plagiarism was strictly avoided by acknowledging all sources used in the literature and theoretical framework (Fadda et al., 2022). Ethical clearance was obtained from both the Uganda Christian University Research Ethics Committee (UCUREC) and the Uganda National Council for Science and Technology (UNCST) following the submission of the required documents: the Informed Consent Form Template, Community Instructional engagement Plan Template, and Risk Management Plan.

The clearance documents were used to request access to study participants from headteachers of selected USE schools. Once permission was granted, each participant was approached individually. The researcher explained the purpose of the study, why their input was important, and provided verbal and written assurances, including an introductory letter from UCUREC and UNCST (Kang & Hwang, 2021). Participants were required to read and sign a consent statement to confirm their voluntary and informed participation (Resnik & Hosseini, 2024).

Voluntary participation was further emphasised by informing respondents of their right to withdraw from the study at any point without penalty. Anonymity and

confidentiality were assured by omitting personal identifiers and treating all responses with utmost discretion. Additionally, participants' privacy was safeguarded in the reporting of findings.

The study also upheld standards of honesty, integrity, and objectivity by ensuring accurate reporting of findings without misrepresentation. Researcher bias in interpretation and discussion of findings was consciously avoided (Taquette& Borges da Matta Souza, 2022).

3.14 Researcher's Positionality

The researcher was one of the headteachers of secondary schools in Kampala Capital City at the time of the study. The school was however, not a USE school. However, this position enabled the researcher to contact his fellow school administrators and their teachers, to ask them to participate in the study as respondents, which they willingly did because they had had many prior interactions with him in different forums, which included headteacher conferences, teacher training sessions, management meetings and others. It should be noted however, that while this positionality helped getting relatively easy access to the respondents, it was not used in any way to influence headteachers' and teachers' responses. Consequently, the data collected from the selected headteachers and teachers was free of the researcher's personal biases.

In addition, the position of the researcher as headteacher or instructional supervisor enriched his understanding of the teachers' e-learning experiences from the supervisory point of view. However, this understanding did not influence his interpretation of the collected data beyond its meaning as provided by the selected teachers and headteachers. Consequently, the findings reveal the exact picture of the teachers' e-learning experiences as they were reflected by the data.

3.15 Methodological Constraints

Methodological constraints refer to limitations arising from the specific methods adopted in a study (Reimann, 2024). While qualitative methods can limit generalisability and quantitative methods can lack depth, this study employed a

mixed methods approach grounded in pragmatism to overcome these individual limitations (Brierley, 2017; Lincoln et al., 2018).

Nonetheless, using a mixed methods design presented its own challenges. The collection of both quantitative and qualitative data was labour-intensive, time-consuming, and costly. The quantitative phase involved a large, stratified sample of teachers. Coordinating data collection in school settings proved challenging due to teachers' varied schedules. Some teachers were not readily available in staffrooms at the same time. To address this, headteachers were asked to assist by scheduling a one-and-a-half-hour window for questionnaire completion. Where that was not feasible, teachers were allowed to take questionnaires and return them within two days to the headteacher's office.

Additional time-related challenges arose from the explanatory sequential design. After analysing the quantitative data, qualitative interviews were needed to clarify emerging gaps. Arranging appointments with busy headteachers was difficult due to administrative duties and meetings. The researcher managed this by showing flexibility and making repeated appointment attempts. Another constraint involved data analysis. The researcher was more proficient in qualitative analysis than in quantitative methods. To address this, the services of a professional statistician were enlisted to support quantitative data analysis.

CHAPTER FOUR
RESENTATION OF FINDINGS AND ANALYSIS

4.0 Introduction

This chapter presents and interprets the findings obtained from the quantitative and qualitative data analysis techniques, which included descriptive analysis, factor analysis, Pearson correlation and multiple linear regression analysis applied to verify hypotheses H_1 to H_4 stated in chapter 1. Quantitative findings are systematically triangulated with qualitative findings from Yin's (2015) framework of thematic analysis. Subsequently, the chapter is organised beginning with a section explaining the sample in terms respondents' attributes considered relevant in this study. The second section covers quantitative and qualitative results in response to research questions. The third section presents results from hypothesis testing.

4.1 Sample demographic characteristics

The sample consisted of the quantitative subsample for teachers and the qualitative subsample for headteachers. The results on teachers' demographic attributes that were considered relevant as background factors for the appropriateness of these respondents to participate in the study are shown in Table 4.1.

Table 4.1: Showing distribution of the demographic factors (N = 393)

Variable	Category	Frequency	Percentage
Academic Qualification	Bachelors	157	40
	Diploma	138	35.1
	Masters	44	11.2
	Postgraduate Diploma	34	8.6
	Other	14	3.6
	PhD	6	1.5
Age Group	40-49 years	149	37.9
	30-39 years	113	28.8
	<30 years	77	19.6
	50-59 years	54	13.7
Designation	Teacher	324	82.4
	Class Teacher	34	8.6
	HOD	23	5.8
	DOS	12	3.2
Device Ownership	School	179	45.6
	Personal	148	37.7
	I don't own; I just borrow	66	16.8

Variable	Category	Frequency	Percentage
Exposure to e-learning (Years)	6-10 years	164	41.7
	1-5 years	126	32.1
	<1 year	69	17.6
	11+ years	34	8.6
Platform Used	WhatsApp	158	40.2
	Zoom	158	40.2
	Google Meet	37	9.4
	YouTube	28	7.1
	Facebook	12	3
Sex	Female	211	53.7
	Male	182	46.3
Teaching Level	Both	165	42
	O-Level	156	39.7
	A-Level	72	18.3
Teaching Subject	Other	133	33.8
	Mathematics	60	15.3
	Chemistry	36	9.2
	English	32	8.1
	Biology	28	7.1
	Literature	20	5.1
	History	19	4.8
	Economics	18	4.6
	Physics	17	4.3
	Geography	17	4.3
	Fine Art	13	3.3
Years as Teacher	6-10 years	170	43.3
	1-5 years	117	29.8
	<1 year	71	18.1
	11+ years	35	8.9
Years in School	1-5 years	257	65.4
	<1 year	73	18.6
	6-10 years	60	15.3
	11+ years	3	0.8

Source: Primary data

The results in Table 4.1 summarise the diversity of the selected 393 teachers in terms of their academic qualifications, experience, career backgrounds and use of technology. The largest proportion of teachers was qualified with a Bachelor's degree (40%) or Diploma (35.1%), with a few having advanced degrees, which included Master's degree (11.2%) and PhD (1.5%). These results suggest that over half of the respondents were mid-career professionals and the largest proportion of them (37.9%) were in the age range of 40–49 years. Over one fifth of the teachers were under 30 years of age, 13.7% were 50 years or older. These results imply that while the selected teachers traversed all age ranges, the majority were below 50 years of age.

Table 4.1 indicates further that the majority of the teachers were subject teachers (82.4%), although were 8.6% who were class teachers, 5.8% who were heads of departments, and 3% who were directors of studies. The results also show that most of the teachers had access to a device that could facilitate e-learning, with 45.6% using school-provided tools, 37.7% applying personally owned devices and 16.8% depending on borrowing. Those who depended on school-provided and borrowed devices were likely to have limited access to e-learning whenever they were away from school or could not get someone to lend them. Table 4.1 also indicates that 41.7% had 6–10 years of exposure to e-learning, 32.1% had 1–5 years, 8.6% had at least 11 years while 17.6% had less than one year of experience. These results point to varied e-learning experience with the majority of the teachers having at least six years of exposure. WhatsApp and Zoom were used by 40.2% of the teachers each. Other teachers applied Google Meet (9.4%), YouTube (7.1%), and Facebook (3%). These results suggest that most teachers in USE schools applied WhatsApp and Zoom, and hence mobile devices that use low-bandwidth networks.

Both forms of gender were represented in the study with female teachers (53.7%) edging their male counterparts (46.3%) slightly. The largest proportion of teachers (42%) handled teaching at both O-Level and A-Level. Those who taught at O-Level only were 39.7% while those who taught at only A-level were the least (18.3%). These results suggest that the selected teachers represented the entire secondary school education as defined in Uganda. Representation of academic subjects taught varied widely with teachers teaching ‘Other’ disciplines claiming the largest block share (33.8%) and those teaching Mathematics, Sciences, and Humanities varying from 15.3% to 3.3%. These results suggest the selected teachers taught most of the academic disciplines featuring in Uganda’s secondary education, especially as compulsory subjects, which points to multi-disciplinary sample.

Table 4.1 indicates that 65.4% of the selected teachers had spent 1-5 years of at their respective current schools, 18.6% under one year, and only 0.8% had been spent at least 11 years. Therefore, most teachers had just joined their current schools, alluding to efficient teacher transfers in Uganda. In addition, around half of the

teachers had been teachers for not less than 6 years (43.3%), and a quarter for 1–5 years (29.8%), which means both stability and some change.

The appropriateness of the selected sample for qualitative data was based on the participants' sex, age, highest qualification, period spent as Headteacher (HT0), period spent in the current school and exposed to e-learning, and devices available in school to support e-learning. Results are presented in Table 4.2

Table 4.2: Selected headteachers by background attributes

	Attributes						
Participants	Sex	Age	Period of exposure to e-learning	Highest Qualification	Period as H/M	Period spent in school	Devices available in school to support e-learning
HT01	Male	55 years	10 years	PhD	8 years	4 years	• Desktop PCs • Internet • WI-FI
HT02	Female	50 years	9 years	Masters	6 years	3 years	• Desktop PCs • Internet • WI-FI
HT03	Male	55 years	8 years	Masters	7 years	4 years	• Desktop PCs • Internet • WI-FI
HT04	Male	52 years	10 years	Masters	5 years	3 years	• Desktop PCs • Internet • WI-FI
HT05	Male	50 years	9 years	Masters	5 years	5 years	• Desktop PCs • Internet • WI-FI
HT06	Male	54 years	11 years	PhD	7 years	5 years	• Desktop PCs • Internet • WI-FI
HT07	Male	55 years	8 years	Masters	7 years	4 years	• Desktop PCs • Internet • WI-FI
HT08	Male	52 years	10 years	Masters	5 years	3 years	• Desktop PCs • Internet • WI-FI
HT09	Male	50 years	9 years	Masters	5 years	5 years	• Desktop PCs • Internet • WI-FI
HT010	Male	55 years	8 years	Masters	7 years	4 years	• Desktop PCs • Internet • WI-FI

The findings in Table 4.2 indicate that nine of the selected headteachers were male and only one was female. The sample was hence predominantly male, reflecting the study population since USE schools in Kampala were predominantly headed by male

headteachers. All the headteachers were at least 50 years of age, suggesting that they all belonged to Generation X (born between 1965 and 1980). Bandara (2024) observed that while people in this generation prefer classroom learning, those in top management positions are compelled to play a significant role in promoting e-learning for young generations working under them. Therefore, all the selected headteachers were in a position to divulge data on the experiences of teachers regarding e-learning in their schools. This position was enhanced by the fact that the selected headteachers had themselves been exposed to e-learning for a period ranging from eight to eleven years. This exposure implies that the headteachers were practically knowledgeable about the experiences that typify e-learning, and could therefore assess those of teachers at the institutional level.

The results in Table 4.2 indicate further that while four of the headteachers had masters, two of them had a PhD as their highest qualification, had spent at least five years as headteachers and at least three years as heads of their current schools. These characteristics imply that the selected headteachers were sufficiently qualified and had enough experience as principles in general and as overall instructional planners and supervisors of what teachers needed to teach and what they actually did in their current schools. Accordingly, the headteachers were in a position to provide data on teachers' e-learning experiences as they observed them.

Last but not the least, headteachers indicated that the technological devices that were available in the selected USE schools support to e-learning included desktop PCs, internet and WI-FI. Comparing these devices to those that teachers used as shown in Table 4.1 reinforces the observation that most of the devices that facilitated e-learning were indeed privately provided by the teachers.

Overall, the findings on the sample characteristics suggest that the selected headteachers and teachers could provide reliable and valid data about the e-learning experiences of instructors in USE schools in Kampala City. The analysis of these data generated results used to answer the research questions and verify the hypothesis in this study as presented forthwith.

4.2 Teachers' instructional engagement experiences with e-learning

The first research question focused on establishing the extent of teacher instructional engagement with the different types of e-learning in USE schools in Kampala Capital City. This extent was ascertained both quantitatively and qualitatively. Quantitatively, the selected teachers were asked to use a 5-point Likert scale of responses ranging from Very Rarely (1) through Rarely (2), Sometimes (3) and Often (4) to Very Often (5) to assess the extent of their involvement in planning and delivering electronic lessons, evaluating students and peer consultation. Descriptives from the assessment are summarised in Table 4.3.

Table 4.3: Descriptives on teachers' instructional engagement experiences with e-learning (N = 393)

Questionnaire Item	Mean	Std.
I search online for information I need to plan lessons	2.70	1.23
I plan for the lessons using an electronic device	2.67	1.23
I deliver lessons to students via Zoom	2.75	1.12
I give assignments to students via Zoom	2.68	1.20
I deliver recorded lessons via school's web portal	2.74	1.23
I send learning materials via school's web portal	2.81	1.17
I deliver lessons in social media texts	2.69	1.24
I deliver video-recorded lessons via social media	2.76	1.27
I deliver lessons via live-video social media calls	2.69	1.20
I deliver lessons via live audio social media calls	2.70	1.17
I send assignments via social media texts	2.79	1.24
I send assignments via school portal	2.59	1.16
I receive assignments via Zoom discussions	2.70	1.19
I search online for lesson prep	2.67	1.21
I receive assignments via school portal	2.65	1.20
I administer exams via Zoom	2.73	1.21
I spend much of teaching time in e-learning activities conducted in classroom	2.79	1.21
I administer exams via school portal	2.69	1.17
I mark assignments using a device	2.66	1.22
I mark exams using a device	2.74	1.17
I compile marks using a device	2.76	1.21
I submit marks for grading using a device	2.63	1.20
I participate in peer review Zoom meetings	2.79	1.19

Source: Primary data

The mean values in Table 4.3 were all close to '3' when rounded off to the nearest whole number, suggesting that the extent of USE teachers' instructional engagement in e-learning occurred sometimes and therefore, moderately that points to irregular instructional involvement in e-learning. A more critical look at the magnitudes of mean values suggests some variation even in this moderate instructional engagement. Teachers were at the high end of their moderate instructional engagement in spending teaching time on e-learning activities conducted in classrooms, participating in peer review Zoom meetings, and sending assignments via social media texts (M = 2.79).

Instructional engagement in searching online for lesson preparation, lesson planning using an electronic device, receiving assignments via school portal, marking them, compiling and submitting student marks online was marginally moderate (M = 2.63–2.67). The same extent of instructional engagement applied to searching online for information needed to plan lessons, lesson delivery through social media texts, audio and video calls, and Zoom discussions as well as administer exams via school portal (M = 2.69–2.70). The fact that much instructional engagement varied between 2.6 and 2.8 on average coupled with large standard deviations above 1.15 suggests large dispersion that implies that some teachers were more involved in e-learning than others.

Generally, the results suggest that while the extent of teacher instructional engagement was generally moderate, there were differences within this extent. A Kruskal-Wallis H test was conducted to establish whether these differences were significant and their underlying explanation.

4.2.1 Kruskal-Wallis H test results

This non-parametric test was used to check noticeable differences in the extent of teachers' instructional engagement in e-learning as a result of their background characteristics. Only instructional engagement indicators that had a strong influence ($p < 0.05$) were included in this analysis and these designing classes, distributing lessons, evaluating results and handling work submissions. Results from the test are shown in Table 4.4.

Table 4.4: Kruskal-Wallis H Test results on differences in teachers' instructional engagement experiences with e-learning

Group	Variable	H Statistic	p-value
Teaching Subject	I search online for information I need to plan lessons	18.357	0.0492
Designation	I give assignments to students via Zoom	8.882	0.0309
	I send learning materials via school's web portal	15.146	0.0017
	I deliver lessons in social media texts	9.59	0.0224
E-learning Exposure (Years)	I search online for lesson preparation	8.549	0.0359
	I administer exams via school portal	9.173	0.0271
	I mark assignments using a device	10.917	0.0122
Platform Used	I deliver lessons to students via Zoom	9.635	0.0470
Teaching Level	I administer exams via Zoom	11.419	0.0033
Academic Qualification	I send assignments via social media texts	12.161	0.0326
Device Ownership	I administer exams via school portal	6.142	0.0464

Source: Primary data

The results in Table 4.4 indicate that teachers' backgrounds and their work context accounted significantly for differences in their e-learning instructional engagement. Specifically, teaching subjects accounted for the difference in the use of online tools for lesson planning ($H = 18.36$, $p = 0.0492 < 0.05$). This suggests that the subject a teacher taught influenced the extent of his or her instructional engagement in online lesson preparation. The same statistics indicate a significant difference in teachers' instructional engagement in teaching via Zoom ($H = 8.882$, $p = 0.0309 < 0.05$), materials sent via the school's web portal ($H = 15.146$, $p = 0.0017 < 0.05$), and lessons given through social media messages ($H = 9.59$, $p = 0.0224 < 0.05$) as a result of their designation. These results suggest that teachers in instructional leadership position such as director of studies and class teacher used e-learning more than subject teachers.

The period of teachers' exposure to e-learning caused significant differences in searching online for lesson related materials, giving exams through the school system, and marking student assignments with electronic devices (H 8.55, p 0.0359, H 9.17, p 0.0271, H 10.92, p 0.0122). These results suggest that instructional engagement increased as the period of teachers' exposure to e-learning increased.

Furthermore, device ownership was a significant cause of teachers' instructional engagement in online administration of examination via school portal. Furthermore, teachers used Zoom more when delivering lessons synchronously, depending on the platform (H = 9.64, p = 0.047). Teachers' use of Zoom for writing exams differed as a result of platform used (H = 11.42, p = 0.0033).

Academic qualification caused a significant difference in teachers' use of social media to send assignments (H = 12.16, p = 0.0326), implying that using social media to evaluate students through assignments increased with increasing educational qualification. Besides, owning a device caused a significant difference in teachers' instructional engagement in the form of administering exams via school portal (H = 6.14, p = 0.0464). This implies that teachers' instructional engagement through evaluating students using exams was made easier by owning a personal ICT device. Indeed, owning an ICT device eased teachers' access to e-learning platforms for examining students.

On the whole, the findings indicate that the extent of teachers' instructional engagement in e-learning was generally moderate, but differed as a result of different personal, professional and systemic attributes, suggesting that positive changes in these attributes can improve this instructional engagement.

4.2.2 Exploratory Factor Analysis Results on Teacher Instructional engagement

Principal Factor Extraction was used to explore the reliable latent measures of the extent of teachers' instructional engagement with e-learning. The results showed that this extent was reliably and significantly measured by three latent factors as summarised in Table 4.5.

Table 4.5: Exploratory Factor Results on e-learning instructional engagement

Variable	Factor1	Factor2	Factor3
I search online for information I need to plan lessons	0.133	0.079	0.087
I plan for the lessons using an electronic device	-0.087	-0.006	0.111
I deliver lessons to students via Zoom	-0.089	-0.296	0.080
I give assignments to students via Zoom	0.026	0.011	-0.228
I deliver recorded lessons via school's web portal	-0.026	0.101	-0.066
I send learning materials via school's web portal	0.137	0.330	0.076
I deliver lessons in social media texts	0.303	0.010	0.239
I deliver video-recorded lessons via social media	0.002	0.011	0.188
I deliver lessons via live-video social media calls	0.082	-0.094	0.245
I deliver lessons via live audio social media calls	0.047	-0.094	-0.019
I send assignments via social media texts	0.013	0.013	-0.113
I send assignments via school portal	-0.004	0.188	-0.079
I receive assignments via Zoom discussions	0.423	-0.124	-0.106
I search online for lesson prep	0.178	-0.061	0.024
I receive assignments via school portal	0.002	-0.244	-0.214
I administer exams via Zoom	0.041	0.179	-0.014
I spend much of teaching time in e-learning	0.001	-0.079	0.053
I administer exams via school portal	0.033	-0.090	0.192
I mark assignments using a device	-0.202	0.064	-0.036
I mark exams using a device	0.393	-0.152	-0.209
I compile marks using a device	-0.025	-0.135	0.102
I submit marks for grading using a device	0.178	-0.083	0.065
I participate in peer review Zoom meetings	0.253	0.163	-0.151

Source: Primary data

The factors in Table 4.5 were identified as follows:

4.2.2.1 Factor 1: Interaction-based and social involvement

According to this factor, teachers said they do these activities: I present assignments using Zoom (0.423), I deliver lessons in messages on social media (0.303) and participate in peer review Zoom meetings (0.253). Teaching computers incorporates teachers working as a team and mostly interacting with each other through social media and zoom. This type of electronic instructional engagement is called relational, since it takes place in real-time or with peers as instructors.

4.2.2.2 Factor 2: Use of structured e-learning platforms in the school

Prominent items for this factor include sending learning materials by using the school's web portal (0.330), sending assignments through the portal (0.188) and joining Zoom meetings for peer review (0.163). Usually, these practices involve using formal e-learning systems at schools. In this case, teachers' actions are tightly connected to formal systems, like Learning Management Systems (LMS).

4.2.2.3 Factor 3: Involvement in online teaching and assessment of students

Items linked to evaluation and content delivery made up a large part of Factor 3 such as: I deliver information on social media (0.239), I conduct live video classes on social media (0.245) and I run tests through the school portal (0.192). Generally, factor loadings are low, but they indicate the existence of a latent factor in which teachers plan, design and carry out lessons with adaptable or improvised tools.

Qualitatively, the interviewed headteachers were asked to assess the extent of their teachers' instructional engagement in e-learning. Following Yin's (2015) framework of thematic analysis, the detailed results obtained from the provided data are shown in Appendix H. From these results, the three themes deciphered from the data included 'occasional engagement in e-learning', 'hybrid learning' and 'devices and platforms used to facilitate e-learning.' A critical overview of these themes suggests that teachers' instructional engagement with e-learning was an experience blended with classroom-based learning, and that it was occasional characterised by use of different devices and platforms. This interpretation comes out clearly when the themes are interpreted one by one as follows.

4.2.3.1 Occasional instructional engagement e-learning: This theme suggests that from the headteachers' point of view, the extent of their teachers' instructional engagement in e-learning was infrequent. This extent was succinctly articulated by HTA01 by stating that, "*E-learning uptake is not the main mode of teaching and studying; its use is not that frequent because teachers use only when they want to understand more about how they should guide learners to relate what is being taught to real-life situations.*" Not being frequent implies that teachers' instructional engagement in e-learning was indeed occasional.

The same view was expressed by HTA02 who recounted that, "*E-learning uptake is not that high in the school because it is intermittently used just to complement classroom instruction as a quick way teachers use to access instructional content, illustrations and materials.*" Consistent with this quotation, HTA03 said, "*We started organising Zoom lessons involving teachers delivering lessons to students, especially during the Covid-19 lockdown, but now this happens once in a while due to the presence of students at school for physical classroom-based learning most of the school time.*" Happening once in a while confirms that teachers' instructional engagement with e-learning was indeed occasional. Teachers experienced occasional instructional engagement with e-learning because USE schools were using hybrid learning, with more emphasis placed on classroom-based education as explained below.

4.2.3.2 Hybrid learning: The results from headteachers indicate that teachers' instructional engagement with e-learning was mixed with classroom-based teaching. This implies that USE schools applied blended instruction and learning. Hybrid learning was such that e-learning was being used complement classroom-based teaching. This was explained by HT05 by stating that, *"The new curriculum is competence-based and hence, about learning by doing, which can only happen in a real-life classroom environment, with e-learning facilitating it as an educational complement."* These results suggest that e-learning complemented classroom-based instruction because the new curriculum required teaching based using real-life or hands-on instructional activities that could enable students to learn practically instead of reading, hearing or watching online lesson content.

The above view was confirmed by HT06 who said, "*New curriculum requires teachers to facilitate student-centred classroom learning by giving learning tasks and letting learners do them on their own.*" A similar view echoed by HT02 who recounted that, "*Learning activities are taught and studied in a real-classroom environment, e-learning complements this process by facilitating teachers to search online for the specific activities, or how the activities can be taught practically.*" HT03 did not differ when he explained that, "*Emphasis is on facilitating hands-on learning in classroom, teachers are expected to search online for the learning activities and*

how best to guide learners to do them on their own, and students are expected to research online for in-depth understanding of the concepts underlying the learning activities."

The foregoing results point to one view that teachers and students in USE schools engage in e-learning as a complement to classroom-based learning. This explains why none of the selected schools had an e-learning management system or student portal on which students could log and send completed assignments/homework as HT04 narrated, "*The school has no e-learning management system or student portal on which students can log to send completed assignments/homework. What we have is a dedicated online portal teachers use to upload continuous assessment results sent to UNEB website.*" HT05 echoed the same view by recounting that, "*We do not have any e-learning management system, let alone an online system that can support reliable administration of exams through facilitating effective exam supervision and invigilation. The school has no system designed and dedicated to supporting online teaching, assessment and marking of students through assignments and exams.*"

The two excerpts above suggest that the selected USE schools lacked an e-learning management system. In the absence of such a system, these schools could not do much as far as providing sufficient uptake of e-learning was concerned. Headteachers could not strictly foster teachers' instructional e-learning engagement when the schools lacked this system. It is therefore not surprising that there was consensus among the headteachers that teachers' instructional engagement in e-learning was occasional. Since the selected USE schools did not have e-learning management systems, the devices and platforms the teachers used to experience this level of instructional engagement were as explained next.

4.2.3.3 Devices and platforms used to facilitate e-learning: The fact that the selected USE schools did not have an e-learning management system implies that teachers' instructional engagement with e-learning was facilitated by alternative devices and platforms. HT02 revealed the devices by explaining that, "*Teachers and students engage in e-learning by using online desktop PCs available in the school's computer lab to access detailed syllabus content of what should be covered in*

lessons as well as learning materials and references." These results suggest that USE schools had PCs that could be connected to the internet to facilitate e-learning uptake by enabling teachers to get easy access to detailed syllabus content. In addition, HT03 pointed out the platforms that teachers' used to engage in e-learning by stating that, "*Our e-learning is mostly through WhatsApp groups, e-library and to a small extent, via zoom, video or audio calls.*" Likewise, HT04 noted that, "*Our school encouraged forming parents' WhatsApp groups which teachers can use as platforms for sending lesson content and assignments from their personal smartphones to students to via parents' or guardians' tablets, smartphones, laptops or desktops.*"

HT05 echoed the same view adding that, "*Parents are encouraged to buy tablets, laptops and WI-FI data, which their children can use to get access to other online platforms such as Google Meet and YouTube to enhance their understanding of concepts taught in the real-life classroom by searching for more information about them online.*" The same view was expressed by HT06 who recounted that, "*We have encouraged teachers and students to use Google Meet as a platform for holding online question-and-answer sessions, discussions and active positive criticism or feedback through sending comments critiquing and improving what is being discussed. We also encourage students to visit educational YouTube channels to gain better understanding of the lesson content being taught in classroom.*"

In summary, headteachers showed that teachers' instructional engagement with e-learning was occasional facilitated by different devices that included school-provided desktop P.C, teachers' own smartphones and their students' laptops and tablets provided by parents. These devices facilitated occasional instructional engagement with e-learning by enabling them to use different platforms, which included teacher-parent WhatsApp groups, Google Meet and YouTube.

Overall, the results in response to the first research question indicate that teachers experienced three levels of instructional engagement with e-learning uptake. Frequent engagement was experienced with searching online for information needed to plan lessons, sending assignments to students via social media texts, searching online for necessary content and learning aids, and compiling students' marks using

electronic devices. Occasional engagement was experienced with respect to lesson delivery via zoom, social media texts and recorded videos, live-video and audio social media calls; receiving completed assignments from students via Zoom question-and-answer presentations or discussions; and marking students' completed assignments and exams facilitated by an electronic device. Most teachers also experienced occasional engagement in submitting students' marks for grading facilitated by an electronic device and participating in peer review meetings with fellow teachers to improve instruction in e-learning. Most of the teachers did not have any experience with engaging in sending assignments to students, receiving completed assignments and administering exams via the school's student portal or e-learning management system, social media or Zoom platforms. Deeper insight into these levels of teachers' instructional engagement experiences with e-learning was deciphered from interview results provided by headteachers. These results indicate that the engagement that the instructional engagement teachers experienced with e-learning was generally occasional, facilitated by different devices that included school-provided desktop PCs, teachers' own smartphones, and students' laptops and tablets provided by parents. The occasional experiences with e-learning uptake were enabled different platforms, which included teacher-parent WhatsApp groups, Google Meet and YouTube. Implications of these results are discussed in the next Chapter. Next are results in response to the second research question.

4.3 Teachers' satisfaction in USE schools with e-learning experiences

Levels of satisfaction reveal the extent to which e-learning meets teachers' instructional expectations. These levels were analysed based on data collected from teachers when they were asked to use a 5-point Likert scale of responses ranging from strongly disagree (1) through disagree (2), neutral (3), and agree (4) and strongly agree (5) to indicate their level of satisfaction with e-learning experiences. With this scale, teachers who disagreed and strongly disagreed (Mean = 1.00–2.44) experienced dissatisfaction with e-learning uptake experiences while those who were neutral (Mean = 2.50-3.44) experienced mixed satisfaction. The teachers who agreed (Mean = 3.50-4.44) indicated that experienced moderate level of satisfaction while those who strongly agreed (Mean = 4.50-5.00) experienced high level of

satisfaction with these experiences. The results from descriptive analysis of teachers' self-assessed satisfaction are shown in Table 4.6.

Table 4.6: Teacher satisfaction with e-learning (N = 393)

Indicators of satisfaction	Mean	Std.
The information I get online is useful in helping me plan my lessons	4.54	.435
I find using a mobile electronic device to facilitate lesson planning better than other devices	4.98	.320
I enjoy the lessons I deliver to students via Zoom	3.96	.744
I like delivering assignments to students via Zoom	3.92	.424
I like using the school's web portal to deliver recorded lessons to students	2.90	.529
I like using the school's web portal to deliver learning materials/references to students	2.94	.637
I feel contented using social media texts to deliver lessons to students	3.95	.619
I like the video-recorded lessons I deliver to students via social media	3.90	.486
I enjoy lessons I deliver to students via live-video social media calls	3.65	.489
I like the lessons I deliver to students via live audio social media calls	3.52	.625
I am contented sending assignments to students via social media texts	3.50	.700
I like sending assignments to students via the school's student portal or e-learning management system	3.23	.438
I enjoy receiving assignments given to students via Zoom question-and-answer presentations or discussions.	3.64	.715
I like receiving completed assignments from students via social media	3.53	.429
I enjoy receiving completed assignments from students via student portal or e-learning management system	3.25	.324
I enjoy administering exams to students via Zoom	2.13	.363
I like administering exams to students via social media	3.07	.628
Administering exams to students via school's student portal or e-learning management system is enjoyable	3.28	.540
I find marking students' completed assignments facilitated by an electronic device enjoyable	3.55	.586
I like marking students' exams when facilitated by an electronic device	4.41	.750
I enjoy using an electronic device to compile students' marks	3.51	.739
I like submitting students' marks for grading facilitated by an electronic device	4.17	.537
I enjoy participating in peer review Zoom meetings with fellow teachers to improve instruction in e-learning	3.99	.371
Assessment of overall experienced satisfaction	**3.63**	**.540**

The overall satisfaction experienced by the selected teachers with e-learning in USE schools was moderate on average (Mean = 3.63, Std. = .540), suggesting that it was below teachers' expected contentment with e-learning on average. Specifically, this moderate level of satisfaction was experienced with respect to delivering lessons to students via Zoom (Mean = 3.96, Std. = .744), delivering assignments to students via

Zoom (Mean = 3.92, Std. = .424), and using social media texts to deliver lessons to students (Mean = 3.95, Std. = .619). Teachers were also moderately satisfied with delivering video-recorded lessons to students via social media (Mean = 3.90, SD = .486), delivering lessons to students via live-video social media calls (Mean = 3.65, Std. = .489) and delivering lessons to students via live audio social media calls (Mean = 3.52, Std. = .625). In addition, most teachers were moderately contented with sending assignments to students via social media texts (Mean = 3.50, Std. = .700), receiving assignments from students via Zoom question-and-answer presentations (Mean = 3.64, Std. = .715) and receiving completed assignments from students via social media (Mean = 3.64, Std. = .429).

Similarly, teachers were moderately satisfied with marking of students' completed assignments facilitated by an electronic device (Mean = 3.55, Std. = .586), marking students' exams when facilitated by an electronic device (Mean = 4.41, Std. = .750), using an electronic device to compile students' marks (Mean = 3.51, Std. = .739), submitting students' marks for grading facilitated by an electronic device (Mean = 4.17, Std. = .537), and participating in peer review meetings with fellow teachers to improve instruction in e-learning (Mean = 3.99, Std. = .371).

A further critical itemised analysis of the results in Table 4.6 reveals that besides being moderately satisfied with most of the indicators of facilitating students' e-learning uptake, most teachers experienced high satisfaction with the helpfulness of the electronic devices they used to facilitate lesson planning (Mean = 4.98, Std. = .320). Similarly, teachers reported high satisfaction with the usefulness of the information they got online to help them plan lessons (Mean = 4.54, Std. = .435). There was also a contrasting discrepancy that involved teachers experiencing dissatisfaction with administering exams via Zoom (Mean = 2.13, Std. = .363).

Furthermore, findings in Table 4.6 indicate that there were indicators with which most teachers were neutral, thereby suggesting mixed satisfaction with them. These indicators included using the school's web portal to deliver recorded lessons to students (Mean = 2.90, Std. = .529), using the school's web portal to deliver learning materials/references to students (Mean = 2.94, Std. = .637), and sending

assignments to students via the school's student portal or e-learning management system (Mean = 3.23, Std. = .438). Other indicators about which teachers were neutrally satisfied included receiving completed assignments from students via student portal or e-learning management system (Mean = 3.25, Std. = .324) and administering exams to students via school's student portal or e-learning management system (Mean = 3.28, Std. = .540)

Generally, the findings in Table 4.6 depict that teachers in USE schools experienced four levels of satisfaction with e-learning. The first level was high satisfaction, which they experienced with the use of mobile electronic devices to facilitate lesson planning and also with the usefulness of the information they got online to help them plan the lessons. The second was moderate satisfaction that the teachers experienced with delivering lessons and assignments to students and receiving completed assignments via social media texts, audio and video-recordings and calls as well as Zoom question-and-answer presentations or discussions. This level also included most teachers' moderate satisfaction with marking students' completed assignments and exams as well as compiling and submitting students' marks for grading using an electronic device, and with participating in peer review meetings with fellow teachers to improve instruction in e-learning. The third level was teachers' dissatisfaction with administering exams to students via Zoom. The fourth level was teachers' mixed satisfaction with using the school's web portal or e-learning management system to deliver recorded lessons, learning materials/references, assignments to students, receive completed assignments from them, and administer exams to them. The implications of each of these four levels of satisfaction that teachers experienced with facilitating students' e-learning uptake are discussed in the next chapter.

In addition to the quantitative results obtained from teachers, the interviewed headteachers were asked as school supervisors to assess their satisfaction with their teachers' involvement with e-learning. When their responses were analysed using Yin's (2015) framework of thematic analysis, only one theme was identified, which was 'insufficient satisfaction'. This theme suggests that headteachers' were not adequately satisfied with their teachers' use of e-learning. HTA01 explained his

insufficient satisfaction by stating that, "*Teachers are not using e-learning that much because they are not well-facilitated to do so. The school does not have enough e-learning resources such as WI-FI, up-to-date computers, and even its own e-learning management system. They try their best using mostly their personal resources such as smartphones and WhatsApp groups, with the school providing data at times.*"

The preceding quotation suggests that the headteachers indicated that their dissatisfaction with the teachers was not caused by the teachers themselves but by the schools being poorly resources with e-learning supporting resources. HTA02 added that, "*I cannot be satisfied because I know that there is a lot the school needs to do to facilitate teachers to facilitate e-learning. We do not even have facilities to support Zoom teaching and learning, which most teachers want to use*". This extract indicates that headteachers were not satisfied with teachers' use of e-learning because the schools did not facilitate them Zoom supporting facilities, which the teachers wanted to take part in e-learning.

Generally, the findings from the headteachers indicate that they were not adequately satisfied with teachers' involvement in e-learning because the schools had no capacity to amply facilitate this participation

4.4 Perception of challenges to e-learning in USE schools

These perceptions were explored in response to the third research question using both quantitative questionnaire data collected from teachers and qualitative interview data collected from headteachers. Teachers were asked to use the same 5-point Likert scale of responses to reveal the challenges they associated with e-learning in USE schools. This scale was interpreted in such a way that teachers who disagreed and strongly disagreed (Mean = 1.00–2.44) indicated that e-learning was challenged by all the factors in Table 6. Teachers who agreed and strongly agreed (Mean = 3.50-5.00) contradicted with this view, thereby showing that the factors were not challenges. Teachers who were neutral (Mean = 2.50-3.44) alluded to a mixed view. The full view of the results is summarised in Table 4.7.

Table 4.7: Teachers' perception of challenges to e-learning (N = 393)

Indicators of factors challenging e-learning uptake	Mean	Std.
I am positive about teaching by sending lesson content online to students to access at their convenient time	1.76	.306
I am positive about teaching by sending students learning materials/references online convenient time	2.39	.443
I am okay with sending students homework online so they access it anytime	2.53	.404
I do not mind students sending me completed assignments online	2.07	.407
I am positive about administering exams to students online	1.99	.371
I am positive about exam feedback delivery online to students	2.18	.179
I do not mind delivering lessons to students live via Zoom	3.72	.420
I am positive about evaluating students using the completed assignments they submit via Zoom presentations or discussions	1.47	.133
Using internet-connected mobile electronic devices eases e-teaching	1.75	.653
Using internet-connected classroom-based devices like desktop PCs, projectors eases e-learning	3.55	.845
Using radio as a tool for instruction eases teaching	2.42	.898
Using television as a tool for instruction makes teaching easier	2.42	.827
I believe e-learning is a favourable educational alternative	3.76	.959
I believe e-learning is an effective means of education	2.33	.907
I believe promoting e-learning increases access to education	2.34	.852
I believe adoption of e-learning is the best option in the 21st century	2.26	.827
I am computer-literate enough to use computerised devices to teach online	2.03	.805
I am amply informed about how to use online technology to teach	2.11	.916
I feel self-motivated to use online resources to improve my teaching ability	3.75	.876
I find it easy to use e-learning resources to teach	3.62	.573
I find the e-learning resources I need to teach easily accessible	1.77	.902
I believe students can understand the lesson content I send online	3.53	.836
I perceive e-learning as a useful mode of learning	3.60	.018
There is a strong internet connectivity at school	1.59	.348
The internet at school is speedy enough to facilitate teaching online	1.36	.084
All students can access lesson content delivered online regardless of whether they are at or away from school	1.18	.066
The school has all ICT equipment that supports e-learning	1.31	.129
ICT facilities available at school support e-learning reliably.	1.86	.823
School's electric supply is stable enough to facilitate e-learning	1.39	.047
School has teachers who are competent to teach students via e-learning	1.24	.925
School has technological capacity to supervise e-learning exams as desired	1.33	.724
School has technological capacity to invigilate e-learning exams as desired	1.98	.640
School management responds quickly to queries related e-learning	1.92	.853
Overall assessment	**2.26**	**.576**

The overall assessment in Table 4.7 suggests that all the indicators represented challenges to e-learning on average (Mean = 2.26, Std. = .576). Itemised analysis indicates that this average view was consistent with most of the individual indicators in Table 4.7. As illustrations, teachers disagreed that they were positive about teaching by sending lesson content online to students to access at their convenient time (Mean = 1.76, Std. = .306). Similarly, teachers disagreed that they were positive about teaching by sending students learning materials/references online convenient

time (Mean = 2.39, Std. = .443). These perceptions suggest that teachers had a negative attitude about asynchronous teaching. Other indicators with the same distribution of descriptive statistics are similarly interpreted.

A more critical itemised analysis reveals however, that not all the factors were experienced by teachers as challenges. Specifically, teachers agreed that they did not mind about delivering lessons to students live via Zoom (Mean = 3.72, std. = .420). Similarly, teachers agreed that using desktop PCs to teach students online eased e-teaching (Mean = 3.55, Std. = .845). They also believed that e-learning was a favourable educational alternative (Mean = 3.76, Std. = .959). Teachers further agreed that they had self-motivation to use online resources to improve their teaching ability (Mean = 3.75, Std. = .876). These results suggest that not only teachers were self-motivated to use online resources to improve their teaching ability. The use of desktops to deliver lessons via Zoom was also not a challenge.

Furthermore, teachers agreed that they found it easy to use e-learning resources to teach (Mean = 3.62, Std. = .573), believed that students could understand the lesson content they sent online (Mean = 3.53, Std. = .836) and perceived e-learning as a useful mode of learning (Mean = 3.60, Std. = .018). These results show that teachers' reflective experiences with synchronous e-learning were generally positive. Teachers expressed mixed perceptions, suggesting that their attitude as mixed about sending assignments online to students to access at their convenient time (Mean = 2.53, Std. = .404).

In general, results in Table 4.7 suggest that the factors that teachers perceived as challenges to e-learning in USE schools included their negative attitude toward using radio, TV internet-connected devices and online platforms such as Zoom to send lessons and learning materials to students and to evaluate students through assignments, exams and receiving feedback. The challenges also included teachers' beliefs that e-learning was an ineffective means of education for the 21st century, their computer illiteracy, inadequate knowledge and competency about using and supervising online technology to teach, invigilate and respond to e-learning queries, and difficulty in accessing ICT resources and technologies needed to teach e-learning

due to their inadequacy and unreliability in schools and among students, and weak and slow internet connectivity at USE schools.

Other perceived challenges to teachers' instructional engagement in e-learning to facilitate its uptake by students included: unstable electricity supply. These results indicate that teachers revealed a set of systemic, infrastructural, and attitudinal challenges to their online lesson planning, preparation of teaching materials, assigning and organizing exams, using institutional portals and social media to mark and submit marks. Other challenges included inadequate availability and usability of devices and infrastructure, and institutional preparedness and capability to support e-learning. The revealed challenges suggest that there is still a lot to do to empower teachers by equipping them with e-learning delivery knowledge and competency, change their attitude and enhance technological environments for digital education.

The Mann-Whitney U test (used in binary variables) and Kruskal-Wallis H test (used in three or more groups of variables) were conducted to establish how the perception of challenges to instructional engagement in e-learning differed according to teachers' attributes generated results shown in Table 4.8.

4.4.2 Perception of challenges according to teacher attributes

Further analysis was conducted to establish how teachers' reflections on the challenges to their instructional e-learning differed according to their background attributes. The findings are summarised in Table 4.8.

Table 4.8: Teacher perception of challenges by teacher attributes (N = 393)

Group	Variable	Statistic	p-value
Sex	Using mobile devices eases online teaching	15957	0.0030
Designation	I am adequately computer-literate for online teaching	8.237	0.0414
	Teachers are competent for e-learning	8.251	0.0411
	School can invigilate e-learning exams	10.103	0.0393
Years as Teacher	E-learning is an effective means of education	8.942	0.0301
	It is easy to use e-learning resources to teach	8.835	0.0316
Years in School	I am positive about sending learning materials online	10.225	0.0168
	I am positive about exam feedback delivery online	9.299	0.0256
	School management responds quickly to e-learning queries	10.29	0.0163

Group	Variable	Statistic	p-value
E-learning Exposure (Years)	I am positive about administering exams online	10.658	0.0137
	Using desktops eases online teaching	8.644	0.0344
	E-learning is a favourable educational alternative	7.839	0.0495
Platform Used	Using desktops eases online teaching	13.948	0.0075
	The school has all ICT needed for e-learning	9.922	0.0418
Teaching Level	E-learning is a favourable educational alternative	7.069	0.0292
	E-learning is a useful mode of learning	9.997	0.0067
Age Group	I am okay with sending assignments online	10.656	0.0137
Academic Qualification	Using television makes teaching easier	11.988	0.0350
	It is easy to use e-learning resources to teach	11.287	0.0460

Source: Primary data

Table 4.8 suggests teachers' reflections on the challenges faced with e-learning in differed significantly as a result of their demographic and qualification groupings. The tests showed that there are personal, institutional, and experience-related features which defined the perception teachers had over several matters of e-learning implementation. Regarding sex, a large difference was found in the perceptions of using mobile devices to facilitate online teaching ($U = 15957$, $p = 0.003$), which means that male and female teachers might differ in the extent of their comfort and flexibility when using mobile-delivered instructional instruments.

Designation had important effects on thoughts about several items. The differences were found in the perception of computer literacy ($H = 8.24$, $p = 0.0414$), teacher competence to e-learning ($H = 8.25$, $p = 0.0411$), and the capabilities of schools to invigilate e-learning examinations ($H = 10.10$, $p = 0.0393$). These variations increase the possibility that teachers in different administrative positions could have diverse technological preparedness and support systems within their institutions. The number of years of experience that teachers had had an important influence on both reflection on e-learning usefulness ($H = 8.94$, $p = 0.0301$) and ease of use of e-learning resources ($H = 8.84$, $p = 0.0316$), which may indicate that with more years of experience, teachers may come to have more or less confidence in the usefulness and usability of digital resources.

In years of study at the current school, remarkable differences arose in sending learning resources through the Internet ($H = 10.23$, $p = 0.0168$), sending feedback regarding exams online ($H = 9.30$, $p = 0.0256$), and responsiveness of the school administration to e-learning ($H = 10.29$, $p = 0.0163$), which means that the

familiarity with the institutions can affect the view on the administrative support and the learning process. Exposure to e-learning (years) also had a significant effect on thoughts about exams being administered online (H = 10.66, p = 0.0137), the utility of desktops in the teaching facilitation (H = 8.64, p = 0.0344), and the perception of e-learning as a desirable educational alternative (H = 7.84, p = 0.0495). This implies that increased exposure to e-learning conditions favourably influences the confidence of teachers in various areas of online teaching.

There were large platform-related differences in perceptions of desktop usefulness (H = 13.95, p = 0.0075) and ICT availability (H = 9.92, p = 0.0418), indicating how platform choice can influence the way in which teachers assess the adequacy of hardware and infrastructural capacity.

Regarding the teaching level, it was found that there were differences in perceiving e-learning as a favourable alternative (H = 7.07, p = 0.0292) and as a useful mode of learning (H = 10.00, p = 0.0067), which means that teachers in terms of the curriculum level can differ in how they assess the potential of e-learning as a broader pedagogical tool. Age group gave unacceptable differences in the attitudes toward submitting assignments through the internet (H = 10.66, p = 0.0137), indicating a generational effect on the technological acceptance in delivering instructions.

Lastly, academic qualification had a considerable influence on thoughts about the use of television in teaching (H = 11.99, p = 0.0350) and perceptions regarding the simplicity of using e-learning materials (H = 11.29, p = 0.0460), which denotes that qualifications can impact the familiarity with or receptivity to specific teaching methods.

4.4.3 Factor analysis of teacher perception of challenges to e-learning

The results obtained from factor analysis of teachers' reflections on the challenges to their e-learning instructional engagement are summarised in Table 4.9.

Table 4.9: Significant e-learning challenging factor (N = 393)

Statement	Factor	Loadings
Electricity supply is stable for e-learning	Factor 1	0.376

There is strong internet connectivity at school	Factor 1	-0.305

Source: Primary data

Factor analysis of teachers' reflections on challenges to their instructional engagement in e-learning produced a simplified structure with only one latent factor being a significant indicator, identified as infrastructure-related challenge. The factor loadings that were greater than the cut-off value of 0.30 included stability of the electricity supply needed to support e-learning (factor loading = 0.376) and internet connectivity (loading = -0.305). These factor loadings suggest while teachers reflected on electricity supply as a key infrastructural determinant of their engagement in e-learning, they showed that internet connectivity was an impediment to this engagement the poorer it became. The negative loading indicates that the teachers with unstable internet connectivity found their instructional engagement in e-learning more challenging. In brief, the results suggest that teachers reflected on the combination of electricity stability and internet connectivity as a significant challenge to their instructional engagement in e-learning.

4.4.4 Correlation among items measuring teachers' reflections on challenges

In further investigation of the association among the perceptions of e-learning challenge by teachers, correlational analysis of all the 33 items of reflection was performed. The Pearson correlation coefficients were also calculated to determine how the various items correlated with each other in order to determine the potential existence of the clusters of correlated perceptions or dimensions.

As indicated by the results in appendix I, the inter-item correlations were found to be exceedingly low with the coefficients mostly falling in the range of -0.15 to +0.15. There were both positive and negative correlation values though none of them indicated any significant strength to indicate consistent pattern of association among the reflection items. As an example, the item I am positive about teaching by sending lesson content online was correlated with most other items very weakly, along with Strong Internet Connectivity at School and Stable Electricity Supply.

Such a general absence of significant inter-item correlation indicates that the considerations of teachers facing the challenge of e-learning adoption are rather unrelated to each other. That is, perceptions referring to infrastructure, pedagogical adaptation, student access, institutional readiness and personal technological competence seem to be different aspects of experiences of teachers, rather than co-varying components of a single underlying construct.

4.4.5 Overview of Teacher Perception of E-learning Challenges

The findings of this section provide an in-depth picture of the perceptions of the teachers on the factors that challenged their instructional engagement in e-learning. The descriptive statistics show that teachers' instructional engagement in e-learning environment, which included the instructional delivery, assessment, technology access, institutional support, and infrastructure reliability. We also reached this conclusion by looking at the factor analysis which produced a very parsimonious factor structure with only two items stable electricity supply and strong internet connectivity coming out as significant contributors to a general infrastructural factor. Most of the items failed to load highly on any particular factor, indicating fragmentation of e-learning challenges experienced by teachers.

The analysis of group comparison showed that the demographic and professional features of teachers had an impact on their vision of particular challenges, but these differences were observed only on several particular items and not throughout whole domains of reflection. Lastly, correlational analysis supported the fact that there were no strong associations between most items of the reflection, which substantiated the fact that reflections of teachers are more likely to be independent, item-specific issues, rather than what can be considered a part of a larger underlying structure.

Taken together, these results indicate that the experiences of teachers with e-learning issues are very personal and situated, which can be attributed to the complexity of the issue of e-learning implementation in USE schools. Based on this, any kind of intervention that is intended to enhance the uptake of e-learning must be constructed in a manner relating to specifics of infrastructural, pedagogical, institutional, and personal variables that challenge e-learning.

4.4.6 Prediction of E-learning uptake by challenges

The multiple linear regression model was utilised with factors perceived as challenges entered as independent variables and the computed e-learning uptake factor entered as a dependent variable. The aim of this analysis was to determine how the perceived barriers predicted teacher's instructional engagement with e-learning, thus providing greater insight into how particular attitudinal, infrastructural or institutional variables favoured or impeded successful uptake of e learning.

Table 4.10: Challenges as predictors of E-learning uptake

Predictor	B	SE	t	p	95% CI
Using desktops eases online teaching	-0.1339	0.05	-2.5	0.01	[-0.238, -0.030] *
All students can access content online	-0.1188	0.05	-2.3	0.02	[-0.222, -0.016] *

Note. *$R^2 = 0.092$; Adjusted $R^2 = 0.009$; $F (33, 359) = 1.10$, $p = 0.325$; $N = 393$.*
B = coefficient; SE = standard error; CI = 95% confidence interval.
$p < 0.05$ (statistically significant).

Source: Primary data

Two challenges were found to be significant in the regression analysis that predicted e-learning uptake among teachers. First, Online teaching facilitated by desktops was negatively related to the uptake of e-learning (B = -0.134, SE = 0.053, t = -2.52, p = 0.012, 95% CI [-0.238, -0.030]). This implies that reliance on desktop computers decrease e-learning uptake by reducing flexibility or mobility, and thus might hinder their overall interactions with the e-learning platforms, particularly in situations where portable and mobile devices could be more versatile in e-learning presentation.

Secondly, content available online to all students also negatively forecasted the adoption of e-learning (B = -0.119, SE = 0.052, t = -2.27, p = 0.024, 95% CI [-0.222, -0.016]). This negative correlation could be an indication of the fact that those teachers who consider full access to students could make them less actively involved in using innovative e-learning techniques on the assumption that the accessibility of the content is the only factor that meets the learning needs of the students.

All other items of reflection were not found to be significant, which again confirms that it is the specific perceptions relating to infrastructures and access that most teachers have which largely determine the extent to which they engage with the e-learning uptake in the USE schools.

4.4.7 Qualitative results on challenges to e-learning uptake

Headteachers were asked to reflect on their observations and interactions with teachers when facilitating e-learning at school. Their insights shed light on the levels of dissatisfaction and frustration among teachers as they navigate the realities of integrating e-learning into their instructional routines. The responses capture the perceived ongoing challenges.

4.4.7.1 Challenges facing teachers

A more in-depth understanding of the challenges to teachers' instructional engagement in e-learning was obtained by asking headteachers to share their perceptions of the obstacles that their teaching staff members faced with this learning. Their responses reveal a complex interplay of administrative, infrastructural, technical, financial, and pedagogical challenging to seamless instructional engagement in e-learning as follows:

4.4.7.1.1 Inconsistent Administrative Support for E-Learning

Administrative support for e-learning was largely described by participants as inconsistent and dependent more on individual effort than on robust institutional structures. Participant HTA01 candidly summarized this reality: ***"Administrative support has been... let's say, modest. We try to encourage our teachers, but budget limitations really tie our hands. We issued a few tablets last year, but follow-up was minimal."*** This highlights the gap between intention and execution. Similarly, HTB02 shared: ***"We've tried to be proactive—designated an ICT champion and encouraged blended lessons. But honestly, morale drops when the tools don't work."*** This illustrates how infrastructural gaps undermine motivational efforts. In other contexts, school leaders employed informal strategies to foster digital instructional engagement. For instance, HTC03 explained: ***"We include e-learning in staff meetings and have allocated time slots for computer lab sessions. But when tech breaks down, we're stuck"***, while HTD04 noted: ***"We***

push digital literacy during professional development days. I also use WhatsApp groups to model digital communication." Both these responses demonstrate efforts to normalize digital practices despite infrastructural fragility.

A few participants described more deliberate, though still modest, institutional responses. HTE05 reported: ***"We've built a small digital hub using our old staffroom. That has helped a lot in showing our commitment."*** This signals an attempt to repurpose existing spaces for technological purposes. Similarly, HTF06 emphasized: ***"We've integrated basic ICT into our weekly CPD. I also encourage staff to use digital tools during meetings."*** This blends administrative routines with digital skill-building. Yet, even these positive practices were undercut by systemic limitations. HTG07 captured this tension: ***"We are strong on motivation. We celebrate small tech wins. But we lack the hardware to go big"***, pointing to the ceiling imposed by material shortages. Creative strategies, such as training internal staff as ICT champions, were also mentioned. HTG08 explained: ***"We allocated part of our school improvement plan to train two teachers in ICT, hoping they'd cascade the skills. But there's no structured framework, so progress is uneven"***. Others echoed the symbolic nature of digital reform.

HTI09 noted: ***"We try to offer moral support. We've made ICT one of our performance review components. However, without resources, it's mostly symbolic encouragement"***. At the strategic level, HTJ10 reported the formation of a digital committee: ***"We even formed a digital committee to oversee e-learning efforts. But without a consistent push from above, enthusiasm varies"***, encapsulating the leadership-resource disconnect that hinders sustainability. At a more strategic level, **Participant HTJ10** emphasized leadership structures, but noted limitations in sustainability: "*We even formed a digital committee to oversee e-learning efforts. But without a consistent push from above, enthusiasm varies."*

There was also inadequate informal response to e-learning queries from teachers. The findings reveal that feedback on e-learning experiences is mostly collected informally, with some schools beginning to institutionalise it. **HTA01** remarked, *"We use staff meetings and informal chats to gather feedback. Sometimes teachers*

write in the suggestion book. We try to act on small issues quickly, like improving Wi-Fi zones, but budget constraints limit bigger changes." Similarly, Participant **HTB02** noted, *"Feedback is mostly verbal during department meetings. We recently introduced a digital form but few fill it due to limited ICT skills."* Participant **HTC03** provided a more structured approach: *"We have structured feedback through end-of-term evaluations. We discuss concerns openly and prioritize fixes in our school improvement plan."*

The progression toward more formalized systems was echoed by Participant **HTD04**: *"Most feedback is shared casually, which makes it hard to track. We plan to start a digital log to record and follow up."* In contrast, Participant **HTE05** reported the use of instant communication platforms: *"We use WhatsApp groups where teachers post issues in real-time. The ICT teacher then summarizes feedback for my attention."* The use of informal channels remained a common theme. Participant **HTF06** shared, *"Feedback is informal. Teachers speak up during break or after classes. We listen but lack funds to solve every issue immediately."*

Participant **HTG07** illustrated a semi-formal feedback mechanism: *"We gather feedback quarterly through written forms. The ICT committee then reviews them and recommends changes."* At a policy level, Participant **HTH08** emphasized formal channels, stating,*"We use end-of-term surveys and sometimes hold short review meetings. Issues raised are taken to the board if resources are required."* Similarly, Participant **HTI09** noted: *"We listen during staff briefings and sometimes assign a senior teacher to compile concerns. It's basic but functional."* Participant **HTJ10** concluded:*"We have a feedback box and also conduct informal ICT check-ins weekly. It's not perfect, but it helps."*

This thematic evidence suggests a duality in feedback systems—ranging from informal interpersonal exchanges to evolving formal strategies. According to Technology-Mediated Learning Theory (Bower, 2019; Ahmed, 2024), institutional structures and communication channels directly influence the usability of e-learning systems. Constructivist principles (Vygotsky, 1978) also highlight the value of contextual, socially mediated feedback loops in enhancing reflective practice among

educators. Moreover, the emphasis on social and collaborative learning embedded in Connectivism (Siemens, 2005) supports the idea that real-time feedback—particularly through platforms like WhatsApp aligns with decentralized, networked knowledge sharing.

Inconsistent administrative support was exacerbated by leadership challenges as Participant HTA01 shared, *"I lead by example by using the platforms myself and showcasing how they can simplify work. But it's not easy keeping up the morale when resources are limited."* Interviewee HTB02 indicated: ***"I try to source partnerships and seek grants, but funds are limited. Sometimes I personally negotiate discounts for internet bundles for staff."*** Participant HTC03 added: ***"I make sure e-learning is part of every staff meeting agenda. Without consistent leadership focus, momentum can easily fade."*** HTD04 emphasized motivation: *"I recognize and reward innovative teachers. We have started a simple 'Digital Teacher of the Month' award to motivate staff."*

ParticipantHTE05 supported experimentation: *"I promote a culture of experimentation and encourage tech-savvy teachers to mentor others."* HTF06 stated: ***"I always encourage staff not to fear mistakes. We celebrate small victories when teachers manage to incorporate e-learning successfully."*** HTG07 highlighted personal involvement: ***"I lead from the front. I attend training myself and share what I learn with staff to keep morale high."***Participant HTH08 encouraged resource-sharing: ***"I advocate for resource-sharing among departments and promote creative use of available tools."*** **HTI09 expressed patience:** ***"I encourage patience and trial. We make progress one step at a time."*** HTJ10 promoted confidence: ***"I work hard to build teacher confidence and create a no-blame environment for mistakes."***

Other identified challenges related to policy gaps and financial constraints, which constituted a significant barrier to institutionalizing e-learning. However, leadership initiative emerges as a crucial enabler, consistent with Technology-Mediated Learning Theory (Bower, 2019), where leadership helps mediate between policy and practice. The individualized leadership approaches reflect Social Constructivism

(Vygotsky, 1978), highlighting the role of guidance and scaffolding in driving adoption. Leadership efforts also mirror UTAUT's effort expectancy and social influence constructs (Venkatesh et al., 2003), where leaders reduce perceived difficulty and model positive behaviour.

4.4.7.1.2 Inadequate Institutional and government Support

Institutional support emerged as a critical challenge to teachers' instructional engagement in e-learning uptake among the teachers in USE schools. The respondents provided diverse but interrelated experiences. Participant HTA01 stated: *"**When the government introduced e-learning support during the pandemic, we received a few tablets and laptops. However, these were not enough for all staff. The PTA also contributed funds to buy a few additional devices. Teachers often have to share or use personal devices to access the platforms. We've tried to partner with local NGOs, but the support is inconsistent.**"* Similar sentiments were echoed by HTB02, who observed: *"**We received a donation of five computers from an old student. Sadly, only three are functional now due to maintenance challenges. The Ministry provided a few online resources, but many require stable internet, which we don't always have.**"*

Expanding on these resource constraints, HTC03 mentioned the importance of government support:*"Last year, we received a government grant that enabled us to subscribe to a few platforms like Kolibri. We also managed to buy several tablets, which are stored in the library for teacher access."* Likewise, HTD04 emphasized localized fundraising efforts:***"The school secured a few laptops and projectors, mostly through fundraising. However, these devices are shared among teachers, which limits individual access."***

ParticipantHTE05 added another dimension, highlighting mobile accessibility: ***"We allow teachers to use their smartphones to access e-learning content. The school subscribes to a few online libraries. Some teachers also share resources through WhatsApp groups."***ParticipantHTF06 emphasized personal responsibility due to institutional limitations: ***"We mainly depend on personal gadgets. The***

school has very limited resources and cannot afford to buy sufficient computers or tablets."

Similarly, Participant HTG07 described emergency measures adopted during the pandemic:***"During COVID-19, we started with mobile-based learning platforms and tried to sustain that momentum. We have since bought some projectors and improved Wi-Fi, but it's still not enough."***IntervieweeHTH08 elaborated on selective investment:***"We secured limited funding to buy smartboards and projectors. These are mainly used for demonstration lessons."***HTI09 underscored reliance on freely available platforms:***"We mostly use free tools like Google Classroom. Unfortunately, access is uneven because not all teachers own suitable devices."***Finally, HTJ10 highlighted pragmatic adaptations:***"We try to promote mobile learning because most teachers own smartphones. For larger presentations, we use a few shared projectors."*

The findings above reveal varied but convergent realities of institutional support characterized by limited resources, shared devices, and innovative adaptations. This is consistent with Technology-Mediated Learning Theory (Bower, 2019) which asserts that technology integration is contingent upon both human and material resources available within an institution. Furthermore, the use of mobile devices and peer sharing reflects Connectivism (Siemens, 2005), where knowledge is distributed across a network of people and devices, and learning occurs through interaction with diverse information nodes. The variance in support also aligns with the Facilitating Conditions construct of the UTAUT model (Venkatesh et al., 2003), where institutional provisions significantly influence technology adoption.

Inadequate government support was further revealed in the form of insufficient funding. Financial constraints were a consistent theme across all schools. **Participant HTA01** remarked, "***Our funding is mainly for buildings and salaries. ICT is seen as a luxury. We rely heavily on donations or NGO support.***" **Participant HTB02** added that, "***No special ICT vote. We've improvised—used PTA funds to buy a modem and a few second-hand desktops.***" The ingenuity of school leaders was often the only mechanism by which e-learning was initiated. This

reliance on external or improvised resources was echoed by **Participant HTC03**, who explained, *"**No direct funding. We get creative—one donor helped us last year. Otherwise, teachers use personal resources.**"* In a similar tone, **Participant HTD04** admitted, *"**We divert part of the library budget occasionally, but it's not sustainable.**"* Positive experiences were typically linked to external support, as illustrated by **Participant HTE05**: *"**We wrote a proposal to an NGO and got basic equipment. Without that, it would be impossible.**"* Meanwhile, **Participant HTF06** reported, *"**Only what we collect from development fees. It's minimal. We sometimes buy mobile data for training days.**"* Fundraising and community involvement were key strategies in other cases. **Participant HTG07** described, *"**We held a fundraising dinner and bought two projectors from the proceeds.**"* However, **Participant HTH08** offered a cautionary tale: *"**We applied for a grant, but it didn't come through.**"*

Participant **HTI09** emphasized how precarious reliance on external promises could be: *"**We once had a donor promise tablets, but the deal fell through.**"* Lastly, **Participant HTJ10** reflected the tension between good intentions and material shortages: *"**We allocate a small part of development funds, but this barely covers internet and maintenance. We rely heavily on teacher goodwill.**"* These findings illustrate that while there is evidence of administrative awareness and isolated leadership actions, systemic support for e-learning in USE schools is insufficient. This aligns with the Technology-Mediated Learning Theory (Bower, 2019; Ahmed, 2024; Geletu& Seid, 2025; Liu & Zhang, 2025), which emphasizes the need for institutional infrastructure and leadership in supporting the integration of digital learning tools. Schools with some digital infrastructure (e.g., Participants HTF06, HTE05, and HTJ10) demonstrated a closer alignment with this theory, albeit within major constraints.

Furthermore, the Unified Theory of Acceptance and Use of Technology (UTAUT) posits that performance expectancy and facilitating conditions significantly influence technology adoption (Venkatesh et al., 2003; Budhathoki et al., 2024; Bayaga & du Plessis, 2024). The participants' experiences reinforce this, particularly in schools where facilitating conditions—such as funding and follow-up training—were absent or inconsistent (e.g., HTB02, HTA01, HTI09). From a Connectivist

standpoint (Siemens, 2005; Downes, 2005), the formation of informal learning communities, such as WhatsApp groups mentioned by HTD04 reflects a shift toward socially driven e-learning support strategies. However, the absence of structural institutional networks limits the scalability of such efforts. Finally, Constructivist Theory (Piaget, 1973; Vygotsky, 1978) emphasizes the learner's active role in constructing knowledge. However, the lack of institutional support constrains teachers' ability to design learner-centered, interactive digital environments, thus hindering constructivist pedagogy in e-learning.

4.4.7.1.3 Unreliable Technological Infrastructure

Participant HTA01 lamented: ***"Frankly, we are struggling. The internet is unreliable, and many times, we lack electricity for hours. Some teachers even use their mobile data, which is costly. Our lab has only a handful of functioning computers."***Participant ***HTB***02 reinforced this with similar challenges: ***"They are far from adequate. Teachers have to book slots to use computers, and sometimes power outages halt lessons altogether. Teachers also complain about high internet costs."*** ParticipantHTC03 acknowledged limited progress: ***"We have made progress, but internet costs remain high. Sometimes teachers wait for Wi-Fi during off-peak hours. Some platforms also require continuous updates, which we can't always afford."*** IntervieweeHTD04 added that: *"Quite limited. Electricity is unreliable, and internet services are very costly. We even use a generator during prolonged outages."*

In a similar argument, interviewee HTE05 shared the resource strain: ***"They are inadequate. Students often share devices, and network fluctuations are common. Sometimes, we even lose connectivity during lessons."*** ParticipantHTF06 reported: *"Honestly, very minimal. Even stable electricity is a luxury here. Internet access is sporadic and expensive."* HTG07 also cited network and data issues: *"The platforms are available, but unstable internet and the cost of data remain serious barriers for both teachers."* ParticipantHTH08 provided a slightly more optimistic scenario: *"They are sufficient for demonstrations, but not for full-time integration. Devices remain few."* ParticipantHTI09 mentioned: *"Insufficient. Many staff members share computers, and technical breakdowns take*

long to fix." ParticipantHTJ10 concluded that *"Not adequate at all. Sometimes even teachers lend their personal devices to students."*

The findings demonstrate infrastructural deficiencies—unreliable internet, electricity challenges, and insufficient hardware—that restrict e-learning uptake. According to the Unified Theory of Acceptance and Use of Technology (UTAUT), these infrastructural challenges directly limit facilitating conditions and indirectly impact Performance Expectancy. Additionally, the findings resonate with technology-mediated learning theory, which emphasizes that technological learning environments must be supported by dependable infrastructure to function optimally (Bower, 2019).

4.4.7.1.4 Teacher Resistance to E-learning Capacity Building

Teachers' capacity to use e-learning platforms varied across schools. ParticipantHTA01 noted:***"Training has mostly come through short workshops organized by the district or NGOs. However, attendance is often poor due to busy schedules. Some teachers are hesitant because they fear the technology."***Similarly, ParticipantHTB02 explained, ***"Some were lucky to attend training workshops organized at the district level, but others rely on self-learning or peer support. Continuous training is a big need."*** Interviewee HTC03 described internal efforts:***"One of our ICT teachers runs in-house training sessions. However, new teachers often need separate orientation, which strains our few trained staff."*** ParticipantHTD04 mentioned recurring challenges, ***"Some training came through partnerships with donor-funded programs. However, staff turnover means that we lose trained personnel, forcing us to retrain often."***

Interviewee HTE05 explained informal learning:***"Training has been informal. Occasionally, NGOs offer workshops, but consistency is lacking. Peer learning has filled the gap."***ParticipantHTF06 noted:*"Mostly self-learning and peer support. Only a handful have attended formal training sessions outside the school."* Interviewee HTG07 emphasized capacity building, ***"We regularly organize capacity-building sessions. Teachers also share tips in departmental***

meetings."ParticipantHTH08 shared collaborative approaches, ***"We collaborate with a nearby university that offers periodic workshops to our teachers."*** Interviewee HTI09 described peer mentoring, ***"Much of the training has been informal, relying on peer mentoring and online tutorials."***ParticipantHTJ10 added:***"NGOs have helped with short ICT courses. Otherwise, it's mainly self-directed learning."***

The findings reflect mixed training experiences characterized by informal learning, peer mentorship, and occasional formal sessions. This aligns strongly with Constructivism (Vygotsky, 1978), where social interaction (peer learning) and scaffolding facilitate competence development. It also reflects Connectivism (Siemens, 2005), as teachers access knowledge through diverse digital and human networks. The variance in formal training reveals gaps in Facilitating Conditions (UTAUT) necessary for consistent technology adoption.

4.5 Strategies against challenges associated with e-learning uptake

4.5.1 Coping strategies used by teachers to deal with e-learning challenges

The last research question focused on establishing strategies that teachers improvised to cope with the challenges they faced in implementing e-learning in the USE schools. Understanding these strategies helps appreciate how teachers personally deal with various barriers to the uptake of e-learning dynamically. Examined therefore, is the teachers' personal initiative, technological adaptation, resourcefulness, collaboration, and appeal to institutional support strategies. Descriptive statistics, internal consistency measure, factor analysis, group-wise comparison, correlation analysis, and predictive modelling (as appropriate) were used in a combination to thoroughly analyse patterns and differences in the coping behaviours of teachers. The results reported in this paper lead to an enhanced understanding of adaptive abilities of educators in online channels of learning.

4.5.1.1 Descriptive statistics of coping strategies

The coping strategies teachers used to deal with technical, infrastructural, and managerial constraints to e-learning were established by asking them to use a 5-point Likert scale of responses ranging from strongly disagree (1) through disagree (2), neutral (3) and agree (4) to strongly agree (5). Teachers who disagreed and

strongly disagreed (Mean = 1.00-2.44) showed that they did not apply the coping strategies. Those who were neutral (Mean = 2.5-3.44) showed a mixed view while those who agreed (Mean = 3.5-4.44) indicated that they applied the strategies but moderately. Teachers who strongly agreed (Mean = 4.5-5.00) showed that they implemented the strategies excellently. The degree to which the coping actions were implemented was on average as presented in Table 4.11.

Table 4.11: Descriptives on teachers' coping strategies (N = 393)

Variable	Mean	Std.
I have received adequate prior exposure to e-learning	3.61	1.30
I personally support e-learning as the best solution	3.65	1.33
Improving internet connectivity is a must	3.58	1.33
Improving the speed of internet is necessary	3.63	1.31
I use personal device when school ICT is down	3.65	1.39
I use personal modem/WI-FI when school internet is down	3.67	1.31
I requisition for the inputs I need to teach	3.70	1.37
School management solves queries about e-learning quickly	3.66	1.30

Source: Primary data

Descriptive analysis of the coping sub-scales used by teachers indicated a general moderate level of endorsement of the different items measuring the various sub-scales. The reported level of previous exposure to e-learning was moderate (Mean = 3.61, Std. = 1.30), indicating that, although teachers had certain training or had heard of e-learning, many did not have significant prior experience being prepared to work in e-learning modalities.

Regarding the attitudinal support, teachers somewhat agreed with the statement that they, themselves, are in support of e-learning as the most optimal solution (Mean = 3.65, Std. = 1.33) which can be characterized as mildly positive acknowledge of digital education despite its current issues. Likewise, the necessity to improve internet connectivity (Mean = 3.58, Std. = 1.33) and internet speed (Mean = 3.63, Std. = 1.31) were met with moderate agreement, which can also be deemed as an infrastructure issue and another consistent obstacle that teachers perceive as the necessity to be addressed.

There were also adaptive behaviours to reduce the constraints of technology. The mean scores of the teachers on the questions regarding moderate use of personal device in cases where school ICT is not working (Mean = 3.65, Std. = 1.39) as well as use of personal modem or Wi-Fi connection when school internet is not working (Mean = 3.67, Std. = 1.31) revealed that teachers depend on own resourcefulness to continue teaching activities when institutional infrastructure fails.

Also, proactive initiatives were indicated in the requisitioning of the required teaching inputs by the teachers (Mean = 3.70, Std. = 1.37) which reflected their participation in the negotiation of resources access. Last but not least, perceptions of the responsiveness of school management to e-learning-related queries demonstrated moderate agreement (Mean = 3.66, Std. = 1.30), indicating that although there is indeed some level of responsiveness in the administration, the support system could be slightly improved at the institutional level.

On the whole, results indicate that teachers used different strategies to cope with the infrastructural and institutional constraints that challenged their instructional engagement in e-learning instructional activities. The level at which teachers implemented the strategies was moderate on average. It was therefore, below expectation, suggesting a need for improvement. The standard deviations (Std.) in Table 10 were all greater than '1', suggesting high dispersion in teachers' sample. This dispersion suggests that although coping strategies were implemented at moderate level on average, there were differences. Further analysis was therefore conducted to establish whether these differences resulted from teachers' background attributes.

4.5.1.2 Differences in coping strategies resulting from teachers' attributes

The results depicting these differences are summarised in Table 4.12.

Table 4.12: Significantly implemented strategies by teachers' attributes (N = 393)

Attributes	Variable	Statistic	p-value
Teaching Level	I requisition for the inputs I need to teach	6.004	0.0497
Age Group	Improving internet connectivity is a must	9.247	0.0262
Academic	I have received adequate prior exposure to e-learning	11.196	0.0476

Qualification	I personally support e-learning as the best solution	11.714	0.0389

Source: Primary data

Table 4.12 indicates that there were significant differences in the implementation of coping strategies resulting from teachers' characteristics. Specifically, the level of teachers' requisition of inputs needed to facilitate e-learning differed significantly as a result of teachers' teaching level (H = 6.00, p = 0.0497). Teachers at A-level tended to be better implementers of these strategies compared to their counterparts at O-level, suggesting that teachers at A-level wanted e-learning uptake facilitated more than those at O-level. In addition, age caused a significant difference in teachers' push for improved internet connectivity (H = 9.25, p = 0.0262). Younger teachers pushed for improving internet connectivity more than older teachers, which suggests a generational difference in which younger teachers are more likely to engage in e-learning compared to their older counterparts.

Furthermore, academic qualification caused significant difference in the implementation of coping strategies. The first significant difference was in prior exposure, which teachers with high academic qualifications received more than their counterparts with lower qualifications (H = 11.20, p = 0.0476). These results suggest that academic training improves exposure to digital teaching. The second significant difference was in teachers' personal support for e-learning as a desirable solution (H = 11.71, p = 0.0389). Again, the difference favoured teachers with higher qualifications compared to those with lower qualification. These results suggest that teachers become supportive of the implementation of e-learning as their qualifications and exposure to it increase.

The preceding results suggest that the strategies teachers use to teach e-learning reflect on a need to improve facilitating its implementation with necessary input resources, including internet connectivity, professional training and personal experience.

4.5.1.4 Factor analysis of teachers' coping strategies

To determine the dimensional structure of the coping strategies, an exploratory factor analysis was applied. Two unique coping factors came out of the EFA, as indicated in Table 4.13 below.

Table 4.13: EFA loadings coping strategies of teachers (n = 393)

Variable	Factor1	Factor2
I have received adequate prior exposure to e-learning	0.194	0.700
I use personal device when school ICT is down	0.731	-0.161

Source: Primary data

Two dimensions of coping mechanism of teachers with respect to e-learning challenges were extracted using the exploratory factor analysis. Personal resourcefulness was the first factor, and the item I use personal device when school ICT is down loaded heavily (Factor 1 = 0.731). This raises the idea that teacher preparation in dealing with technological constraints within the institutional settings enables some educators to overcome the technological deficiency with their own personal technology to ensure continuity in the instruction.

The second factor was an indication of prior preparedness and exposure where the item, "I have had enough prior exposure to e-learning" had a high loading on the second factor (Factor 2 = 0.700). This means that previous exposure to e-learning environment is a unique aspect of coping, which would most probably affect the confidence of teachers and their competence to teach effectively in the online world. The two reasons indicate that the coping responses of teachers relate to the institutional replacement by personal resources and the personal readiness in terms of the previous exposure to e-learning. The multidimensionality aspect of coping mechanism underlines the fact that personal and systems factors take centre stage in facilitating the capability of teachers to overcome the challenge of e-learning in USE schools.

4.5.1.5 Difference in coping strategies owing to groups

To investigate the hypothesis that coping behaviour differed among demographic and professional grouping, non-parametric group comparisons were done. Mann-Whitney U test was used in case of binary variables and Kruskal-Wallis H test was used in case of three or more groups of variables. Quite a few statistically significant differences were found, as summarized in Table 13 below.

Table 4.14: Significant differences in teachers coping strategies (N = 393)

Group	Variable	Statistic	p-value
Teaching Level	I requisition for the inputs I need to teach	6	0.0497
Age Group	Improving internet connectivity is a must	9.25	0.0262
Academic Qualification	I have received adequate prior exposure to e-learning	11.2	0.0476
	I personally support e-learning as the best solution	11.71	0.0389

Source: Primary data

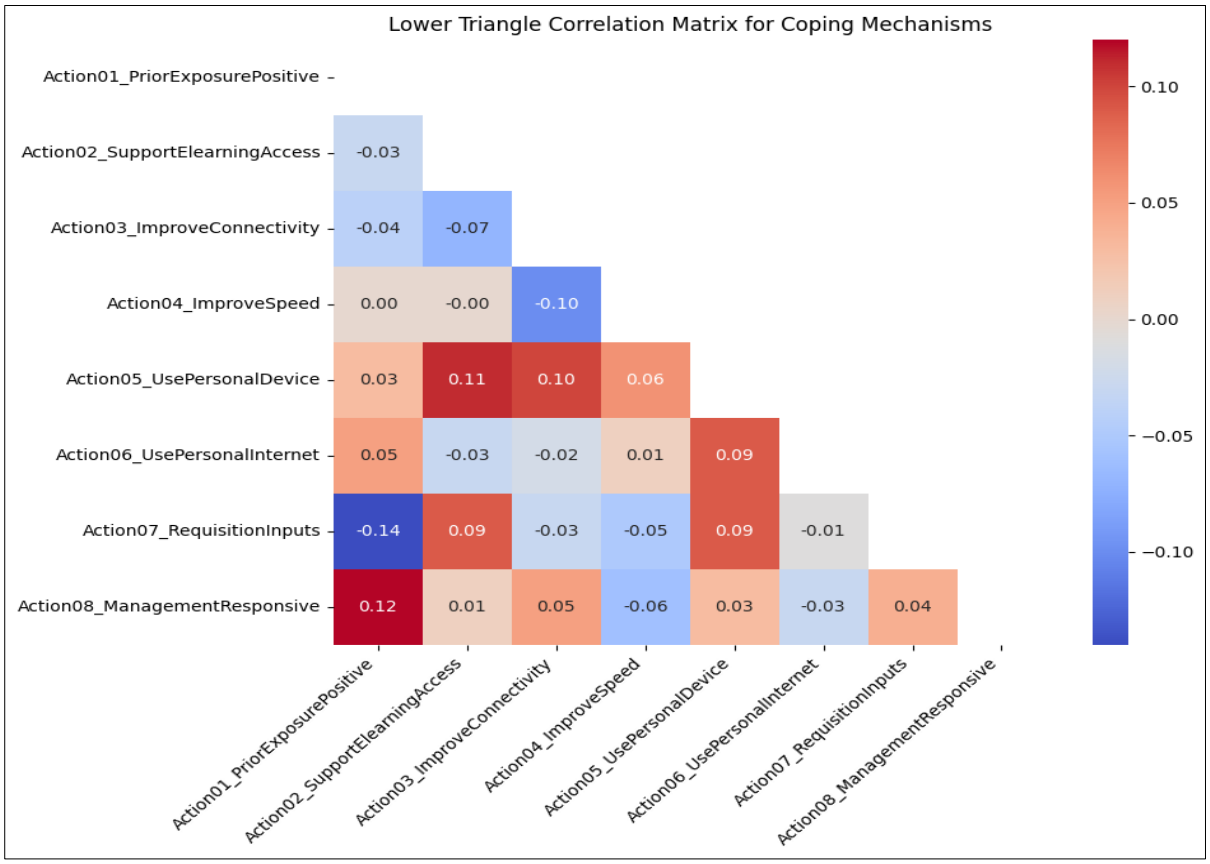
The comparisons showed that there were multiple statistically significant group differences in the coping mechanism of the teachers to resolve the e-learning challenges. Regarding teaching level, teachers varied in the degree to which they requisitioned inputs needed to teach (H = 6.00, p = 0.0497), indicating that teachers at different curriculum levels might have different access or permission to administrative action or authority to request teaching materials or technical assistance.

The factor of age group had a significant result in perceiving that it is necessary to enhance internet connectivity (H = 9.25, p = 0.0262). This could depict generational differences in the sensitivity to infrastructure constraints or difference in internet usage behaviour amongst the age groups. Two coping strategies were highly correlated with academic qualification. The teachers of different qualifications had the reported difference in the prior exposure to e-learning (H = 11.20, p = 0.0476), which suggests that formal education can be one of the factors determining the familiarity and comfort with the digital teaching space. Also, academic qualification correlated with variation in personal belief in e-learning as a feasible solution (H = 11.71, p = 0.0389), indicating that more qualified teachers expressed personal support to implementing e-learning. These findings imply that coping strategies are defined by personal as well as professional attributes and have a bearing on how interventions and institutional assistance can be targeted towards meeting the unique demands of teachers when it comes to dealing with the challenges of e-learning.

4.5.1.6 Interrelations between coping strategies

Correlation analysis was conducted to determine the relationship among teachers coping strategies and e-learning uptake as summarised in Figure 1.

Figure 4.1: Correlations between teachers' coping strategies



Source: Primary data

The correlation analysis of the coping strategies indicated an overall weak interrelationship among and between the individual coping strategies embraced by teachers. Most of the correlation coefficients were concentrated around zero, suggesting that the coping behaviours do not form strongly interconnected pattern but stand apart as rather independent entities. Positive correlation was found between some items of coping in a small degree. As an illustration, the personal device use during school ICT outage was positively correlated with the personal facilitation of e-learning access (r = 0.11), enhancing connectivity (r = 0.10) and enhancing internet speed (r = 0.06). This indicates that more proactive teachers in terms of complementing the institutional infrastructure with their own devices might also have a bit more favourable attitude towards e-learning solutions and infrastructural necessities.

Also, the use of personal modems or Wi-Fi and requisitioning of teaching inputs (r = 0.09), and personal internet use and use of personal devices (r = 0.09) showed a

small positive correlation, respectively, demonstrating that there was limited co-overlap between personal technology dependence and the institutional coping strategies. Some of the correlations were however negative or close to zero, including the inverse relationship between requisitioning inputs and prior exposure to e-learning (r = -0.14), indicating that perhaps teachers who have prior experience of e-learning feel less need to continue requisitioning inputs perhaps because they are more familiar and resourceful in digital teaching.

Generally, the low correlations indicate that the coping strategies of the teachers are highly specific and situational. It confirms the previous result of the internal consistency analysis that coping strategies do not constitute a single dimension, but represent individualized and separate strategies that teachers apply depending on their particular situation and resource availability.

4.5.1.8 Coping strategies of teachers in summary

The coping strategy analysis indicated that educators at USE schools have recourse to a broad assortment of personalized reactions in a bid to deal with the e-learning uptake related challenges. Descriptive statistics revealed that the degree to which teachers adopt coping behaviour of using personal devices and internet connectivity when ICT infrastructure is not provided institutionally and that of individually championing e-learning as a solution in education is moderate. Instructional engagement in institutional coping practices involving requisitioning of inputs and management responsiveness, were however, at lower levels of instructional engagement, indicating that there might be institutional constraints in the full instructional engagement in supporting the adaptive effort of teachers.

Group comparison tests revealed significant results among certain demographic and professional grouping, especially teaching level, academic qualification and age group. These findings indicate that individual history and institutional status could determine the method by which educators choose and implement various coping strategies when reacting to the challenges of e-learning.

The multidimensionality of coping behaviours was also established using exploratory factor analysis, which identified two coping dimensions, that is, personal resourcefulness (depending on personal devices) and individual preparedness (previous experience of e-learning). In a nutshell the coping strategies of the teachers can be described situational and influenced by both individual factors and institutional setting. These results demonstrate that the process of e-learning adoption is rather complex and requires a multifaceted institutional intervention in order to support the adaptation of individual teachers.

4.5.2 Qualitative results from headteachers

The strategies suggested by the interviewed headteachers to improve e-learning uptake were as follows:

4.5.2.1 Institutional Support

To address the multifaceted challenges surrounding the uptake of e-learning in USE schools, various institutional strategies were implemented, primarily focusing on local resource mobilization. Several school heads highlighted community-based initiatives as critical interventions. For instance, ***"We've worked closely with the PTA and community leaders to purchase solar panels and a few second-hand laptops"*****(HTA01),** demonstrating a grassroots effort to resolve power and equipment shortages. Similarly, **HTB02** explained that ***"We collected voluntary teacher contributions to repair old computers"***, reflecting the spirit of collective sacrifice. Building on such localized responses, **HTC03** reported: ***"We tapped into alumni networks for donations. One of the former students gave us refurbished tablets,"*** underlining the role of stakeholder networks in boosting technological access. Other schools innovatively engaged with private sector stakeholders; HTD04 noted that ***"We reached out to private school owners and convinced one to share their learning platform temporarily,"*** a move that exposed teachers to alternative e-learning solutions. Complementing these efforts, HTE05 described an in-school fundraising model: ***"We introduced an 'ICT Support Day' fundraiser during our open days. Parents contributed, and we were able to buy three tablets and install Wi-Fi in the staffroom"***. These initiatives collectively reveal a pattern of

adaptive and locally driven strategies used to confront resource-related e-learning challenges.

Furthermore, many schools exhibited budgetary creativity and strategic partnerships in overcoming these constraints. For example, HTF06 recounted that ***"We repurposed part of the library budget to buy a projector and portable speaker"***, a decision marked by calculated resource reallocation. Similarly, HTG07 emphasized external collaboration: ***"We partnered with an ICT vocational institute that gave us five computers and a technician who trains our teachers on weekends"***, illustrating a sustainable support model. HTH08 revealed more formal resource mobilization: ***"We wrote proposals to NGOs and secured one grant which funded a smartboard and two laptops"***, suggesting how external funding streams can be harnessed effectively. In the same spirit, HTI09 shared that ***"We pooled funds from co-curricular savings to fix the school's broken laptops"***, an unconventional yet practical financial manoeuvre. Finally, HTJ10 explained: ***"We redirected funds meant for school trips to buy a Wi-Fi router and a projector"***, an example of reprioritizing institutional budgets in favour of digital advancement. Together, these narratives reflect a shared commitment across USE schools to leverage internal ingenuity and external networks to mitigate the barriers hampering the implementation of e-learning.

The prescribed transcripts reflect a broad range of resource mobilization strategies, from leveraging community and alumni support to reallocating internal budgets and applying for grants. These efforts reflect strong contextual adaptability where the school environment shapes and responds to educators' needs. The reliance on local initiatives and collaboration is also aligned with Connectivism (Siemens, 2005), which underscores learning as a networked process involving people and resources. The practical orientation seen in these efforts supports the TMLT view that sustainable technology integration requires dynamic interplay between technological tools and institutional strategies (Bower, 2019; Ahmed, 2024).

In an effort to mitigate the barriers associated with e-learning, teachers in USE schools have increasingly relied on collaborations with external stakeholders,

ranging from NGOs and religious institutions to private companies and individual benefactors. Participant HTA01 acknowledged that ***"An NGO trained our teachers last year, and a local telecom company provided discounted internet bundles"***, although these forms of support were not always consistent. Similarly, HTB02 shared: ***"A church partner donated some mobile routers. Parents now occasionally contribute to monthly data plans"***, highlighting the incremental but valuable role played by community partners. Reinforcing institutional collaboration, HTC03 noted: ***"Our partnership with the district ICT office has been helpful. They conduct annual refresher courses for our staff,"*** underscoring the relevance of ongoing capacity building. In a more transformative instance, HTD04 reported: ***"UNESCO's regional office sponsored an ICT boot camp for our teachers. That's when adoption really started,"*** demonstrating how targeted, intensive interventions can catalyze long-term changes in digital teaching practices.

Other teachers reported valuable partnerships with higher education institutions, the private sector, and even individuals within their extended networks. For instance, **HTE05** emphasized: ***"A local university's education faculty partnered with us. Their students conduct tech demonstrations for our teachers, and we benefit from their temporary access to e-resources,"*** illustrating a model of reciprocal academic exchange. Additionally, **HTF06** shared that ***"We worked with a local internet provider to get discounted bundles for teachers. Some parents also donated their old smartphones for school use,"*** reflecting the importance of both formal and informal stakeholder contributions. **HTG07** highlighted national-level support, stating: ***"The Ministry of Education's digital unit has been helpful. They enrolled some of our teachers in a free online certification program"***. Meanwhile, **HTH08** mentioned the role of alumni, noting that ***"An old student who now works in IT offered to train our staff for free"***, which significantly enhanced teachers' digital confidence. Notably, **HTI09** credited the diaspora community: ***"Parents in diaspora helped us buy a backup generator to reduce disruptions caused by power outages"***, while **HTJ10** described an innovative media partnership: ***"A local radio station offered us free airtime during the lockdown to broadcast educational content"***, a strategy that sustained teacher-learner instructional engagement during a critical time. Collectively, these accounts

underscore the centrality of stakeholder collaboration in supplementing institutional limitations and fostering an enabling environment for e-learning in resource-constrained USE schools.

These responses illustrate the significance of external stakeholder involvement in mitigating e-learning challenges. Collaborations with NGOs, telecom companies, universities, and government entities extend the schools' capacity, consistent with the UTAUT framework's construct of "facilitating conditions" (Venkatesh et al., 2003; Budhathoki et al., 2024). Such collaborations mirror the distributed nature of knowledge and the capacity described by Connectivism. They also reinforce the social, interconnected processes of learning. Moreover, the variety in partnerships points to adaptive leadership and institutional innovation—the key dimensions emphasized in the TMLT framework (Geletu& Seid, 2025).

4.5.2.2 Administrative Support and Teacher Satisfaction

Participants broadly agreed that administrative backing—both technical and emotional—plays a vital role in motivating teachers toward e-learning. Participant **HTA01** shared, *"We give moral support, flexible lesson planning time, and public recognition. When teachers feel appreciated, they engage more confidently with digital tools."* This sentiment was echoed by Participant **HTB02**: *"We encourage collaboration and allow extra time for digital lesson preparation. Teachers appreciate the understanding, especially those new to tech."* Participant **HTC03** added a personal leadership dimension: *"I lead ICT sessions personally. My visible involvement makes teachers feel we are in it together."* Participant **HTD04** stated: *"We provide training slots during CPDs and allow teachers to co-teach with peers who are more experienced with ICT."*

Participant **HTE05** emphasized incentives: *"We offer small tokens, like data bundles or airtime, which motivates teachers. They feel their efforts are valued."* In a similar tone, Participant **HTF06** explained: *"We allow flexibility—teachers can adjust lesson times when tech fails. That level of understanding improves satisfaction."* Participant **HTG07** highlighted appreciation:*"Admin support means giving them time, praise, and listening. We also reward top performers with school-*

sponsored internet." Participant **HTH08** emphasized the emotional element:*"Support isn't only about tools—it's emotional too. We comfort teachers when they feel overwhelmed by tech changes."* Participant **HTI09** mentioned: *"We assign mentors to struggling teachers. The moral and technical support makes them feel less alone."* Participant **HTJ10** concluded: *"I let teachers take the lead and support their ideas. That autonomy builds satisfaction and trust."*

The findings reflect high alignment with the UTAUT model's social influence and effort expectancy constructs (Venkatesh et al., 2003; Budhathoki et al., 2024), where teachers' behavioral intention to use e-learning tools is shaped by perceived support. Leadership that values autonomy and emotional well-being also reflects Constructivist approaches (Piaget, 1973) in promoting agency and personalized learning environments. Furthermore, Technology-Mediated Learning Theory (Geletu& Seid, 2025) posits that administrator-teacher interaction quality significantly influences teacher satisfaction with digital tools.

4.5.2.3 Teacher adaptability to Accessible Technological Infrastructure

In response to the persistent technological constraints that affect the uptake of e-learning in USE schools, teachers have demonstrated remarkable adaptability and ingenuity. Participant **HTA01** emphasized their proactive approach: ***"Teachers are very resourceful—they download content at night when internet is cheaper and use Bluetooth to share with colleagues. We even print out digital materials when devices are few"***. This combination of digital sharing and analogue fallback methods is echoed by **HTB02,** who explained: ***"Teachers often prepare printed notes from e-resources. When the internet is down, they improvise with offline backups stored on flash drives"***. Personal initiative was also noted by HTC03: ***"Most teachers carry personal phones with educational apps. They use these creatively—even showing short clips from YouTube using their own data"***, showcasing the commitment of teachers to integrate multimedia content despite limited institutional support. In more constrained contexts, low-tech alternatives prevailed, as HTD04 revealed: ***"Some teachers use basic SMS to communicate homework. It's not fancy, but it works when online platforms fail"***. These

accounts underscore a recurring theme of adaptive improvisation, where teachers merge both digital and traditional methods to maintain instructional continuity.

In addition to these improvisational strategies, teachers have embraced pre-planning and collaborative techniques to mitigate infrastructural deficits. **HTE05** described a multi-media approach: ***"Some rely on offline teaching videos downloaded ahead of time. Others use TV shows or radio segments to supplement lessons, especially in subjects like English"***. Similarly, **HTF06** noted a strategic preparedness: ***"Most have learned to keep backup lessons in notebooks. That way, when power or internet fails, they still deliver lessons without disruption"***. Creative scheduling was evident in **HTG07's** account: ***"They pre-record their lessons when the lab is free and then project them during class. That way, teaching continues even when teachers are away"***, showing an efficient use of shared spaces and time. **HTG08** shared an innovative content-sharing mechanism: ***"Teachers record lessons and save them on memory cards, which students borrow to study from home"***, while HTI09 explained: ***"They use radio recordings and pre-download videos using their personal data. They've really gone the extra mile"***. Finally, **HTJ10** highlighted collaborative time management: ***"They teach in shifts to share devices. Those not teaching record lessons or prepare e-content"***, reflecting a coordinated effort to maximize limited digital resources. Altogether, these responses demonstrate that despite the scarcity of infrastructure, teachers have adopted both low-tech and high-ingenuity strategies to sustain e-learning practices in their schools.

Generally, the preceding adaptive strategies described across schools demonstrate resilience and practical ingenuity. These actions resonate with TMLT's premise that technology adoption is highly context-driven and shaped by available resources and user innovation (Bower, 2019; Liu & Zhang, 2025). Constructivist learning theory also applies, as teachers draw from prior experience and peer collaboration to construct meaningful teaching practices despite technological limitations. Their creativity reflects a grassroots model of innovation that prioritizes continuity over perfection.

In response to limited ICT infrastructure, teachers in USE schools have developed creative strategies to ensure that e-learning efforts remain uninterrupted. A common practice has been the establishment of rotational schedules and shared access frameworks. As HTA01 explained, ***"We have a rotation schedule for the school's two projectors. Teachers also use their phones during lessons and plug them into speakers to reach large classes,"*** illustrating the dual use of institutional and personal resources. HTJ10 affirmed a similar system of organization: ***"We run scheduled usage slots for digital tools. Everyone knows when it's their turn to use what, which avoids conflict,"*** emphasizing how coordinated planning minimizes disruptions. In departments with minimal devices, collaboration is key. HTC03 noted that ***"We have one reliable laptop per department. Teachers coordinate through WhatsApp to schedule and avoid conflicts"***, while HTB02 highlighted foresight in content preparation: ***"Each department has a shared folder. Teachers plan ahead and download what they need to avoid last-minute disappointments."*** These approaches reflect deliberate, structured routines that enhance the equitable and efficient use of scarce technological resources.

In addition to rotational access, teachers have embraced shared digital repositories and collaborative teaching models to extend the utility of available ICT tools. HTD04 described a grassroots solution: ***"We keep a pool of lesson plans and digital materials in a shared flash disk. It's our low-tech workaround for access problems"***, a strategy echoed by HTI09: ***"We keep a lesson bank on a central flash drive. When one device fails, another teacher can quickly continue the lesson,"*** which underscores a strong culture of resource resilience. Digital communication platforms have further enabled continuity beyond the classroom. According to HTE05, ***"Teachers create WhatsApp groups to engage students outside class. One teacher even shared pre-recorded audio notes with learners who missed class,"*** indicating how mobile platforms bridge gaps in real-time learning. On a more structured scale, HTG07 shared: ***"We have introduced a shared Google Drive folder. Teachers upload learning materials weekly so others can access them anytime,"*** enabling asynchronous content sharing. Moreover, innovative teamwork is evident in HTF06's and HTH08's accounts. HTF06 reported: ***"They share devices***

and even combine classes occasionally to use the projector", while HTH08 stated: ***"They form teaching pairs—one manages the tech, while the other focuses on delivery. This strategy has reduced stress,"*** showing how collaborative delivery optimizes both human and digital resources. Altogether, these strategies depict a responsive and collaborative culture among teachers, aimed at overcoming technological constraints and ensuring continuity in e-learning delivery.

The collective maximization of ICT resources underscores the principles of Connectivism, particularly the shared management of knowledge and tools across teacher networks. These findings also reinforce the importance of collaborative learning environments, as per Constructivist ideals, where knowledge and practices are co-created. According to UTAUT, these coordinated practices also enhance effort expectancy and performance expectancy, boosting teacher motivation and use of available technologies (Bayaga & du Plessis, 2024)

4.5.2.4 Teacher e-learning competency building

To build internal e-learning capacity amid limited external training opportunities, teachers in USE schools have cultivated peer-based knowledge-sharing strategies. These practices, which are often informal yet highly impactful, reflect a strong collegial spirit and self-initiated professional development. For instance, **HTA01** shared that ***"Our senior ICT teacher mentors' others. Sometimes during break time, teachers gather to demonstrate how to create Google Forms or upload videos. It's informal but effective,"*** highlighting spontaneous mentorship. Similarly, **HTB02** explained: ***"We established 'tech buddies'—each new or struggling teacher is paired with someone more experienced in e-learning"***, reflecting an intentional peer-support structure. **HTC03** added that ***"Monthly peer-learning sessions are now a tradition. Teachers demonstrate how they deliver content using digital tools,"*** emphasizing the institutionalization of collaborative learning. Regular integration into staff routines was also noted by **HTD04**: ***"Every week, we dedicate 30 minutes during staff briefing to share new digital tricks or tips"***, illustrating how professional development is embedded into routine instructional engagements.

Beyond scheduled interactions, teachers have also fostered innovative and culturally embedded practices to promote knowledge sharing. **HTE05** reported a structured yet informal initiative: ***"We organize a peer-led 'Tech Thursday' where one teacher presents a skill each week. It has helped bridge confidence gaps,"*** supporting incremental digital literacy development. Likewise, **HTF06** noted: ***"Teachers here are collaborative. They informally meet in the evenings to solve tech-related challenges together,"*** reinforcing the value of flexible peer instructional engagement. **HTG07** observed that ***"Peer-to-peer training has been our biggest asset. Even during morning assemblies, teachers sometimes share useful apps or tricks,"*** showing how digital knowledge has permeated everyday interactions. **HTH08** described a relaxed and inclusive model: ***"They hold weekly lunch-and-learn sessions. No pressure, just informal sharing with snacks provided"***, indicating how a positive social atmosphere encourages participation. Moreover, HTI09 noted: ***"Teachers shadow one another during lessons. It's an organic form of mentorship that has strengthened skills,"*** while **HTJ10** highlighted documentation and continuity through: ***"Every department maintains an 'e-learning tip logbook.' Teachers update it after discovering new tricks"***. Collectively, these strategies demonstrate how grassroots knowledge-sharing networks among teachers have significantly enhanced the collective capacity for e-learning, even in the absence of formal training programs.

Peer learning and informal knowledge-sharing appear to be foundational in building digital competence among teachers. These experiences align closely with Constructivist learning (Vygotsky, 1978), which emphasizes scaffolding and social interaction in knowledge development. Connectivism is also relevant here, where the learning environment is enhanced through the flow of information across teacher networks. According to UTAUT, this form of social influence supports the uptake of e-learning technologies as teachers' model behaviours and reduces the anxiety of less confident peers.

Continuous professional development (CPD) has played a pivotal role in addressing e-learning skill gaps, although its implementation remains uneven across institutions. Participant HTA01 observed that ***"The Ministry's CPD sessions are***

irregular, so we rely heavily on peer-led initiatives. Occasionally, I bring in alumni working in tech to train our staff," highlighting how formal gaps are being filled through community and alumni instructional engagement. HTB02 emphasized the impact of localized efforts: ***"We hosted a regional ICT workshop that really built momentum. It exposed our staff to tools beyond just PowerPoint and WhatsApp,"*** illustrating the transformative potential of well-structured CPD events. Similarly, HTC03 noted that ***"CPD workshops opened teachers' minds to the usefulness of LMS platforms. It has also improved their confidence with troubleshooting,"*** underscoring both attitudinal and technical gains. For many, CPD has marked a turning point; HTD04 recalled that ***"Before CPDs, many teachers avoided tech. Now they at least try, especially after learning from colleagues during sessions,"*** reflecting a shift from resistance to experimentation in digital instructional engagement.

Furthermore, schools have initiated internal structures and leveraged external resources to sustain CPD efforts, thereby deepening teachers' practical competencies in e-learning. HTE05 shared a concrete outcome from government support: ***"The district's ICT unit offered a three-day training last term. Since then, we've seen teachers incorporate more multimedia content into their lessons"***. This trend toward skill diversification was echoed by HTG07: ***"Continuous PD has exposed teachers to new tools like Edmodo and Padlet. They are now more adventurous with tech,"*** highlighting both exposure and adoption. Internal initiatives were also prominent. HTF06 stated: ***"The school arranges quarterly internal workshops where experienced teachers train others. This builds confidence over time"***, while HTH08 described a personalized model: ***"The school hired an ICT assistant who doubles as a trainer. He offers drop-in sessions where teachers can get one-on-one help"***. Informal learning supplements structured CPD, as HTI09 explained: ***"Training from the sub-county office was useful, though brief. We've built on it by encouraging teachers to watch free YouTube tutorials together."*** Finally, HTJ10 noted the institutional integration of digital skills: ***"We've integrated tech into CPD sessions. It's become routine to dedicate at least one hour to digital skills,"*** reflecting a sustained commitment to technological advancement. Collectively, these responses demonstrate how CPD—whether

externally facilitated or internally led—has significantly contributed to teachers' digital competence, gradually bridging the skill gaps inherent in the e-learning transition.

In summary, continuous professional development (CPD) has positively influenced teachers' competence, despite inconsistencies in formal programming. These findings support the TMLT emphasis on ongoing skill enhancement as a factor for successful digital integration (Bower, 2019). Connectivism is evident, with teachers using peer collaboration and external learning nodes (like YouTube or alumni trainers) to fill gaps. CPD also enhances UTAUT's "effort expectancy" and "facilitating conditions," by equipping teachers with tools and reducing perceived complexity (Xue, Rashid & Ouyang, 2024).

4.5.2.5 Policy and leadership Improvement

In response to the evolving demands of digital teaching, schools have begun to systematically revise internal policies to support and normalize e-learning practices. A key area of transformation has been curriculum planning and workload management. As HTA01 reported, ***"We updated our ICT policy to include digital lesson planning and shared account responsibility. We also allow teachers extra time to prepare if tech fails"***, signalling recognition of both structural and logistical barriers. Similarly, HTB02 explained: ***"We adjusted teaching load allocations to factor in digital preparation time. This relieved pressure and gave room for experimentation,"*** demonstrating a practical shift toward enabling innovation. Other schools institutionalized digital expectations into teaching frameworks. For example, HTC03 stated: ***"We added ICT as a requirement in our scheme of work formats. Heads of department now ensure everyone includes digital elements"***, while HTD04 added: ***"We modified lesson observation tools to include ICT use indicators. This encourages accountability and improvement,"*** revealing how evaluation tools are being updated to match digital competencies.

Beyond instructional planning, schools have revised administrative and operational policies to reinforce structured e-learning adoption. Participant HTE05 observed: ***"We've updated our staff handbook to include guidelines on device-sharing and***

data privacy. These additions were necessary once more teachers started using tech tools," highlighting the importance of safeguarding digital instructional engagement. HTF06 emphasized strategic planning, stating: ***"We've included e-learning goals in our termly departmental workplans. It has given structure and clarity on expectations"***, while HTG07 shared a monitoring innovation: ***"We now require every teacher to submit a weekly e-learning activity report. It helps us track usage and offer timely support"***. Templates and planning tools have also evolved. As HTH08 explained, ***"We've introduced a tech-friendly lesson planning template that prompts teachers to incorporate digital tools where possible"***, thereby integrating e-learning into daily routines. HTI09 contributed that ***"We made it mandatory to include an ICT strategy in every subject meeting. That keeps the momentum going,"*** and HTJ10 concluded: ***"Policies now recognize e-learning as part of lesson delivery. It's reflected in how we assess teacher performance,"*** demonstrating a full policy shift toward embedding digital teaching into professional benchmarks. These cumulative revisions illustrate a systemic effort to align school-level governance with the practical realities of digital education, fostering both accountability and sustainability in e-learning integration.

Analytically, **t**he evolution of school-level policies to accommodate digital integration reflects the importance of institutional responsiveness to emerging educational demands. These changes mirror TMLT's emphasis on adaptive governance and the need for instructional policies that support technology use (Ahmed, 2024). In UTAUT terms, the policy adaptations enhance both facilitating conditions and performance expectancy, making digital instructional engagement more feasible and rewarding for staff.

School leadership has played a pivotal role in creating an enabling and psychologically safe environment for e-learning innovation among teachers in USE schools. Leaders have modelled digital instructional engagement themselves, thereby reducing hierarchical barriers and inspiring teacher participation. As **HTA01** shared: ***"I'm always present during ICT-related activities, and I try to model digital use myself; When teachers see me trying, they gain confidence too,"*** demonstrating the power of visible participation. Similarly, HTD04 emphasized a

culture of experimentation: ***"I create room for experimentation and protect teachers from blame when digital tools fail,"*** reinforcing an atmosphere where learning from failure is normalized. This was echoed by **HTB02**, who noted: ***"I encourage risk-taking and reassure staff that failure is part of learning. That attitude has reduced tech-related anxiety,"*** highlighting the importance of affective support in fostering digital confidence. Leadership through sharing was also a key theme; as **HTC03** explained: ***"I share digital resources with staff weekly. Leading by sharing makes people feel guided rather than pushed"***, suggesting a relational approach to change management. Moreover, **HTF06** pointed out that ***"I always acknowledge effort over perfection. Teachers know they can experiment without fear of reprimand"***, which cultivates a low-risk environment for innovation.

In addition to modelling and emotional support, school leaders have employed inclusive and motivational practices to sustain teacher instructional engagement with e-learning. HTG07 illustrated participatory leadership: ***"I involve teachers in every e-learning decision. That ownership has motivated them to embrace changes more willingly,"*** fostering collective responsibility. HTI09 also reinforced open-door leadership: ***"I stay available for consultation. Teachers know they can reach me with any digital challenge—even late in the evening,"*** showing responsiveness to individual needs. Recognition and encouragement were cited as critical tools for motivation. HTE05 remarked: ***"I ensure teachers get recognition during assemblies when they try new digital methods. That public appreciation encourages others to step out of their comfort zones"***, while HTJ10 shared: ***"I praise every attempt at innovation during our weekly briefings. It has cultivated a spirit of trying, even among the sceptics"***.

Finally, HTH08 linked leadership involvement with collective ownership: ***"I attend the ICT workshops myself. My involvement reassures teachers that e-learning isn't just their burden—it's a collective goal"***, demonstrating shared accountability. These leadership practices not only reflect inclusive values but also align with Connectivist principles by promoting collaboration, emotional safety, and professional interdependence. Within the **Unified Theory of Acceptance and Use**

of Technology (UTAUT) framework, these behaviours enhance **effort expectancy** and **social influence**—key predictors of technology adoption (Bayaga & du Plessis, 2024). Furthermore, **Technology-Mediated Learning Theory (TMLT)** emphasizes the leader's role as a mediator who bridges institutional vision with practical implementation, underscoring the importance of visible commitment, empathy, and participatory governance in driving successful digital transitions (Geletu & Seid, 2025).

4.6 Hypothesis Verification

Four hypotheses (H_1, H_2, H_3 and H_4) were stated to aid establishing the effects of teachers' experiences with e-learning on its uptake in Kampala USE schools. These hypotheses were verified using linear regression of the level of e-learning uptake as assessed by teachers on all their self-assessed experiences. The results obtained from teachers' self-assessed experiences have been presented in response to the research questions. Table 4.15 below presents the results showing the level of e-learning uptake in the selected USE schools as assessed by teachers using a 5-point Likert scale of responses ranging from strongly disagree (1) through disagree (2), neutral (3) and agree (4) to Strongly Agree (5). With this scale, teachers who disagreed and strongly disagreed (Mean = 1.00-2.44) indicated that there was no e-learning uptake in their schools. those who were neutral (Mean = 2.5-3.44) showed a mixed view. Teachers who agreed (Mean = 3.5-4.44) showed that e-learning uptake was low yet those who strongly agreed (Mean = 4.5-5.00) indicated that e-learning uptake was high.

Table 4.15: Level of e-learning uptake in USE schools as assessed by teachers

Indicators of e-learning uptake	Mean	Std.
I spend much of my teaching time engaged learning online	3.52	.573
The lessons I deliver online are effective in terms of being understood by students	4.07	.902
Students use the reference materials I send them online as expected	3.88	.836
The 'data' I use to search online is not in vain as I get all the information I need to plan the lessons I deliver to students.	3.67	.018
Students demonstrate good knowledge acquired from the lessons I upload on their portal.	3.59	.348
Teaching online has improved my instructional performance	3.56	.084

Overall assessment of e-learning uptake	**3.72**	**.460**

From the descriptive statistics in Table 4.15 indicate that teachers showed that the level of e-learning uptake was low in the selected USE schools on average (Mean = 3.72, Std. = .460). As to whether and how this level was explained by teachers' experiences with e-learning was investigated at the inferential level, which involved using different inferential statistical methods to prepare for the verification the research hypotheses. Findings from factor and correlation analysis are presented in Appendix K. results obtained from linear regression analysis are summarised in Table 4.16.

Table 4.16: Linear regression statistics on prediction of e-learning uptake by teachers' experiences with e-learning

Predictors (Teachers' experiences with e-learning)	**Statistics predicted on the dependent variable: Level of e-learning uptake**									
	Unstandardised Coefficients		Standardised Coefficients							
	B	Std. Error	Beta	t	P-value	R	R^2	Adjusted R^2	F	p-value
(Constant)	-4.301	3.414		-1.260	.210	.776	.603	.593	191.48	.000
Instructional engagement experiences in e-learning	.108	.082	.306	2.092	.001					
Satisfaction with e-learning	.695	.057	.795	12.255	.000					
perceived challenges to instructional engagement in e-learning	-.511	.066	-.416	-6.159	.000					
Strategies for coping with challenges	.352	.136	.044	0.082	.663					

The adjusted R^2, corresponding F-value and level of significance indicate that all teachers' instructional experiences with e-learning predicted its level of uptake by a significant 59.3% (Adjusted R^2 = .593, F = 191.48, p-value = .000 < 0.01). The R^2 = .603 indicates that these experiences claimed 60.3% of the variation in the level of e-learning uptake in USE schools in Kampala Capital City. Therefore, a change in any of these experiences would translate into a significant change in the level of e-learning uptake in these schools.

A scrutiny of the Beta coefficients, their corresponding t-values and levels of significance in Table 4.16 suggests however, that not all teachers' experiences were significant predictors of the level of e-learning uptake, and also that not all these experiences were positive predictors. Specifically, teachers' engagement experiences affected e-learning uptake significantly and positively (Beta .306, t = 2.092, p-value = .001 < 0.01). This effectively verified **H_1** which stated that "Teachers' instructional engagement in e-learning has a significant effect on its uptake in USE schools in Kampala Capital City." This suggests that a positive change in teachers' instructional engagement significantly improves e-learning uptake in USE schools in Kampala Capital City.

In addition, teachers' perceived level of satisfaction with e-learning had a positive and significant effect on e-learning uptake (Beta .867, t = 25.272, p-value = .000 < 0.01). This verified **H_2** which stated that, "Teachers' satisfaction with e-learning has a significant effect on e-learning uptake in USE schools in Kampala Capital City." This verification implies that a positive change in teachers' satisfaction with e-learning translates into a significant improvement in e-learning uptake in USE schools in Kampala Capital City. Furthermore, teachers' coping strategies had a positive, but not significant effect on e-learning uptake (Beta= .044, t = .082, P-value = .663 < 0.01). Therefore, **H_3** which stated that, "Teachers' perceived challenges to e-learning have a significant effect on its uptake in USE schools in Kampala Capital City" was rejected. This implies that despite its positive nature, the effect of teachers' coping strategies did not translate into a significant impact on e-learning uptake.

On the contrary, teachers' perceived challenges to e-learning had a significant effect on its uptake (Beta = -.416, t = -6.159, p-value = .000 < 0.01). This verified **H_4** which stated that, "Teachers' coping strategies with e-learning have a significant effect on its uptake in USE schools in Kampala Capital City." However, the effect was negative suggesting that the challenges' effect was such that they significantly constrained e-learning uptake in USE schools in Kampala Capital City. Therefore, reversing the effect of these challenges is necessary if e-learning uptake is to be improved in these schools. the implications of these results are discussed in the next chapter.

CHAPTER FIVE
DISCUSSION OF RESULTS

5.1 Introduction

This chapter provides a detailed discussion of the findings guided by the four objectives that guided the study, which included: determining the influence of teachers' instructional engagement experiences on uptake e-learning, assessing the influence of satisfaction experienced by teachers with their e-learning instructional experiences on its uptake, examining the effect of teachers' perceived challenges to e-learning on its uptake, and investigating the effect of strategies employed by teachers cope with the challenges to their e-learning instructional experiences on its uptake. The discussion is grounded in the theoretical perspectives of Connectivism, TMLT, and the UTAUT. Furthermore, previous literature is engaged to situate the results within the broader academic discourse on digital education practices in resource-constrained contexts typical of Sub-Saharan Africa.

5.2 Teacher Instructional engagement with E-Learning Platforms

The results reveal that a positive change in teachers' instructional engagement experiences with e-learning translates into a significant increase in its uptake in USE schools in Kampala Capital City. This implies that if teachers improve their instructional engagement in e-learning, its uptake increases significantly in these schools. These results are therefore consistent with Connectivism, which, as explained by Siemens (2005) and Downes (2005), states, in essence, that the more one's engagement experience involves connecting oneself with knowledge networks the higher is the likelihood of one's uptake of e-learning in the form of gaining and sharing the knowledge and skills exchanged along these networks. The results also resonate with Bower's (2019) TMLT, which states that the more one engages in the use of technologies connected to knowledge networks, the greater is one's e-learning uptake.

In addition to their theoretical consistency, the results suggest that improving teachers' instructional engagement experiences is one of the ways that can be adopted to address the low level of e-learning uptake reported in USE schools in

Uganda, particularly in Kampala Capital city by different scholars such as Walekhwa et al. (2022) and Kyomuhendo et al. (2024). Moreover, this improvement is needed since the results show that the extent of teachers' instructional engagement was moderate on average, characterised not only by limited connection of devices and platforms to the knowledge networks but also their insufficient use to facilitate e-learning instructionally. This extent implies that teachers were yet to be fully embedded in the instructional implementation of e-learning. It hence points to a need to be enhanced if Uganda is not only to improve access to school education as envisioned in Uganda's Vision 2040 but also achieve SDG 4(1). Improving the extent of this engagement requires making teachers' attitude towards e-learning positive, enhancing their personal competencies and familiarity with technology, and ensuring availability of supportive infrastructure for e-learning.

Improving the supportive infrastructure is needed in the light of most of the interviewed headteachers who described scenarios in which teachers accessed e-learning platforms using shared or personal devices due to limited institutional resources. As illustration, HTA01 explained that, "*Teachers often have to share or use personal devices to access the platforms*." This was echoed by HTF06 who stated that "*we mainly depend on personal gadgets*," reflecting the improvisational strategies teachers use to maintain instructional engagement in the absence of adequate school-provided tools. This confirms that the observed level of instructional engagement is strongly influenced by the availability of resources at the school level and further supports the argument that technology integration is contingent upon both human and material resources, as outlined in TMLT (Bower, 2019).

However, instructional engagement patterns were found to be uneven across the teaching workforce. Significant variations were observed across teaching subjects, academic qualifications, professional designation, and prior exposure to e-learning platforms. Teachers with greater technological exposure and digital literacy showed higher levels of platform usage, suggesting that prior knowledge is a critical determinant of instructional engagement. From a Connectivist standpoint (Siemens,

2005), these teachers are more adept at forging connections between digital tools, information resources, and learners—an essential aspect of 21st-century education.

Headteacher narratives corroborate this finding, as many reported that teachers' levels of instructional engagement were shaped by their familiarity with technology and access to prior training. HTB02 noted, "*Some were lucky to attend training workshops... but others rely on self-learning or peer support*." HTC03 added that "*one of our ICT teachers runs in-house training sessions*," indicating that instructional engagement is reinforced through localized efforts to build teacher capacity. Such instances reflect professional growth facilitated by mentorship, scaffolding, and participation in social learning communities.

Nonetheless, infrastructural barriers such as erratic internet connectivity, device shortages, and frequent power outages continue to disrupt these efforts, inhibiting optimal networked learning environments (Ayalon & Aharony, 2024; Alam, 2023). This was vividly illustrated in interviews with headteachers who consistently cited unreliable internet, limited hardware, and electricity outages as deterrents to teacher instructional engagement. HTA01 lamented that "*the internet is unreliable, and many times, we lack electricity for hours.*" HTD04 added that "*teachers have to book slots to use computers*," and HTJ10 even described situations where "*teachers lend their personal devices to students*." These qualitative insights reinforce the quantitative findings and emphasize the systemic infrastructural deficiencies that frustrate meaningful digital instructional engagement.

Further analysis revealed a multi-dimensional structure of instructional engagement, classified into interactional instructional engagement, platform-based instructional engagement, and assessment-oriented instructional engagement. This breakdown supports emerging models that recognize the differentiated nature of digital pedagogical practices (Dubey et al., 2023; Li & Xue, 2023). Importantly, the empirical results echo the findings of Nyathi and Sibanda (2022), who argue that digital instructional engagement among educators is both profession-specific and context-dependent, making targeted professional development and institutional support essential for enhancing digital integration in secondary schools.

Qualitative findings also pointed to the importance of leadership in influencing teacher instructional engagement. Headteachers such as HTA01 reported leading by example, while HTD04 introduced motivational strategies like a "*Digital Teacher of the Month*" award. Others promoted experimentation and mentorship, as HTG07 stated: "*I lead from the front... to keep morale high.*" These leadership actions align with the Social Influence and Effort Expectancy constructs in the UTAUT model (Venkatesh et al., 2003), illustrating that school leaders who model digital use and reduce perceived complexity positively impact teacher instructional engagement.

In sum, while quantitative results indicate a moderate but fragmented level of teacher instructional engagement with e-learning platforms, the integration of qualitative data adds nuance and depth to this understanding. Institutional support, technological infrastructure, teacher competence, and leadership practices collectively mediate the extent and quality of instructional engagement. The findings thus affirm that e-learning uptake is not solely a function of individual initiative but is heavily shaped by the broader school environment, making institutional strengthening a critical area for policy and intervention.

5.3 Teacher Satisfaction with E-Learning Uptake

The results established satisfaction teachers experienced with e-learning as a significant positive predictor of its uptake in USE schools in Kampala Capital City. This prediction implies that improving teachers' satisfaction with their e-learning instructional experiences translates into a significant increase in its uptake. The results are therefore consistent with Venkatesh et al.'s (2003) UTAUT, which identifies personal factors (such as teacher satisfaction) among the factors that significantly determine the level of technology uptake, which, in this case, is in the form of e-learning uptake. The results are also in line with the studies of Mokgosi and Maile (2025) and Su et al. (2024), which indicate that the level of teacher satisfaction with the e-learning is a significant predictor of its uptake.

The results indicator however, that teachers' satisfaction with e-learning was moderate on average. This implies that the teachers' e-learning instructional

experiences did not meet the quality of teaching encounters they expected to optimise its uptake. This was exacerbated by the dissatisfaction teachers experienced with infrastructural and institutional factors, which included unreliable electricity supply, poor internet connectivity, and limited ICT support. This dissatisfaction signalled structural weaknesses in the selected USE schools, echoing previous studies that pointed out the role of unreliable infrastructure in constraining technology use (Atukunda et al., 2024; Bada et al., 2020).

The weak internal consistency observed across satisfaction indicators suggests that satisfaction is not a monolithic construct but rather comprises context-specific perceptions influenced by local realities. This fragmentation parallels findings by Chimbunde (2023), who noted that teacher satisfaction with e-learning is deeply rooted in localized institutional dynamics and availability of support structures. Differences in satisfaction across gender, teaching experience, and academic qualification further confirm that demographic and professional backgrounds significantly shape how teachers evaluate their e-learning experiences. These differences reinforce the position of Ahmad and Siddiqui (2022) that e-learning satisfaction is mediated by individual readiness and exposure to digital environments.

Qualitative results from headteachers added important nuance to these findings. Across schools, satisfaction appeared to be heavily influenced by how institutions collected and responded to teacher feedback. Participant HTA01 noted, *"We use staff meetings and informal chats to gather feedback... but budget constraints limit bigger changes,"* highlighting the institutional struggle to respond effectively to dissatisfaction even when concerns are heard. HTB02 mentioned the use of a digital feedback form, though its uptake was low due to limited ICT skills among teachers. This suggests that satisfaction is constrained not only by external infrastructure but also by internal feedback processing strategies.

While some schools, such as that of Participant HTC03, employed structured feedback through end-of-term evaluations, others continued to rely on informal methods, such as verbal exchanges or WhatsApp group messages, as reported by

HTE05. These insights illustrate that the degree to which teachers feel heard and supported contributes directly to their satisfaction. The presence of both formal and informal feedback systems reflects the dual nature of communication structures within schools—often adaptive, but lacking in systematization. These strategies align with the principles of Technology-Mediated Learning Theory (Bower, 2019), which suggests that institutional strategies and communication channels directly influence user satisfaction.

Further insights emerged from the administrative support strategies highlighted by headteachers. Participant HTA01 indicated that moral support, flexible lesson planning, and public recognition foster a positive perception of e-learning. This was supported by HTB02, who emphasized the value of allowing extra time for digital lesson preparation—especially for teachers new to technology. HTF06 added that flexible scheduling during technical failures improved teacher morale, while HTG07 explained that appreciation and reward systems, such as providing data bundles or sponsored internet, were effective motivators.

These accounts underscore the significance of leadership empathy and practical responsiveness in enhancing teacher satisfaction. According to the UTAUT model (Venkatesh et al., 2003; Budhathoki et al., 2024), such support strategies fall under the social influence and effort expectancy constructs, both of which significantly impact behavioural intentions toward technology adoption. Additionally, Technology-Mediated Learning Theory (Geletu& Seid, 2025) posits that the quality of interaction between administrators and teachers is a key determinant of satisfaction, especially in digitally transitioning institutions. The emotional and motivational support described by several headteachers, including Participant HTH08 who emphasized comforting overwhelmed teachers.

Despite these positive initiatives, regression analysis revealed that satisfaction indicators—whether infrastructural, administrative, or emotional—did not significantly predict the actual level of e-learning adoption. Even access-related variables such as desktop usage or content availability showed weak and negative predictive values. These findings challenge the assumption that improving

satisfaction alone can directly increase technology use in classrooms. Rather, they align with emerging literature (Alamri & Tyler-Wood, 2023; Aslan & Zhu, 2022) suggesting that adoption is not merely a function of access or satisfaction, but of how these experiences are situated within pedagogically transformative and systemically supported environments.

In conclusion, while satisfaction with e-learning among USE school teachers is clearly influenced by infrastructure and support strategies, qualitative evidence indicates that teacher morale is also significantly affected by leadership responsiveness, peer collaboration, and recognition. Satisfaction, therefore, must be understood as a layered construct that encompasses technical, institutional, and emotional dimensions. Its impact on e-learning uptake is limited unless accompanied by sustained infrastructural investment, targeted professional development, and systematized school-wide strategies that transform satisfaction into pedagogical action.

5.4 Challenges Affecting E-Learning Uptake

In line with the third objective, the study examined the factors challenging teachers' e-learning instructional experiences USE schools. The quantitative findings underscored infrastructural deficits as the most significant barriers, particularly unreliable electricity, poor internet connectivity, limited ICT devices, and weak institutional support systems. These issues mirror broader systemic challenges across Sub-Saharan Africa (Kassymova et al., 2023; Mutalemwa et al., 2024), which continue to frustrate efforts to digitize education in resource-limited environments.

Supplementing these findings, qualitative data from headteachers revealed that infrastructural inadequacies are not merely technical issues but are deeply embedded in institutional culture and funding structures. Many headteachers described scenarios where their leadership aspirations were undermined by material scarcity. For example, Participant HTA01 admitted, *"We try to encourage our teachers, but budget limitations really tie our hands. We issued a few tablets last year, but follow-up was minimal."* The disconnection between administrative intention and implementation reflects the fragility of infrastructural planning in

many schools. Similarly, HTB02 noted that while efforts were made to assign ICT champions and encourage blended learning, "*morale drops when the tools don't work.*" These accounts affirm that motivation and instructional engagement are fragile when not supported by operational infrastructure.

In some cases, administrators adopted adaptive but informal approaches to sustain digital momentum. As HTC03 stated, *"We include e-learning in staff meetings and have allocated time slots for computer lab sessions. But when tech breaks down, we're stuck."* HTD04 shared a similar sentiment: *"We push digital literacy during professional development days... but it's a challenge when systems are not working."* These patterns reflect a recurring theme across responses: while leaders attempt to integrate e-learning into school culture, inconsistent technical support often stalls momentum. Such challenges resonate with the **Technology-Mediated Learning Theory** (Bower, 2019), which emphasizes the need for alignment between pedagogical aspirations and infrastructural realities. In the absence of this alignment, schools struggle to leverage technology in a sustainable way.

Beyond infrastructure, the quantitative results revealed that teachers also grappled with limited time and training to adapt to new technologies. This was confirmed by several headteachers who described training efforts as either inconsistent or informal. HTG08 remarked, *"We trained two teachers to cascade ICT skills, but there's no structured framework, so progress is uneven."* The lack of systematic professional development reflects what Rahman et al. (2023) describe as the interplay between personal readiness, institutional support, and environmental constraints in shaping e-learning adoption. The data also showed that demographic variables—such as teaching experience, age, and academic qualification—influenced the perception of challenges. Veteran teachers often expressed deeper frustration with institutional responsiveness, while newer teachers focused more on access-related barriers, indicating that instructional engagement is filtered through different experiential lenses.

The qualitative responses further exposed the fragile link between leadership and resource allocation. Some administrators, such as HTE05 and HTF06, described

modest innovations like repurposing staffrooms into digital hubs or embedding ICT into CPDs. However, HTG07's statement captured the paradox: *"We are strong on motivation. We celebrate small tech wins. But we lack the hardware to go big."* These experiences reflect a wider reality in many USE schools—where leadership initiative is present but undercut by chronic underfunding.

The issue of funding constraints emerged as a dominant and cross-cutting challenge in the headteacher interviews. Financial limitations affected not only hardware acquisition but also sustainability of training, internet access, and platform subscriptions. HTA01 summarized the problem: *"ICT is seen as a luxury. We rely heavily on donations or NGO support."* Many schools reported diverting funds from unrelated budget lines—such as the library or development funds—to maintain minimal digital functionality. HTB02 stated: *"We've improvised—used PTA funds to buy a modem and second-hand desktops."* Others like HTC03 and HTI09 described relying on promised donations or development partners, which sometimes fell through, exacerbating uncertainty and disillusionment.

Even schools that successfully acquired equipment through proposals or fundraising faced long-term sustainability issues. HTF06 reported using student development fees to purchase internet bundles, while HTG07 organized a fundraising dinner to buy projectors. These accounts illustrate the fragmented, short-term nature of financing, where schools depend on ad hoc solutions rather than consistent funding streams. This reinforces the argument by Kassym ova et al. (2023) and Bayaga and du Plessis (2024) that without dedicated financing strategies, digital transformation in schools remains vulnerable and unsustainable.

The findings collectively demonstrate that challenges affecting e-learning uptake are deeply structural and multidimensional**.** From a theoretical standpoint, the **Unified** Theory of Acceptance and Use of Technology (UTAUT**)** provides a useful lens to interpret these barriers. According to UTAUT, facilitating conditions and performance expectancy are crucial drivers of technology adoption (Venkatesh et al., 2003). In many USE schools, both factors are compromised—facilitating conditions are weakened by poor infrastructure and unstable funding, while

performance expectancy is diminished by repeated technology failures and lack of support. As HTJ10 aptly noted, *"We formed a digital committee to oversee e-learning, but without a consistent push from above, enthusiasm varies."* This highlights the tension between symbolic institutional structures and the material support necessary to sustain them.

From a Connectivist perspective (Siemens, 2005; Downes, 2005), teachers' use of informal networks—such as WhatsApp groups or peer mentorship—reflects an effort to maintain continuity in learning and support in the absence of formal systems. HTD04 mentioned using WhatsApp to model digital communication, while HTI09 pointed to informal support through senior staff. These grassroots networks align with the connectivist emphasis on knowledge as distributed and emergent. However, the lack of broader institutional scaffolding limits the scalability and long-term viability of such informal innovations.

In conclusion, both the quantitative and qualitative findings affirm that the challenges hindering e-learning uptake in USE schools are systemic, multifaceted, and contextually rooted. Addressing these challenges requires more than infrastructure—it demands sustainable funding, strong administrative commitment, continuous professional development, and institutional frameworks that promote resilience and innovation. Without addressing these foundational issues, the adoption of e-learning will remain sporadic and unsustainable, despite individual efforts and pockets of innovation.

5.5 Strategies Employed by Teachers to Address E-Learning Challenges

The final objective of the study focused on identifying the strategies employed by teachers to navigate the multifaceted challenges associated with e-learning uptake. Quantitative findings indicate that teachers employed a combination of personal and institutional strategies to mitigate these barriers. Personal strategies included the use of personal devices, financing their own internet access, and improvising with offline teaching materials. On the institutional side, teachers often relied on peer support, requisitioned for required ICT instructional resources from school management, or lobbied for access to shared resources. These strategies were often

reactive, reflecting an immediate need to sustain teaching and learning continuity under constrained circumstances.

However, internal consistency analysis (Cronbach's Alpha = 0.078) revealed that these coping strategies were highly fragmented and individualized rather than coordinated or systemic. This fragmentation aligns with Andrada and Barrot's (2025) findings that in low-resourced contexts, teacher resilience manifests through varied and uncoordinated coping paths. Further analysis showed that strategy adoption varied by teacher demographics: experienced and digitally literate teachers leaned toward self-driven coping, while newer and less experienced teachers preferred collaborative or institutional support. These trends mirror those identified by Wang et al. (2022) and Nyemike et al. (2022), highlighting the importance of individual readiness and context in shaping adaptive responses.

Qualitative results from headteachers provided critical insight into the ways schools supported, enabled, or depended upon these teacher-led strategies. Many institutional responses emphasized grassroots mobilization and local partnerships. HTA01 shared, *"We've worked closely with the PTA and community leaders to purchase solar panels and second-hand laptops,"* demonstrating how schools addressed power and equipment shortages through community-based resource mobilization. Similarly, HTC03 reported tapping into alumni networks: *"One former student gave us refurbished tablets."* Other schools leveraged support from the private sector or even rival institutions—HTD04 revealed, *"We convinced a private school owner to share their learning platform temporarily."* These institutional strategies were rooted in local ingenuity, which aligns with context-responsive problem-solving shaped by the environment.

A pattern of strategic budget reallocation and stakeholder partnership also emerged. HTF06 repurposed part of the library budget to purchase a projector, while HTJ10 redirected funds originally allocated for school trips to buy a Wi-Fi router. Some schools initiated fundraising events such as HTG07's dinner to procure projectors. Others, like HTG07 and HTE05, engaged vocational institutions and NGOs, which supplied both equipment and training support. These actions align with the TMLT,

which emphasizes the dynamic interplay between available tools and institutional strategy in shaping effective technology integration (Bower, 2019; Geletu & Seid, 2025). They also reflect Connectivist principles (Siemens, 2005), where knowledge and resources flow through decentralized and collaborative networks rather than formal hierarchies.

In parallel, teachers themselves demonstrated substantial resilience and adaptability in confronting technological limitations. Many improvised with hybrid solutions that merged digital and traditional tools. HTA01 described how *"teachers download content at night when internet is cheaper and use Bluetooth to share it with colleagues,"* while HTB02 noted the use of printed notes and offline flash drives when internet access failed. These adaptive behaviours reflect the self-reliant spirit found in grassroots innovations and support personal experience to craft workable solutions within their immediate environments.

Collaborative coping strategies were also prominent. Teachers created rotational usage schedules for limited digital devices, shared lesson plans via flash drives, and co-taught classes to maximize projector use. As HTI09 described, *"They keep a lesson bank on a central flash drive. When one device fails, another teacher can quickly continue the lesson."* HTF06 and HTH08 reported pairing teachers during lessons—one to manage technology, the other to lead instruction—a teamwork model that optimized both technical and pedagogical capacities. These cooperative strategies mirror the **Connectivist** framework, wherein knowledge is socially constructed through distributed networks and collective problem-solving.

Notably, mobile-based communication tools such as WhatsApp were harnessed not only for instruction but also for coordination and mentorship. HTD04 shared, *"We use WhatsApp to model digital communication,"* while HTE05 highlighted how teachers use WhatsApp groups to share recorded audio lessons. These approaches reflect both formal and informal use of networks for knowledge exchange—an idea central to Connectivism. According to the UTAUT model, such collaborative environments contribute to enhanced effort expectancy and facilitate conditions

that improve technology adoption (Venkatesh et al., 2003; Bayaga & du Plessis, 2024).

Another key theme that emerged was the role of **p**eer mentorship and informal professional development**.** Teachers built internal capacity through knowledge sharing and collaborative learning sessions. HTA01 described *"break-time demonstrations on how to create Google Forms,"* while HTB02 noted the pairing of tech-savvy teachers with less experienced colleagues through "tech buddy" systems. HTC03 emphasized that *"monthly peer-learning sessions are now a tradition."* These grassroots professional learning communities are consistent with guided participation and interaction.

Schools also formalized and institutionalized some of these efforts. HTG07 reported, *"We've introduced a shared Google Drive folder. Teachers upload materials weekly,"* while HTF06 described internal CPD workshops led by experienced teachers. HTJ10 revealed that CPD sessions routinely allocate time to e-learning skill development, signifying a sustained institutional commitment. These practices affirm that while coping initially emerged from necessity, many schools are beginning to integrate teacher-led strategies into broader professional development structures. The **TMLT** and **UTAUT frameworks** both affirm that sustained competence building is key to overcoming technology-related anxiety and boosting adoption, especially when formal training is limited or inconsistent (Xue, Rashid & Ouyang, 2024).

Moreover, partnerships with external stakeholders played a vital role in enhancing institutional coping capacity. HTD04 described how a UNESCO-sponsored ICT boot camp *"kick-started"* teachers' digital adoption journeys, while HTG07 highlighted a Ministry of Education certification program that *"increased teacher confidence."* Community support was equally pivotal—HTF06 received smartphone donations from parents, and HTI09 noted that diaspora members provided a backup generator. These collaborations expanded schools' capacity and aligned with UTAUT's **facilitating conditions** construct, which underscores the importance of institutional support in influencing individual use of technology.

In summary, the findings reveal that teachers in USE schools have embraced a range of personalized and institutional coping strategies in response to the numerous challenges facing e-learning adoption. While individual strategies like using personal devices or downloading content with personal data are commendable, they are insufficient in isolation. The strength of e-learning sustainability lies in coordinated, community-rooted, and institutionally supported frameworks. The integration of peer mentoring, resource pooling, creative budgeting, and stakeholder collaboration illustrates that even in low-resourced settings, adaptive and networked strategies can be mobilized to support digital transformation. However, the absence of systemic planning and long-term investment means that these innovations remain fragile. As the regression analysis suggested, coping strategies, though important, did not significantly predict e-learning adoption levels. Thus, for Uganda's USE schools to move from survival to sustainability, these strategies must be scaled, institutionalized, and embedded within broader national digital education policies.

5.6 Integration with Theoretical Frameworks

The integration of four theoretical perspectives provided a robust foundation for interpreting the findings. Connectivism underscores the potential of educators to form digital learning networks, but these are frequently undermined by infrastructural instability and limited digital fluency (Ayalon & Aharony, 2024; Jailani et al., 2023). TMLT emphasizes the role of digital tools in enhancing the learning process, yet highlights the discrepancy between the availability of technology and the readiness of institutions to support its meaningful use (Bower, 2019). UTAUT further clarifies that facilitating conditions—particularly performance expectancy, effort expectancy, and institutional readiness—are key determinants of technology acceptance. In the USE context, the absence of these facilitating conditions remains a significant constraint on adoption, a trend also evident in other developing countries (Rahman et al., 2023; Osei & Boateng, 2023).

5.7 Summary of the Key Findings and Implications

Overall, the study reveals that e-learning in USE schools is characterized by moderate instructional engagement, less context-specific satisfaction, diverse

challenges, and fragmented coping strategies. Teachers' willingness to engage instructionally in e-learning is significantly constrained by institutional and infrastructural barriers. Satisfaction levels are shaped more by context than by system-wide provisions, and while coping strategies are prevalent, they remain individually driven and insufficient to produce significant e-learning uptake. The theoretical framework reinforces that without strong facilitating conditions, digital initiatives are unlikely to result in long-term transformation. Teachers' instructional engagement in e-learning, their satisfaction with it and perceived personal and institutional challenges to this engagement are significant predictors and hence drivers of e-learning uptake in USE schools in Kampala Capital City.

The findings call for strategic interventions that prioritize infrastructure development, strengthen leadership commitment, build institutional capacity, and support continuous professional development. Long-term sustainability of e-learning in USE schools depends not just on teacher resilience but also on systemic readiness, governance structures, and coordinated policy frameworks that enable technology to thrive as a tool for educational transformation.

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents evidence-based conclusions and recommendations for policy, institutional practice, and future scholarly inquiry. Drawing from the empirical insights presented in Chapter 5 and framed within the combined theoretical perspectives of Connectivism, TMLT and UTAUT, this chapter synthesizes how teacher experiences reflect broader institutional and infrastructural dynamics in e-learning uptake. Recommendations are provided for policymakers, school leadership, teachers, and development partners. The chapter concludes by outlining the study's original contributions to knowledge and identifying directions for future research.

6.2 Conclusions

The study was designed to achieve four objectives which included: determining the influence of teachers' instructional engagement with different types of e-learning on e-learning uptake in USE schools in Kampala Capital City; assessing the influence of teachers' satisfaction with e-learning instructional experiences on its uptake in Kampala Capital City; examining the effect of teachers' perceived challenges to e-learning on its uptake in Kampala Capital City; and investigating the influence of strategies teachers employ to cope with challenges experienced with e-learning uptake on its uptake.

6.2.1 Teacher Instructional Engagement with E-learning

Results in response to the first objective of the first indicate that improving teachers' instructional engagement experiences from the moderate level while also neutralising the unevenness within this level translates into significant increase in e-learning uptake in USE schools in Kampala Capital City. Following TMLT, teachers' instructional engagement experiences need to be improved by encouraging regular use digital tools and platforms such as Zoom, WhatsApp, and Google Classroom for lesson preparation and delivery, not in a supplementary fashion but in a transformative way, regardless of subject specialization. This instructional engagement also needs to be improved by enhancing USE teachers' digital literacy,

access to e-learning tools or ICT availability, internet connectivity, and administrative support.

6.2.2 Satisfaction with E-learning Uptake

The findings in response to the second objective of the study indicate that improving teachers' satisfaction with e-learning instructional experiences from the moderate to the expected level translates into significant increase in e-learning uptake in USE schools in Kampala Capital City. The improvement can be realised through in-service e-learning instructional training that eliminates teachers' less satisfying and dissatisfying instructional experiences with online lesson delivery; online sending of assignments, online receiving of students' answered work, online marking of students' work and exams; and online compiling and submitting of marks for grading using electronic devices. Improvements are also needed in the factors that cause teachers' dissatisfaction, including poor quality of insufficiently available ICT infrastructure and tools, reluctant leadership responsiveness, and unstable power supply.

6.2.3 Perceived Challenges Affecting E-learning Uptake.

The results in response to the third objective indicate that reversing the constraining effect of the perceived diverse personal, administrative, leadership, infrastructural, institutional and systemic challenges to teachers' instructional engagement in e-learning improves its uptake in USE schools in Kampala Capital City significantly. The needed reversal needs to focus on complementing immobile and inflexible desktops with mobile and flexible e-learning devices such as smartphones, tablets, and laptops. It also needs to focus on encouraging teachers to upload learning content to enable students to access it online; improving the reliability of internet connectivity, eliminate electric power outages, inadequacy of ICT devices, and insufficiency of their maintenance. The reversal needs to strengthen the weak administrative responsiveness and to ensure consistency in teachers' instructional engagement

6.2.4 Coping Strategies by Teachers

The results in response to the fourth objective indicate that teachers' coping strategies to the challenges to their e-learning instruction can translate into

increasing e-learning uptake in USE schools in Kampala Capital City only when they are supplemented by enhancement of institutional ICT infrastructure, internet connectivity and speed, leadership commitment, structured support systems, and development of teacher competency for teaching via e-learning. the effect of teachers' coping strategies can also result into increased e-learning uptake when they are supplemented by strengthened peer support networks and informal sharing of e-learning instructional content through platforms such as WhatsApp.

6.3 Recommendations

6.3.1 In accordance with the conclusion reached in response to the first objective of the study, it is recommended that:

- USE teachers in Kampala Capital City should improve their instructional engagement with e-learning by getting involved in regular use of digital tools and platforms such as Zoom, WhatsApp, and Google Classroom for lesson preparation and delivery, not in a supplementary way but in a transformative way, regardless of their subject specialization.
- The headteachers of these schools should organise internal in-service training in the form of workshops aimed at improving teachers' instructional engagement in e-learning by enhancing their digital literacy and also provide sufficient administrative support for this engagement.
- The Government of Uganda should, through the Ministry of Education and Sports, increase access to e-learning devices and platforms by ensuring sufficient ICT availability, stable, speedy and strong internet connectivity, and stable electricity supply.

6.3.2 Based on the conclusion reached in response to the second objective of the study, it is recommended that:

- Headteachers in USE schools in Kampala Capital City should organise attitude change in-service training for improving teachers' satisfaction with e-learning instructional experiences with online lesson delivery; online sending of assignments, online receiving of students' answered work, online marking of

students' work and exams; and online compiling and submitting of marks for grading using electronic devices.

- The headteachers should, as top leaders in USE schools in Kampala Capital City, avoid being reluctant by responding promptly to the e-learning instructional queries raised by teachers.
- The Government of Uganda should, through the Ministry of Education and Sports, eliminate teacher dissatisfaction with e-learning instructional experiences by improving the quality of ICT infrastructure and tools provided to USE schools in Kampala Capital City and ensuring that they are sufficiently available in these schools and connected to stable power supply.

6.3.3 Based on the conclusion reached in response to the third objective of the study, it is recommended that:

- Teachers should attend in-service training that can reverse their negative attitude toward e-learning and also improve their e-learning instructional competency
- Headteachers should strengthen their administrative support for e-learning and leadership responsiveness to queries raised by teachers about their challenging instructional experiences with it.
- The Government of Uganda solve the infrastructural, institutional and systemic challenges to teachers' instructional engagement in e-learning in USE schools in Kampala Capital City by providing teachers with mobile and flexible e-learning devices such as smartphones, tablets, and laptops, and fund their regular maintenance. The Government should also strengthen the reliability of internet connectivity through a private-public partnership with private internet service providers; eliminate electric power outages.

6.3.4 In accordance with the conclusion reached in response to the fourth objective, it is recommended that teachers' coping strategies to the challenges to their e-learning instruction should be supplemented by:

- Headteachers providing sufficient and committed leadership supervisory support

- Government of Uganda ensuring that USE schools have enough ICT devices, strong and speedy internet connectivity, and structured support systems and facilitate e-learning.

6.4 Original Contribution to Knowledge.

This study introduces the *Strategic E-Learning Implementation Framework (SEIF)*, developed to translate conceptual insights from the IMELUM model into a practical, scalable, and context-sensitive implementation roadmap. It addresses the persistent gap between policy ambition and on-ground adoption in Uganda's Universal Secondary Education (USE) schools. Grounded in empirical findings and informed by theoretical lenses such as UTAUT, TMLT and Connectivism, SEIF provides a results-oriented blueprint to guide stakeholders—including policymakers, educators, and development partners—in institutionalizing sustainable e-learning practices in resource-constrained environments.

The purpose is to provide an actionable, step-by-step roadmap for institutionalizing, scaling, and sustaining e-learning in Uganda's USE schools by aligning infrastructure, leadership, training, content, and policy systems. The SEIF is presented through a Logical Results Chain:

Inputs → Strategic Activities → Expected Outputs → Responsible Actors → Timeframe → Success Indicators

Key Components and Activities

Implementation Framework Table

Component	Strategic Activity	Expected Output	Responsible Actor(s)	Timeframe	Success Indicators
1. Infrastructure Readiness	Upgrade electricity, internet, and device access in rural USE schools	ICT-enabled schools with minimum functional infrastructure	MoES, District Education Offices, NGOs, Private ICT providers	Short to Medium Term (1–3 yrs)	% of schools with electricity, internet, and devices

2. Leadership Capacity	Train headteachers and deputies on digital leadership, strategic ICT planning, and e-learning integration	Digitally competent school leaders with structured e-learning implementation plans	MoES, National Leadership Institutes, NGO Capacity Builders	Short Term (6–12 months)	# of schools with leadership-led ICT plans
3. Continuous Professional Development (CPD)	Establish tiered digital pedagogy training: beginner, intermediate, advanced	Skilled teachers capable of designing and delivering e-content	NCDC, CPD Units, Teacher Training Colleges, MoES	Medium Term (1–2 yrs)	% of teachers trained at different ICT competency levels
4. Peer Learning Networks	Institutionalize teacher peer-support systems (e.g., tech buddies, WhatsApp forums, CPD clusters)	Collaborative teacher communities for e-learning support	Headteachers, ICT Coordinators, Zonal Education Officers	Ongoing	# of functioning peer-learning units per school
5. Institutional Culture	Embed ICT practices in school calendars, lesson planning, and performance recognition (e.g., Digital Teacher of the Term)	A pro-innovation school climate that normalizes e-learning	School Management Committees, BoGs, Headteachers	Ongoing	Inclusion of ICT in school plans, teacher appraisal reports
6. Curriculum-Aligned Content	Develop and localize e-learning content aligned to the Uganda secondary curriculum	Accessible, relevant, curriculum-integrated digital content	NCDC, MoES, Private Content Developers	Medium Term (1–2 yrs)	# of curriculum topics with digital content options
7. Policy & Coordination	Develop and enforce a national e-learning policy with	Coherent policy that guides resource	MoES, Parliament, Development Partners	Medium Term (1–3 yrs)	National policy adopted and implemented

	USE-specific benchmarks and monitoring frameworks	allocation and accountability			
8. Monitoring & Evaluation (M&E)	Design an ICT uptake scorecard linked to school inspection and teacher appraisal	Evidence-based tracking of e-learning instructional engagement and improvement	UNEB, District Inspectors, MoES QA Units	Short Term (6–12 months, renewable)	Quarterly M&E reports, performance dashboards
9. Financial Sustainability	Integrate e-learning financing into school budgets, grants, and donor programs	Reduced overreliance on donor funding, predictable ICT financing	MoES, MoFPED, School Boards, NGOs	Medium to Long Term (2–4 yrs)	ICT budget line in school operational budgets
10. Inclusive Access	Provide ICT support for students and teachers with disabilities; offer mobile/offline solutions	Equitable access to e-learning across diverse learner needs	MoES, Special Needs Dept., NGOs, Inclusive Ed. Partners	Medium Term (1–2 yrs)	% of schools with disability-inclusive e-learning tools

Guiding Principles (Elaborated)

1. **Phased Implementation**

Recognizing the disparities in ICT infrastructure and resource availability across Ugandan USE schools, SEIF adopts a phased approach. Initial efforts are concentrated in high-need, underserved regions where the digital divide is most pronounced. Lessons learned from early implementation sites serve as a foundation for scaling interventions to additional regions. This ensures gradual institutional capacity building, minimizes risk, and fosters adaptive learning at each phase.

2. Localization

A one-size-fits-all approach to e-learning fails to account for the diverse contextual realities of Ugandan schools—rural versus urban settings, language preferences, cultural perceptions of technology, and existing infrastructure. SEIF prioritizes local

adaptation of tools, content, and training strategies to reflect the sociocultural and infrastructural context of each school. For example, in areas with poor internet connectivity, offline-first solutions or radio-based content delivery may be emphasized.

3. **Data-Driven Decision-Making.**

Robust Monitoring & Evaluation (M&E) strategies are embedded within the framework to generate real-time insights into implementation progress, challenges, and emerging opportunities. Through periodic scorecards, digital usage logs, and teacher/student feedback loops, data is collected and analyzed to support evidence-based refinement of strategies. This principle ensures that interventions remain responsive, cost-effective, and grounded in actual school experiences.

4. **Multi-Stakeholder Partnerships**

Effective e-learning implementation in resource-constrained settings requires coordinated efforts across multiple actors. SEIF promotes partnerships with telecom companies (for connectivity and subsidized data), universities (for digital content development and training), community organizations (for outreach and support), and NGOs (for technical and financial assistance). These collaborative efforts amplify impact, foster shared ownership, and bridge gaps that a single stakeholder might be unable to address alone.

Implementation Notes (Elaborated)

- **Alignment with IMELUM Model.**

The SEIF framework operationalizes the Institutionally Mediated E-Learning Uptake Model (IMELUM) by converting theoretical constructs into actionable interventions. For instance, IMELUM's emphasis on leadership, teacher digital competence, and institutional culture is directly mirrored in SEIF's strategic activities such as leadership training, tiered CPD programs, and school-level ICT culture-building initiatives.

- **Grounded in Empirical Findings**

SEIF is rooted in field-based insights derived from the study, which highlighted barriers such as infrastructure inadequacy, weak leadership, and fragmented teacher

support systems. These findings informed the design of the framework, ensuring that the proposed interventions are not only theoretically sound but also contextually relevant and practically feasible.

- **Integration of Theoretical Foundations**

The framework integrates four key theoretical perspectives:

  - **UTAUT (Unified Theory of Acceptance and Use of Technology):** Emphasized through strategies that enhance *facilitating conditions* (e.g., improved infrastructure) and leverage *social influence* (e.g., digital leadership and peer networks) to drive adoption.

  - **TMLT (Technology-Mediated Learning Theory):** Addressed by aligning digital tools and pedagogical practices with institutional goals, ensuring that the technology introduced is contextually meaningful and functionally embedded.

  - **Connectivism:** Operationalized through support for digital communities of practice, peer mentoring, and collaborative knowledge-sharing networks that extend learning beyond traditional classroom boundaries.

6.5 Suggestions for Further Research.

Future studies should include the learner perspective, examining how socio-economic conditions, home environments, and parental support influence student instructional engagement in e-learning.

- Longitudinal studies are also needed to track the evolution of digital adoption, infrastructure development, and institutional reforms over time.
- Additionally, research should explore the applicability of emerging technologies—such as mobile-based learning, AI tutors, and offline content systems—in resource-constrained school settings.
- Lastly, gender-specific investigations could uncover how social norms and institutional cultures shape the digital participation of male and female teachers, informing more inclusive and equitable e-learning policies.

Overall, future research in this direction will not only contribute to academic knowledge of e-learning in low-resource secondary education systems, but will also keep in mind the creation of more contextually appropriate, equitable, and sustainable digital education interventions in Uganda and other low-resource education systems.

6.7 Concluding thought

To sum up, the evidence of the present research once again proves that the effective implementation of e-learning in the context of the Ugandan Universal Secondary Education (USE) system cannot rely only on the personal resilience, creativity, or goodwill of educators, as well as on the isolated and short-term institutional programs.

However, although plenty of educators have shown an impressive degree of flexibility and personal initiative to maintain the instructional continuity amidst the systematic disruptions, these individual-based coping strategies are not enough to promote the scalable, sustainable, and equitable integration of e-learning. The complexities described in this analysis act as a timely reminder that successful application of e-learning requires a much more coordinated and systemic approach, one which recognizes the important interconnections which exist between technological infrastructure, institutional governance, leadership involvement, professional capacity building, and enabling policy frameworks.

To transform e-learning as an atomized experimentation to a fully integrated pedagogical process, the USE system in Uganda needs to emphasize on systemic educational change which concurrently invests in hardware, software, human resource, and institutional ethos. Responsiveness of the leadership needs improvement with respect to the domain of the schools possessing the vision, administrative frameworks, and strategic determination to manage digital transformation procedures. Professional development People must remain the focus of empowerment, through specific professional development opportunities, which should result in the building of digital competence as well as the development of

pedagogical innovation. Of equal essence, the national policy should establish enabling environments that encourage consistency, quality assurance, and equal access, especially to rural and under-resourced schools that are the most susceptible to digital exclusion.

The more e-learning is taking the centre stage in the world, which has been catalysed by technology and amplified by the emerging global crises that have questioned the sustainability of the traditional face-to-face learning education, the more there is the need to pay attention to the contextual realities of secondary education systems in Sub-Saharan Africa. E-learning may easily turn into another area of educational inequality without systemic and structural changes that were revealed in this study. As such, the study not only adds new empirical data to the existing body of knowledge, but also sounds a clarion call to concerted, evidence-based action to make sure that e-learning becomes an inclusive, resilient, and sustainable element of the bigger educational development agenda in Uganda.

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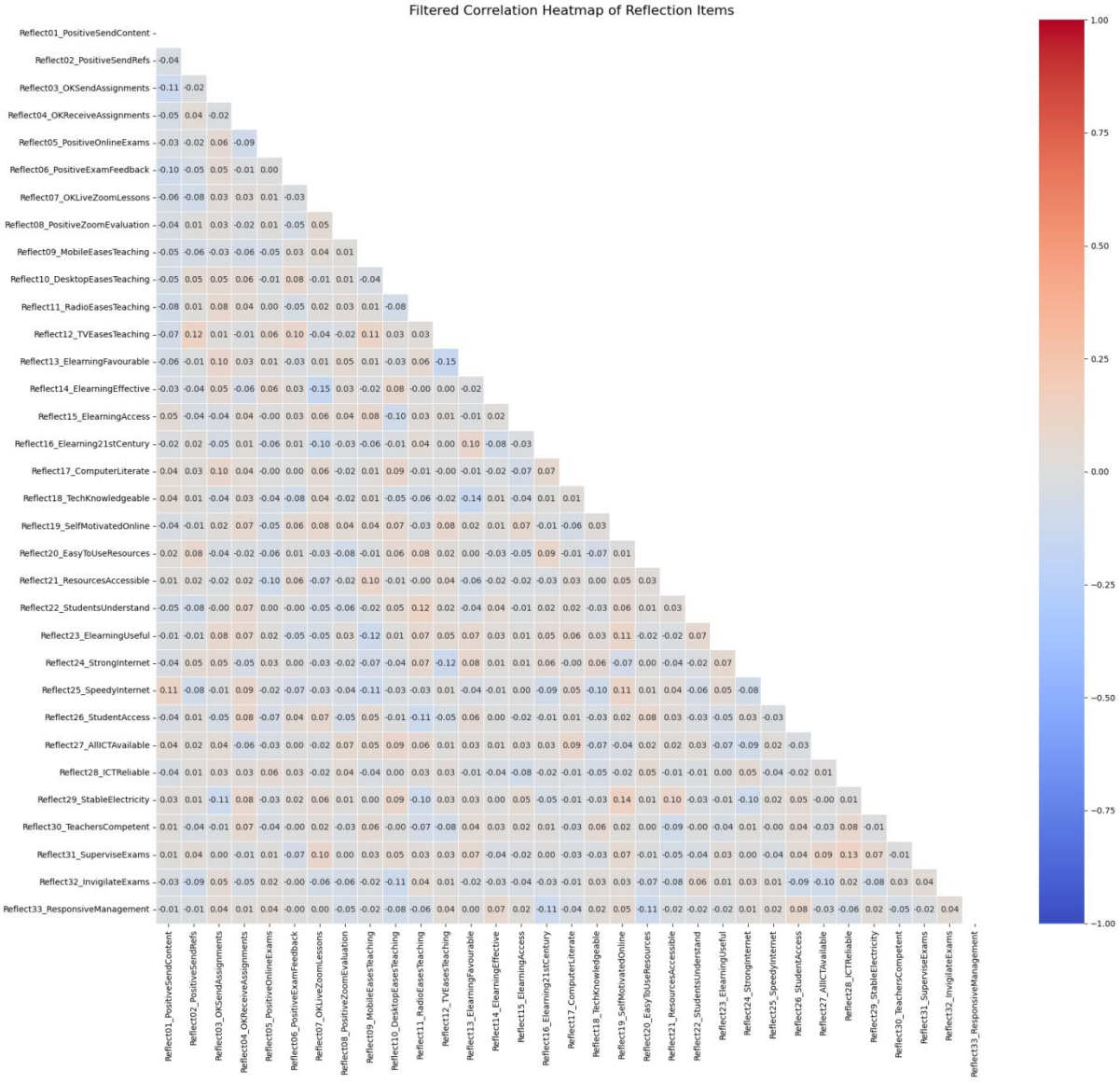
APPENDICES

APPENDIX A:Correlation matrix of teacher's perceptions towards E-learning challenges

Figure 1: Correlation matrix of teacher's perceptions towards E-learning challenges (N = 393)



APPENDIX B

APPENDIX B: RISK MANAGEMENT PLAN

Research Project Title: ***An Analysis of Academic Staff Experiences with E-Learning Uptake in Universal Secondary Education Schools in Kampala Capital City*****.**

The study will be conducted during the school term, since this is the time when students, teachers and headteachers can be accessed at school. This timing is however, associated with a risk of interrupting each of these categories of potential respondents' respective learning, teaching and school supervision schedules. The interruption will be in the form of asking each of these categories of potential respondents to spare a part of your valuable office, teaching or learning time to answer interview questions and fill in questionnaires, respectively.

Effort will however, be made to minimise the interruption allude to above by asking the teachers to fill in the questionnaires at their time of convenience and return the filled in questionnaire to their headteacher's office from which the researcher will collect it, more so if the teacher will be too preoccupied to fill in the questionnaire there and then. Permission will also be obtained from the headteacher to ask the teachers to allow the researcher access to the students to fill in the questionnaire designed for them as a class and within one hour. Effort will also be made to fix appointment with headteachers for interviews at the time of their convenience.

Ministry of Health has announced the outbreak of monkey pox and Ebola — the two health risks. Effort will be made to minimise respondents', principle researcher's and data collectors' exposure to these risks by purchasing necessary disinfectants (soap, water, JIK and spray) against the Monkey pox and Ebola virus, which are recommended by the Ministry of Health, from a licensed pharmacy to disinfect all the questionnaires and interview schedules, the principle researcher and the hired data collectors, and to ensure that all respondents wash their hands with water and soap before filling in the questionnaires.

The teachers will be asked to disinfect before entering the staffrooms and the students will be asked to do the same before entering their classrooms.

APPENDIX C: COMMUNITY ENGAGEMENT PLAN

Research study entitled: ***An Analysis of Academic Staff Experiences with E-Learning Uptake in Universal Secondary Education Schools in Kampala Capital City*****.**

No.	Name of Investigator	Designation	Address/Telephone/Email	Institution of Affiliation
1.	Nantagya Grace	Principal Investigator	nantagyagrace2018@gmail.com 0772401668	Uganda Christian University
2.	Dr Stephen Kyakulumbye	Co-investigator/ Academic supervisor	***3759606@myuwc.ac.za*** 0772492843	Uganda Management Institute

1. Goal and objectives

The goal of this plan is to explain how the researcher will involve relevant stakeholders of Uganda Christian University and research participants in the study to ensure that they do not feel conscripted into the study and that the study reflects the actual e-learning uptake experiences of teachers and students in University Secondary Education (USE) schools in Kampala City in particular and Kampala Capital City in general.

2. Community Consultation

The researcher will begin by seeking an introductory letter from the Uganda Christian University Research Ethics Committee (UCUREC) and using to write to the Uganda National Council for Science and Technology (UNCST) requesting for clearance to conduct this study in USE schools in Kampala City. After securing the clearance, the researcher will proceed to the selected USE schools to request their headteachers for permission of access to teachers. After getting this permission the researcher will commence with data collection by contacting both teachers.

3. Sensitization and Education

The researcher will sensitise headteachers, teachers by explaining the purpose of the study to the teachers, why they are needed to participate in it and how they will participate. These respondents will be informed that the study is about investigating and understanding

their experiences with e-learning in terms of the extent to which they engage in it, their level of satisfaction with it, their reflections on factors challenging their uptake of it, and the actions they take to deal with these factors. These respondents will be enlightened that they will reveal their experiences by answering interview questions (headteachers) and filling in the questionnaires (teachers). They will also be informed that the potential benefits of the study will be to improve e-learning uptake in USE schools. They will further be informed that their rights and freedom, including their informed consent, voluntary participation and privacy will be required and respected regardless of whether they are granted to the researcher or not.

4. Capacity strengthening

Effort will be made to first prepare headteachers, teachers who will participate in the study before administering the respective research instruments designed for them. preparation will involve explaining to the teachers how they are expected to use the provided Likert scales to reveal their e-learning experiences in terms of engagement, satisfaction, reflections of factors challenging e-learning uptake and actions taken to deal with the factors. This explanation will put them in a better position as far as filling in the questionnaire is concerned.

5. Community participation and involvement

The participation of headteachers, teachers will be in the form of answering interview questions and filling in their respective questionnaires, respectively.

6. Community empowerment

The sensitisation of the headteachers, teachers, and the strengthening of their capacity for answering the questions designed for each of them as explained in (3) and (4) above will sufficiently empower them to participant in the study from an informed point of view. In addition, the use of disinfectants to mitigate the risk of exposure to monkey pox and Ebola with shall ensure that the study participants are protected from any harm during the process of data collection.

7. Research evaluation

After the study, participants will be asked to give their opinions on what they suggest can be done better what could not have gone well, but also share areas for improvement.

8. Ethical approval

This research was reviewed and approved by the Uganda Christian University Research Ethics Committee (UCUREC) which is overseen by the Uganda National Council for Science and Technology (UNCST), if there are any ethical or your rights related concerns, please contact UCUREC Chairperson, Prof. Peter Waiswa, 0772405357, pwaiswa@ucu.ac.ug, or UCU-REC Manager, Mr. Osborn Ahimbisibwe, 0775737627, oahimbisibwe@ucu.ac.ug. Or UNCST: Tel; +256 414 705500/info@uncst.go.ug

APPENDIX D: SELF-INTRODUCTORY LETTER SEEKING PERMISSION TO ACCESS DATA SOURCES

Nantagya Grace
PhD Candidate
Uganda Christian University
06th May 2025

To:
The Headteacher
_____
_____

Re: Request for Permission to Conduct Field Research in Your School

Dear Sir/Madam,

I hope this message finds you well. My name is **Nantagya Grace**, a doctoral candidate at **Uganda Christian University**, currently pursuing a PhD in Education administration and Management. As part of the requirements for the successful completion of my program, I am conducting a dissertation study entitled: **"An Analysis of Academic Staff Experiences with E-Learning Uptake in Universal Secondary Education Schools in Kampala Capital City."**

This research seeks to explore and analyse the practical experiences, challenges, and institutional factors influencing e-learning implementation in government-aided USE secondary schools. The study aims to contribute to educational policy, institutional practice, and future academic scholarship on digital learning strategies in resource-constrained contexts.

I am currently in the data collection phase of my research and respectfully request your permission to engage with your school as one of the selected study sites. Specifically, I seek access to:

- You (the Headteacher), to participate in a semi-structured interview as a key informant;
- A sample of teachers in your school, who will be invited to respond to a structured questionnaire on their e-learning experiences.

All research protocols, including ethical clearance, have been duly reviewed and approved by the Uganda Christian University Research Ethics Committee (UCUREC)and subsequently cleared by theUganda National Council for Science and Technology (UNCST). Copies of the approval letters and consent forms will be provided for your reference.

Participation in the study is entirely voluntary, and all data collected will be treated with the utmost confidentiality and used strictly for academic purposes. No personal identifiers will be disclosed in any part of the final report.

I would be immensely grateful for your support and cooperation in facilitating this important academic endeavor. Should you require any further information or clarification, please do not hesitate to contact me directly at 0772401668.

Thank you very much for considering my request. I look forward to your positive response.

Yours faithfully,
Nantagya Grace
PhD Candidate,
Uganda Christian University

APPENDIX E: PARTICIPANTS CONSENT FORM

1. Introduction and rationale of the Study

Dear Headteacher&Teacher

I am conducting a study titled ***An Analysis of Academic Staff Experiences with E-Learning Uptake in Universal Secondary Education (USE) Schools in Kampala Capital City*.** This study seeks to provide an understanding how teachers' and students' experiences with e-learning uptake. The aim of the study to establish a basis for appreciating and improving e-learning uptake in USE schools where necessary.

2. Description of the Research

The study is designed as an explanatory cross-sectional sequential mixed methods survey of teachers' and students' experiences in the form of how teachers and students in USE schools engage in, are satisfied with, reflect on factors challenging their e-learning uptake and the actions they take to deal with the factors. I am now at the stage of collecting data needed to accomplish this study.

3. Participation

The participants in the study include headteachers, teachers and students. In your respective positions, you have useful information required to complete this study. Therefore, you are invited to take part in this study by providing this information. The information is to be provided by responding to all the questions compiled in the research instrument designed for you as honestly and objectively as possible.

4. Potential Risks and Discomforts

Participation in the study is likely to cause interruption in your work, teaching or learning schedule as it will imply you spending a part of your valuable office, teaching or learning time to answer the questions. Effort will however, be made to minimise this interruption by asking the teachers to fill in the questionnaires at their time of time, and by asking students to fill in theirs as classes and within one hour. Effort will also be made to fix appointment with headteachers for interviews at the time of their convenience. In addition, effort will be made to disinfect all the

questionnaires and interview schedules, the principle researcher and the hired data collectors with appropriate disinfectants against the Monkey pox and Ebola virus being announced by the Ministry of Health as emerging health risks spread contagiously.

5. Potential Benefits

The benefits from the study will be a fresh drink and a snack during the individual engagements following the length of the interview otherwise there will be no major benefits other than that. The other alternative benefit is that its recommendations will result into improving e-learning uptake.

6. Confidentiality

All the information you will provide will be treated with utmost confidentiality. You are not required to divulge your intimate personal details such as the nature, national identity card number, student or teacher number, and the like.

7. Procedure

All information expected from you will be provided by answering questions or responding to questionnaire items by using ticks? The session will take between one and two hours?

8. Voluntary Participation

Your decision to participate in this study is completely voluntary. If you decide to not participate in this study, it will not affect your work in any way.

9. Withdrawal from the Study and/or Withdrawal of Authorization

As a participant in this study, you can withdraw at any point if you choose not to continue. You have the right and freedom to withdrawal from the study if need arises. You are also free to answer or not to answer any question during the interview or in the course of responding to the questionnaire items or

10. Reimbursements

Since the respondents will be found at their respective schools, there is no reimbursement planned for them. Apart from refreshments and a simple bite during the interview sessions

11. Whom to contact in case of ethical related concerns

a) Prior Ethical approvals and permissions.

There is no ethical approvals required from foreign Research Ethics Committees.

b) Local authorities and approvals.

This study was Approved by Uganda Christian University Research Ethics Committee (UCU-REC) and cleared by Uganda national Council for Science and Technology (UNCST), In case of any Ethical or your rights related concerns or inquiries, please contact UCUREC Chairperson; Prof. Peter Waiswa, 0772405357,pwaiswa@musph.ac.ug or UCUREC Manager, Mr. Osborn Ahimbisibwe, 0775737627 or oahimbisibwe@ucu.ac.ug. UNCST: Tel; +256 414 705500, info@uncst.go.ug

Statement of Consent

Do you accept to be recorded?

Yes ☐ No ☐

I voluntarily agree to participate in this research program; to tick appropriately

Yes ☐ No ☐

I understand that I will be given a copy of this signed Consent Form.

Name of Participant: ……

Signature: …… Date: …….

Name of Researcher/designee: ……

Signature: …….

Date: ……

NOTE: Depending on the nature of participants, witnesses or guardians (for minors & other vulnerable groups) will be required.

APPENDIX F: HEADTEACHERS' SEMI-STRUCTURED INTERVIEW SCHEDULE

Introduction

Dear Academic staff member,
You are kindly requested to respond to the items in this questionnaire as a way of participating in a study aimed at understanding teachers' experiences with e-learning promoted in schools under the Universal Secondary Education (USE) programme. Your responses are needed for purely academic purposes and will not be used to victimise you in any way. Please, feel free to provide all the information you can by responding to the questions I am going to ask you as honestly as possible. The information will be will be treated confidentially. Therefore, your personal details, including your name are not required. Thanks in advance for your kind cooperation.

Section A: Background Information

1. Your highest academic qualification?
2. Number of years spent as a headteacher?
3. Number of years spent in the headteacher of the current school?
4. What ICT devices are available in school to facilitate e-learning?
5. What online platforms are available in school to support e-learning?
6. For how long have you been exposed to e-learning

Section B: Learning Experiences

1. How would you rate your teachers' engagement in e-learning?
2. Why do you think teachers in your school rarely use a student portal or e-learning management system to engage in online education?
3. What do teachers in your school use to engage in e-learning?

4. Would you briefly assess your satisfaction with your academic staff members' use of e-learning to teach students?
5. What do you think are the factors constraining e-learning uptake in your school?
6. Would you suggest what you think are the solutions to these factors?

Appendix G: Academic staff Questionnaire

Introduction

Dear Academic staff member,

You are kindly requested to respond to the items in this questionnaire as a way of participating in a study aimed at understanding teachers' experiences with e-learning promoted in schools under the Universal Secondary Education (USE) programme. Your responses are needed for purely academic purposes and will not be used to victimise you in any way. Please, feel free to provide all the information you can by responding to the questions or statements in this questionnaire as honestly as possible. The information will be will be treated confidentially. Therefore, your personal details, including your name are not required. Thanks in advance for your kind cooperation.

Please, respond to each item in all the tables provided by ticking in cell corresponding to the option that best suits your opinion.

Section A: Background Information

1. Sex:

Male		1
Female		2

2. Age in years

Less than 30		1
30-39		2
40-49		3
50-59		4
60 and above		5

3. Highest Academic Qualification

High School Certificate		1
Diploma		2
Bachelor's Degree		3
Postgraduate Diploma		4
Master's Degree		5
PhD		6
Other (specify).....		7

4. Teaching Subjects supported by e-learning

English		1
Mathematics		2

Biology		3
Chemistry		4
Physics		5
Geography		6
History		7
Literature in English		8
Economics		9
Fine Art		10
Other (specify).....		11

5. Teaching Level

O' Level		1
A' Level		2
Both O' and A' Level		3

6. Designation

Teacher		1
Class Teacher		2
Head of Department		3
Director of Studies		4
Other (specify).....		5

7. Number of years spent as a teacher:

None		1
Less than a year		2
1-5		3
6-10		4
11 and above		5

8. Number of years spent in the current school:

None		1
Less than a year		2
1-5		3
6-10		4
11 and above		5

9. Which of the following devices facilitates your teaching? (You are free to tick more than one as long as you use it):

None		1
Desktop personal computer		2
Laptop		3
Mobile phone		4
Smartphone		5
Ipod		6
Ipad		7
Modem		8

WI-FI		9
Radio		10
Television		11
Other (Please specify)		12

10. The electronic device(s) you use to facilitate your teaching:

Is (are) provided by the school		1
Is(are) personal		2

11. Which of the following platforms facilitates your teaching? (You are free to tick more than one as long as you use it):

None		1
Zoom		2
WhatsApp		3
YouTube		4
Facebook		5
Tiktok		6
Skype		7
Google meet		8
Instagram		9
Microsoft Team		10
Other (Please specify)		11

12. Period of exposure to e-learning

None		1
Less than a year		2
1-5		3
6-10		4
11 and above		5

Section B: Engagement

Please, tick in the cell corresponding to the option that best describes your involvement in e-learning.

No.	Statement	Very Rarely	Rarely	Sometimes	Often	Very often
1.	I search online for information I need to plan lessons					
2.	I plan for the lessons using an electronic device					
3.	I deliver lessons to students via Zoom					
4.	I give assignments to students via Zoom					
5.	I deliver recorded lessons to students, which they can access via the school's web portal at their convenient time					
6.	I send learning materials/references to students, which they can access via the school's web portal at their convenient time					

No.	Statement	Very Rarely	Rarely	Sometimes	Often	Very often
7.	I deliver lessons to students in social media texts					
8.	I deliver video-recorded lessons, which students can access via social media at their convenient time					
9.	I deliver lessons to students via live-video social media calls					
10.	I deliver lessons to students via live audio social media calls					
11.	I send assignments to students via social media texts					
12.	I send assignments to students via the school's student portal or e-learning management system					
13.	I receive assignments given to students via Zoom question-and-answer presentations or discussions					
14.	I spend much of my lesson preparation time searching online for necessary content and learning aids					
15.	I receive completed assignments from students via school's student portal or e-learning management system					
16.	I administer exams to students via Zoom					
17.	I spend much of the teaching time facilitating e-learning uptake					
18.	I administer exams to students via school's student portal or e-learning management system					
19.	I mark students' assignments facilitated by an electronic device					
20.	I mark students' exams facilitated by an electronic device					
21.	I compile students' marks facilitated by an electronic device					
22.	I submit students' marks for grading using an electronic device					
23.	I participate in peer review Zoom meetings with fellow teachers to improve instruction in e-learning					

Section C: Satisfaction

Please, tick in the cell corresponding to the option that indicates the extent to which you agree or disagree to each statement.

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly
1.	The information I get online is useful in helping me plan my lessons					
2.	I find using a mobile electronic device to facilitate lesson planning better than other devices					
3.	I enjoy the lessons I deliver to students via Zoom					

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly
4.	I like delivering assignments to students via Zoom					
5.	I like using the school's web portal to deliver recorded lessons to students					
6.	I like using the school's web portal to deliver learning materials/references to students					
7.	I feel contented using social media texts to deliver lessons to students					
8.	I like the video-recorded lessons I deliver to students via social media					
9.	I enjoy lessons I deliver to students via live-video social media calls					
10.	I like the lessons I deliver to students via live audio social media calls					
11.	I am contented sending assignments to students via social media texts					
12.	I like sending assignments to students via the school's student portal or e-learning management system					
13.	I enjoy receiving assignments given to students via Zoom question-and-answer presentations or discussions.					
14.	I like receiving completed assignments from students via social media					
15.	I enjoy receiving completed assignments from students via student portal or e-learning management system					
16.	I enjoy administering exams to students via Zoom					
17.	I like administering exams to students via social media					
18.	Administering exams to students via school's student portal or e-learning management system is enjoyable					
19.	I find marking students' completed assignments facilitated by an electronic device enjoyable					
20.	I like marking students' exams when facilitated by an electronic device					
21.	I enjoy using an electronic device to compile students' marks					
22.	I like submitting students' marks for grading facilitated by an electronic device					
23.	I enjoy participating in peer review Zoom meetings with fellow teachers to improve instruction in e-learning					

Section D: Perceived challenges to e-learning instruction uptake

Please, tick in the cell corresponding to the option that indicates the extent to which you agree or disagree to each statement.

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly Disagree
1.	I am positive about teaching by sending lesson content online to students to access at their convenient time					
2.	I am positive about teaching by sending students learning materials/references online convenient time					
3.	I am okay with sending students homework online so they access it anytime					
4.	I do not mind students sending me completed assignments online					
5.	I am positive about administering exams to students online					
6.	I am positive about exam feedback delivery online to students					
7.	I do not mind delivering lessons to students live via Zoom					
8.	I am positive about evaluating students using the completed assignments they submit via Zoom presentations or discussions					
9.	Using internet-connected mobile electronic devices eases e-teaching					
10.	Using internet-connected classroom-based devices like desktop PCs, projectors eases e-learning					
11.	Using radio as a tool for instruction eases teaching					
12.	Using television as a tool for instruction makes teaching easier					
13.	I believe e-learning is a favourable educational alternative					
14.	I believe e-learning is an effective means of education					
15.	I believe promoting e-learning increases access to education					
16.	I believe adoption of e-learning is the best option in the 21st century					
17.	I am computer-literate enough to use computerised devices to teach online					
18.	I am amply informed about how to use online technology to teach					
19.	I feel self-motivated to use online resources to improve my teaching ability					
20.	I find it easy to use e-learning resources to teach					
21.	I find the e-learning resources I need to teach easily accessible					
22.	I believe students can understand the lesson content I send online					
23.	I perceive e-learning as a useful mode of learning					
24.	There is a strong internet connectivity at school					

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly Disagree
25.	The internet at school is speedy enough to facilitate teaching online					
26.	All students can access lesson content delivered online regardless of whether they are at or away from school					
27.	The school has all ICT equipment that supports e-learning					
28.	ICT facilities available at school support e-learning reliably.					
29.	School's electric supply is stable enough to facilitate e-learning					
30.	School has teachers who are competent to teach students via e-learning					
31.	School has technological capacity to supervise e-learning exams as desired					
32.	School has technological capacity to invigilate e-learning exams as desired					
33.	School management responds quickly to queries related e-learning					

Section E: Actions for dealing with factors challenging e-learning uptake
Please, tick in the cell corresponding to the option that indicates the extent to which you agree or disagree to each statement.

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly Disagree
1.	I have received adequate prior exposure to e-learning that has made my attitude towards e-learning positive					
2.	I personally support e-learning as the best solution to educational access challenges in Uganda					
3.	Improving internet connectivity is a must if e-learning is to improve as desired					
4.	Improving the speed of internet is necessary to support e-learning as desired					
5.	I use personal electronic device to teach whenever the ICT facilities provided by the school are down					
6.	I use personal modem or WI-FI to connect to the internet whenever the internet provided by the school is down					

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly Disagree
7.	I requisition for the inputs I need to teach via e-learning whenever they are not available					
8.	The school management responds quickly by solving the queries raised about e-learning					

Section E: Level of e-learning uptake

Please, tick in the cell corresponding to the option that indicates the extent to which you agree or disagree to each statement.

No.	Statement	Strongly Agreed	Disagree	Neutral	Agree	Strongly Disagree
1.	I spend much of my teaching time engaged learning online					
2.	The lessons I deliver online are effective in terms of being understood by students					
3.	Students use the reference materials I send them online as expected					
4.	The 'data' I use to search online is not in vain as I get all the information I need to plan the lessons I deliver to students.					
5.	Students demonstrate good knowledge acquired from the lessons I upload on their portal.					
6.	Teaching online has improved my instructional performance					

Appendix H: Detailed results from headteachers' interview responses analysed using Yin's (2015) framework of thematic analysis

Themes	Codes
Occasional instructional engagement	E-learning uptake is not the main mode of teaching and studying; its use is not that frequent because teachers use it only when they want to understand more about how they should guide learners to relate what is being taught to real-life situations
	We started organising Zoom lessons involving teachers delivering lessons to students, especially during the Covid-19 lockdown, but now this happens once in a while due to the presence of students at school for classroom-based learning most of the school time.
	E-learning uptake is not that high in the school; it is intermittently used just to complement classroom instruction and learning as a quick way of accessing instructional and learning content, illustrations and materials
Hybrid learning	The new curriculum is competence-based and is hence about learning by doing, which can only happen in a real-life classrooms; e-learning facilitates it as an educational complement
	Emphasis is on facilitating hands-on learning in classroom, teachers are expected to search online for the learning activities and how best to guide learners to do them on their own
	New curriculum requires teachers to facilitating student-centred classroom learning by giving learning tasks and letting learners do them on their own
	Learning activities are taught and studied in a real-classroom environment, e-learning complements this process by facilitating teachers to search online for the specific activities, or how the activities can be taught practically.
	The school has no e-learning management system or student portal on which students can log to send completed assignments/homework. What we have is a dedicated online portal teachers use to upload continuous assessment results sent to UNEB website.
Devices and platforms used to facilitate e-learning	Encouraged teachers to form and use WhatsApp groups to send homework to students via their parents' smartphones because students are not allowed to use smartphones unguided
	Teachers and students use online desktops accessible in the school's computer lab to access detailed syllabus content of what should be covered in lessons
	Our e-learning is mostly through WhatsApp groups, e-library and to a small extent, via zoom, video or audio calls.
	We have encouraged teachers and students to use Google Meet as a platform for holding online question-and-answer sessions, discussions and active positive criticism or feedback through sending comments critiquing and improving what is being discussed.
	Zoom is one of platforms we encourage teachers to use to deliver lessons to students when it is necessary, but students are not physically accessible in classrooms such as during the long-Easter holiday. We also encourage students to visit educational YouTube channels

Appendix I: Computation of Reliability of Administered scales

Table I: Reliability of items for measuring teachers' experiences with engagement in e-learning

Case Processing Summary			
		N	%
Cases	Valid	393	100.0
	Excluded[a]	0	0.0
	Total	393	100.0
a. Listwise deletion based on all variables in the procedure.			

Table I2: Reliability Statistics

Cronbach's Alpha	N of Items
.701	23

Table I3: Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I search online for information I need to plan lessons	8.04	288.903	.901	.701
I plan for the lessons using an electronic device	8.06	291.740	.902	.701
I deliver lessons to students via Zoom	8.06	291.526	.893	.701
I give assignments to students via Zoom	8.04	289.892	.904	.701
I deliver recorded lessons to students, which they can access via the school's web portal at their convenient time	8.05	290.436	.889	.701
I send learning materials/references to students, which they can access via the school's web portal at their convenient time	8.03	288.493	.903	.701
I deliver lessons to students in social media texts	8.08	294.015	.853	.702
I deliver video-recorded lessons, which students can access via social media at their convenient time	8.03	288.548	.901	.701
I deliver lessons to students via live-video social media calls	8.07	292.360	.858	.701
I deliver lessons to students via live audio social media calls	8.03	288.207	.905	.701
I send assignments to students via social media texts	8.05	291.084	.895	.701
I send assignments to students via the school's student portal or e-learning management system	8.06	291.423	.910	.701
I receive assignments given to students via Zoom question-and-answer presentations or discussions	8.04	288.634	.894	.701
I spend much of my lesson preparation time searching online for necessary content and learning aids	8.04	289.888	.902	.701
I receive completed assignments from students via school's student portal or e-learning management system	8.01	286.165	.906	.700
I administer exams to students via Zoom	8.02	287.688	.906	.701
I spend much of the teaching time facilitating e-learning uptake	8.03	288.471	.905	.701
I administer exams to students via school's student portal or e-learning management system	8.01	285.792	.906	.700

I mark students' assignments facilitated by an electronic device	7.58	311.511	.158	.701
I mark students' exams facilitated by an electronic device	7.57	311.321	.157	.701
I compile students' marks facilitated by an electronic device	7.55	311.846	.143	.701
I submit students' marks for grading using an electronic device	7.59	312.314	.141	.701
I participate in peer review Zoom meetings with fellow teachers to improve instruction in e-learning	7.61	311.873	.159	.700

Table I2: Reliability Statistics for items for measuring satisfaction experienced by teachers with e-learning

Cronbach's Alpha	N of Items
.705	23

Table I5: Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
The information I get online is useful in helping me plan my lessons	18.12	798.725	.875	.704
I find using a mobile electronic device to facilitate lesson planning better than other devices	18.07	793.514	.872	.704
I enjoy the lessons I deliver to students via Zoom	18.07	792.032	.857	.705
I like delivering assignments to students via Zoom	18.04	790.469	.865	.705
I like using the school's web portal to deliver recorded lessons to students	18.08	795.432	.866	.705
I like using the school's web portal to deliver learning materials/references to students	18.20	804.408	.878	.705
I feel contented using social media texts to deliver lessons to students	18.24	809.431	.851	.705
I like the video-recorded lessons I deliver to students via social media	18.09	796.240	.878	.704
I enjoy lessons I deliver to students via live-video social media calls	18.14	799.431	.876	.704
I like the lessons I deliver to students via live audio social media calls	18.19	805.841	.841	.705
I am contented sending assignments to students via social media texts	18.20	804.229	.878	.705
I like sending assignments to students via the school's student portal or e-learning management system	18.02	804.124	.818	.705
I enjoy receiving assignments given to students via Zoom question-and-answer presentations or discussions.	17.87	792.419	.811	.705
I like receiving completed assignments from students via social media	18.10	808.606	.815	.705
I enjoy receiving completed assignments from students via student portal or e-learning management system	18.04	802.836	.873	.705
I enjoy administering exams to students via Zoom	18.08	804.697	.866	.705
I like administering exams to students via social media	17.56	764.328	.946	.704

Administering exams to students via school's student portal or e-learning management system is enjoyable	17.63	772.420	.922	.704
I find marking students' completed assignments facilitated by an electronic device enjoyable	17.93	791.609	.883	.704
I like marking students' exams when facilitated by an electronic device	17.98	795.440	.831	.705
I enjoy using an electronic device to compile students' marks	17.93	789.607	.866	.705
I like submitting students' marks for grading facilitated by an electronic device	18.06	804.526	.812	.705
I enjoy participating in peer review Zoom meetings with fellow teachers to improve instruction in e-learning	18.12	809.797	.825	.705

Table I6: Reliability Statistics for items for measuring teachers' Perceived challenges to e-learning instruction

Cronbach's Alpha	N of Items
.714	31

Table I7: Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I am positive about teaching by sending lesson content online to students to access at their convenient time	66.63	397.764	.868	.715
I am positive about teaching by sending students learning materials/references online convenient time	66.43	391.364	.824	.715
I am okay with sending students homework online so they access it anytime	66.50	394.975	.803	.716
I do not mind students sending me completed assignments online	66.54	392.249	.884	.714
I am positive about administering exams to students online	66.58	395.926	.855	.715
I am positive about exam feedback delivery online to students	66.51	397.992	.808	.716
I do not mind delivering lessons to students live via Zoom	66.49	393.920	.823	.715
I am positive about evaluating students using the completed assignments they submit via Zoom presentations or discussions	66.71	403.965	.846	.716
Using internet-connected mobile electronic devices eases e-teaching	66.68	392.603	.902	.714
Using internet-connected classroom-based devices like desktop PCs, projectors eases e-learning	66.38	381.846	.858	.714
Using radio as a tool for instruction eases teaching	66.43	382.691	.861	.714
Using television as a tool for instruction makes teaching easier	66.43	381.344	.901	.713
I believe e-learning is a favourable educational alternative	66.37	379.298	.869	.713
I believe e-learning is an effective means of education	66.48	383.831	.866	.714

I believe promoting e-learning increases access to education	66.46	381.948	.897	.713
I believe adoption of e-learning is the best option in the 21st century	66.48	385.055	.865	.714
I am computer-literate enough to use computerised devices to teach online	66.45	382.833	.891	.713
I am amply informed about how to use online technology to teach	66.40	379.271	.897	.713
I feel self-motivated to use online resources to improve my teaching ability	63.36	440.680	-.032	.717
I find it easy to use e-learning resources to teach	63.52	453.686	-.274	.712
I find the e-learning resources I need to teach easily accessible	63.07	444.266	-.131	.717
I believe students can understand the lesson content I send online	63.25	443.855	-.133	.717
I perceive e-learning as a useful mode of learning	63.44	446.810	-.188	.718
There is a strong internet connectivity at school	63.21	451.899	-.240	.711
The internet at school is speedy enough to facilitate teaching online	63.68	440.546	-.033	.718
All students can access lesson content delivered online regardless of whether they are at or away from school	63.12	455.311	-.362	.711
The school has all ICT equipment that supports e-learning	63.39	448.348	-.225	.711
ICT facilities available at school support e-learning reliably.	63.32	443.383	-.101	.711
School's electric supply is stable enough to facilitate e-learning	63.02	454.040	-.394	.720
School has teachers who are competent to teach students via e-learning	63.05	449.735	-.282	.714
School has technological capacity to supervise e-learning exams as desired	63.44	446.810	-.188	.714
School has technological capacity to invigilate e-learning exams as desired	63.21	451.899	-.240	.711
School management responds quickly to queries related e-learning	62.94	448.182	-.269	.714

Table I8: Reliability Statistics for items for measuring teachers' actions dealing with factors challenging e-learning

Cronbach's Alpha	N of Items
.711	8

Table I9: Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I have received adequate prior exposure to e-learning that has made my attitude towards e-learning positive	30.41	18.657	.469	.711
I personally support e-learning as the best solution to educational access challenges in Uganda	30.35	17.767	.759	.711
Improving internet connectivity is a must if e-learning is to improve as desired	30.32	18.158	.782	.711
Improving the speed of internet is necessary to support e-learning as desired	30.35	18.168	.756	.711

I use personal electronic device to teach whenever the ICT facilities provided by the school are down	30.35	18.384	.645	.710
I use personal modem or WI-FI to connect to the internet whenever the internet provided by the school is down	30.41	18.136	.603	.711
I requisition for the inputs I need to teach via e-learning whenever they are not available	30.56	16.103	.640	.711
The school management responds quickly by solving the queries raised about e-learning	30.35	18.110	.776	.711

Table I10: Reliability Statistics for items for measuring teachers' self-assessed level of e-learning uptake

Cronbach's Alpha	N of Items
.727	6

Table I11: Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I spend much of my teaching time engaged learning online	19.91	9.334	.426	.724
The lessons I deliver online are effective in terms of being understood by students	19.46	12.431	.201	.733
Students use the reference materials I send them online as expected	19.63	10.843	.623	.720
The 'data' I use to search online is not in vain as I get all the information I need to plan the lessons I deliver to students.	19.83	10.983	.409	.727
Students demonstrate good knowledge acquired from the lessons I upload on their portal.	19.60	10.932	.203	.727
Teaching online has improved my instructional performance	20.07	9.811	.433	.727

Table I12: Reliability Statistics for items for measuring teachers' self-assessed level of e-learning uptake

Cronbach's Alpha	N of Items
.707	91

Table I13: Item-Total Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I search online for information I need to plan lessons	152.63	3192.489	.546	.707
I plan for the lessons using an electronic device	152.65	3196.225	.566	.707
I deliver lessons to students via Zoom	152.65	3197.292	.546	.707
I give assignments to students via Zoom	152.63	3193.835	.554	.707

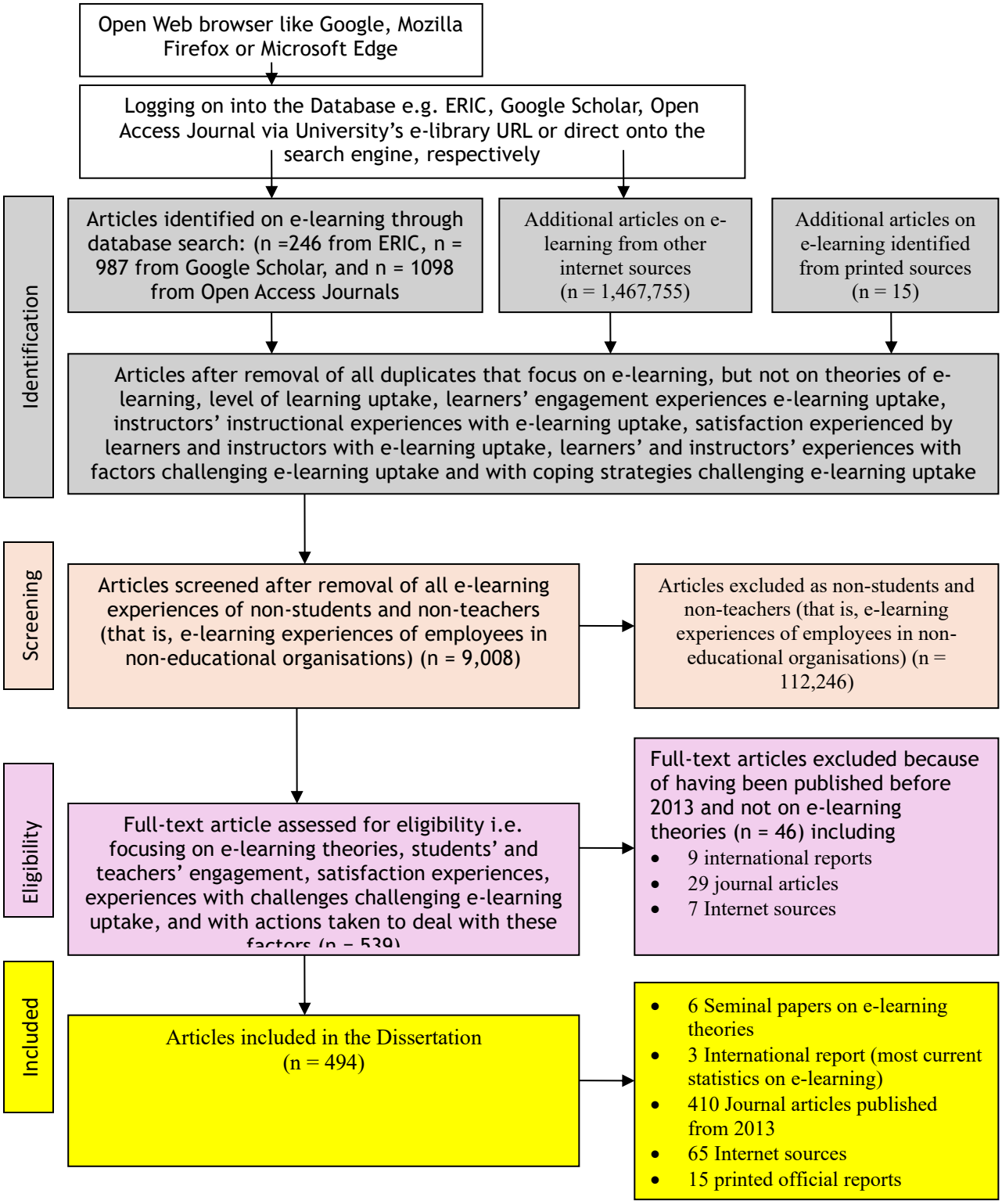
I deliver recorded lessons to students, which they can access via the school's web portal at their convenient time	152.64	3196.117	.534	.707
I send learning materials/references to students, which they can access via the school's web portal at their convenient time	152.62	3189.888	.562	.707
I deliver lessons to students in social media texts	152.67	3200.655	.539	.707
I deliver video-recorded lessons, which students can access via social media at their convenient time	152.62	3190.130	.560	.707
I deliver lessons to students via live-video social media calls	152.66	3198.654	.528	.707
I deliver lessons to students via live audio social media calls	152.62	3189.999	.557	.707
I send assignments to students via social media texts	152.64	3195.311	.557	.707
I send assignments to students via the school's student portal or e-learning management system	152.65	3196.466	.562	.707
I receive assignments given to students via Zoom question-and-answer presentations or discussions	152.63	3193.603	.527	.707
I spend much of my lesson preparation time searching online for necessary content and learning aids	152.63	3192.784	.562	.707
I receive completed assignments from students via school's student portal or e-learning management system	152.60	3186.465	.552	.707
I administer exams to students via Zoom	152.61	3187.628	.569	.707
I spend much of the teaching time facilitating e-learning uptake	152.62	3191.393	.550	.707
I administer exams to students via school's student portal or e-learning management system	152.60	3185.059	.557	.707
I mark students' assignments facilitated by an electronic device	152.17	3153.519	.649	.707
I mark students' exams facilitated by an electronic device	152.16	3151.577	.648	.707
I compile students' marks facilitated by an electronic device	152.14	3151.049	.642	.707
I submit students' marks for grading using an electronic device	152.18	3156.518	.627	.707
I participate in peer review Zoom meetings with fellow teachers to improve instruction in e-learning	152.20	3158.556	.640	.707
The information I get online is useful in helping me plan my lessons	152.16	3152.364	.644	.707
I find using a mobile electronic device to facilitate lesson planning better than other devices	152.11	3150.166	.609	.707
I enjoy the lessons I deliver to students via Zoom	152.11	3148.319	.598	.707
I like delivering assignments to students via Zoom	152.08	3145.694	.605	.706
I like using the school's web portal to deliver recorded lessons to students	152.12	3150.723	.618	.708

I like using the school's web portal to deliver learning materials/references to students	152.24	3160.973	.644	.707
I feel contented using social media texts to deliver lessons to students	152.28	3166.862	.636	.707
I like the video-recorded lessons I deliver to students via social media	152.13	3149.153	.644	.707
I enjoy lessons I deliver to students via live-video social media calls	152.18	3155.230	.633	.707
I like the lessons I deliver to students via live audio social media calls	152.23	3160.771	.633	.707
I am contented sending assignments to students via social media texts	152.24	3160.738	.644	.707
I like sending assignments to students via the school's student portal or e-learning management system	152.06	3120.110	.865	.706
I enjoy receiving assignments given to students via Zoom question-and-answer presentations or discussions.	151.91	3093.329	.874	.706
I like receiving completed assignments from students via social media	152.14	3127.852	.874	.706
I enjoy receiving completed assignments from students via student portal or e-learning management system	152.08	3119.079	.911	.706
I enjoy administering exams to students via Zoom	152.12	3123.492	.900	.706
I like administering exams to students via social media	151.60	3055.483	.911	.706
Administering exams to students via school's student portal or e-learning management system is enjoyable	151.67	3066.175	.913	.706
I find marking students' completed assignments facilitated by an electronic device enjoyable	151.97	3104.938	.869	.706
I like marking students' exams when facilitated by an electronic device	152.02	3111.396	.825	.706
I enjoy using an electronic device to compile students' marks	151.97	3102.944	.842	.706
I like submitting students' marks for grading facilitated by an electronic device	152.10	3119.564	.869	.706
I enjoy participating in peer review Zoom meetings with fellow teachers to improve instruction in e-learning	152.16	3125.741	.917	.706
I am positive about teaching by sending lesson content online to students to access at their convenient time	152.21	3132.758	.919	.706
I am positive about teaching by sending students learning materials/references online convenient time	152.01	3107.411	.916	.706
I am okay with sending students homework online so they access it anytime	152.08	3117.843	.899	.706
I do not mind students sending me completed assignments online	152.12	3122.651	.893	.706

I am positive about administering exams to students online	152.16	3125.741	.917	.706
I am positive about exam feedback delivery online to students	152.09	3126.765	.906	.706
I do not mind delivering lessons to students live via Zoom	152.08	3115.634	.913	.706
I am positive about evaluating students using the completed assignments they submit via Zoom presentations or discussions	152.29	3153.156	.877	.706
Using internet-connected mobile electronic devices eases e-teaching	152.26	3131.136	.858	.706
Using internet-connected classroom-based devices like desktop PCs, projectors eases e-learning	151.96	3101.071	.824	.706
Using radio as a tool for instruction eases teaching	152.01	3109.057	.795	.706
Using television as a tool for instruction makes teaching easier	152.01	3106.625	.824	.706
I believe e-learning is a favourable educational alternative	151.96	3096.581	.822	.706
I believe e-learning is an effective means of education	152.06	3114.248	.787	.706
I believe promoting e-learning increases access to education	152.04	3110.401	.808	.706
I believe adoption of e-learning is the best option in the 21st century	152.07	3117.557	.785	.706
I am computer-literate enough to use computerised devices to teach online	152.03	3110.560	.815	.706
I am amply informed about how to use online technology to teach	151.99	3100.154	.826	.706
I feel self-motivated to use online resources to improve my teaching ability	148.94	3263.746	-.080	.708
I find it easy to use e-learning resources to teach	149.11	3291.730	-.250	.708
I find the e-learning resources I need to teach easily accessible	148.65	3267.011	-.116	.708
I believe students can understand the lesson content I send online	148.83	3268.262	-.149	.708
I perceive e-learning as a useful mode of learning	149.02	3279.909	-.229	.708
There is a strong internet connectivity at school	148.79	3291.895	-.249	.708
The internet at school is speedy enough to facilitate teaching online	149.26	3258.048	-.023	.708
All students can access lesson content delivered online regardless of whether they are at or away from school	148.70	3301.561	-.386	.708
The school has all ICT equipment that supports e-learning	148.97	3285.226	-.276	.708
ICT facilities available at school support e-learning reliably.	148.90	3268.984	-.126	.708
School's electric supply is stable enough to facilitate e-learning	148.60	3304.062	-.489	.708
School has teachers who are competent to teach students via e-learning	148.63	3282.344	-.274	.708

School management responds quickly to queries related e-learning	148.52	3279.216	-.276	.708
I have received adequate prior exposure to e-learning that has made my attitude towards e-learning positive	148.57	3278.618	-.226	.708
I personally support e-learning as the best solution to educational access challenges in Uganda	148.52	3294.072	-.450	.708
Improving internet connectivity is a must if e-learning is to improve as desired	148.48	3288.873	-.430	.708
Improving the speed of internet is necessary to support e-learning as desired	148.51	3292.365	-.464	.708
I use personal electronic device to teach whenever the ICT facilities provided by the school are down	148.51	3292.530	-.430	.708
I use personal modem or WI-FI to connect to the internet whenever the internet provided by the school is down	148.57	3297.673	-.443	.708
I requisition for the inputs I need to teach via e-learning whenever they are not available	148.72	3309.176	-.423	.709
School has technological capacity to supervise e-learning exams as desired	148.48	3288.873	-.430	.708
School has technological capacity to invigilate e-learning exams as desired	148.51	3292.365	-.464	.708
The school management responds quickly by solving the queries raised about e-learning	148.52	3290.644	-.446	.708
I spend much of my teaching time engaged learning online	149.11	3291.730	-.250	.708
The lessons I deliver online are effective in terms of being understood by students	148.65	3267.011	-.116	.708
Students use the reference materials I send them online as expected	148.83	3268.262	-.149	.708
The 'data' I use to search online is not in vain as I get all the information I need to plan the lessons I deliver to students.	149.02	3279.909	-.229	.708
Students demonstrate good knowledge acquired from the lessons I upload on their portal.	148.79	3291.895	-.249	.708
Teaching online has improved my instructional performance	149.26	3258.048	-.023	.708

Appendix J: PRISMA Methodology applied to review literature



The PRISMA methodology above indicates that the articles from which the theoretical and empirical literature in this chapter was reviewed were 494 in total.

These included six seminal papers on e-learning theories which are reviewed in the next section, three international reports on the most current statistics on e-learning uptake, which were presented in Chapter 1 and 409 journal articles published from 2013 from which most of the background to this study was developed and literature presented in this chapter was reviewed. Also included were 65 internet sources, most from professional bloggers on e-learning experiences and 15 printed official reports on the state of e-learning uptake in Uganda's education system. The literature reviewed from these sources is presented forthwith, beginning with the theoretical review.

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Appendix K: FACTOR ANALYSIS AND CORRELATION RESULTS ON TEACHERS' E-LEARNING EXPERIENCES AND THEIR RELATIONSHIP WITH E-LEARNING UPTAKE

Factor analysis results: As explained in Chapter 3, the principle component method of confirmatory factor analysis was together with the varimax rotation technique applied to reduce the questionnaire items into a few components and ensure that each item loaded into the component to which it correlated most, thereby maximising the variance accounted for by the component in the variable being investigated. The findings were sorted by size and are presented according to the respondent categories to which questionnaire items were administered.

Factor analysis results from teachers

The results from questionnaire items used to measure engagement teachers experienced with facilitating e-learning uptake are in Table 4.26.

Questionnaire items administered to measure level of engagement experienced by teachers with facilitating e-learning uptake	Generated Components					
	1	2	3	4	5	6
I use my device mostly to search online for information I use in lesson planning	.889					
I mark students' assignments facilitated by an electronic device	.854					
I submit students' marks for grading using an electronic device	.831					
I plan for the lessons using a electronic device	.803					
I compile students' marks facilitated by an electronic device	.691					
I mark students' exams facilitated by an electronic device	.546					
I deliver lessons to students via Zoom		.848				
I give assignments to students via Zoom		.794				
I participate in peer review Zoom meetings with fellow teachers to improve instruction in e-learning		.770				
I administer exams to students via Zoom		.669				
I receive assignments given to students via Zoom question-and-answer presentations or discussions		.548				
I send learning materials/references to students, which they can access via the school's web portal at their convenient time			.853			
I deliver recorded lessons to students, which they can access via the school's web portal at their convenient time			.818			
I administer exams to students via school's student portal or e-learning management system			.607			
I send assignments to students via the school's student portal or e-learning management system			.625			
I receive completed assignments from students via school's student portal or e-learning management system			.594			

Questionnaire items administered to measure level of engagement experienced by teachers with facilitating e-learning uptake	Generated Components					
	1	2	3	4	5	6
I send assignments to students via social media texts				.841		
I deliver video-recorded lessons to students, which they can access them at their convenient time via social media				.779		
I deliver lessons to students in social media texts				.767		
I deliver lessons to students via live audio social media calls					.860	
I deliver lessons to students via live-video social media calls					.776	
I spend much of my lesson preparation time searching online for necessary content and learning aids						.795
I spend much of the teaching time facilitating e-learning uptake						.598
Eigen value	6.762	2.822	2.420	2.300	2.048	1.899
% of Variance	29.401	18.381	15.909	12.262	6.732	3.002
Cumulative %	29.401	47.782	63.691	75.988	82.685	85.687
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						

Table 4.26 indicates that six components were generated from the questionnaire items administered to measure the level of engagement experienced by teachers with facilitating e-learning. These components were identified as follows: '1' was the 'Teachers' use of e-electronic devices to facilitate e-learning uptake', '2' was 'synchronous teaching via Zoom', '3' was 'asynchronous teaching via student portal', '4' was 'asynchronous teaching via social media', '5' was 'synchronous teaching via social media' and '6' was 'teachers' level of involvement'. The Eigen values corresponding to these components were all greater than one, suggesting that the components were reliable indicators of the level of engagement that teachers experienced with facilitating e-learning uptake. The cumulative percentage of variance explained indicates that all these components accounted for 85.687% of variation in the engagement that teachers experienced with facilitating e-learning uptake. This suggests that much of the components accounted for much of the variation in this engagement. The percentage of variance suggests that the best indicator of this engagement was teachers' Teachers' use of e-electronic devices to facilitate e-learning uptake (29.401%)

The correlations in Table 4.26 indicate that using an electronic device to search online for information used in lesson planning was the best measure of teachers' Teachers' use of e-electronic devices to facilitate e-learning uptake (Correlation =

.889). Similarly, delivering lessons to students via Zoom was the best measure of synchronous teaching via Zoom (Correlation = .848). Likewise, sending learning materials/references to students, which they can access via the school's web portal at their convenient time was the best measure of asynchronous teaching via student portal (Correlation = .863). The best measure of asynchronous teaching via social media was to send assignments to students via social media texts (Correlation = .841) and that of involvement was teachers spending much of their lesson preparation time searching online for necessary content and learning aids (Correlation = .795). Therefore, attention needs to be put on each of these best measures if the need to improve the engagement experienced by teachers with facilitating e-learning arises. The findings factor analysis of teachers' self-assessed satisfaction experienced with e-learning are presented in Table 4.27.

Questionnaire items administered to measure level of satisfaction experienced by teachers with facilitating e-learning uptake	**Generated Components**					
	1	**2**	**3**	**4**	**5**	**6**
I am contented sending assignments to students via social media texts	.891					
I like receiving completed assignments from students via social media	.790					
I enjoy receiving completed assignments from students via the school's student portal or e-learning management system	.662					
Administering exams to students via school's student portal or e-learning management system is enjoyable	.618					
I like sending assignments to students via the school's student portal or e-learning management system	.892					
I like administering exams to students via social media	.677					
I enjoy receiving assignments given to students via Zoom question-and-answer presentations or discussions.		.763				
I like the Zoom arrangement I use to deliver assignments to students		.731				
I enjoy administering exams to students via Zoom		.675				
I enjoy participating in peer review Zoom meetings with fellow teachers to improve instruction in e-learning		.515				
I like the video-recorded lessons I deliver to students via social media			.873			
I feel contented using social media texts to deliver lessons to students			.776			
I like the use of the school's web portal to deliver learning materials/references to students			.703			
I like the use of the school's web portal to deliver recorded lessons to students			.598			
I like submitting students' marks for grading facilitated by an electronic device				.887		
I enjoy using an electronic device to compile students' marks				.840		
I find marking students' completed assignments facilitated by an electronic device enjoyable				.823		
I like marking students' exams when facilitated by an electronic device				.822		

I enjoy the lessons I deliver lessons to students via Zoom					.862	
I enjoy lessons I deliver to students via live-video social media calls					.800	
I like the lessons I deliver to students via live audio social media calls					.704	
The information I get online is useful in helping me plan my lessons						.758
I find using a mobile electronic device to facilitate lesson planning better than other devices						.689
Eigen value	5.513	3.540	2.466	2.296	2.160	2.104
% of Variance	23.971	15.391	10.723	8.242	6.782	5.668
Cumulative %	23.971	39.362	50.085	58.327	65.110	70.778
Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.						

From the factor analysis results in Table 4.27, the six generated components were identified as follows: '1' was identified as 'teachers' satisfaction experienced with asynchronous student evaluation', '2' as 'teachers' satisfaction experienced with synchronous student evaluation', '3' as 'teachers' satisfaction experienced with synchronous lesson delivery', '4' as 'teachers' satisfaction experienced with using electronic devices', '5' as teachers' satisfaction experienced with synchronous lesson delivery, and '6' as 'teachers' satisfaction experienced with asynchronous lesson planning'. The Eigen values corresponding to these components were all greater than one, implying that the components were reliable measures of the level of satisfaction that selected teachers experienced with e-learning. The analysis of the cumulative percentage of variance reveals that all the components explained up to 70.778% of the variation in the level of satisfaction teachers experienced with facilitating e-learning uptake. This suggests that the components accounted for much of the variation in this satisfaction. The percentage of variance indicates that the best indicate of this satisfaction was the level of satisfaction that teachers experienced with asynchronous student evaluation (23.971%).

A comparative scrutiny of the magnitudes of the correlations in Table 4.27 reveals that the best measure of teachers' satisfaction experienced with asynchronous student evaluation was their contentment with sending assignments to students via social media texts (Correlation = .891). Likewise, the best measure of teachers' satisfaction experienced with synchronous student evaluation was their enjoyment with receiving assignments given to students via Zoom question-and-answer presentations or discussions (Correlations = .763). The best measure of teachers' satisfaction experienced with synchronous lesson delivery was their delivery of

video-recorded lessons to students via social media (Correlation = .873). In addition, the best measure of teachers' satisfaction experienced with using electronic devices was submitting students' marks for grading facilitated by an electronic device (Correlations = .887). The best measure of teachers' satisfaction experienced with synchronous lesson delivery was the lessons they delivered students via Zoom (Correlation = .862) yet that of asynchronous lesson planning was the usefulness of the information the teachers got online in helping them plan lessons (Correlation = .758). The results obtained from factor analysis of the questionnaire items administered to measure teachers' reflective experiences with factors challenging e-learning uptake are shown in Table 4.28.

Questionnaire items administered to measure teachers' reflective experiences with factors challenging e-learning uptake	**Component**				
	1	**2**	**3**	**4**	**5**
School has teachers who are competent to teach students via e-learning	.831				
ICT facilities available at school support e-learning reliably.	.806				
The school has all ICT equipment that supports e-learning	.796				
School's electric supply is stable enough to facilitate e-learning	.787				
All students can access lesson content delivered online regardless of whether they are at or away from school	.753				
School management responds quickly to queries related e-learning	.829				
There is a strong internet connectivity at school	.504				
School has technological capacity to invigilate e-learning exams as desired	.743				
School has technological capacity to supervise e-learning exams as desired	.724				
The internet at school is speedy enough to facilitate teaching online	.696				
I am okay with sending students homework online so they access it anytime		.857			
I am positive about administering exams to students online		.841			
I am positive about teaching by sending lesson content online to students to access at their convenient time		.801			
I do not mind delivering lessons to students live via Zoom		.797			
I am positive about evaluating students using the completed assignments they submit via Zoom presentations or discussions		.742			
I am okay with online sending of learning materials/references to students		.712			
I do not mind students sending me completed assignments online		.698			
I am positive about exam feedback delivery online to students		.692			
I believe promoting e-learning increases access to education			.846		
I believe adoption of e-learning is the best option in the 21st century			.824		
I believe e-learning is an effective means of education			.814		
I believe e-learning is a favourable educational alternative			.804		
I perceive e-learning as a useful mode of learning			.666		

Questionnaire items administered to measure teachers' reflective experiences with factors challenging e-learning uptake	Component				
	1	2	3	4	5
I believe students can understand the lesson content I send online			.584		
Using internet-connected mobile electronic devices eases e-teaching				.879	
I find it easy to use e-learning resources to teach				.835	
I find the e-learning resources I need to teach easily accessible				.778	
Using internet-connected classroom-based devices like desktop PCs, projectors eases e-learning				.769	
Using television as a tool for instruction makes teaching easier				.650	
Using radio as a tool for instruction eases teaching				.599	
I am computer-literate enough to use computerised devices to teach online					.835
I am amply informed about how to use online technology to teach					.831
I feel self-motivated to use online resources to improve my teaching ability					.676
Eigen value	8.974	6.848	2.325	2.062	2.042
% of Variance	27.194	20.751	17.046	16.248	16.020
Cumulative %	27.194	47.944	64.990	71.238	87.258

From Table 4.28, five components were generated as the reliable measures of the reflective experiences of teachers on the factors challenging e-learning uptake. These components were such that '1' was identified as 'institutional factors challenging e-learning', '2' as 'teachers' attitude towards e-learning', '3'as 'teachers' beliefs about e-learning, '4' as 'ease of use of e-learning devices' and '5' as 'teachers self- efficacy'. The corresponding Eigen values were all greater than one, suggesting that the components were reliable measures of these factors. The percentage of variance indicates that institutional factors were the best indicators of these challenges (27.194%). The cumulative percentage variance indicates that all the components accounted for up to 87.258%, suggesting that the greatest variation in these factors was explained by those identified in Table 4.28.

The analysis of the correlations in Table 4.28 reveals that the best measure of institutional factors challenging e-learning uptake was the school having teachers who are competent enough to teach students via e-learning (Correlation = .831). In the same way, the best measure of teachers' attitude towards e-learning was their being okay with sending assignments online to students to access at their convenient time (Correlation = .857). The best measure of teachers' beliefs about e-learning was the belief that e-learning should be promoted to increase access to education

(Correlation = .846). Similarly, the best measure of ease of use of e-learning devices was the use of mobile electronic devices to teach students online (Correlation = .879).

The results obtained from factor analysis on teachers' experiences with actions for dealing with the factors challenging e-learning uptake are summarised in Table 4.29.

Questionnaire items administered to measure teachers' experiences actions	**Component**	
	1	**2**
Improving the speed of internet is necessary to support e-learning as desired	.812	
The school management responds quickly by solving the queries raised about e-learning	.773	
I use personal electronic device to teach whenever the ICT facilities provided by the school are down	.622	
Improving internet connectivity is a must if e-learning is to improve as desired	.542	
I have received adequate prior exposure to e-learning that has made my attitude towards e-learning positive		.758
I personally support e-learning as the best solution to educational access challenges in Uganda		.710
I use personal modem or WI-FI to connect to the internet whenever the internet provided by the school is down		.588
I requisition for the inputs I need to teach via e-learning whenever they are not available		.561
Eigen value	2.401	1.851
% of Variance	30.018	23.144
Cumulative %	30.018	53.162
Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.		

From Table 4.29, two components were extracted from the items that were administered to measure teachers' experiences on actions against factors challenging e-learning uptake. These components were such that '1' was identified as 'teachers' experiences institutional actions' and '2' as 'teachers' experiences with personal actions'. The corresponding Eigen values were both greater than one, implying that the components were reliable measure of the actions. Institutional actions were the best measure as it accounted for the greater percentage variance

(30.018%) of the total cumulative percentage variance of 53.162% that the two components claimed.

The correlations indicate that the best measure of institutional actions was in the form of improving the speed of internet is necessary to support e-learning as desired (Correlation = .812) while that of personal actions constituted teachers receiving adequate prior exposure to e-learning that makes their attitude towards e-learning positive (Correlation = .758). The factor analysis results obtained from the questionnaire items used to measure level of e-learning uptake are shown in Table 4.30.

Questionnaire items administered to teachers to measure level of e-learning uptake	Component 1
I deliver most of the lessons online	.810
I encourage students to access the reference materials online	.789
I use my 'data' searching for online information I need to plan lessons I deliver to students.	.711
I spend much of my teaching time engaged learning online	.639
Teaching online has improved my instructional performance	.621
I upload most of the lessons prepared for students on their school portal	.469
Eigen value	5.275
% of variance	72.529
Extraction Method: Principal Component Analysis	

Table 4.30 indicates that only one component was generated. This component was obviously the level of e-learning uptake. The items measured it in a reliable way (Eigen value = 5.275) and they accounted for up to 72.529% of the level of e-learning realised in the selected schools. After establishing the reliable measures of the independent and dependent variables, correlation analysis was conducted.

Results from correlation analysis:

The correlation results obtained from teachers' self-assessed experiences with e-learning and its level of uptake are presented in Table 4.32.

Variables	Statistics	Level of e-learning uptake	Instructional engagement in e-learning	Satisfaction experienced with e-learning	Perceived challenges to e-	Coping strategies

					learning instruction	
Level of e-learning uptake	r	1	.352**	.676**	.466**	.440**
	Sig. (2-tailed)		.000	.000	.000	.000
	N		167	167	167	167
Level of engagement experienced with e-learning	r		1	.478**	.512**	.682**
	Sig. (2-tailed)			.000	.000	.000
	N			167	167	167
Satisfaction experienced with e-learning	r			1	.617**	.596**
	Sig. (2-tailed)				.000	.000
	N				167	167
Perceived challenges to e-learning instruction	r				1	.857**
	Sig. (2-tailed)					.000
	N					167
Coping strategies	r					1
	Sig. (2-tailed)					
	N					
**. Correlation is significant at the 0.01 level (2-tailed).						

The correlations (r) in the first row of Table 4.32 indicate that each of the independent variables (level of engagement experienced with e-learning [r = .352, Sig. = .000 < 0.01], Satisfaction experienced with e-learning [r = .676, Sig. = .000 < .01], reflective experiences with factors challenging e-learning [r = .466, Sig. = .000 < 0.01] and experiences with coping strategies [r = .440, Sig. = .000 < 0.01) correlated significantly with the level of e-learning uptake. Therefore, the dependent variable could be regressed on the independent variables using multiple linear regression analysis. Results are presented in the next section.

APPENDIX L: UGANDA CHRISTIAN UNIVERSITY RESEARCH ETHICS APPROVAL

UGANDA CHRISTIAN UNIVERSITY
A Centre of Excellence in the Heart of Africa

Office of the Vice Chancellor
Research Ethics Committee UG-026

11th August, 2024

NANTAGYA GRACE SSEBANAKITTA,
Uganda Christian University
+256 772401668,
Email: nantagyagrace2018@gmail.com

UG-REC-026 APPROVAL NOTICE

To: **Nantagya Grace Ssebanakitta,** Principal Investigator

Re: **UCU-REC Application titled**: *An Analysis Of Academic Staff And Student Experiences With E-Learning Uptake In Universal Secondary Education Schools In Central Uganda.*

Application Number: **UCUREC-2024-909**

UGANDA CHRISTIAN UNIVERSITY APPROVED UNTIL 09 JUL 2025 RESEARCH ETHICS COMMITTEE

Version: 4.1
Type: [ ] **INITIAL REVIEW**
[ ] Protocol Amendment
[ ] Letter of Amendment (Loa)
[ ] Continuing Review
[ ] Material Transfer Agreement
[ ] Other, Specify:

I am pleased to inform you that the **UG-REC-026;** UCUREC approved the above referenced application.
Approval of the research is for the period from **09th July, 2024,** to **09th July, 2025**
This research is considered minimal risk category.
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and additions to the protocol or the consent form must be submitted to the REC for re-review and approval **prior** to the activation of the changes. The REC application number assigned to the research should be cited in any correspondence.

P.O. Box 4, Mukono, Uganda, Plot 67-173, Bishop Tucker Road, Mukono Hill
Tel: +256 (0) 312 350 885 Fax: +256 (0) 4142 90 800 Email: rec@ucu.ac.ug Web: www.ucu.ac.ug
UCUREC is accredited by Uganda National Council for Science & Technology, FDA, and National Institutes for Health of the United States of America

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Office of the Vice Chancellor
Research Ethics Committee UG-026

3. Reports of unanticipated problems involving risks to participants or other must be submitted to the REC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for REC review.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date of 09th July, 2025 in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by **UG-REC _026:**

	Document Title	Language	Version	Version Date
1.	Research Proposal	English	3.0	2024-06-13
2.	Data Collection Tools	English	2.0	2024-06-13
3	Informed consent forms	English	2.0	2024-06-13
4	CVs for Investigators	English	2.0	2024-06-13

Signed and Stamped

Prof. Peter Waiswa.
UCUREC Chairperson,
pwaiswa@musph.ac.ug

UGANDA CHRISTIAN UNIVERSITY
APPROVED
UNTIL
09 JUL 2025
RESEARCH ETHICS COMMITTEE

UGANDA CHRISTIAN UNIVERSITY
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Office of the Vice Chancellor
Research Ethics Committee UG-026

11th August, 2024

NANTAGYA GRACE SSEBANAKITTA,
Uganda Christian University
+256 772401668,
Email: nantagyagrace2018@gmail.com

UG-REC-026 LETTER OF AMENDMENT NOTICE

To: Nantagya Grace Ssebanakitta, Principal Investigator

Re: UCUREC Application titled: *Influence Of Ontology-Based E-Learning Design Features On Its Uptake In Universal Secondary Education Schools In Central Uganda To An Analysis Of Academic Staff And Student Experiences With E-Learning Uptake In Universal Secondary Education Schools In Central Uganda.*

Application Number: **UCU REC-2024-909**
Version: 4.0

UGANDA CHRISTIAN UNIVERSITY APPROVED UNTIL 09 JUL 2025 RESEARCH ETHICS COMMITTEE

Type: [ ] **LETTER OF AMENDMENT (LOA)**
[ ] Initial Review
[ ] Protocol Amendment
[ ] Continuing Review
[ ] Material Transfer Agreement
[ ] Other, Specify:

I am pleased to inform you that the **UG-REC-026;** UCUREC has accepted to amend the above referenced application.
The amendment is valid with the initial approval of the research which is from **09th July, 2024.** to **09th July, 2025.**

This research is considered minimal risk category.
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and additions to the protocol or the consent form must be submitted to the REC for re-review and approval prior to the activation of the changes. The REC application number assigned to the research should be cited in any correspondences

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4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits

5. Regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date of 09th July, 2025 in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by UG-REC _026:

	Document Title	Language	Version	Version Date
1.	Research Proposal	English	3.0	2024-06-13
2.	Data Collection Tools	English	2.0	2024-06-13
3	Informed consent forms	English	2.0	2024-06-13
4	CVs for Investigators	English	2.0	2024-06-13

Signed and Stamped

Prof. Peter Waiswa.
UCUREC Chairperson,
pwaiswa@musph.ac.ug

UGANDA CHRISTIAN UNIVERSITY
APPROVED
UNTIL
09 JUL 2025
RESEARCH ETHICS COMMITTEE

Grace Nantagya

AN ANALYSIS OF ACADEMIC STAFF EXPERIENCES WITH E-LEARNING UPTAKE IN UNIVERSAL SECONDARY EDUCATI...

FINAL SUBMISSIONS
RESEARCH SUPERVISION 2025
Uganda Christian University

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