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RESEARCH THESIS

AN E-LEARNING THEORY FOR INTERACTION AND COLLABORATION

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THIS RESEARCH THESIS IS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR PhD. DEGREE IN INFORMATION SYSTEMS OF THE UNIVERSITY OF NAIROBI

Declaration

I hereby declare that this thesis is my work and has not been submitted to any other institution of higher learning to the best of my knowledge.

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This thesis has been submitted in fulfilment of the requirements for the PhD in Information Systems of the University of Nairobi, with my approval as the University supervisor.

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Dedication

This thesis is dedicated to my dear husband, Patrick Kibuku, whose support and patience throughout this PhD have been unwavering. May God bless you immensely, and for sure, I will make it up to you for the long hours of my absence while undertaking this research.
To my daughters Julie, Judie, and June, "my PhD is my PhD," and I love you to the moon and back.

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Finally, I bear the responsibility for all the mistakes and errors in this document, the above assistance notwithstanding.

Rachael Kibuku, 2020

Abstract

The use of modern technologies in various sectors has gained popularity in contemporary days to improve effectiveness and efficiency in service delivery. The education sector, too, has witnessed innovative use of technology to deliver education, a practice commonly known as e-learning. The term e-learning is a compound term comprised of two parts: the 'electronic' part referred to as the 'e' and the 'learning' part.

This research focused on the theoretical perspective of e-learning, having observed that most of the previous research in e-learning mainly applied itself to descriptive studies of e-learning systems, their design, implementation, success stories, and challenges. A closer look at the existing literature does not reveal any e-learning theory specifically developed to guide the e-learning practice. Instead, e-learning has relied on the 19th and 20th Century Classical Learning Theories (CLTs), namely: *behaviourism, cognitivism, constructivism,* and *social constructivism*. Though these theories are applied to e-learning with notable success, they fall short in certain aspects of e-learning. Their main shortcoming stems from the fact that they were stipulated long before e-learning existed with all its modern technologies. Thus the technology concept is missing in them. Constructivism and social constructivism are the two theories that underpin interaction and collaboration among e-learners and between e-learners and e-tutors. Connectivism is a more contemporary theory that aims at explaining the use of contemporary digital technologies to achieve social connectedness for interaction and collaboration between the parties. However, taken together, these theories fail to explain certain aspects of interaction and collaboration in e-learning adequately. e-Learning practitioners have appealed to Information System (IS) theories to explain the 'e' part of e-learning. Notably, the IS theories were not stipulated for e-learning but as general models for technology acceptance. Other researchers had previously observed this theoretical gap in e-learning, and some of them justified the need for an e-learning theory. Others laid the foundation upon which future researchers would build such a theory. Therefore, this research sought to develop a theory for interaction and collaboration that strikes a balance between CLTs and the IS theories.

The research used Constructivist Grounded Theory (CGT), a suitable methodology for developing a theory when the existing theories do not adequately explain a phenomenon and whose output is a theory to clarify the phenomenon. The research involved two Institutions of Higher Learning

(IHLs) in Kenya that the researcher *sampled purposively*. It involved the researcher interacting with e-learners, e-tutors, and e-learning managers that were *sampled theoretically*. The research used *in-depth interviews* and *participant observation* to iteratively collect data from the research participants. The research obtained qualitative data that was analyzed qualitatively using Atlas.ti. Data collection followed *theoretical sampling,* where the researcher pursued participants who maximized the possibility of getting rich data with the necessary variability. The research used *thematic analysis* to identify emergent themes and dimensions from the data, which were further *categorized* and *sorted* into eight key concepts based on the discovered similarities, differences, and relationships. The key concepts included *e-Learner, e-Tutor, e-Learning Technologies, e-Content, Learner-Learner Interaction, Learner-Tutor Interaction, Learning,* and *e-Learning Context.* Finally, the key concepts were *integrated* to form the overarching theme or the *core concept/category,* namely *'the interactive and collaborative e-learning theory.'*

The contribution of this research is a theory that explains interaction and collaboration in e-learning. This research appreciates the contributions of the extant theories that have guided e-learning in the past and is in no way proposing that those contributions are not valid or no longer needed. On the contrary, these theories have been tested repeatedly and have proven to work as best practices. Thus, certain aspects have been borrowed and integrated with the new findings in the developed theory. This research believes that it has significantly contributed to e-learning practitioners, providers, researchers, policymakers, e-learners, e-tutors, and academia.

The research recommends further investigation in the teaching of STEM subjects that involve practicals via e-learning, which has proved to be a daunting task to both universities in the wake of resource constraints and limited e-tutors' ICT and pedagogical competencies. The research also recommended quantitative testing of the theory in e-learning settings and more IHLs, with different social and technical environments, to expand its generalizability.

Key Terms: Learning, ICT, e-Learning, Theory, Pedagogy, e-Learning Pedagogical Model, Interactive and Collaborative Learning.

Key Terms

Learning is the lasting behaviour and attitude adjustment manifested as a result of acquiring knowledge through conditioning by practices and experiences in the learning environment (Bognar, 2015).

e-Learning is the application of Information and Communication Technologies (ICTs) in the teaching and learning process. These ICTs include various media, applications, and processes to deliver text, audio, images, animation, and streaming video. In practice, e-learning incorporates learning strategies and technologies that range from removable media to radio and TV, satellite-delivered, computer-based learning, local intranet and extranet, web-based learning, audio and video conferencing (Suryawanshi & Suryawanshi, 2015). This definition is broad enough to include mobile learning that encompasses mobility and blended learning that emphasizes the use of learning technologies in the conventional classroom.

Theory is the set of the connections between phenomena, emphasizing the causal relationships that identify what variables come first (A) and when they come, and which variables (B) happen due to the earlier events. These explanations include why particular events happen or do not happen (Sutton & Staw, 1995). Charmaz (2014) defines the term 'theory' from positivist and interpretivist perspectives. Sutton and Staw's (1995) definition is the commonplace example of theory derived from a positivist position. It accounts for connections among abstract concepts/variables observed from a phenomenon under study and seeks to explain the causality in order to generalize it to situations outside the phenomena. On the other hand, the interpretivist view of theory underscores interpretation and offers abstract understanding greater priority than explanation. Beyond seeking causality, 'interpretative theory allows for indeterminacy and aims to theorize patterns and connections' (Charmaz, 2014, p. 230).

Pedagogy is the set of conscious activities and interactions between teachers and learners in the learning environment (Murphy, 2008). It is the art or science of teaching and learning that constitutes various teaching and learning strategies to suit different situations. It is a master plan that details what is to be done by the teacher and the learner (Bhowmik et al., 2013).

Pedagogical Models are the set of broad principles through which theory is applied to learning and teaching practice. In contrast, **e-learning pedagogical models** are the roles that technology plays in supporting the teaching and learning process (Mayes & de Freitas, 2004).

Interactive and Collaborative Learning involves learners and tutors participating in discussion groups, engaging in interactive and collaborative activities. When applied to e-learning, e-learners and e-tutors communicate, interact, and collaborate using electronic means such as discussion forums, chat rooms, email, bulletin boards, social media, teleconferencing, video conferencing, and group working tools (Musa et al., 2012).

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List of Acronyms and Abbreviations

BYOD	Bring Your Own Device
CAK	Communication Authority of Kenya
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CGT	Constructivist Grounded Theory
CGGT	Classical Glaserian Grounded Theory
CLTs	Classical Learning Theories
COVID-19	Corona Virus Disease-2019
CUE	Commission of University Education
C-TPB-TAM	Combined Theory of Planned Behavior and Technology Acceptance Model
EE	Effort Expectancy
e-Learning	Electronic Learning
FC	Facilitating Conditions
FGT	Feminist Grounded Theory
GOK	Government of Kenya
GT	Grounded Theory
ICT	Information and Communication Technologies
IDT	Innovation Diffusion Theory
IHLs	Institutions of Higher Learning
IS	Information Systems
ISP	Internet Service Provider
IT	Information Technology
LC	Learning Communities
LMS	Learning Management System
m-Learning	Mobile Learning
MM	Motivational Model
MOODLE	Modular Object-Oriented Dynamic Learning Environment
MoE	Ministry of Education
NACOSTI	National Commission for Science, Technology, and Innovation
ODeL	Open, Distance and e-Learning
PCUM	PC Utilization Model

PE	Performance Expectancy
REP	Rural Electrification Programme
ROI	Return On Investments
ROP	Republic of Kenya
SCT	Social Cognitive Theory
SGT	Straussian Grounded Theory
SI	Social Influence
SMS	Short Messaging System
STEM	Science, Technology, Engineering and Mathematics
TAM	Technology Acceptance Model
TOE	Technology-Organization-Environment Framework
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology
3G	Third Generation
4G	4th Generation

CHAPTER 1: INTRODUCTION

1.0 Background to the Problem

There has been an expanded demand for higher education in Kenya in the past two decades, fueled by the high number of secondary school leavers and working-class students (Nyerere et al., 2012). This demand has led to an increased number of universities and middle-level colleges. According to the Commission of University Education (CUE), by December 2020, there were 31 state-sponsored universities with seven constituent colleges, 20 private-sponsored universities with three constituent colleges, and 13 universities operating with letters of interim authority (CUE, 2020). Some universities in Kenya have embraced Open, Distance, and e-Learning (ODeL) to widen access to higher education and improve flexibility. According to a study by Nyerere (2016) entitled '*Open and Distance Learning in Kenya, A Baseline Survey Report,'* eight public universities and five private universities had ODeL programs. However, despite the numerous e-learning benefits, promises, and opportunities, e-learning initiatives in Kenyan universities face many challenges. According to Ssekakubo et al. (2011), most e-learning initiatives in developing countries do not fulfil their promise; they either fail partially or totally. These challenges, in turn, have led to the slow uptake of e-learning in Institutions of Higher Learning (IHLs) in Kenya (Nyerere, 2016).

According to Kibuku et al. (2020a & 2020b), the uptake, implementation, and delivery of e-learning are hindered by some challenges, which include:

i. ICT and e-learning policy implementation issues (Nyerere, 2016; Tarus et al., 2015).
ii. Lack of and/or inadequate ICT infrastructure necessary to carry out the e-learning activities (Communication Authority of Kenya [CAK], 2018; Government of Kenya [GoK], 2012; Kashorda & Waema, 2014; Nyerere, 2016).
iii. Lack of ICT and pedagogical skills and training on the part of e-tutors and e-learners (Isaacs & Hollow, 2012; Kashorda & Waema, 2014; Nyerere et al., 2012; Tarus et al., 2015)
iv. Budgetary constraints and sustainability issues (Isaacs & Hollow, 2012; Kashorda & Waema, 2014; Tarus et al., 2015).
v. Questionable e-learning quality and negative attitudes towards e-learners' qualifications by prospective employers (Gaskell & Mills, 2014; Hadullo et al., 2017; Njoroge & Kibaru, 2012; Nyerere, 2016).

vi. Domination of learning by technology leading to unmet educational aims and goals (Njenga & Fourie, 2010; Shank, 2015).

vii. Lack of and/or inadequate learner support (Gaskell & Mills, 2014; Muuro et al., 2014; Nyerere et al., 2012).

Each of the identified challenges presents an improvement area in e-learning that should be addressed. Of importance to this research are two challenges; first, lack of interaction and collaboration among e-learning participants, leading to learner isolation and loneliness. Second and perhaps the more fundamental problem that has been very apparent in e-learning is the lack of a guiding theory (Andrews, 2011; Kibuku & Orwa, 2018 & Kibuku et al., 2020a; Ruth & Kaspar, 2017; Serdyukov, 2015). Theories play a central role in guiding practice across all disciplines. However, a review of the available literature reveals no e-learning theories per se. What is known are enhancements of the Classical Learning Theories (CLTs) of *behaviourism, cognitivism, constructivism*, and *social constructivism,* to include the use of technology in learning (Mayes & de Freitas, 2004). Besides, most of the existing literature constitutes accounts of practice and experiences in e-learning (Andrews, 2011). In 2005, *connectivism* was stipulated as a learning theory in the digital era to explain the interconnection of e-learners and e-tutors using modern technologies. The argument justifying the application of CLTs in e-learning has been that e-learning is just like conventional learning, with the only difference being the 'e'; where the 'e' has been argued to be just a conduit of delivering learning (Andrews, 2011). e-Learning being a hybrid/compound term suggests something distinctive about it that makes it different from conventional learning. Thus, a blanket application of CLTs to e-learning may not work. These CLTs were formulated long before e-learning existed with all the modern technologies in use today (Pange & Pange, 2011). Information System (IS) theories have been used to inform technology adoption in e-learning. Still, they too have inadequacies because they were not explicitly intended to explain technology adoption in e-learning per se.

1.1 Statement of the Problem

Learners learn better when interacting with fellow learners and tutors during the learning process. However, this is not the case with many e-learning initiatives found today because they lack adequate and prompt e-tutors' feedback, have limited or lack learners' collaboration and social

interactions (Muuro et al., 2014). These challenges effectively make e-learning a solitary journey relegating the e-learners to isolation and loneliness. Consequently, e-learner isolation results in low motivation, low completion rates, and high dropout rates, among others (Gaskell & Mills, 2014). Theoretical principles provide the foundation upon which any practical discipline is built and thus determine the healthy development of that discipline. However, the past and present e-learning initiatives lack a guiding theory expressly stipulated for e-learning; hence they refer to the CLTs. *Constructivism* and *social constructivism* are the relevant CLTs to interaction and collaboration. e-Learning initiatives have also referred to *connectivism,* a contemporary learning theory in the digital era. Despite these theories having contributed immensely to e-learning with great success, they have certain lacunae, hence inadequate to address specific critical aspects of e-learning (Andrews, 2011; Harasim, 2012; Ruth & Kaspar, 2017). Taken together, constructivism, social constructivism, and connectivism fail to explain what constitutes the desired online interactive and collaborative activities and behaviours, how and when those activities should happen, who should initiate those activities, what roles to be played by the e-learners and e-tutors in the interaction, the desired level of interaction among the e-learners and between e-learners and e-tutors, which technologies to use to achieve the intended social connectedness of learners and tutors and how to choose those technologies. Therefore, it is imperative to have a theory that will answer these questions to address e-learner isolation.

1.2 Purpose of the Research

Having identified a theoretical gap in e-learning, the purpose of this research was to develop a substantive e-learning theory for interaction and collaboration to address the lack of or limited interaction and collaboration between e-learners and e-tutors in IHLs in Kenya. By interviewing the e-learning participants and observing the Learning Management Systems (LMSs), this research sought and established the attributes and concepts that formed the substantive e-learning theory for interaction and collaboration. It also sought factors that influenced interaction and collaboration in e-learning, the e-learners and e-tutor's challenges when interacting during the learning process and the strategies to address them. Finally, the research also sought to establish the LMS design characteristics and challenges that resulted in limited and/or lack of interaction and collaboration.

1.3 Research Questions

The main research question for the research was: *'what key concepts should be considered in developing the e-learning theory, and how do they relate to each other?'* Specifically, the research sought to answer the following questions:

i. What key concepts should be considered in developing the theory to underpin interaction and collaboration?
ii. What attributes of the key concepts should be considered in developing the theory for interaction and collaboration?
iii. How do the relationships between identified attributes and concepts affect interaction and collaboration among e-learners and between e-tutors and e-learners?
iv. How will the key concepts be integrated to form the e-learning theory for interaction and collaboration?

1.4 Scope of the Research

The research focused on distance learning programs of IHLs in Kenya to improve interaction and collaboration in e-learning from a theoretical perspective.

1.5 Significance of the Research

The results of this research will particularly be important to the e-learning stakeholders (e-learners, e-tutors, e-learning providers, e-learning system designers, researchers, and policymakers) and other industry practitioners outside the education sector in the following ways:

i. The e-learning providers and practitioners will have the theory to guide the provision and implementation of e-learning initiatives.
ii. The e-learners and e-tutors will benefit from improved interaction and collaboration in e-learning if and when practitioners put it into use.
iii. The e-learning policy and decision-makers will have the theory to appeal to when formulating policies and making decisions, respectively.
iv. The research results will contribute to the existing knowledge available to academia and future e-learning researchers.
v. The e-learning system designers will have a reference theory when designing systems for usability, affordability, and learnability with an eye towards interaction and collaboration.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter presents the literature on the theoretical background in e-learning and its justification. It includes a detailed discussion of the CLTs, their contributions and shortcoming in the e-learning context. It consists of a discussion of the IS theories that have informed technology uptake in e-learning, including their contribution and limitations. It also explains the CLTs' corresponding pedagogical models and their efficacy in delivering e-learning. The contemporary research efforts towards developing an e-learning theory(ies) have also been discussed, highlighting their achievements and research gaps. Finally, the chapter ends by summarizing the identified research gaps and how this research addressed them.

2.1 Theoretical Framework

e-Learning is a hybrid term made up of learning, and the technologies used to deliver education referred to as the 'e' (Andrews, 2011). This theoretical framework consists of a literature review on the CLTs that underpin the learning part and the IS theories that underpin the 'e' part of e-learning. The theoretical framework played a central role throughout the research process and permeated many aspects of the research (Collins & Stockton, 2018; Grant & Osanloo, 2014). Before data collection, the theoretical framework formed the foundation upon which the research was built. It was geared towards identifying the research gaps in the CLTs and formulating the research problem. It also aimed to determine the provisional concepts and develop the research questions that guided the data collection process. Post the data collection stage; the theoretical framework informed the data analysis and theory development decisions and their justification.

2.1.1 Classical Learning Theories

Learning theories offer realistic accounts of how learning happens, explaining which variables are involved in learning (Mayes & de Freitas, 2004; Watson, 2001). The following sections present the discussion of the generation-wise evolution of learning theories.

a) Behaviourist Theory

Behaviourism has its foundation in the works of among others: Ivan Pavlov, the founder of *classical conditioning* (Pavlov, 1927), J.B. Watson, who coined the term *behaviourism* (Watson,

1924) and B.F. Skinner, the proponent of *operant conditioning* (Skinner, 1938). Behaviourists believe that learning constitutes behaviour modification (response) resulting from external stimuli. Behaviour modification is the escalation or reduction of particular behaviour relative to the learning objectives (Anderson & Simpson, 2012; Schunk, 2012a; Standridge, 2010; Watson,1924). Practice combined with either positive or negative reinforcement is used to achieve and strengthen the intended behaviour. Positive reinforcement in the form of rewards escalates the desired behaviour, while negative reinforcement in the form of punishments suppresses the undesired behaviour (Pange & Pange, 2011; Pavlov, 1927; Standridge, 2010). They believe that the learner's mind is a black box that does not involve any mental processing and that the only indicator of learning is the observable or measurable behaviour (Modtritscher, 2006; Schunk, 2012a; Standridge, 2010; Watson, 1924). Behaviourism applies to e-learning in content organization and ordering of instructional experiences so that easy concepts precede the difficult concepts to encourage the development of the intended behaviour (Modtritscher, 2006). It is also suitable for training and coaching skills that entail demonstrations, working processes, and drilling (Alzaghoul, 2012; Modtritscher, 2006).

Behaviourism has some shortcomings; first, it fails to explain how learners process external stimuli and understand the information they receive from the environment. To them, elucidations not based on human behaviour are immaterial (Tomic, 1993), and this is the inadequacy that consequently gave rise to cognitivism (Bezhovski & Poorani, 2016). Therefore, the black box argument may not be entirely accurate since some information processing occurs in the human mind, as was later proved by cognitivism. Secondly, behaviourism reduces learning to a mechanical level by expecting all learners to portray similar behaviour. In contrast, learners are intelligent beings capable of responding differently even to the same stimuli (Tomic, 1993). This perspective limits its application in the e-learning environment due to the diverse characteristics of e-learners drawn from different backgrounds, especially if it fails to meet their varied needs. Thirdly, behaviourism confines learners to learning to do/behave instead of learning to become (Anderson & Simpson, 2012). This perspective does not suffice because there is more to learning than behaviour modification.

Furthermore, since not all behaviour is observable or measurable, learning goals should go beyond quantifiable behaviour (Anderson & Dron, 2011; Weiss et al., 2014). Its application in the e-learning context is limited because the anticipated behaviour adjustment may be difficult to quantify or observe owing to the distance between the e-learners and e-tutors. Finally, behaviourism is a tutor-oriented theory that encourages passive learning and lacks social presence (Anderson & Dron, 2011). Thus, when applied to e-learning, it widens the gulf between remote e-learners and their e-tutors.

b) Cognitivist Theory

Cognitivism had several proponents. It has its foundation in the works of Jean Piaget, the proponent of *'human cognitive development stages'* (Piaget, 1970), and Edward Tolman, the proponent of *'purposive behaviour'* or *'goal-directed learning,'* which was a departure from behaviourists' convictions (Tolman, 1959). Cognitivism argues that the human mind is a white box that reveals the inner mental activities and processing of external stimuli with memory involvement. Such activities include comparison, abstraction, thinking, attention, and reflection (Bognar, 2016; Pange & Pange, 2011; Piaget, 1970; Yilmaz, 2011). Cognitivism recognizes diverse learner characteristics, arguing that learning approaches should include those differences and encompass all senses (Alzaghoul, 2012; Modtritscher, 2006). Thus, it applicable to e-learning in the design of learning resources and activities to accommodate the different cognitive styles among the e-learners (Modtritscher, 2006).

Cognitivism advocates decomposing the complex content into small and manageable bits to avoid overloading the memory (Yilmaz, 2011). Since it supports the sequencing of information from previously learned information to new information, it's appropriate for e-learners due to the content challenges they face in the absence of the e-tutor. However, cognitivism is a tutor-oriented theory that encourages passive learning and lacks social presence (Anderson & Dron, 2011). Hence it's a teaching theory rather than a learning theory, an inadequacy exacerbated in e-learning due to the spatial and temporal separation between the parties. Further, its e-learning application is inadequate since e-learners play an active role due to the e-tutor's passive role. This reversal of roles necessitates redefining the roles of both parties. Open learning is cognitivism's corresponding pedagogical model.

c) Constructivist and Social Constructivist Theories

Constructivism was advanced by the works of John Dewey, the proponent of the *'active learning'* concept (Dewey, 1938 & Schunk, 2012b), Jerome Bruner, the proponent of the *'discovery learning'* concept (Bruner, 1961), and Albert Bandura, the proponent of *'social learning'* theory (Bandura, 1977; Bognar, 2016; Kalpana, 2014). Constructivism argues that learners understand through critical inquiry and construct new knowledge by actively participating in learning experiences instead of absorbing information from tutors (Bandura, 1977; Dewey, 1938; Mayes & de Freitas, 2004; Pange & Pange, 2011). To e-learning, constructivism implies that e-tutors should create learning resources and experiences that involve online collaborative activities to encourage e-learners to participate in the learning and knowledge discovery process independently (Alzaghoul, 2012; Modtritscher, 2006). Distributed learning is constructivism's corresponding pedagogical model.

Vygotsky and Bruner extended constructivism to *social constructivism* to include the *'social presence'* in learning (Vygotsky, 1978; Bruner, 1984). They reasoned that learning in groups allows learners to co-create knowledge and understand the real world they exist in and experience, a concept known as the *'situated learning'* (Bruner, 1984; Kalpana, 2014; Vygotsky, 1978). To e-learning, the situated perspective implies that learning experiences ought to be designed close to the real world where the e-learners exist (Amineh & Asl, 2015; Bruner, 1984; Vygotsky, 1978). Distributed learning and Learning Communities (LCs) are social constructivism's corresponding pedagogical models.

Constructivism and social constructivism are learning rather than teaching theories (Anderson & Dron, 2011; Richardson, 2003). In a constructivist environment, tutors' mastery of content is secondary, and their role reduces to a facilitator. Therefore, there is a gap in the definition of the constructivist tutors' role, with many yearning to teach in a conventional class setting to showcase their content mastery to their learners (Richardson, 2003). In constructivist e-learning, since the e-tutors are already passive, their role becomes more blurred. Moreover, being meaning-making theories, they advocate that e-learners should understand the experiences encountered in a constructivist e-learning environment, such as e-tutors' instructions, e-content, and the different knowledge creation and interaction technologies. Unfortunately, it may be more challenging for

the constructivist e-learners to make sense of the e-content in the absence of the e-tutor and figure out how to use the different interaction technologies.

2.1.2 Connectivist Theory

Connectivism is a contemporary theory of learning proposed by Siemens (2005) and Downes (2008) to guide learning in the digital age. They argued that knowledge is situated in LCs where learners learn by contributing to or drawing from the community (Downes, 2008; Siemens, 2005). Thus, learning is based on the diverse opinions of the LCs members (Foroughi, 2015; Kop & Hill, 2008). LCs are groups of learners with similar learning interests and agenda. They exchange ideas, share knowledge, participate in projects and social-cultural activities to collectively solve problems in their real-world setting (Aparicio et al., 2016; Downes, 2008; Kop & Hill, 2008; Siemens, 2005). Therefore, the design of e-learning experiences and activities should include active learning groups where e-learners and e-tutors participate. Thus, the e-tutors' role (Bruner, 1984; Kalpana, 2014; Vygotsky, 1978), (Bruner, 1984; Kalpana, 2014; Vygotsky, 1978), (Bruner, 1984; Kalpana, 2014; Vygotsky, 1978), (Bruner, 1984; Kalpana, 2014; Vygotsky, 1978), extends beyond facilitation to support the e-learners, particularly with the complex e-content (Kalpana, 2014; Watson, 2001).

Connectivism emphasizes contemporary technologies to interconnect the e-learners and e-tutors (Foroughi, 2015; Siemens, 2005). Its justification is that CLTs were postulated long before we had e-learning with its new technologies, but it also has its inadequacies when used in e-learning (Sahin, 2012). Due to its emphasis on contemporary technologies, its corresponding pedagogical models are subsequently techno-centric and include social media networks and LCs (Dabbagh, 2005), which is problematic in some ways. First, significant decisions tend to be based on technologies rather than existing theory(ies) and learning objectives. Second, technologies are ever-evolving; hence connectivism is not certain about emerging technologies (Sahin, 2012). Third, learning technologies are likely to sidetrack the e-learners from the e-content they deliver, thus hindering the achievement of the learning objectives. Fourth, the efficient working of a connectivist e-learning environment relies on the availability of vital resources, such as devices, the internet, electricity, and financial resources (Sahin, 2012). Fifth, to survive in a connectivist environment, e-learners and e-tutors need to be trained to use these new technologies.

Connectivism's pedagogical application to e-learning is problematic because it's more evidently a knowledge organisation theory than a teaching or learning theory (Anderson, 2008, Anderson & Dron, 2011; Siemens, 2005). Therefore, it is hard to map it into learning strategies and harder into teaching strategies (Anderson & Dron, 2011; Janssen & Bodemer, 2013). Secondly, apart from being a facilitator and fellow node in the network, the e-tutors' role is almost alien (Anderson & Dron, 2011). Correcting this inadequacy is necessary since nearly all e-learners need e-tutors' support in complex content and activities. They also need e-tutors' help to verify and corroborate information obtained from other sources (Kop & Hill, 2008). Thirdly, e-learners feel confident when they can sense e-tutors' control of the class, akin to a conventional classroom, lacking in connectivist e-learning. As a result, connectivist e-learners feel confused and lost, especially at the beginning of the course, since it is difficult to relate to the new technologies, thus needing the e-tutors' help to navigate the connected cyberspace (Anderson, 2008 & Anderson & Dron, 2011). Finally, connectivism fails to explain the impact of social interconnectedness (or its failure thereof) on e-learners' performance. It also fails to define collaborative learning activities, the necessary tutorial support in the connected environment, and the impact of diverse social-cultural backgrounds on group dynamics (Sahin, 2012).

Table 2.1 summarizes the contributions and shortcomings of CLTs as applied to e-learning.

Table 2.1 Summary of Contributions and Shortcomings of CLT as Applied to e-Learning (Source: Kibuku & Orwa, 2019)

CLTs	Contributions to e-Learning	Shortcomings in e-Learning Context
Behaviourism	1. It stipulates that a behaviour change is evidence of learning having taken place. 2. Proposes that instructional steps should be sequenced to build on previously learned knowledge. 3. It advocates for breaking down complex learning content into small manageable units. 4. Its Advocates for teaching and learning simple concepts before complex ones. 5. It is applicable for teaching and learning skills and tasks that entail demonstration, coaching, procedure, and operation.	1. Since the e-learners are away from the e-tutors, it may be difficult for e-tutors to observe/measure the behaviour change. 2. It flips the e-learners and e-tutors' roles because it is tutor-centred with passive learners; hence, learning may not occur since e-learning is essentially learner-centred. 3. It lacks social presence, confining the e-learners and e-tutors to a solitary learning style. 4. It does not account for how the e-learners process and make sense of stimuli they receive from the e-learning environment.
Cognitivism	1. It stipulates that learning is an active process through which information is processed in mind in interaction with memory and attention, which involves thinking, reflecting, comparison and abstraction, 2. It advocates for breaking down content into small chunks to prevent memory overload. 3. It proposes the inclusion of activities in the learning content and process for different learning and cognitive styles. 4. It advocates for the use of all senses in the learning process.	1. Like behaviourism, cognitivism flips the e-learners and e-tutors' roles because it is tutor-centred with the passive learner; hence learning may not occur since e-learning is essentially learner-centred. 2. Like behaviourism, cognitivism lacks social presence, thus confining the e-learners and e-tutors to a solitary learning style.
Constructivism	1. It proposes that learning should be learner-centred. 2. It advocates for group and collaborative learning to address loneliness. 3. Advocates that learners should construct their knowledge. 4. Proposes that learning should be by discovery and authentic experiences within learners' context. 5. Advocates for learning that promotes critical thinking and meaning-making experiences.	1. It mainly focuses on learning rather than teaching, diminishing the role of the e-tutor. 2. It is challenging for e-learners to make meaning of content with a remote and passive e-tutor. 3. Fails to take into consideration the cultural differences of the e-learners. 4. Though it advocates for collaborative and interactive behaviours, it does not define the scope of such behaviours and activities.

CLTs	Contributions to e-Learning	Shortcomings in e-Learning Context
Social Constructivism	1. It proposes that learning should be learner-centred. 2. It advocates for group and collaborative learning (social presence) to address loneliness. 3. It advocates that learners should construct their knowledge. 4. It proposes that learning should be by discovery and authentic experiences within learners' context. 5. It advocates for learning that promotes critical thinking and meaning-making experiences. 6. It emphasizes situating learning, knowledge, and authentic learning experiences within the social context of the e-learner.	1. Like constructivism, it mainly focuses on learning than teaching and hence diminishes the tutor's role. 2. It is challenging for e-learners to make meaning of content with a remote and passive tutor like in constructivism. 3. Like constructivism, it fails to consider the cultural differences of the e-learners. 4. Like in constructivism, though it advocates for collaborative and interactive behaviours, it does not define the scope of such behaviours and activities.
Connectivism	1. The theory emphasizes networks achieved through modern technology to interconnect the e-learners and e-tutors 2. It also further emphasizes the organization of knowledge in all the available technologies.	1. The role of the e-tutor is not defined. 2. Like in constructivism and social constructivism, though it advocated for collaborative and interactive behaviours, it did not define the scope of such behaviours and activities. 3. Connectivism emphasizes the use of modern technologies; hence its pedagogical strategies are techno-centric, and so are the e-learning decisions. Consequently, this leads to the domination of learning outcomes and objectives by technology. 4. The knowledge stored in all these technologies needs to be authenticated before the e-learners can use it.

2.1.3 Information Systems (IS) Theories in e-Learning

Having reviewed the CLTs that have contributed to the 'learning' part of 'e-learning' in the previous section, this section focuses on the contribution of IS theories to the 'e' part. IS theories are different from theories in other disciplines because they extend their ontological and epistemological stances to include innovation, access, acceptance, use of artefacts/technologies, and the interaction of users with artefacts (Gregor, 2006). Technology acceptance is the observable willingness of a user or a group of users to use technology to support the task for which it was designed (Dillon, 2001). e-Learning employs a host of ICTs whose acceptance and use at the individual (e-learners and e-tutors) and organizational level need to be understood from a theoretical perspective. According to Attuquayefio and Addo (2014), the application of IS theories is crucial because it informs the planning of ICT integration and adoption in learning to ensure the successful implementation of e-learning initiatives to achieve the learning goals. Further, they argue that certain conditions which enable the creative use of ICTs in teaching and learning should be met. These pre-conditions include availing the necessary ICTs, technical training and support, professional and pedagogical training, and the adjustment of e-tutors' and e-learners' negative attitudes and perceptions towards ICT integration in teaching and learning.

Therefore, this literature review sought to know the contributions and limitations of the IS theories as applied to e-learning. Understanding IS theories before data collection was relevant because it informed the research about the technical factors to anticipate and how likely they are to influence technology adoption or its lack thereof in e-learning. During data analysis and in the theory development stage, the IS theories were relevant because they allowed evaluation of the extent to which acceptance had taken place and how e-learners and e-tutors responded to these e-learning technologies. The IS theoretical framework also formed the basis of relating the results to the existing theories and literature (Grant & Osanloo, 2014 & Collins & Stockton, 2018).

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

Venkatesh et al. (2003) proposed UTAUT as an attempt to provide a unified model of user acceptance of technology by integrating constructs from eight prominent theoretical models of user acceptance. The constituent models include the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Motivational Model

(MM), Combined Theory of Planned Behavior and Technology Acceptance Model (C-TPB-TAM), PC Utilization Model (PCUM), Social Cognitive Theory (SCT) and Innovation Diffusion Theory (IDT). UTAUT's key constructs include:

i. ***Performance Expectancy (PE)*** is the extent to which a user perceives that using technology will aid them to achieve gains in job performance.

ii. ***Effort Expectancy (EE)*** is the ease of using technology.

iii. ***Social Influence (SI)*** is the extent to which one believes that their social circle of friends thinks that s/he should use a particular technology. The need to conform with one's circle of friends and preserve one's social status or image drives the SI.

iv. ***Facilitating Conditions (FC)*** is the extent to which a user perceives that a technical and organizational infrastructure exists to support the use of a particular technology.

In UTAUT theory (see Figure 2.1), ***PE, EE,*** and ***SI*** have a direct impact on ***Behavioral Intention (BI),*** which consequently affects ***Behavior Use (BU)***. The model also indicated that **FC** directly affects ***Use Behavior (UB)*** (Attuquayefio & Addo, 2014)**.**

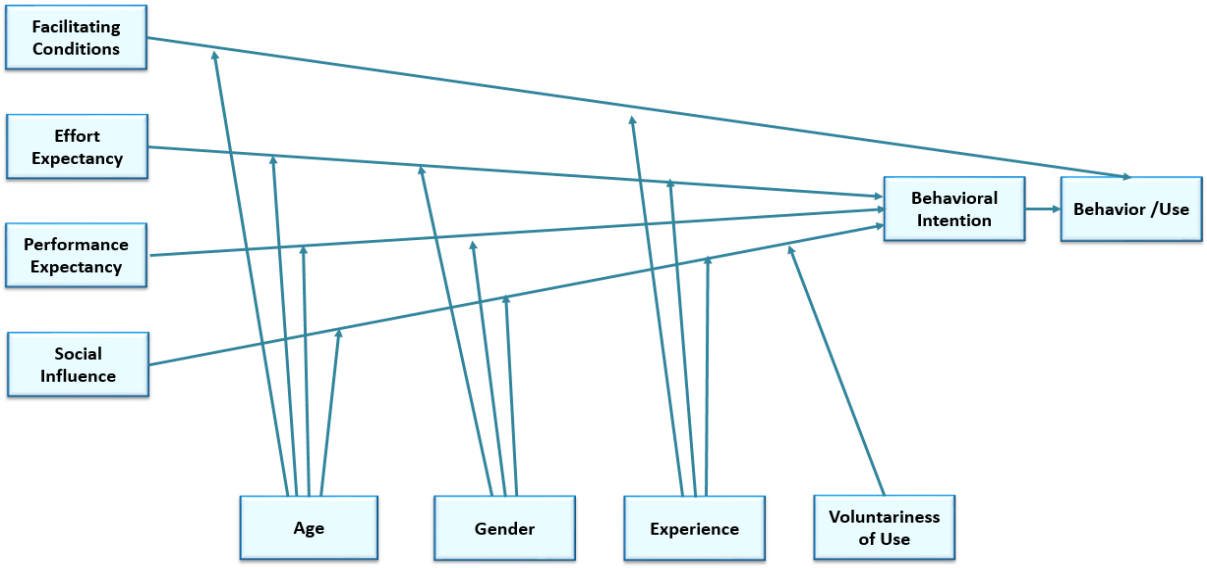

Figure 2.1: UTAUT Model (Source: Venkatesh et al., 2003).

Table 2.2 shows UTAUT's key constructs, descriptions, and theory (ies) from which they were drawn.

Table 2.2: UTAUT Constructs, Descriptions, and Contributing Theories

Key Construct	Constructs	Description	Contributing Theory
Facilitating Conditions (FC)	Perceived Behavioral Control(PBC)	It is the user's perception of the existence or nonexistence of necessary resources and opportunities that limit technology use. It includes self-efficacy, resource, and technology facilitating conditions.	TPB, (C-TAM-TPB)
	Facilitating Conditions(FC)	These are the observable factors in the job context that observers agree as making the job easy to undertake. They include the provision of the necessary technologies and equivalent technical support.	PCUM
	Compatibility(C)	It is the extent to which a technology is perceived to be consistent with the prevailing principles, past experiences, and needs of prospective users.	IDT
Performance Expectancy (PE)	Perceived Usefulness(PU)	It is the extent to which a user considers that using a particular technology will improve their job performance.	TAM, TAM2, (C-TAM-TPB)
	Extrinsic/External Motivation(EM)	The external benefits that users perceive as accruing from using technology including improved job performance, promotions, and better salary.	MM
	Job-Fit (JF)	It is the degree to which a user considers that using technology can improve their job performance.	PCUM
	Relative Advantage(RA)	It is the extent to which a technology is considered better than its forerunner.	IDT
	Outcome Expectation(OE)	These are the perceived possible consequences of using technology.	SCT
Effort Expectancy (EE)	Perceived Ease of Use(PEOU)	It is the extent to which a potential user anticipates that the intended technology will be effort-free to use.	TAM, TAM 2
	Complexity(C)	It is the extent to which a technology is perceived to be comparatively challenging to comprehend and use.	IDT, PCUM
	Ease of Use(EOU)	It is the extent to which a technology is perceived as challenging to use.	IDT
Social Influence (SI)	Subjective Norm(SN)	It is a user's perception that most of their friends think they should or should not use the technology.	TRA, TAM, TAM 2 TPB, C-TAM-TPB)
	Social Factors(SF)	These are the user's attitudes and perceptions of the culture of a reference group and particular relational arrangements made between them and others in particular social circumstances.	PCUM
	Image	It is the extent to which using the technology is perceived as enhancing the user's status in one's social circles.	IDT

UTAUT has made theoretical contributions on some fronts: First, it indicates that ***PE*** is the strongest predictor of behavioural intention in mandatory and voluntary environments. It suggests that age combined with gender moderates the relationship between ***PE*** and behaviour intention (Ahmad, 2014; Venkatesh et al., 2003). For instance, since ***PE*** focuses on accomplishing tasks using technology, it tends to be salient in men because they are more task-oriented than women. The combined effect of age and gender is particularly so for younger men (Ahmad, 2014; Venkatesh et al., 2003). Second, it indicates that age and experience moderates the relationship between ***FC*** and behaviour use (or non-use) of technology, especially when considering the older users with little or no experience in mandatory and voluntary environments (Ahmad, 2014; Venkatesh et al., 2003). Third, UTAUT indicates that experience and age combined with gender moderates the relationship between ***EE*** and behavioural intention in mandatory and voluntary environments (Ahmad, 2014; Venkatesh et al., 2003). It suggests that the expected effect of ***EE*** on behavioural intention to use technology is salient in women, mainly among younger women in their early days of experiencing the technology (Ahmad, 2014; Venkatesh et al., 2003). Fourth, it indicates that age, gender, experience, and voluntariness of use moderates the relationship between ***SI*** and behavioural intention in mandatory environments. It argues that ***SI*** is salient among older users, especially among women in the early days of experiencing technology. ***SI*** is more salient for women because they are more susceptible to the opinions of important people in their lives, particularly younger women. However, this effect reduces as they grow older and gain experience in using technology. Finally, it indicates a substantial positive relationship between behavioural intention to use technology and use (or non-use) (Ahmad, 2014; Venkatesh et al., 2003).

Like all theories, UTAUT has some shortcomings; one observable shortcoming is its failure to underscore the importance or the role of training in technology (Ahmad, 2014). Another shortcoming is its assumption that the technology already exists and/or it is available to individual users; thus, it is only applicable to organizations adopting the technology and not individuals outside a formal organization (Dwivedi et al., 2019). Further, it fails to consider some attributes of individual users adopting the technology. Key among such attributes would be the users' motivation, attitudes, and perceptions as independent or moderating factors (Ahmad, 2014; Dwivedi et al., 2019).

This research favoured UTAUT for four reasons. First, it accumulated eight technology acceptance models and their constructs under one accessible theory. Second, before data collection, UTAUT informed how its key constructs influence technology adoption (or its lack thereof) in determining e-learners' and e-tutors' behavioural intention and subsequent behaviour use (or non-use) of e-learning technology. Third, during data analysis and theory development, UTAUT was used to evaluate the extent to which the key constructs actually influenced adoption. Finally, UTAUT was relevant because it includes the effects of demographics (gender and age), user experience, and voluntariness of use as moderating constructs, unlike some of its constituent theories. This advantage allowed the researcher to evaluate the extent to which these moderating factors influenced the uptake of e-learning technologies among e-learners and e-tutors.

b) Technology-Organization-Environment (TOE) Framework

Tornatzky et al. (1990) posited TOE to capture the entire process from inception, creation, marketing, adoption, deployment, and use of the technology within an organizational context (Baker, 2012). It describes three constructs that influence technology acceptance decisions: technological, organizational, and environmental contexts (see Figure 2.2).

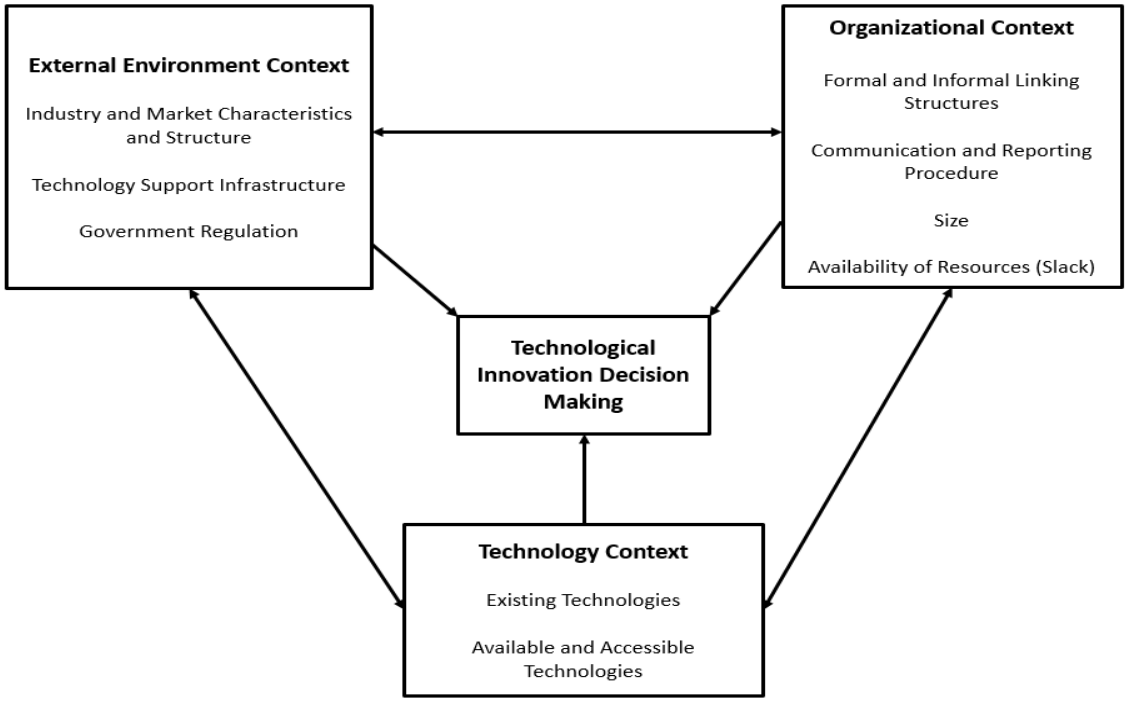

Figure 2.2: Technology-Organization-Environment Framework (Source: Tornatzky et al., 1990)

The *technological context* encompasses the current technologies within an organization and those available and accessible in the market should the organization desire to expand its range of existing technologies (Awa et al., 2017).

The *organizational context* encompasses intra-organizational attributes such as organizational structure (centralized or decentralized decision making, formal or informal linkages between staff, and flow of communication between staff). TOE argues that decentralized cross-functional, lateral, and informal relationships between departments and teams within an organization can boost technology acceptance at the adoption level. It also argues that top management's formal structures and centralized decisions are favourable, especially at the technology implementation level, and in embracing and supporting technological changes to improve its core business. The size of an organization is another attribute of consideration where large organizations are thought to be more likely to adopt a technology than small organizations (Awa et al., 2017; Baker, 2012). However, there is no conclusive relationship between size and adoption from previous research. The bigger the organization, the more factors that are likely to confound the adoption process making it more complex (Baker, 2012). It also argues that slack influences adoption, which is the amount of resources at the organization's disposal needed to fund the technology's acquisition, deployment, and sustenance. However, this argument is countered by the observation that limited or lack of technology adoption can persist even in the presence of resource availability.

The *environmental context* captures all the entities external to the organization adopting the technology, which include: first, the ICT industry, the technologies available in the market, the regulatory framework, competition among the institutions adopting and those innovating the technology, availability of the ICT service providers, the rate of technology evolution and innovation as well as the maturity of the industry. Second, the supporting infrastructure includes the ICT infrastructure within a country and the necessary skilled technical capacity. Third, government regulation in the form of policies that either allow or disallow certain technologies or ways of using certain technologies. Prohibitive policies can positively and negatively impact society and the organization's adoption of the technologies. Such policies may constrain or increase the adoption rate in an organization (Awa et al., 2017; Baker, 2012).

TOE has some shortcomings too. Firstly, its application as a technology acceptance theory is limited to organizations since it fails to consider individual users' adoption factors within or outside organizational settings (Awa et al., 2017). Secondly, it assumes that the organizations within which individual users exist have already availed the technologies to be adopted, which may not always be the case (Awa et al., 2017). Thus some individual users may have to acquire their technologies within their organizations.

This research used TOE inductively, and its use became necessary during the data analysis and theory development stage. Its relevance stemmed from the fact that the *'e-learning environment'* emerged as a key concept during theory construction. The *'e-learning environment'* concept had two sub-concepts: *organization and the external environment*. The external environment was made up of the government agencies that regulate higher education, such as the CUE and Ministry of Education (MoE). It also consists of the national ICT infrastructure that supports e-learning. Therefore, TOE was used to evaluate the results to establish how these three factors influence the adoption of e-learning at the organizational level and, by extension, how it affects interaction and collaboration.

2.2 e-Learning Pedagogical Models

Bhowmik et al. (2013) define pedagogy as the art and science of teaching and learning. Mayes and de Freitas (2004) describes pedagogical models as the set of broad principles through which learning theories are applied to learning and teaching practice. Consequently, e-learning pedagogical models are the particular roles that technology plays in supporting e-learning pedagogy and implementation. The following sections present a discussion of the e-learning pedagogical models.

2.2.1 Open/Flexible Learning

Open learning is an approach that shifts the learning focus from the e-tutor to the e-learner. It involves delivering a pre-established curriculum to flexibly meet the individual e-learners' needs while creating open learning spaces anytime, anywhere the e-learners might be (Aparicio et al., 2016). It includes a range of non-conventional learning offerings such as part-time or evening courses, short courses, workshops, seminars, conferences, certificate programs, and bespoke

package training. Open learning environments rely on the Internet and Web-based technologies, including knowledge portals, knowledge networks, virtual classrooms, tele-learning, and asynchronous learning networks (Dabbagh, 2005). The open learning pedagogical model encourages one-to-one communication between the e-tutors and e-learners, and their unit of involvement in learning is an individual (Dabbagh, 2005). Therefore, it is equivalent to the cognitivist theory. Many e-learning initiatives in IHLs in Kenya today use the open learning pedagogical model characterized by asynchronous learning portals that lack real-time interactive and conversational communication between e-tutors and e-learners (Nyerere et al., 2012). Thus the e-tutors upload the learning materials, and e-learners, in turn, download and study them privately, attempt the tests individually and upload them back to the LMS for their e-tutors to grade them (Nyerere et al., 2012).

2.2.2 Distributed Learning

Distributed learning or ubiquitous learning is the delivery of education whenever and wherever, using one or more technologies (Aparicio et al., 2016). It mostly tends to be off-site learning with e-learners taking their courses at home at a self-paced and self-appointed time. The e-learners interact with their fellow e-learners and e-tutors via e-mail, chatrooms, discussion fora, audio, and video conferencing (Dabbagh, 2005; Kibuku & Orwa, 2019). Distributed learning is characterized by one-to-many (between e-tutor and e-learners) as well as many-to-many (among e-learners) communication (Dabbagh, 2005). Therefore, its unit of involvement in learning is a group and is consequently equivalent to the constructivist theory (Dabbagh, 2005; Kibuku & Orwa, 2019). Though there are efforts to use chatrooms and discussion fora in IHLs in Kenya, their use between e-tutors and e-learners is limited and involves the whole class instead of small groups. Despite the LMSs having collaborative tools, many-to-many communication and collaborative learning were lacking. Nyerere et al. (2012) also noted a lack of audio and video conferencing tools in e-learning.

2.2.3 Learning Communities

Learning Communities (LCs) are groups of learners supporting one another in their learning agenda. They work on projects, learn from one another and their environment, engage in collective authentic socio-cultural activities, solve challenging problems together, where participation leads to gaining new knowledge (Aparicio et al., 2016). LCs, demand deliberate reorganization of e-

learners' time around the shared projects to boost learning among learners, between e-learners and their e-tutors, and across disciplines. LCs are academic and social support groups. They are informal learning environments that shift the emphasis from teaching to learning (Dabbagh, 2005). LCs should involve e-tutors' participation to share their views with e-learners (Weiss et al., 2014). They are characterized by one-to-many (between e-tutor and e-learners) as well as many-to-many (among e-learners) communication (Dabbagh, 2005). Therefore, their unit of involvement in learning is also a group. Consequently, they are equivalent to the social constructivist and connectivist theories (Dabbagh, 2005; Kibuku & Orwa, 2019). Except for social media use among the e-learners using WhatsApp, the kind of interaction and collaboration envisaged in LCs lacked in IHLs in Kenya (Nyerere et al., 2012).

Table 2.3 summarizes the learning theories, corresponding pedagogies and technologies, unit of involvement, content structure, learner evaluation level, learner status, and the tutor's role.

Table 2.3 Summary of Learning Theories, e-Learning Pedagogies, and Technologies Used (Adapted from Kay & Kibble, 2016).

Underpinning Learning Theory	e-Learning Pedagogical Model	Technology Used	Learner Activities	Learning Unit of Involvement	Content Structure	Evaluation	Status of e-Learner	Role of e-Tutor
Behaviourism	N/A	Printed Materials.	Reading	Individual	Fine: scripted and designed from the ground up.	Recall	Passive and Reactive	Content Creation and Disseminator.
Cognitivism	Open Learning (ODeL)	Print, TV, radio. One-to-one communication.	Reading, listening, and watching.	Individual	Fine: scripted and designed from the ground up.	Recall	Passive	Content Creator and Stage Manager of the learning process.
Constructivism (Active Learning)	Distributed Learning	Conferencing (audio, video, and Web). One-to-many & Many-to-many communication.	Reading, listening, watching, innovating, and constructing	Group	Medium: scaffolded and arranged, teacher-guided.	Co-creating, analyzing, and synthesizing knowledge.	Active	Facilitator, Guide, and Helper in the knowledge construction process.
Social Constructivism (Situated Learning)	Distributed Learning & Learning Communities.	Conferencing (audio, video, and Web). One-to-many & Many-to-many communication.	Reading, listening, watching, innovating, discussing, creating, and constructing.	Group	Medium: scaffolded and arranged, teacher-guided.	Co-creating, analyzing, and synthesizing knowledge.	Active	Discussion Leader, Facilitator, and Guide in the knowledge construction process.
Connectivism (Social Interconnectedness)	Learning Communities & Social Media Networks.	Web 2.0: Social networks, aggregation & recommender systems. Many-to-many communication.	Exploring, connecting, creating, application, constructing, and evaluating.	Network	Coarse: Large mainly at object and person level, self-created.	Creating knowledge and evaluating artefacts.	Active	Friend with critical input and fellow sojourner.

2.3 Contemporary Efforts Towards e-Learning Theory Development.

Some researchers observed a theoretical gap in e-learning and noted that though the CLTs had some shortcomings, they informed the e-learning practice. From the literature review, there have been various attempts toward the development of an e-learning theory (ies) by some researchers such as Anderson (2008), Andrews (2011), Andrews and Hythornthwaite (2007), Harasim (2012), Mayes and de Freitas (2004), Nichols (2003, 2011), Pange and Pange (2011) and Siemens (2005).

Nichols (2003), in a study titled '*A Theory for e-Learning*', observed the theoretical gap in e-learning and proposed ten-point principles upon which future researchers can develop an e-learning theory. His model included: technology, content, e-learner, e-tutor, and pedagogy factors summarized in Table 2.4. However, it failed to include the *'learner-learner interaction'* and *'learner-tutor interaction'* factors. Even for the factors considered, there are specific attributes that were missing. For instance, in the technology factor, the study assumed an already existing set of technologies. It failed to consider that the said technologies must be acquired and deployed, after which there must be the training of the e-learners and e-tutors and their eventual use. Furthermore, it failed to recognize the role of the organizational and national environment in facilitating and availing of the technologies needed for e-learning.

Table 2.4: Nichols' (2003) Ten Fundamental Principles of an e-Learning Theory

S/No	Hypothesis/Fundamental Principle	Key Factors
1	e-Learning as a means of learning should be based on educational philosophies such as behaviourism and cognitivism constructivism.	Learning theories.
2	e-Learning should fit in the paradigms of learning, i.e., it can be applied to face-to-face and distance education models of education using innovative technologies.	Technology.
3	Choice of technology should be based on theory to support the pedagogy.	Technology.
4	Pedagogical choices will drive the e-learning agenda.	Learning.
5	e-Learning can be used to deliver content and to enable communication and interaction between the tutors and learners.	Content, interaction, and technology.
6	e-Learning technology tools should be integrated into the e-learning course design.	Content and technology.
7	e-Learning technologies must have an added value to the process of learning.	Technology and learning.
8	e-Learning pedagogies chosen should allow the learner to learn and create more learning opportunities.	Learner, Tutor, learning.
9	e-Learning being a means of education, should allow learning to happen and educational goals to be achieved.	Learning.
10	Pedagogical advantages of e-learning over face-to-face learning will justify the use of e-learning	Learning and technology.

Later on, Nichols (2011), in another study entitled *'Articulating e-Pedagogy for Education',* continued to recognize the role of technology in delivering education to distance learners, thus relating it to pedagogy but failed to capture the facilitating environment in which e-learning technology functions.

The research by Mayes and de Freitas (2004) titled '*Review of e-Learning Theories, Frameworks, and Models*' noted that CLTs guided e-learning and observed the theoretical gap in e-learning. Their research reviewed the main contributions of the CLTs to e-learning but did not present their shortcomings. However, unlike the previous study by Nichols (2003) its failed to formulate a framework for theoretical postulations.

The research by Anderson (2008) entitled '*Towards a Theory of Online Learning',* designed a model of online learning with the following components: learner, tutor, communication, support,

and content/knowledge (See Figure 2.3). Though the study did not explicitly name the *'technology'* construct, it is implied in the *'communication'* construct. It stated that communication between the e-learning participants could be asynchronous or synchronous through innovative technologies. The study indicated that internet access is nearly ubiquitous in the developed countries, but this is not the case in developing countries where internet access and affordability are still challenging. Therefore, any e-learning initiative needs to be sensitive to the level of ICT infrastructure in the country within which the organization, the e-learners, and e-tutors exist.

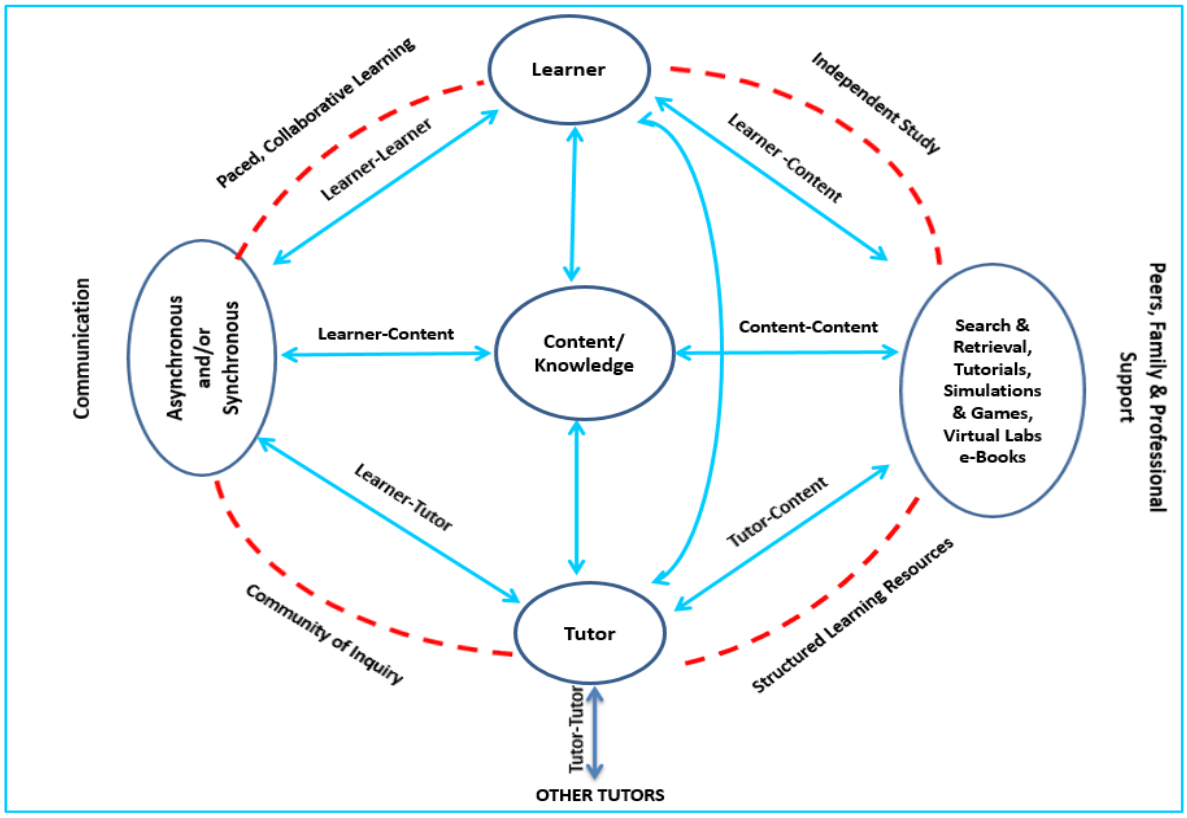

Figure 2.3: A Model of Online Learning (Adapted from Anderson, 2008)

The research by Andrews (2011) titled *'Does e-Learning Require a New Theory*? *Some Initial Thoughts',* highlighted the critical differences between e-learning and conventional learning, thus making a case for an e-learning theory. Unlike the forerunners such as Nichols (2003) and Anderson (2008), this study did not yield a theory, but it initiated the debate towards an e-learning theory where it argued that the development of such a theory needs to combine theories from social informatics, communication, digital media, and conventional learning as the building blocks. The

proposal was a plausible starting point, but it was too general since it lacked the specific factors that would constitute the eventual e-learning theory.

The research by Pange and Pange (2011) entitled *'Is e-Learning Based on Learning Theories? A Literature Review'* observed that CLTs guided e-learning and that the existing literature mainly described e-learning from a techno-centric perspective lacking in theoretical backing. The research failed to inform about the pedagogical challenges resulting from the lack of an e-learning theory and did not develop one.

Serdyukov (2015), in a study titled *'Does Online Education Need a Special Pedagogy?',* justified the need for a special e-learning theory based on the differences between conventional learning and e-learning. The differences cited include curriculum and content design, content presentation, learning context and procedures, learning outcomes, instruction technologies, learning abilities, attitudes and perceptions, interest and motivation, learner autonomy, interaction, communication and collaboration, and interaction between learners and tutors. It went ahead to propose a ten-construct e-learning theoretical model as summarized in Table 2.5. However, it failed to name the 'e-learner' construct explicitly and referred to it generally as a *'human development'* construct. Further, although it included the *'education technologies'* construct*,* it assumed that such technologies are already available and ready for use. But this research believes that before the technologies are in place and ready for use, certain prerequisites need to be met. These prerequisites include affordability, access, training, and choice of the technologies to use by the organizations, e-learners, and e-tutors.

Moreover, e-learning in any country exists in a broader context defined by various players likely to impact the acquisition, deployment, and delivery of e-learning technologies. That context includes the national ICT infrastructure, national ICT and e-learning policy, national ICT and education regulatory bodies, and MoEs. These external factors influence the availability, access, and use of technology and hence need to be considered in the technology construct. Finally, although it mentioned the engagement between e-learners and e-tutors as a contributing factor to the *'methodology of teaching and learning'* construct, it omitted the activities that occur, when

they occur, how frequently they occur, and via what technologies. It also failed to include the attributes of the construct about the engagement among e-learners.

Table 2.5: e-Pedagogy Theoretical Model (Adapted from Serdyukov, 2015)

S/No.	Contributing Attributes	Factors
1	Education value, purposes of education, systems of education, pedagogy as an art and science, relationships between pedagogy and other sciences, constructivism and connectivism, e-pedagogy locating in the overall pedagogy, contemporary and future developments in education	Online Pedagogy
2	Goals, Types, Structures, and Formats	Online Higher Education
3	Human Development (cognitive, emotional, social, and professional), students' characteristics, abilities and learning styles (adult vs conventional student), students in online vs classroom environments, students' dispositions, motivation, socialization in education, learner autonomy, self-efficacy, and self-development in the process of learning.	Human Development
4	Pedagogical approaches, content and knowledge creation, interaction and collaboration in learning, quality assurance, acquisition and use of ICT skills	Principles of Teaching and Learning
5	Methods of teaching, content formatting, critical thinking, solving problems, communication, socialization, teaching, and learning technologies.	Methods and Tools
6	Technical and pedagogical features, e-learning technologies, social media networks, m-learning tools	Educational Technologies
7	e-Tutor and e-learner engagement in the learning process, The rationale and order of the process, kinds of learning, e-learner activities, quality assurance	Methodology of Teaching and Learning
8	Content masterly, pedagogical masterly, continuous ICT and pedagogical training e-tutor's roles and activities, instructional style	Online Instructor
9	Course structure, learning material design, e-tutor activities, e-learner activities, interaction, and navigation e-learner assessment and support	Designing Online Education
10	Course and lesson preparation, management of time	Planning and Time Management in Teaching and Learning

2.4 Knowledge Gaps

Based on the foregoing discussion, some knowledge gaps emerged that needed further investigation. It was clear that there lacks an e-learning theory (ies) despite the growth and the development witnessed in the e-learning field (Andrews, 2011; Andrews & Haythornthwaite, 2007; Mayes & de Freitas, 2004; Nichols, 2003; Ruth & Kaspar, 2017). The CLTs missed the

technology construct (Pange & Pange, 2011). The 21st Century learners are also very different from the 20th Century learners for whom these theories were intended (Scott, 2015). Thus there is a need to investigate how their attributes have changed over time. Anderson (2008), Andrews (2011), Andrews and Hythornthwaite (2007), Harasim (2012), Mayes and de Freitas (2004); Nichols (2003), Pange and Pange (2011) and Siemens (2005), had previously identified this gap and proposed the development of an e-learning theory (ies). Though there have been certain initiatives towards developing an e-learning theory, still they have not fully accounted for certain key constructs and their characteristics such as technology, e-learners, e-tutors, interactive support, and collaboration.

The missing attributes of the technology concept identified from the literature and investigated in the research included: ICT infrastructure availability, accessibility, bandwidth, bandwidth affordance, interaction design and usability, ICT budget/funds availability**,** ICT training, and ICT costs. The missing characteristics of the e-learners' concept that were identified from the literature and investigated in the research included: age, age difference, gender, motivation levels, interest, learner autonomy, ICT literacy, e-learning readiness, cultural differences, conflicting priorities, specific roles, and activities of e-learner, and their attitudes towards technology and e-learning. The missing characteristics of the e-tutors' concept identified from the literature and investigated in the research included: age, gender, motivation, ICT competencies, e-pedagogy preparedness, attitudes, and perceptions. Finally, the missing characteristics of the e-content concept identified from the literature and investigated in the research included: content design, content presentation, accuracy, completeness, currency, inclusion of multimedia, adequate instructions, the inclusion of group work activities, inclusion of objectives, and consistency with learning objectives. Table 2.6 summarizes the knowledge gaps that guided the research and how this research addressed each gap.

Table 2.6: Knowledge Gaps (Source: From the Research)

Researcher(s)/ Author(s)	Study Focus	Finding(s)	Knowledge Gap	Strategy
Nichols (2003)	A Theory for e-Learning	It postulated ten hypotheses (principles) of e-learning meant to provide a platform for e-learning theory development.	It failed to eventually develop a theory based on the ten-point framework proposed in their study.	This research developed a theory to explain interaction and collaboration in e-learning.
Andrews and Hythornthwaite (2007) & (2013)	The Sage Handbook of e-Learning Research 1st and 2nd Edition, respectively.	They identified the lack of an e-learning theory expressly stipulated for e-learning.	Though they observed this theoretical gap in e-learning, they failed to formulate one.	This research used CGT to identify the building blocks/constructs/ categories, their attributes, and relationships to develop the theory.
Mayes and de Freitas (2004)	Review of e-Learning Theories, Frameworks, and Models.	They reviewed the significant contributions of the CLTs as applied to the e-learning practice.	They failed to present the inadequacies of CLTs as applied to e-learning practice.	This research explored and established the inadequacies and criticisms of the CLTs.
Anderson (2008)	Towards a Theory of Online Learning.	It proposed a model with five components: e-Learner, e-Tutor, Communication, Support & e-Content.	It failed to include some key attributes of these components. It did not explicitly name the 'technology component' though it was implied. It assumed that the Internet was ubiquitous in the developed countries.	This research considered more components in the developed theory: e-Learner, e-Tutor, e-Content, Technology, Learning, Learning Context, Learner-Learner, and Learner-Tutor Interaction.
Andrews (2011)	Does e-Learning Require a New Theory of Learning? Initial Thoughts.	It highlighted the critical differences between conventional learning and e-learning and thus made a case for developing an e-learning theory.	Though it advocated developing an e-learning theory, it failed to create one or update an existing CLT.	This research established the factors/building blocks and developed a substantive e-learning theory for interaction and collaboration.
Pange and Pange (2011)	Is e-Learning Based on Learning Theories? A Literature Review.	They found out that the available literature mainly described successes and challenges based on CLTs and underscored the importance of developing an e-learning theory.	They failed to present the consequences of the lack of an e-learning theory. They also failed to develop the advocated e-learning theory.	This research identified the pedagogical challenges and consequences of the lack of a guiding theory in e-learning.
Serdyukov (2015)	Does Online Education Need a Special Pedagogy?	It answered this question affirmatively and created a pedagogical framework for developing the theory.	The framework had some critical factors missing, while some factors had essential attributes missing.	This research used their framework to develop the substantive e-learning theory for interaction and collaboration.

2.5 Provisional Concepts/Guiding Interests

This literature review has demonstrated the knowledge and theoretical gaps in existing learning theories and IS models, thus the need to develop a theory to explain interaction and collaboration. Theory development requires an inductive process that allows the researcher to move from qualitative data towards theory formulation (Saunders et al., 2012). This research used Grounded Theory (GT), a suitable methodology when the existing theories have lacunae explaining a phenomenon of interest (Creswell, 2012; Gasson & Waters, 2013; Willig, 2013), which was the case in this research. In line with GT principles, this research did not have a conceptual framework common to the hypothetico-deductive research; instead, provisional concepts guided the research (Charmaz, 2014). The provisional concepts were derived from the literature review and included the: e-learner, e-tutor, e-learning support, e-content, and e-learning technology. These concepts and their attributes were further explored in detail during the research. In addition, other concepts that emerged from the research were included as the process unfolded.

2.6 Summary

The literature shows that CLTs stipulated for conventional learning have mainly informed e-learning. The development of an e-learning theory (ies) may be countered with the argument that CLTs are well-established and adapted to the new e-learning demands with great success. However, CLTs have certain shortcomings when applied in e-learning, as revealed by the literature. Another justification for using CLTs in e-learning has been that e-learning is just another place for learning, and thus no need for an e-learning theory. However, the literature revealed the differences between conventional learning and e-learning, which are sufficient to justify developing a new theory (ies) for e-learning. The review further analyzed past e-learning theory development initiatives. It revealed existing knowledge gaps in these studies in missing constructs and/or attributes. The research addressed these knowledge gaps by developing an e-learning theory that explains interaction and collaboration.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

Creswell (2012) defines *research methodology* as the overall approach to conducting research, including the philosophical underpinning, research paradigm, research approaches, research design, collection, analysis, and presentation of data and interpreting the research findings. This chapter presents the *Constructivist* Grounded Theory (CGT) methodology (Charmaz, 2014) and its justification. It also describes the population, the sample and sampling techniques, the needed data, instrumentation, data collection methods, analysis, memo writing, and theory development.

3.1 Research Philosophy

The *research philosophy* describes how research is carried out in a particular discipline; there are three research philosophies: *positivism, interpretivism, and pragmatism* (Saunders et al., 2012). *Positivism* believes in objectively observing and measuring the events happening in reality. It is mainly associated with natural sciences based on empirical evidence in the form of precise and accurate data. *Interpretivism* adds a subjective perspective to human behaviour. It argues that humans are different from physical objects in that they do not just act, but they have a reason for their actions, thus creating meaning for their behaviour. *Pragmatism* is the middle ground position chosen when the research questions imply the use of both positivism and interpretivism (Gray, 2018; Saunders et al., 2012). As used in this research, the CGT adopted the *interpretivist* philosophical stance, which sought an interpretative representation of the data obtained from the research (Charmaz, 2014). The interpretivism stance was implied by establishing the categories of meaning and their relationships from interview and observation data.

3.2 Research Paradigm

The *research paradigm* defines the nature of inquiry along three major perspectives: *ontology, epistemology,* and *methodology*[1] (Denzin & Lincoln, 2011). *Ontology* describes the state of being/existence and what constitutes reality; it represents an understanding of '*what is' Epistemology* describes the nature of knowledge and what constitutes acceptable knowledge in a field of study; it explains *'what it means to know'* (Gray, 2018). Both ontological and

[1] *Methodology is a set of principles by which knowledge is formed.*

epistemological perspectives form a person's worldview. Saunders et al. (2012) postulate two possible worldviews: O*bjectivism and subjectivism. Objectivists* believe that reality exists outside the human actors concerned with that reality hence must be studied through the laborious scientific inquiry process. Notably, *objectivism* is closely linked to the *positivist* philosophical stance (Gray 2018). S*ubjectivists* believe that human actors, from their consciousness/perceptions, create phenomena. Their subsequent actions are concerned with reality (Saunders et al., 2012); hence, it is impossible to measure subjective human behaviour objectively. Notably, s*ubjectivism* is closely linked to *the interpretivist* philosophical stance (Gray, 2018). This research's CGT chose the *subjective* epistemological view whereby the resulting theory is a *creation* of reality by an active researcher with "privileges, perspectives and interactions" in the research process (Charmaz, 2014).

3.3 Research Approach

The *research approach* refers to the perspective from which the researcher engages with the theory in the study (Gray, 2018; Kothari, 2004). When the engagement occurs before undertaking the research, it is referred to as the *deductive approach.* When it happens after the research, it is referred to as the *inductive approach*. Gray (2018) further argued that inductive and deductive approaches are not mutually exclusive; thus, they can be combined. However, though the researcher conducted a review of technical literature initially, the CGT predominantly took the inductive approach since the full engagement with the existing theories was after constructing the substantive e-learning theory.

3.4 Constructivist Grounded Theory (CGT) Methodology

GT is a methodology of carrying out research that allows the formulation of new context-specific theories grounded in data instead of relying on analytical constructs and concepts derived from extant theories (Wiesche et al., 2017). Therefore, GT implies two things: the research process, namely the methodology and the output, namely the new theory empirically grounded in data (Walsh et al., 2015). It involves identifying and integrating categories of meaning as observed from the data, and its main output is a theory (Wiesche et al., 2017). The output of this research is a substantive e-learning theory for interaction and collaboration. Theories offer accounts for why occurrences happen and give answers to questions (Corbin & Strauss, 2015). GT is applicable

when the existing theories have lacunae explaining a phenomenon (Gasson & Waters, 2013; Willig, 2013). Other methodologies lead to theory development, such as the case study, ethnography, and phenomenology (Creswell, 2012). However, this research favoured GT because its flexible procedures allowed the researcher to examine the e-learners' and e-tutors' thoughts, feelings, and experiences in depth and breadth, thus revealing the latent issues through probing that would otherwise not be possible (El Hussein et al., 2014 & Kalpokaite & Radivojevic, 2019). Further, GT comes in various versions, as explained hereafter.

GT originated with Barney Glaser and Anselm Strauss in 1967 (Glaser & Strauss, 1967). They advocated delaying the literature review until after data collection and analysis to avoid impurifying the emerging theory (Glaser & Strauss, 1967; Muhaiyuddin et al., 2016). They emphasized the iterative process of data collection and its analysis by constant comparison; hence their version of GT was purely positivist and objectivist (Glaser & Strauss, 1967). Over time, different GT versions have emerged, taking different philosophical and epistemological stances from the original version (Khan, 2014; Rupšienė & Pranskuniene, 2010). The emergence of different versions was initially marked by the eventual breakaway of the co-originators of GT, causing two divisions: *'Glaserian'* and *'Straussian'* GT (SGT).

Glaser remained steadfast on the original views of GT; hence his version is known as *Classical Glaserian* GT (CGGT), while SGT extended towards interpretative and subjective perspectives. Further, Glaser viewed GT as a general methodology for conducting research (qualitative or quantitative). He argued that CGGT involves using a systematic set of methods to collect and analyze data to inductively develop a substantive theory about a phenomenon (Khan, 2014; Muhaiyuddin et al., 2016; Rupšienė & Pranskuniene, 2010). On the other hand, Strauss viewed GT as a strategy of qualitative research that allows a theory to systematically emerge from the analysis of qualitative data (Rupšienė & Pranskuniene, 2010). Other ideological disagreements related to the role of the researcher, theoretical sampling, theoretical sensitivity, as well as the place and role of literature review (Corbin & Strauss, 2015; Rupšienė & Pranskuniene, 2010).

The next generation of grounded theorists emerged from the students of Glaser and Strauss, for instance, Corbin and Clarke, among others ascribed to the SGT (Morse et al., 2009). Over time,

SGT became more famous among researchers leading to the version of GT is known as *'Strauss and Corbin'* GT (Muhaiyuddin et al., 2016), which continued to further the views of the SGT. Weust (1995) originated the *Feminist GT* (FGT) for studying nursing as a combination of Feminist Theory and GT. It has application in health and social sciences not as a methodology but as a perspective for studying feminist issues using GT (Muhaiyuddin et al., 2016). It was intended for designing research with a greater probability of revealing the latent issues and experience specific to women. Adele Clarke propagated the *post-modern* GT, also known as the *Situational Analysis,* as an extension of GT that includes a collection of modern-day contexts in which the phenomenon under study is situated (Clarke, 2005). The *post-modern* GT analysis comprises situational maps, positional maps, and social arenas (Rupšienė & Pranskuniene, 2010).

Charmaz originated the CGT, which goes back to the CGGT principles and tries to adjust them to fit the requirements of the modern methods (Charmaz, 2014; Rupšienė & Pranskuniene, 2010). CGT is not a strict set of prescribed rules but a flexible set of guidelines and procedures used in qualitative and quantitative data (Charmaz, 2014). Further, in CGT, the theory is *'constructed'* from the data instead of being discovered. 'Construction' means creating the theory from empirical data analyzed and interpreted by the researcher, who is not a bystander but a co-creator of knowledge in conjunction with the research participants (Charmaz, 2014). Using interviews in CGT gave room for further probing, corroborating the previously collected data and clarifying issues. Interviews involved visiting the e-learner participants in their locations, thus allowing the researcher to witness and relate to the internet access challenges experienced, especially in the remote and rural areas. CGT also allowed data analysis using systematic approaches and applying researchers' intuition and imagination (El Hussein et al., 2014), leading to the conceptualization of interaction and collaboration in e-learning. Thus it was possible to perceive the complete picture of the e-learning context, thereby answering the research questions.

3.5 Preliminary Study and Ethical Consents

Before data collection, the research conducted a preliminary study using the participant observation method to understand the actual situation (see Appendix I and II). It entailed observing the system design characteristics, exchanges among the e-learners and their e-tutors, frequency of the exchanges, tools used in the interaction, attributes of the e-content, among any other

observable features and behaviours. The preliminary study thus shaped the research by establishing the sample's variability and assisted the researcher to reflect and focus on the data needed and where to get it. The results of these observations in the preliminary study also guided the design of the interview schedules (See Appendix III and IV). However, these tools were not strictly adhered to since their primary use was to seek authorization for data collection from the ethics and review board.

The data collection authorization granted by the ethics and review board (see Appendix V) was used to seek further approval from National Commission for Science, Technology, and Innovation (NACOSTI) (See Appendix VI) and Nairobi County's MoE (See Appendix VII). These authorizations were then presented to the respective universities' research and postgraduate schools to seek data collection authorization from their e-learning programs. After that, the researcher called the participants to request an interview; if granted, we scheduled a date. At the beginning of every interview, the purpose and terms of the interview were explained, and participants signed the informed consent form. Once done with the introductory preliminaries, the interviewing process began.

3.6 Research Design

Research design is the strategy of answering the research questions. It involves making decisions about the data needed, which includes: "*what, where, when,* how *much* and by *what means* to gather and analyze the data?" (Kothari, 2004, p. 31). The research adapted the CGT proposed by Charmaz (2014) by combining it with the research design framework proposed by Tie et al. (2019), as shown in Figure 3.1 and explained in the following sections.

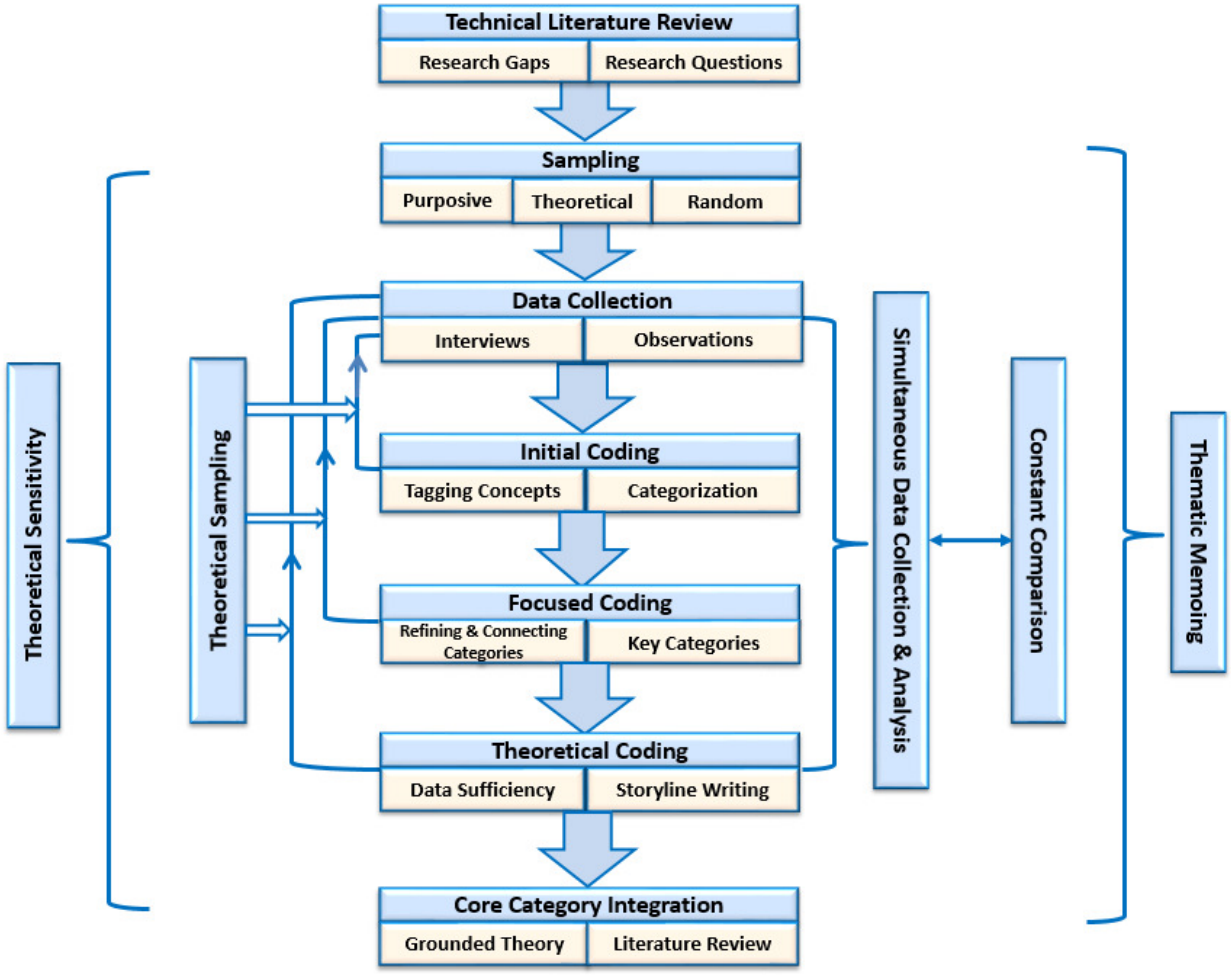

Figure 3.1: Research Design (Adapted from Charmaz, 2014 and Tie et al., 2019)

3.6.1 Technical Literature Review

The research design included a review of technical literature at the beginning. The review served three purposes: first, establishing the theoretical framework to undertake the research, analyze and evaluate the results. The second was to formulate the research problem and research questions. The third was establishing the research gaps and provisional concepts.

3.6.2 Sampling and Sample Size

The research was undertaken in two universities: University-1 and University-2, distance learning programs offered via e-learning, identified through purposive sampling because they had e-learning programs thus, provided the required data. University-1 was selected to represent contemporary universities. University-2 was chosen to represent the older generation of

universities; hence, it had a long history of ODeL programs evolving through all the distance learning generations: correspondence learning, broadcast learning, computer-based learning, and internet-based learning. Though its e-learning programs have not fully grown to intelligent and flexible e-learning, it has adopted m-learning to a greater extent. Therefore, the research had the highest likelihood to observe how gender and age influenced ICT skills acquisition and the adoption of technology into e-learning among its e-tutors. It also had the best chance of understanding how the attitudes and perceptions of the older e-tutors affected the uptake of e-learning over time. The institution also has a broader selection of e-learning programs and, by extension, a larger student base from which to sample. It still uses the learner support centres inherited from the previous generations of distance learning spread across the country to bring the much-needed learner support closer to the e-learners.

University-1 represents contemporary universities with its e-learning history dating back to 2012. It has fewer courses offered via e-learning; hence its e-learning activities are undertaken by a department. It delivers ICT support from the main campus-based ICT support centre to all the e-learners and e-tutors. Further, it leapfrogged to the fourth generation of web-based/online learning without the previous development stages. It also exhibits a great deal of m-learning. With its short e-learning history, it was possible to observe and compare the e-tutor's ICT skills of the relatively younger faculty with University-2 older faculty.

Among the characteristics that made them suitable for the purposive sample included the fact that they were using the MOODLE platform, which has been customized to deliver learning content to the e-learners. The research was interested in studying the extent to which the e-learning systems were designed for usability, affordance, and interactivity. Both universities employed the blended e-learning model. Part of e-learning is carried out online with two weeks of face-to-face interaction between the e-learners and the e-tutors, commonly known as the tutorials. It allowed the researcher to establish the kind of online activities they engage in and the challenges experienced during those engagements. In both universities, interaction and communication are asynchronous using chats and discussion forums. The researcher was able to study the nature of interactions between e-learners and e-tutors, the frequency of interactions, and the technologies used in these interactions. Both universities appreciate the need for training, as evidenced by the orientation training early in

the course for e-learners and e-tutors. The researcher established the focus and frequency of the training and the challenges experienced in training. Both universities also appreciate the need for technical support for e-learners and e-tutors by having ICT support centres. This attribute allowed the researcher to investigate the nature of technical challenges faced by e-learners and e-tutors. Both universities also allowed the researcher to study the e-learners' and e-tutors' profiles regarding their age, gender, motivation, interests, perceptions, attitude, personal characteristics, ICT, and pedagogical preparedness and how all these, in turn, influenced interaction and collaboration in e-learning. Finally, they allowed the observation of the e-learning requirements for the institutions, e-learners, and e-tutors in terms of internet access, device affordability, and the technical capacity of all parties.

The research used a multistage sampling approach comprised of purposive, theoretical, and random techniques to interview 51 participants; 35 e-learners and 16 e-tutors. To identify the e-learners from University-2, class lists of those enrolled in three support centres were obtained from which the participants were sampled theoretically. Similarly, in University-1, class lists of the e-learners enrolled in the various programs were obtained, from which participants were sampled theoretically. An e-tutors list was obtained from University-1's e-learning department, from which the participants were sampled theoretically. In selecting e-tutors from University-2, a list of department heads was obtained. The heads supplied the list of e-tutors in their departments who were sampled theoretically. Out of the 16 e-tutors who participated in the research, six were sampled purposively by virtue of being e-learning coordinators and managers. Since the lists had so many e-learners and e-tutors, the researcher used random sampling to select the specific participants. The selected participants were then contacted via telephone calls, and those who declined to participate in the study were replaced using the same method.

3.6.3 Data Collection

This research used in-depth interviews and participant observation to collect data to answer research questions (i) and (ii). Since the research was qualitative, data collection, analysis, and memoing/presentation were interleaved. In the first iteration of the interviews, the agenda for data collection was the general question, *"Would you kindly narrate your e-learning story, the journey, and the experience so far?"* This question was strategic because it opened up the interview to

varied responses from the participants. It gave them the latitude to respond in the best way possible from their experiences and other relevant viewpoints. Depending on the answer to this question, other probing questions followed. Probing allowed the researcher to seek more information as a follow-up to the response given to the general question. Data collection took place in iterations. The first iteration was a face-to-face interview conducted in a convenient location to the participants and within the official working days to be in line with ethics and review board guidelines. Iterative data collection allowed the researcher to return to the previously interviewed participants to seek clarification and more data based on the emerging concepts and theory. The initial interview with each participant took about one hour to 1½ hours. The researcher used the member-checking technique via telephone calls to conduct successive iterations of data collection as advised by Charmaz (2014). It involved checking on the participants' welfare, clarifying any pending issues, and collecting more data. Member-checking was easy in the successive iterations of data collection because the researcher had already interacted with the participants during the first iteration of face-to-face interviews. The e-learners' data was captured using note-taking, while the e-tutors' data was captured using note-taking and audio recording. Participant observations were further used to corroborate (triangulate) data received through the interviews as advised by Aldiabat & Le Navenec (2018).

3.6.4 Initial Coding

Before initial coding, interview data were subjected to an *'inspection cycle';* a pre-analysis step aimed to establish the *'look and feel'* of the data and understand what each participant was saying (Kalpokaite & Radivojevic, 2019, p. 50). It involved transcribing, cleaning, and ordering the data into a logical flow. It also involved identifying any errors and gaps. Where necessary, at this point, the participant(s) were called (member-checking) to corroborate the information transcribed, correct the errors, fill in the gaps, and probe for more data. The transcribed data was then loaded into Atlas.ti for coding/analysis.

Coding is the analytic process of deciding which part of the data is tagged and the category labels to be assigned. It evolves through three stages (initial, focused, and theoretical) to tell the story (Miles et al., 2020). Analysis followed *constant comparison* and *thematic analysis* techniques. Constant comparison is the iterative data analysis process that involves identifying categories,

similarities among, and differences between emerging categories with the ultimate goal of relating and integrating the identified categories that will eventually form the emerging theory (Willlig, 2013). Thematic analysis is the 'process of identifying patterns or themes within qualitative data' (Maguire & Delahunt, 2017, pp 3352).

Data analysis started with the *initial coding or tagging of the data* from the transcripts using the *constant comparison* approach. This first cycle coding used several coding styles that included descriptive, in vivo, concept, emotion, and attribute coding. The previous interview was coded before conducting the successive interview, and memo writing started right away with the coding of the first interview.

3.6.5 Focused Coding

Focused coding is the second level of data analysis; it involved grouping the codes from the initial coding level into categories based on their similarities. Further data collection using *theoretical sampling* continued iteratively to identify the sub-categories that eventually formed the key categories/concepts for theory development. *Theoretical sampling* is the iterative/cyclic process of simultaneously gathering data, analyzing and interpreting it for theory development, and pursuing more data to saturate and densify the theory (Charmaz, 2014; Gentles et al., 2015; Muhaiyuddin et al., 2016). During iterative data collection and analysis, the researcher remained alert and open to new and unanticipated concepts and their attributes that arose from the research process, a practice known as *theoretical sensitivity.* Memo writing continued throughout all the iterations of data collection and analysis to document the emerging themes.

Figure 3.2 shows the initial and focused coding levels of an excerpt from an e-learner's interview using Atlas.ti as carried out in this research.

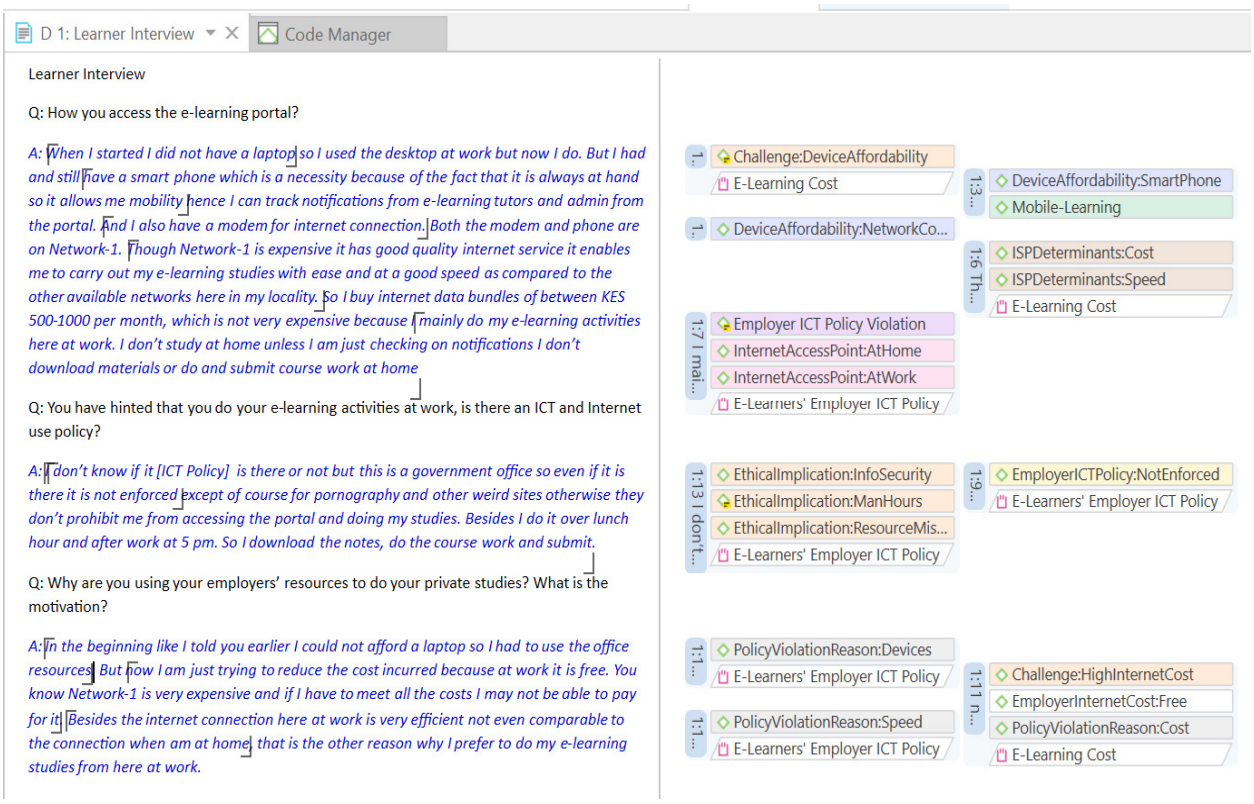

Figure 3.2: An Example of Initial and Focused Coding Cycle

3.6.6 Theoretical Coding

The researcher collected and analyzed more data in the later stages using *theoretical sampling* to saturate the theoretical categories identified from the focused coding level. This process is known as *theoretical coding*. At this coding level, the researcher also sought to identify negative cases that did not fit the constructed categories to qualify and elaborate the developed theory.

Table 3.1 shows the coding levels from the research based on the e-learner's interview excerpt in Figure 3.2.

f the Three Coding Levels

From the First Interview	Initial Coding	Focused Coding	Theoretical Coding
-learning portal?			
have a laptop, so I used the desktop at work, a smartphone, which is necessary because it me mobility and tracking notifications from min from the portal. And I also have a on. Both the modem and phone are on -1 is expensive, it has good quality internet ry out my e-learning studies with ease and ther available networks in my locality. So I between KES 500-1000 per month, which is mainly do my e-learning activities here at unless I am just checking on notifications. I do and submit coursework at home	Mainly doing e-learning activities at work Minimally doing e-learning activities at home Inability to afford a laptop computer Ability to afford a smart mobile phone Mobile learning Choice of the Internet at home based on cost and quality Ethical questioning of CT Policy Violation ICT Policy status is not enforced though there is defined safe use	Devices needed Seeking to reduce internet access cost E-learner internet challenges faced by e-learning Seeking to exploit their employers' good quality internet for free Ethical issues raised in violating employers' ICT Policies	How the e-learners coped with e-learning internet access challenges
do your e-learning activities at work, is e policy?			
is there or not, but this is a government office, t enforced except, of course, for pornography rwise, they don't prohibit me from accessing dies. Besides, I do it over the lunch hour and nload the notes, do the course work and submit			
employers' resources to do your private ion?			
d you earlier, I could not afford a laptop, so I es. But now I am just trying to reduce the rk it is free. You know Network-1 is very eet all the costs, I may not pay for it. tion here at work is very efficient, not even n when I am at home, so I prefer to do my e- t work.	Internet at work is free Employer ICT policy violation reasons 1. Internet access cost at home is high 2. Lack of devices to interconnect 3. Internet's quality at work is good than at home		

3.6.7 Core Category Integration

The key categories/concepts yielded from the previous stages were the theory-building blocks. They were *sorted* and *integrated* to form the substantive grounded theory. Our adapted CGT process ended with another round of literature review on the development of theories, where the new theory was compared with existing learning theories.

3.6.8 Memoing and Data Presentation

Memoing is the process of documenting the participants' experiences and the unfolding stories to observe the emerging themes or patterns from the data (Charmaz, 2014). It took place from the time the first interview was coded and ran throughout all the data collection and analysis cycles. Generally, and where possible, memoing started right away after analyzing the last interview data and before proceeding to the following interview. Table 3.2 shows an example of a memo updated with subsequent interviews and data analysis following the excerpt from Table 3.1.

Table 3.2: An Example of a Memo

Internet Access Challenges + Family Commitment Challenges = Employer ICT Violation (Emergent Theme)
Because of the employers' ICT policy, it was never expected that the e-learners would be carrying out their e-learning activities at work. But the first e-learner to be interviewed indicated accessing the portal at work and using the employer's resources which included the computer, time (person-hours), and the internet. On further probing, the participant indicated that they violated the employer's ICT policy because internet access cost at home was high, they lacked a personal laptop. In addition, the internet connection speed at home was poor. The use of employer ICT resources had started to emerge as a trend by the time we had conducted four interviews. This revelation left the researcher wondering what coping mechanisms were used by the unemployed e-learners or those working in informal settings without access to free ICT resources? Through theoretical sampling, it was established that unemployed e-learners visit the cyber café to reduce that cost. Those working in informal settings and those working in formal organizations but with enforced ICT policies invested in their internet though they complained about the high cost of internet access Further, through theoretical sampling, it turned out that the majority of the e-learner participants were using the employers' ICT resources to do their e-learning work. It also emerged that the motivations for violating the employers' ICT Policy were varied. The first was saving costs since the employers' ICT resources are free. The second was saving time that otherwise would be spent undertaking e-learning activities at home. The third was exploiting the [very] good internet quality (speed and reliability) at work. The fourth was creating room for other family commitments in the evening or over the weekend. To the e-learners, this strategy to cope with internet and family commitment challenges seemed harmless. However, it has ethical implications such as misappropriation of the employers' resources, organizational information security, and failure to manage work-life-study boundaries on the part of the e-learners.

This research presented the results using Gioia charts (Gioia et al., 2012), a technique for *structuring* qualitative data, combined with vignettes from the data (Reay et al., 2019). The interpretation of the data culminated into *categories* of meaning (Saunders et al., 2012) that *summarized* the interaction and collaboration e-learning *storyline* in a narrative, networks, and diagrams.

3.7 Validation of the Results

The researcher was an e-tutor and a participant-observer in the research process thus had experience in e-learning. Furthermore, it was advantageous because the researcher had technical knowledge and an understanding of the e-learning context. Under this background, the researcher contends that the results can be deemed trustworthy based on the following premises. First, the use of a sample of two universities yielded comparable results. Second, the combined use of interviews and observations ensured triangulation of the results. Third, although the participants were theoretically sampled, they were also randomly identified. Fourth, the involvement of e-tutors and e-learning managers triangulated e-learners' findings. Finally, the researcher conducted and recorded face-to-face interviews with participants drawn from different parts of the country, eliminating room for biasing the data.

CHAPTER 4: DATA ANALYSIS, FINDINGS, AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter presents the analyzed data and findings, summarized as key concepts or categories of meaning constructed from the data. The key concepts are illustrated using Gioia charts and vignette techniques. The causal relationships between the attributes and concepts are presented using network diagrams. It also gives the criteria by which the key concepts were integrated into the theory (core concept). It ends with a discussion and analysis of the results.

4.1 THE E-LEARNER CATEGORY

Since the e-learners are at the centre of the e-learning storyline, this section presents their characteristics such as gender, age, attitudes and perceptions, motivation, culture, ICT skills, and the ICT infrastructure in their residence or work locations. It also presents the factors that determined their choice to study via e-learning, such as family commitments, work, career goals, and the cost of e-learning. Finally, the e-learner category also explains how these characteristics influenced interaction and collaboration.

4.1.1: Age, Gender, Work, Career Goals and Family Commitments

The e-learners' age was binned into the following categories: '20-29' '30-39', '40-49', and '50 & Above' years to align with other demographic studies (Wang et al., 2009). The majority of the e-learners are employed and pursuing higher education qualifications for career development. Most of the time, working-class learners find themselves returning to school when they are relatively older than their conventional learning counterparts, mainly in the '30-39' and '40-50' age bin. This result was corroborated by Cercone (2008), who noted that e-learning is more prevalent among adult learners. She further argued that there is a significant difference in the way adults learn from how children, teenagers, and youth learn. Thus there is a need to rethink how adults learn and integrate it with e-learning practice and the design of e-learning systems. However, this research observed an emerging trend of a younger generation of participants between the age of 20-29 years who had enrolled in e-learning, mainly fresh from high school, some of whom were not working. This group took up e-learning due to cost, arguing that e-learning tuition fees are cheaper than conventional learning. In their own words, they were quite displeased with e-learning. One young

participant said, *"when I was in the second year of study, I felt like transferring to the* conventional *learning, but it was costly to change'*. They were unhappy because young learners in this age bin feel comfortable socializing with their age mates during the learning process, an expectation that was unmet in two ways. First, they had too much time in their hands, yet they did not have fellow learners to interact and socialize with because their fellow e-learners were mainly busy at work during the day and engaged with family commitments in the evening. Second, even where they had opportunities to interact with their fellow e-learners, they experienced barriers due to age and socio-economic differences between them and their senior e-learning counterparts.

Family commitments emerged as a factor that influenced some e-learners' decision to enrol in e-learning, predominantly so among female e-learners. One female participant said, "*I had other considerations to make over and above work, especially because my family is young and I had a baby"*. Culturally, in the Kenyan context, female parents are the principal caregivers to young ones. They are also in charge of helping with homework for their young school-going children, laundry, shopping, and fixing meals, all of which are undertaken in the evening after work. In both universities, online chats and forums are mainly planned to occur in the evenings at around 8.00 p.m. So it may not be possible for the female e-learners to participate in those interactive sessions. Older female participants (40-49 years) also had family commitment considerations to make. One participant said, *"I have a husband and teenage children, and I didn't want to leave them behind every evening"*.

This interaction and collaboration challenge emanating from work-life-study balance was corroborated by one e-tutor saying,

> *I still find that some e-learners cannot participate because they have family-related issues that limit their level and quality of interaction in chats. This is because one is a wife, another is a mother, another is a staff, so the interaction time is limited.*

Unexpectedly, a few male participants also cited family commitment as a contributing factor. For example, one male participant said, *"e-learning allows me to combine education and work as I take care of my young family"*. Thus, there is a clear indication of shifting responsibilities in contemporary times where male parents are beginning to appreciate the need to participate in the

affairs of their families despite this being culturally perceived as a female-oriented role. Therefore, this research intuited that family commitments are becoming crucial for men, despite being prevalent among women.

Figure 4.1. shows the relationship between age, gender, work, and career goals.

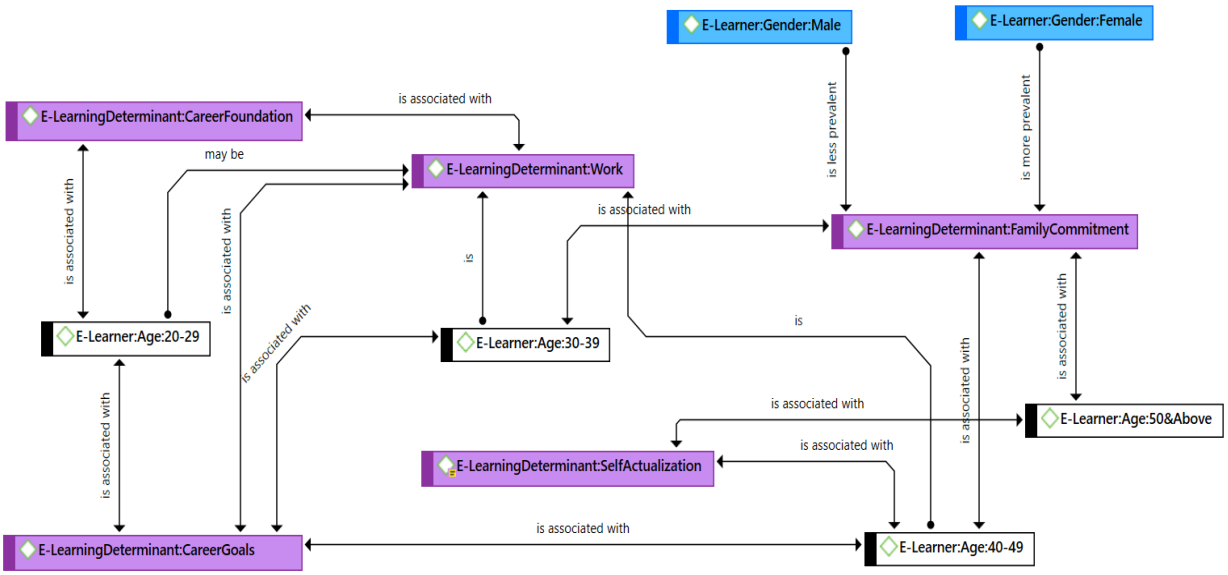

Figure 4.1: Age, Gender, Work and Career Goals Relationship

Due to work and family engagements, some e-learners indicated experiencing work-life-study balance challenges with e-learning activities relegated to 2nd or 3rd position in the list of competing priorities. For example, one participant said, *"there are so many assignments I must attend to, yet I have limited time due to family and work pressure"*. These results are consistent with Meenakshi et al. (2013) and Romero (2011) in their respective studies, where they reported that conflicts are likely to arise among the three spheres of the e-learners' lives. Moreover, according to our research, in such situations, some e-learners failed to meet the coursework deadlines and to participate in interactive sessions, hinting at their failure to have the academic discipline needed in e-learning.

4.1.2: e-Learners' Location

The e-learners' locations were binned into five categories: *urban, suburban, rural, remote,* and *roving*. Location was important because it determined the availability and accessibility of the Internet. In turn, internet availability or its lack thereof determined whether it was possible to

interact and collaborate. Internet accessibility influenced the quality of the interaction. This research observed that the digital divide persisted between urban and rural areas, with most ICT infrastructural installations concentrated in urban areas, as reported by GoK (2019) and Ndung'u et al. (2019). While many e-learners worked and resided in urban and sub-urban areas where the internet is a not big problem, there is a percentage that lived or in the rural and remote areas where the internet is either intermittent or unavailable. Most rural-based e-learners had difficulty accessing the e-learning platform, let alone interacting with fellow e-learners and e-tutors in chatrooms and discussion fora. It was especially difficult for those in remote areas with no internet connectivity since they had to travel to the nearest urban centre to access the internet. One such participant said,

> *I worked in rural Karatina [126 km from Nairobi], which was so interior and remote, and Network-1 was very poor. I even missed an assignment once because I lacked internet connectivity. So what I used to do is travel to Karatina town, buy internet data bundles and check if there are upcoming assignments and chats [or those that I might have missed while at work]. Then if there is an assignment, I will go back home [rural Karatina] to do the assignment, then return to Karatina town and submit it while there because the internet is good in Karatina town.*

Furthermore, some e-learners had their jobs taking them from one location to another. This kind of roving was problematic when it took them to remote areas with no internet or where the internet was intermittent. Hence, they had to wait until they returned to internet coverage areas. One such e-learner said,

> *I had travelled to Kitale [390 km from Nairobi] branch for work, where I stayed for a couple of weeks. Unfortunately, there was no strong Network-1 signal, so I could not access the portal. When I returned to Nairobi and checked the e-learning portal, an assignment was due for submission at midnight, and I was not ready to submit it.*

All e-learners indicated that the cost of accessing the internet privately at home was prohibitive, and the connections were mainly slow and unreliable. As a result, to cope with these internet access challenges, most working-class e-learners indicated that they accessed and used their employers' ICT resources to carry out their e-learning activities. Since most of the chats and discussion forums

are planned to occur in the evening, some found it hard to participate in the interactive fora when they don't have access to the employers' ICT resources. Notably, e-learners not working in formal employment incurred a higher internet access cost since they did not have free access to ICT resources like their employed counterparts.

Finally, the urban-based e-learners had to bear travelling back-and-forth between work and home in heavy traffic and slow-moving public transport systems. This presents a challenge mainly because e-tutors require e-learners to participate in online chats in the evening around 8.00 p.m. due to their unavailability during the day. That arrangement does not work well with e-learners because they arrive home late and tired after a long day of work to other competing family responsibilities. One participant said, *"were it not for the pressure of work and the commuting through traffic back and forth, I would be committing the entire evening to my studies"*.

4.1.3: e-Learners' Motivation

Motivation emerged as an e-learners' attribute that determined their level of engagement in e-learning activities. The first interviewee introduced the concept of motivation in the research without being prompted in the following words *"I am highly motivated in my e-learning activities"*. Through theoretical sampling, where the participants did not explicitly reveal their motivation, the research sought implicit hints of motivation in their responses to the questions. It sought to know what/who drives their e-learning activities, whether their desire to learn and carry out their e-learning activities was internally or externally driven. For example, if an e-learner kept complaining about the e-tutor(s) and blaming them for every problem, it was inferred that they were high in 'external' and low in 'internal' motivation. On the other hand, if an e-learner talked about how they organized their studies and resolved problems without reference to the e-tutor(s), we inferred that they are self-driven and high in 'internal' and low in 'external' motivation. Some e-learners exhibited a balance of both types of motivation.

Moreover, this research identified a link between motivation and challenges where some e-learners justified their low motivation by citing the challenges they experienced. One participant said,

Some units are very difficult to study on my own, and when I try to get the e-tutors, they are busy, or when I get them, it's for a bit of time, or their response takes several days to come. So you see, all these challenges serve to demotivate me; they are motivation killers.

There is general agreement that internally motivated learners exhibit behaviour patterns such as exploration, self-regulation, deep understanding, and reflection (Palo et al., 2018). In the e-learning environment, it is paramount for e-learners to be self-directed, internally motivated, and autonomous to sustain their interest in e-learning in the face of enormous challenges. Cercone (2008) argues that e-learners are internally motivated by factors like self-esteem, self-satisfaction, and self-actualization. They are externally motivated by job promotion, salary increments, academic qualifications, and achievements.

4.1.4: e-Learners' ICT Skills, Age, Gender, Self-Efficacy, and Training

ICT skills are needed since e-learning is delivered using electronic devices, which the e-learner should master. ICT skills are necessary because they quell the fear of technology and give the e-learner some confidence to face new ICT devices and applications used in e-learning. ICT mastery was measured using the prior ICT skills attained before enrolling in the course. It emerged that e-learners had varied prior ICT skills, including computer and/or professional application packages, IT qualifications at the certificate, diploma, and/or degree level, and e-learning skills from previous exposure in e-learning environments. In addition, there was a category of self-trained e-learners with no prior ICTs training. One such participant said, *"I found myself working in the payroll department then realized that I needed to develop my IT skills. So I am self-trained on the job"*.

The e-learners indicated that their prior ICT skills were beneficial in e-learning. One e-learner said, *"my prior training and the experience gained here at work was very helpful when it came to e-learning because I knew how to navigate the portal with fewer problems"*. Therefore, prior ICT training (part of the experience) served as a moderating factor to the ***EE*** and ***FC*** factors as stipulated in the UTAUT model (Venkatesh et al., 2003).

The research also sought to establish the e-learners' perceived confidence (self-efficacy) in using day-to-day technologies and services such as the ATM, mobile money, mobile banking, i-tax, and

e-citizen. ICT self-efficacy is essential because it indicates how readily the e-learners would embrace, learn, and use the new e-learning technologies. ICT self-efficacy is high, especially if computers and associated technologies are readily available to the users. Generally, e-learners' ICT self-efficacy was high though there was a category of a few participants that perceived themselves as average. This finding is in line with the results by Ahmad (2014). He observed that ***attitudes*** and ***perceptions*** such as ***self-efficacy (***part of ***FC)*** and ***perceived ease-of-use*** (part of ***EE)*** are important considerations to ***behaviour intention*** and ***behaviour use (or non-use)*** of a technology.

The research observed that female e-learners generally rated their ICT skills lower than their male counterparts which is in line with Morante et al. (2017), who reported that women tend to underrate their ICT skills. However, a closer look at the data revealed a relationship between ICT self-efficacy and combined gender and age as moderating factors advocated by Venkatesh et al. (2003). A trend emerged where predominantly the senior (40-49 years) female e-learners had a higher perceived ICT self-efficacy than their male counterparts. Although ICTs are gender-neutral, they have tended to draw a masculine symbolism with patriarchal connotations in society. Furthermore, ICT proficiency has been associated with the younger generations. Perhaps these two arguments motivate senior female e-learners to conquer their ICT anxieties and deficiencies to survive in e-learning and achieve their academic qualifications. Therefore, perceived ICT ***self-efficacy*** (part of ***FC)*** was moderated by experience in determining the ***actual use*** of the technology as stipulated in UTAUT (Venkatesh et al., 2003).

There is an e-learner induction training upon enrolment in both universities to familiarize the e-learners with e-learning. The induction focuses on demos of how to access the LMS and its technical features. It includes functions such as downloading learning materials and uploading coursework to the e-tutors. Training on pedagogical aspects of e-learning was largely missing in the induction sessions. The absence of the e-pedagogy in training was echoed by one participant who said,

> *You see, the orientation only concentrated on how to use the tablet and access the notes. But using a tablet is a very small thing if you ask me; instead, the training should have concentrated on helping me understand everything that e-learning entails.*

The induction, especially in University-1, took absurdly short amounts of time, sometimes below two hours. Although University-2 took a whole day for the orientation, the e-learners still complained that it was inadequate to cover all there was to learn about e-learning. The training inadequacy was corroborated by some coordinators who said the training is hardly enough. The e-learners were further probed about their perceived worthiness of the induction training. There was a category that believed the induction training was helpful. Another category believed it was somewhat helpful, with one participant qualifying the response by saying, *"it was only helpful in as far as getting started with e-learning was concerned"*. Yet another category said it was not helpful, especially those who reported very small training timeframes. Though training was not considered directly as a factor in the UTAUT model, it emerged as an attribute of experience moderating the relationship between ***EE*** and behaviour intention**.** It also moderated the relationship between ***FC*** and behaviour use (Venkatesh et al., 2003).

Despite the majority of the e-learners having had prior ICT skills and having attended the e-learning induction, certain hunches hinted to inadequate or lack of ICT skills in certain aspects of e-learning. This is best captured by the words of one participant when asked why s/he did not initiate a discussion on the chats and discussion fora responded, *"I don't know how to use them"*. This response is an indicator that the induction training was inadequate. Figure 4.2. summarizes the e-learner training sub-category.

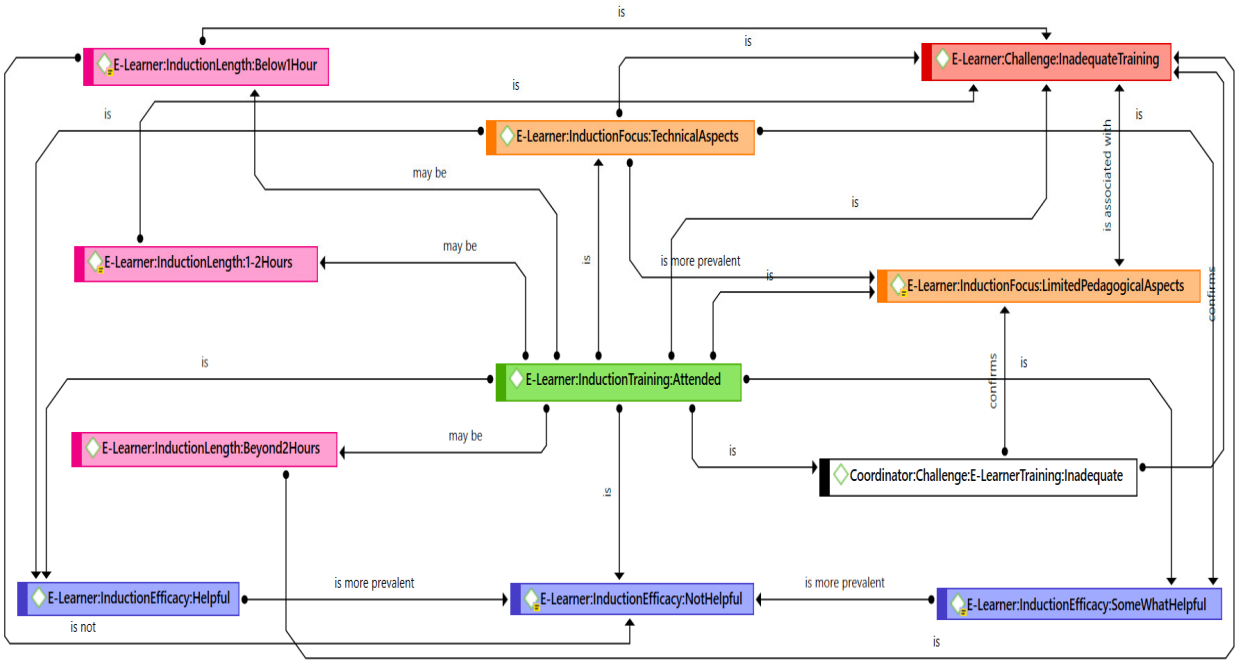

Figure 4.2: e-Learner Induction Training Sub-Category

Figure 4.3 is the data structure that summarizes the e-learners' concept in terms of its attributes, themes, and dimensions.

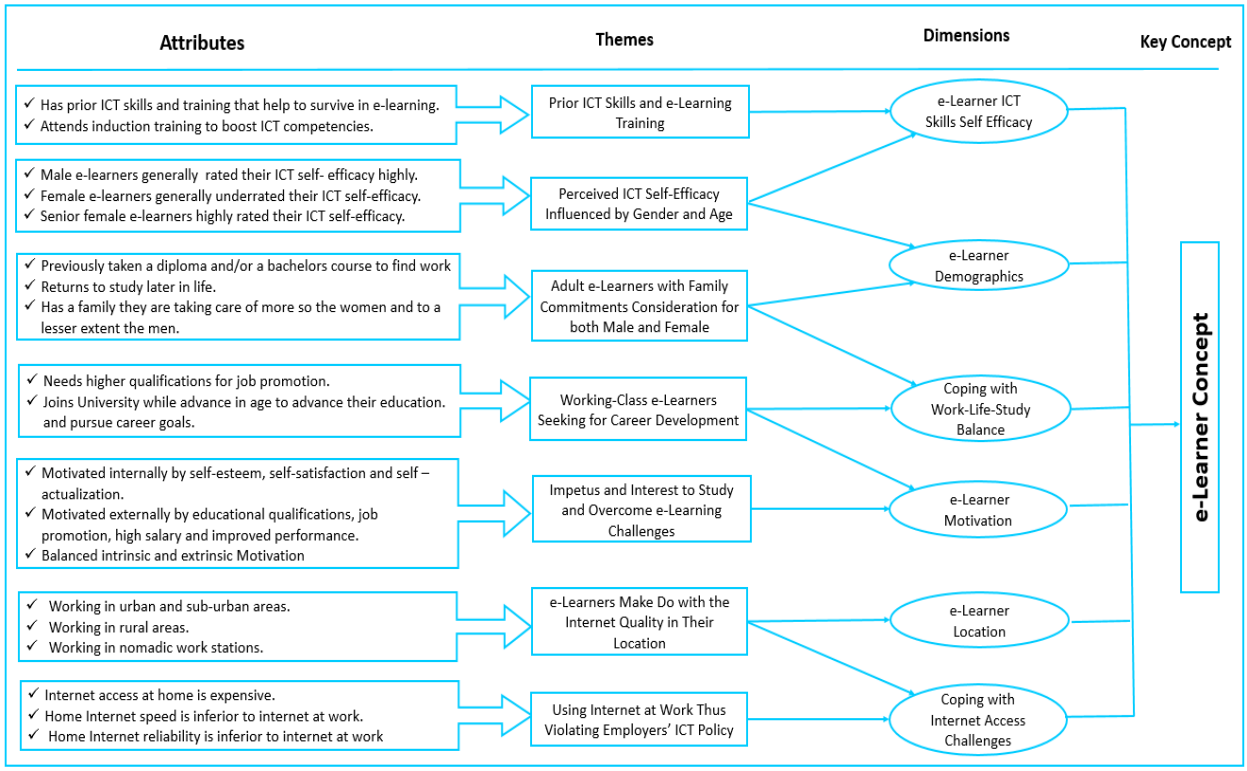

Figure 4.3: The e-Learners' Concept

4.2 THE E-TUTOR CATEGORY

This category presents the profile of the e-tutors engaged in the e-learning programs in both universities in terms of their demographics, ICT and e-pedagogy preparedness, motivation, attitudes, and perceptions.

4.2.1: Age, ICT, and e-Pedagogy Skills

The e-tutors' age was binned into the categories of '30-39', '40-49', and '50 & Above' years to align with other demographic studies (Wang et al., 2009). There emerged a link between age and technical skills. Although the senior e-tutors (50 & Above years) had accumulated subject knowledge, they had limited technical skills to pass the knowledge to the e-learners. This presented a dilemma to e-learning management, as echoed by one coordinator saying,

> *I have witnessed a generation that is still not very conversant with e-tutoring, and you know as the old adage goes, 'teaching an old dog new tricks is hard', yet these are the very tutors who have a wealth of expertise and are very knowledgeable in certain critical areas needed in e-learning.*

This dilemma was further amplified by one e-learning manager who said,

> *Some of them have not been using the [e-learning] technology. Yet, they are the only ones in the department, so we must utilize them in e-learning since we don't have the younger generation of e-tutors with that kind of [content] experience.*

This manager went ahead to propose that in order to tap into the senior faculty's content expertise, there is a need to assign them the younger generation of e-tutors to do the technical part of e-learning as they concentrate on the learning part in the following words,

> *I have been urging that e-tutoring be done by the younger generation who have grown up with the technology. We even spend the time training them, and they feel comfortable doing whatever they do on the e-learning platform.*

However, this has not been the case as the universities operate under the assumption that if you can teach in conventional programs, you can also teach in e-learning, which is a false assumption. One senior e-tutor lamented, *"the problem is that they allocate you to teach an online class and don't bother to know whether you can teach online or have e-tutoring experience"*. Thus the

proposal to deploy the technically savvy younger e-tutors to support the senior e-tutors would facilitate the senior e-tutors to deliver their accumulated knowledge to the e-learners despite their limited technical skill as stipulated in UTAUT (Ahmad, 2014; Venkatesh et al., 2003).

Another observed trend is the mandatory engagement of the conventional programs' faculty in e-tutoring, typical in University-2, leading to less interest in using e-learning technologies. Mandatory use is mainly a challenge for the senior faculty, as evidenced in the following words of a manager;

> *The challenge with the older e-tutors is that they have not moved with the advanced technology, meaning they don't have the technical skills needed in e-tutoring. Yet, the training by the university is inadequate. Besides, they cannot take a long time participating in online activities because of their health status. Moreover, after a certain age, their eyesight fails them, the speed of typing is slow, and the rate at which they grasp concepts during training is a very slow movement back and forth.*

According to Ahmad (2014) and Venkatesh et al. (2003), ***voluntariness in using*** technology is a moderating factor to the ***SI*** factor that leads to ***intention to use*** and ***actual use*** of technology. In this case, the ***intention to use*** is defeated by the mandatory use imposed on the e-tutors' thus demotivating them from the desire to learn how to use the e-learning technologies. The e-tutors involved in e-learning against their wish believed that their social standing and status among academia are not determined by use or failure to use e-learning technology.

4.2.2: e-Tutors' Prior ICT Skills

The e-tutors had different levels of prior ICT skills and training such as computer application packages and certificates in IT at degree or postgraduate level, previous experience in e-tutoring. A minority had self-trained on how to use computers. Prior ICT skills were necessary because e-tutors are less likely to have the anxiety associated with new technologies. This is captured in the words of one e-tutor who said, *"I did not fear using a computer like many other people that I have observed being really scared by technologies"*. The e-tutors indicated that prior ICT skills were beneficial in carrying out their e-tutoring duties. One e-tutor said, *"I could apply those skills and knowledge to the new e-learning system"*. The e-tutors' prior ICT skills (experience) served as a

moderating factor to the ***EE*** and ***FC*** factors as stipulated UTAUT model (Venkatesh et al., 2003). Prior ICT skills thus decreased the perceived level of ***EE*** to perform a task, and therefore they felt more facilitated ***(FC)*** to begin using new e-learning technologies.

4.2.3: e-Tutor ICT and e-Pedagogy Training

The e-tutors that attended the initial training indicated that the main focus of the training was technical with limited pedagogical aspects. The failure to give equal emphasis on pedagogical training resulted in a lack of e-pedagogy. There is a false perception among the e-learning providers that once they have carried out the technical-based training, the e-tutors are ready to handle the e-learning classes. One manager said*, "most people make a mistake of thinking e-learning is equal to IT, while it has both components: learning part and technology part".* This research proposes a balance between technical and pedagogical training, a view corroborated by one manager who said, *"one cannot ignore pedagogy because pedagogy is how a teacher teaches, become a teacher first, and then move to technology part".* Nevertheless, it has been ignored even with its importance having been underscored.

The research further sought to know whether the induction training was effective as far as carrying their e-tutoring activities was concerned. Those who attended believed that the induction training was helpful to get them started in e-tutoring but indicated that it was inadequate. A fact that was further corroborated by the e-learning coordinators and managers arguing that the institutions were financially constrained to roll out an effective e-learning training program.

Besides the induction, there are in-service or refresher training sessions for e-tutors carried out from time to time in both universities. Though pedagogical aspects received more attention in the in-service training than in the induction training, the technical aspects were still central to the in-service training. It was established from the e-tutors and corroborated by e-learning managers from both universities that in-service training experiences e-tutors' apathy. One manager said, *"when I call them for training, they fail to attend, so they don't have those skills".* Three reasons are attributed to in-service training apathy. First, e-tutors were time-constrained since they also teach in the conventional programs when refresher trainings are planned. Second, from the managements' perspective, failure to attend was considered indiscipline and a breach of contract.

Third, some had expert mentality because they had experience in online teaching; thus, they see no need to attend the in-service training. One participant said, *"besides, once you learn how to use the system, you can adapt to the new features introduced later"*. The failure to attend in-service training results in limited e-tutoring skills, which leads to e-learning technology aversion in some e-tutors. Figure 4.4 shows the e-tutors' training challenges.

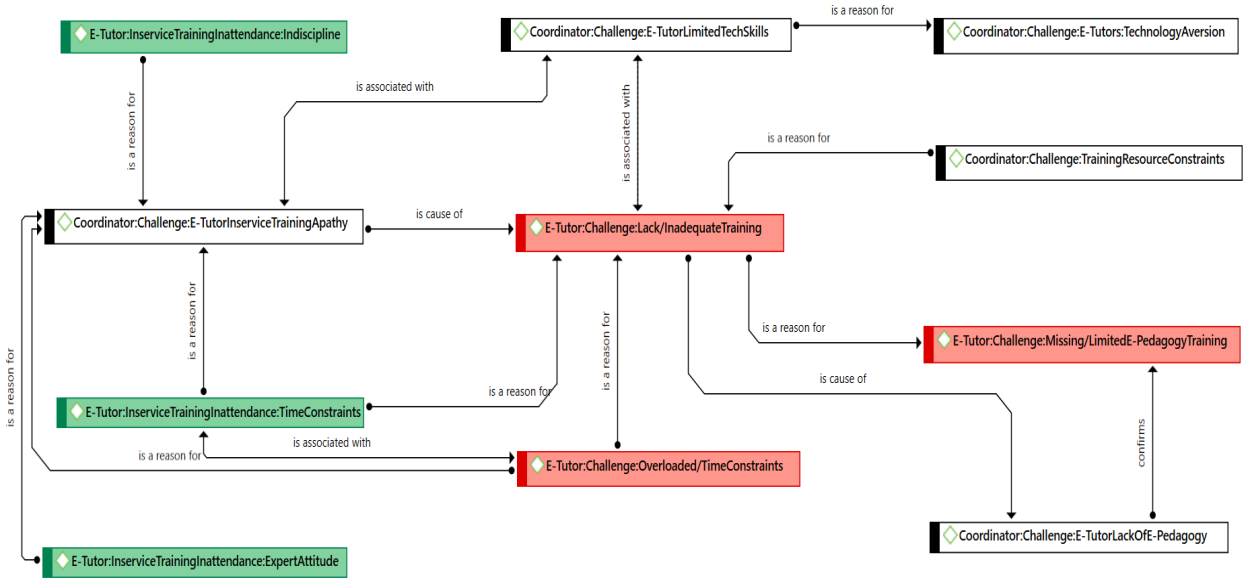

Figure 4.4: e-Tutor Training Challenges

4.2.4: Age, Gender, ICT Self-Efficacy, and Attitudes Towards e-Learning

As in the case of the e-learners, the female e-tutors underrated their ICT self-efficacy. However, the research observed a link between ICT training attitude and gender among the seniors' category (50 years and above). This finding is in line with Abbasi et al. (2015), Venkatesh et al. (2003) and Wang et al. (2009), who observed that age and gender show a simultaneous influence on an individual's intent to use technology. In this research, the senior female e-tutors displayed a more positive attitude towards learning and mastering e-learning technology. One such female participant said,

> *Though I am not IT-trained, I am good at using computers to do my work, specifically the e-learning system. I learned to use a computer on the job while teaching in conventional classes. This experience came in handy when I started e-tutoring because I just transferred those skills to the e-learning environment and got started and settled in with ease.*

Another senior female said,

> *The first thing as an e-tutor is to be trained on using the e-learning platform. There is also an open office policy for training and IT support within the e-learning department. So if I am not sure how to do something, I will go there, and they will train me. I can even go with my teaching materials, and they will help me practically anytime.*

Despite these female e-tutors having no IT background (beyond their prior ICT skills in the form of computer application packages), they depicted a positive attitude to ICT training that is necessary for survival in e-learning in comparison to the defeatist attitude portrayed by a senior male colleague who said,

> *No one bothered to introduce me to e-tutoring and the e-learning system. I was just given some numbers of two trainers in charge which I called. Unfortunately, one had already transferred to another department. The other was available after two weeks, after which I had already given up, so I had to figure it out all by myself.*

After further probing, this participant indicated that he gave up on e-tutoring and justified his move on lack of training in the following words, *"I blame it on the lack of orientation. I have asked them not to schedule me any e-learning classes; I am dropping them'*. Though this e-tutor had prior training in IT, he showed less interest in e-tutoring and coping with the technical challenges for continued survival in e-tutelage. While this was not the observed general trend, it hinted at a relationship between attitudes toward adopting e-learning technologies moderated by age and gender. In response to such sentiments, one coordinator said,

> *There is induction training, and we even make it very personalized. Again the problem is not lack of training but the e-tutors' attitude. If any e-tutor has a problem uploading study materials, they can go to the support team, and they will be helped, so it's an attitude problem because they have done the conventional teaching all their lives, and they want it to remain that way.*

4.2.5 e-Tutors' Access to e-Learning Technologies

The e-tutors described the internet as [very] fast in both universities. However, certain ***facilitating conditions (FC)*** were missing in both universities in varying degrees. For instance, University-1 does not provide desktop computers to full-time or part-time faculty except those in management

positions, encouraging the Bring Your Own Device (BYOD) practice. Although University-2 provides full-time faculty with desktop computers, there is still a percentage that does not have desktop computers. Part-time faculty in University-2 don't have facilitation in the form of devices either. The management of the University-2 argues that it has well-equipped computer laboratories meant for e-tutors' use. Notably, there is the assumption or expectation that e-learning activities only occur during the day in both universities. However, it emerged that e-learning activities mainly happen in the evening and/or over the weekend due to e-tutors and e-learners' unavailability during the day.

Second, both universities failed to provide mobile devices to the e-tutors to facilitate access while away from the campuses. Third, they also failed to provide a means to access the internet while away from the university to enable e-tutors' access the portal. Therefore, in the absence of technical facilitation, the e-tutors used their own devices and met the cost of internet access to provide e-tutelage services while away from campuses, a factor that did not sit well with the e-tutors. One e-tutor decried,

> *They did not provide me with a computer; the only thing these people did was allocate me the unit to teach online. They created an e-tutoring account for me, but how or where I get the tools for e-tutoring was none of their business but mine as an e-tutor.*

On probing the e-learning managers about the failure to provide the technical resources, they cited financial constraints and lack of policy on providing e-learning devices and internet access to the e-tutors, especially for use while away from campuses.

4.2.6 e-Tutors Motivation

The e-tutors' motivation was generally low to moderate. The poor motivation was attributed to the following factors: -

a) **e-Tutor Isolation**- Like the e-learners, the e-tutors complained about isolation and psychological distance between them and their e-learners. They indicated that there was limited and/or lack of learner-tutor interaction. One participant said,

> *I feel there is some disconnect between me and my e-learners. The whole atmosphere around e-learning is so impersonal; it feels like they are out there somewhere in space. It is interesting because when they have an issue, they discuss it amongst themselves*

instead of contacting me, so I am just a bystander, and which student does not need a teacher?

b) **Remuneration –** Having taught in the conventional programs, the e-tutors complained that the pay in e-learning is much lower, yet they must do so much more to deliver. It is worse because the meagre payment is also delayed. One participant said,

Teaching in the e-learning program is too much of a bother; the payment is meagre, yet I have to put so much effort into it. The personal investment is not worth it because I even have to use my own money to buy internet bundles, devices, and time.

c) **Time Constraints-** the e-tutors argued that they lacked time to do e-tutoring activities because they doubled up as conventional and e-learning tutors, leaving less time for e-learning activities. There is a perception by the universities' management that if you can teach in the conventional programs, you can also teach in the e-learning programs, which may not always be accurate. Particularly in University-2, where it is mandatory for conventional programs faculty to teach in e-learning. This confounds the matter because they have to do it whether they like it or not, whether they have the skills or not, and whether they are willing to be trained. One manager said, *"These conventional program tutors are very few in the departments, and they are still forced to take more load including in e-learning because we don't have any other personnel to teach the course"*. It is at that point where the e-tutors do the bare minimum.

These results are in line with Serdyukova and Serdyukov (2014). They observed that in some IHLs, the conventional program's tutors are turned into e-tutors. They must master the ever-evolving technological tools with little or no training in their use in e-learning. Thus the e-tutors are constrained to find time and capacity to theorize on e-learning practices and put together a comprehensive e-pedagogy on their own. Further, Serdyukov (2015) and Yilmaz (2011) observed that most e-tutors are content experts without pedagogical expertise who tend to be middle-aged or older and burdened with conventional classroom experiences. Therefore, they are not very receptive to the new technologies and prefer to stick to those they have already mastered. Mandatory use of e-learning technology

can have severe consequences because e-tutoring requires extra training, resources, and e-tutors' goodwill to succeed in their e-tutelage roles. One coordinator put it this way,

> *As long as we use the e-learning concept, which they are not very conversant with because it is new to them, it becomes an impediment to delivering the knowledge they have accumulated over the years. And as an e-learning coordinator, I have to step in sometimes to post the notes for them, but when e-learners ask questions, I have to pass them on to the respective e-tutors; that now becomes harder for me because I cannot do all the work for everyone.*

d) **ICT Skills-** Failure to attend the training, negative attitudes towards ICT, and mandatory e-tutoring lead to limited or lack of ICT skills on the part of e-tutors. These challenges lead to low motivation, which causes the poorly skilled e-tutors to disengage from their e-tutoring activities. This was evidenced by the observation on LMS of one e-tutor's e-learning account, who had posted only two topics in an entire semester while others had failed to convert their notes into electronic formats.

e) **Lack of Adequate Facilitation** – as observed earlier, the universities fail to meet all the facilitating conditions for e-tutors. They do not facilitate the e-tutors with devices, especially those needed for mobility. The management operates under the perception that the e-tutors have the devices. However, the BYOD expectation is not welcome by the e-tutors as one participant said, *"even if they do not provide I have the tools, but they are meant for my private use, not for carrying out the University's work"*. Therefore, the universities had failed to enable the technical ***facilitating conditions (FC),*** which is a predictor of behaviour use of e-learning technologies (Venkatesh et al., 2003).

Figure 4.5 summarizes the e-tutors' concept in terms of its attributes, themes, and dimensions.

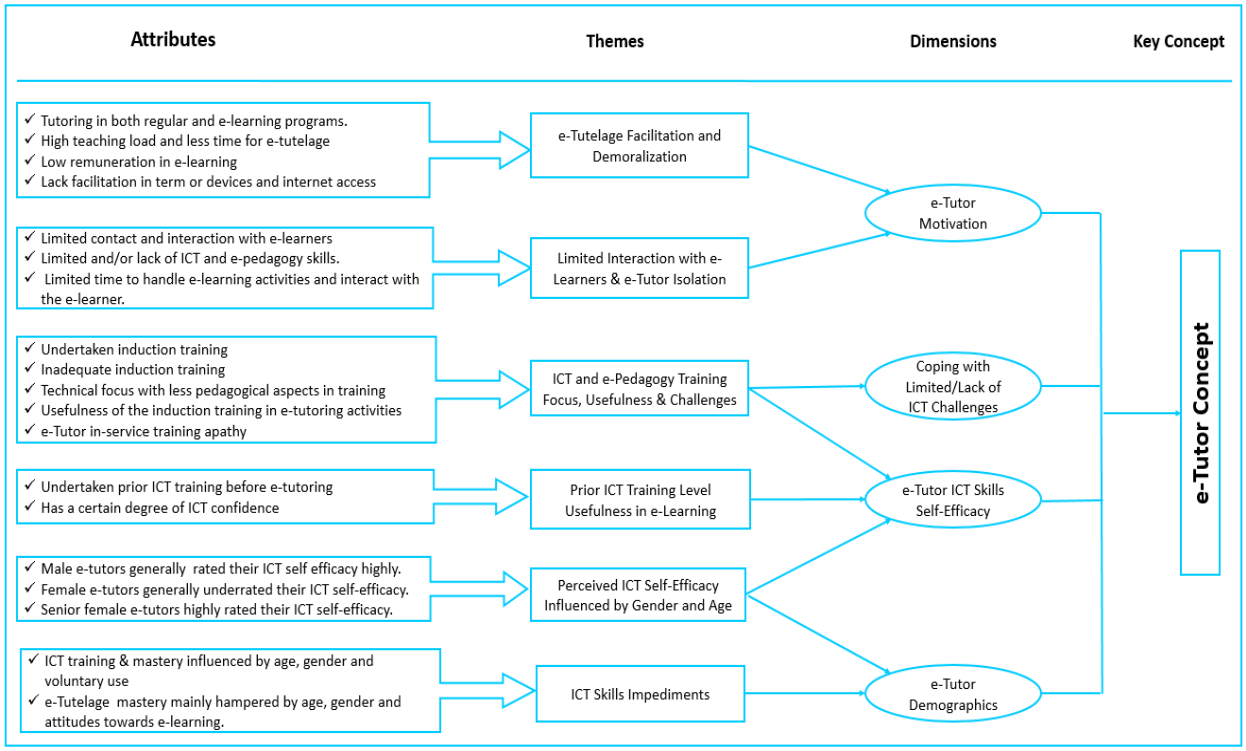

Figure 4.5: The e-Tutors' Concept

4.3 E-LEARNING TECHNOLOGIES CATEGORY

This category is about the technologies in use in e-learning. From the research, three subcategories emerged: the e-learning device requirements, the internet, and the e-learning platform, each of which has been captured in the following sections.

4.3.1: Personal e-Learning Devices Sub-Category

Devices at the e-learners' disposal included laptop computers, tablets, smartphones, and desktop computers. Though not all e-learners had all these devices, at least each had a device at their disposal. Both universities participating in the research started by providing a tablet to the newly enrolled e-learners. This was a bare minimum ***FC*** for equitable access to the e-learning portal (Venkatesh et al., 2003). However, the tablet was not freely issued because there was a cost item on the tuition fee for the tablet spread across a period of time. This concession on the tablet payment made it affordable to the e-learners who could not meet its cost at once. In University-1, the tablet is issued to those who needed it because some e-learners have tablets when enrolling. However, it emerged that the tablet had several challenges. First, with the increase in 4G

smartphones in the market, its role had been replicated. Thus, the observable trend of reducing tablets, especially in University-1. Second, the 3G tablets issued earlier were rendered useless because other accompanying technologies had changed to 4G, making the old tablets very slow and sometimes incompatible with the upcoming technologies. Third, in University-2, the tablet had limited use outside e-learning since it was locked to e-learning purposes only.

Furthermore, in University-2, it has to be returned to the university to be synchronized and loaded with the new content at the beginning of every new semester. Moreover, it has to be repaired in the university's IT support centre in case of failure or breakage, a requirement that many e-learners find cumbersome. Therefore, some e-learners indicated that they had set it aside and continued to access the portal on other devices. However, University-2's tablet concept is ideal for e-learners in places with no internet or intermittent internet, such that e-learners always have their content available offline. Finally, the size of the tablet internal memory was limited, making it difficult to run heavy application software needed in the practical-oriented courses; in such cases, the e-learners must have laptops or desktop computers.

Another observable trend is the high ownership of mobile devices such as smartphones, tablets, and laptops.

4.3.2: e-Learner Internet Access

e-Learning in Kenya is happening against a backdrop of an inadequate ICT infrastructure both at the national and organizational level (Kibuku et al., 2020a & 2020b; Ndungú et al., 2019; Nyerere, 2016). National and organizational ICT infrastructure are informed by TOE theory as ***environmental context*** (Baker, 2012) and by UTAUT as an ***FC*** factor (Ahmad, 2014; Venkatesh et al., 2003). While discussing the ICT infrastructural environment may not arouse a lot of interest and debate in the developed world, a similar discussion is crucial in the developing world such as Kenya. That discussion is crucial because there is a digital divide in the internet's reach, quality, and affordability between rural and urban areas (Ndungú et al., 2019). Even in the urban areas, there exists a digital divide between the urban rich and the urban poor. Still, some suburban neighbourhoods have poor internet quality (speed and reliability) that cannot sustain multimedia access required in e-learning. Internet is a mandatory requirement for e-learning; thus, the research

sought to establish if there was internet available at the e-learners' location and whether it was reliable and affordable to the e-learners. It emerged that there are three places from where e-learners accessed the internet, namely: *at home* (or the personal internet, which includes mobile phone access), *at work* and *cyber café*. The e-learners had a means of connecting to the internet to access the portal from home, mainly for lightweight e-learning activities such as checking notifications and submitting assignments. Most of those in formal employment mostly undertook their e-learning activities at work using their employers' ICT resources. Some participants indicated that they have occasionally visited the cyber café to check notifications and printing services. Such visits to the cybercafé attracted a negligible cost for the e-learners.

a) Internet Access at Home

Some e-learners have various Internet Service Providers (ISPs) to chose from, especially those in the urban and suburban areas. In contrast, others have one ISP in their locations, especially in the rural areas. The primary ISP is chosen based on its *speed, reliability, cost, and location of the participant* in that order. Since the primary ISP is mainly determined by the connection's quality (speed and reliability), this research concluded that the stronger the network signal, the faster and reliable the internet connection. These findings are consistent with Chenai (2017) that reported that internet connection quality is the main determinant in choosing an ISP; however, a high-quality internet connection comes at a higher cost. The observable trend from the research is that the most popular choice of the primary ISP amongst the e-learners is the most expensive, with the best speed and most reliable connection than all the rest. Therefore, the e-learners don't mind paying more for a superior quality connection for a brief period since the larger part of the internet cost component had already been offset by the free internet at work, as we will see later in this chapter. However, some participants also considered their ISP due to its favourable cost over others.

Another determinant of the choice of ISP was the availability of internet infrastructure in the e-learner's physical location, such as *urban*, *suburban, rural, and remote areas.* While the urban and suburban areas had fewer internet access challenges, the story was worse for some rural-based participants and worse-off for all remote-based e-learners. Some rural and remote regions had only one ISP, as captured in the words of one participant who said, *"there is no other ISP in the remote*

parts of Northern Kenya except Network-1, even in some of those places Network-1 is not stable or is unavailable". The research also observed a category of e-learners who did not have a permanent physical location of work thus kept moving/roving from one place to another. Such participants experienced internet access challenges when they moved to areas with no internet or where the internet is intermittent. They had to wait until they returned to internet connectivity areas in such situations. The research further observed another category of e-learners who worked and/or resided in areas with no internet, thus had to travel to the nearest town/urban or suburban area to access the internet. This is evidenced by the words of one participant who said, *"I had to travel for about 40 kilometres to access the internet and submit the coursework"*. Figure 4.6 shows the factors around the choice of the primary ISP.

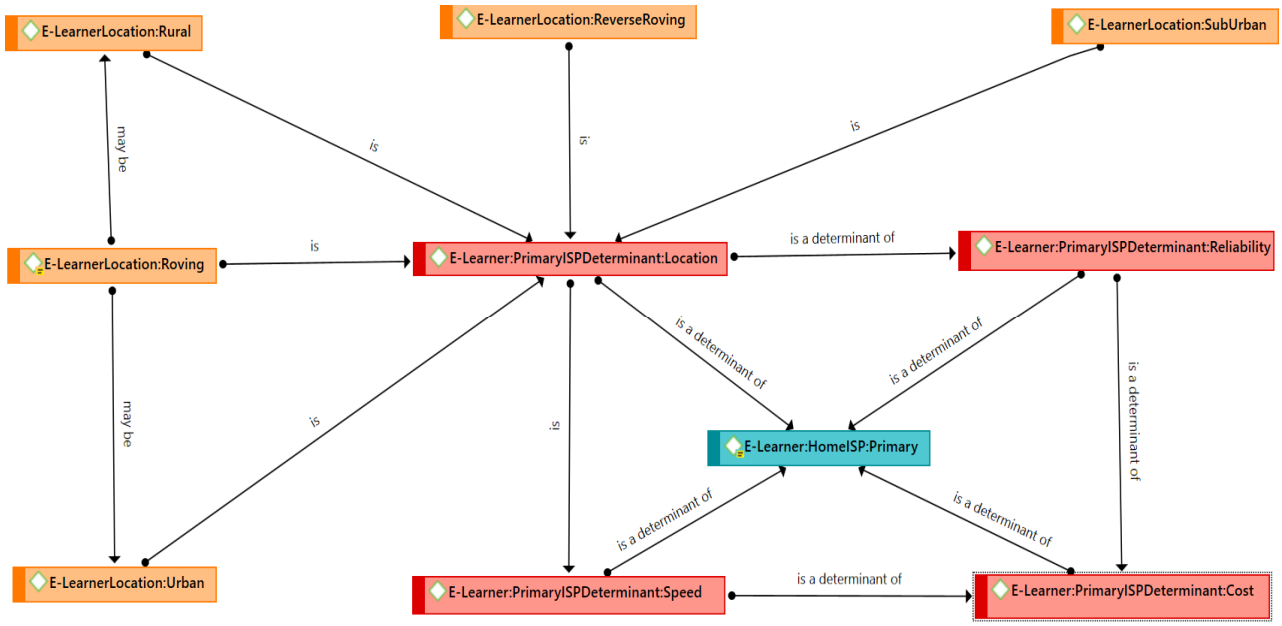

Figure 4.6: Factors Determining the ISP Choice

The secondary ISP's choice is based on the following reasons in this order:

i. To reduce the high cost of the primary ISP.

ii. When the e-learners' location did not have the primary ISP coverage and/or the signal strength was weak, especially while on the move.

iii. When the quality (speed and reliability) of primary ISP's is compromised.

iv. When the primary ISP has failed hence, the secondary becomes the backup.

Accessing the portal, interacting, and collaborating with fellow e-learners and e-tutors can only be possible with an affordable and reliable internet connection. However, this was not always the case, especially for some rural and remote-based e-learners. These internet access challenges led the e-learners to access the internet at their employers' premises, as explained in the following section.

b) Internet Access at Work

It emerged that most e-learners access the e-learning portal at work using the employers' ICT resources which included computers and the internet. This research probed them about employers' ICT policy, which prohibits employees from using the organization's ICT resources to do personal work. It emerged that some participants work in organizations where the policy is not enforced, while some work in organizations that allow limited access, otherwise defined as fair use. Further, there is a category of e-learners who did not have access to free ICT resources. This category included those working in organizations where the policy is enforced or informal organizations without exploitable ICT resources. Yet, there is a category of e-learners that ethically regulated themselves against such actions. The ICT policy violators were probed further for the motivation of doing so, and the following reasons emerged:

i. The need to reduce cost is the most compelling reason, with participants indicating that internet access cost at home is prohibitive. Since internet access at work is free, it motivates them to violate the ICT policy. One such participant said, *"the cost of accessing the portal, downloading materials, submitting coursework, and searching for extra reading materials online can be very high and unaffordable for me. I have no otherwise but use employer's internet because it is free"*.

ii. The need to *save time* spent studying at home in the evening while tired and having other competing family commitments. One participant said, *"I take advantage of studying here at work instead of struggling with books at home"*.

iii. Some participants indicated that they violate ICT policy due to its *superior quality* (speed and reliability) than the home internet. For example, one participant said, *"the reason for stealing Internet at work is that it is very fast, excellent I don't have to keep waiting for things to download or upload"*.

iv. Some e-learners cited family commitments as a reason for studying at work to avoid disruptions and other competing priorities at home. One participant justified it this way, *"it is the convenience that comes with it, sitting here at work and doing my work as opposed to going home where many things are competing for my study time, like family"*.

Figure 4.7 captures the reasons behind employers' ICT policy violations by e-learners.

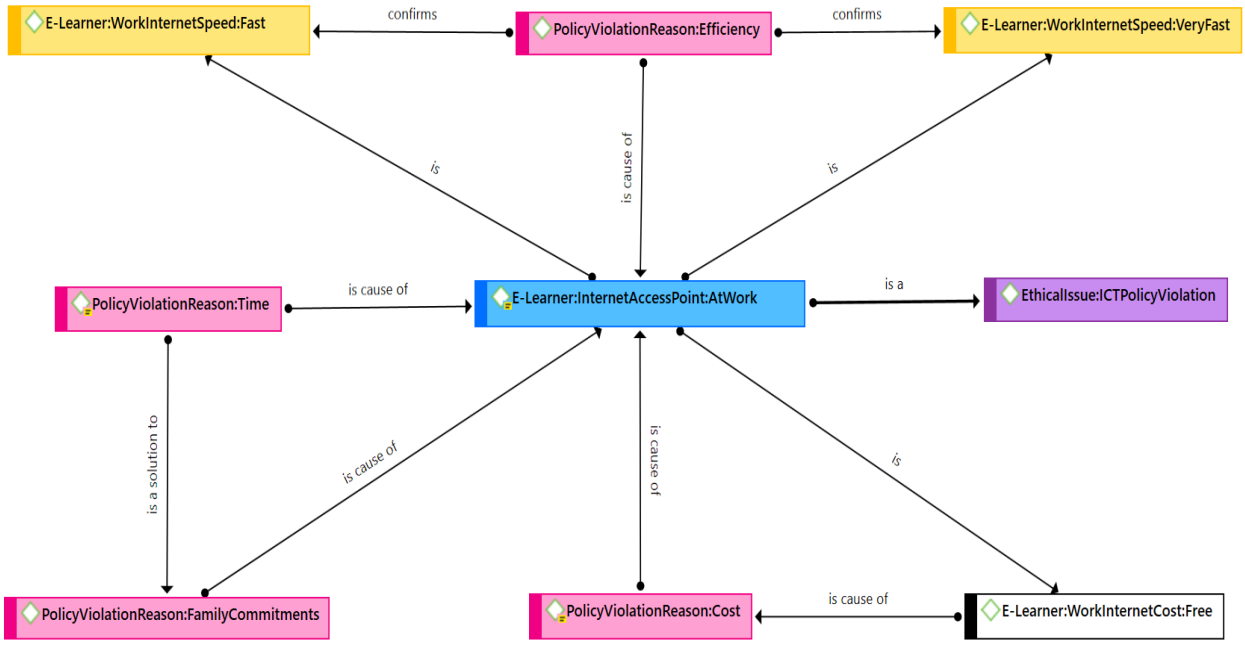

Figure 4.7: ICT Policy Violation Reasons

Interactive activities between e-learners and the e-tutors occur in the evening since both parties are mainly engaged during the day. The challenge for the e-learners using the employers' ICT resources is that they do not have that access because they are at home in the evening, which influences the extent and quality of interaction. One e-tutor echoed this challenge in the following words,

> *Learner-tutor interaction through chats is limited because many of our e-learners are working during the day and maybe using computers and the Internet at work that are not accessible in the evening or on the weekend when most chats are scheduled.*

4.3.3: The e-Learning Platform

The research also sought to establish the e-learners' experiences with the design, look and feel of the e-learning platform. In most interviews, the researcher asked deliberate questions about design challenges that both the e-learners and e-tutors faced when using the LMS. Generally, e-learners from both universities described the LMS as *"user-friendly"* and *"navigable",* interpreted by this research to mean *'usability'* and *'affordance',* respectively. Many participants indicated that once they were trained during the induction, it was easy to use and interact with the system, hinting at its *'learnability'*. This finding amplifies the fact that training (which is part of experience) moderated the relationship between ***FC*** and ***behaviour use*** and ***EE*** and ***intention to use*** as stipulated in UTAUT (Venkatesh et al., 2003). They described the LMS as highly accessible except when it is down for maintenance. However, one participant decried about the interface lacking in aesthetics and being too text-based in the following words, *"other websites use images for text, ours is just text-based. It is not properly designed; it's just drab, flat, and quite official; it's not beautiful. e-Learning should be more attractive and interesting"*. This participant was a software developer; thus, such concerns should be taken into account since the interfaces of the e-learning platforms can be made more graphical-based which in turn translate into better usability, affordance, learnability, and hence high efficiency and effectiveness. Another design issue raised and observed on both platforms is the lack of mobile telephone contacts for each class member in the class list. The participants decried that they could not contact each other and had to wait to meet physically during the tutorials, which is too late for any meaningful interaction. When probed why they could not contact each other on the system-based chats, they argued that chats are not immediately accessible since not everyone was on the portal simultaneously. The lack of e-learners' telephone numbers hindered interaction, mainly because the e-learners preferred to communicate via phone-based modes like WhatsApp, SMS, and telephone calls.

Figure 4.8 shows the summary of e-learning technologies' concept in terms of its attributes, themes, and dimensions.

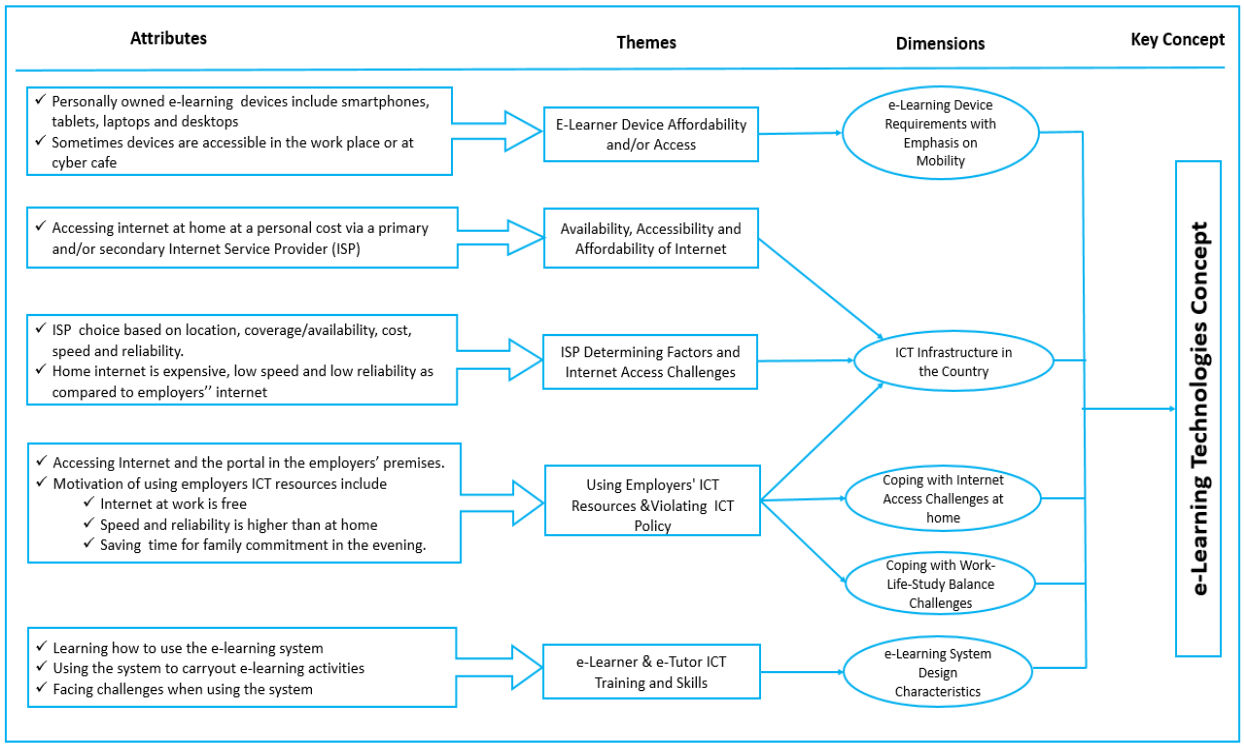

Figure 4.8: The e-Learning Technologies Concept

4.4 E-CONTENT CATEGORY

Content is the learning materials exchanged between the e-tutor and the e-learner. They include course manuals, course outlines, lecture notes, tests (coursework), and reference materials. In the behavioral and cognitive theoretical dispensations, the e-tutor is the primary source of these materials disseminated to the e-learners (Tomic, 1993). In the constructivist, social constructivist and connectivist dispensations, e-learners are expected to create their knowledge and share it with fellow e-learners and even the e-tutors (Amineh & Asl, 2015). Further, in connectivism, the e-learner is expected to locate other learning materials in the learning networks, including the internet (Siemens, 2005). The research sought to understand the design characteristics of the e-content exchanged between the e-tutors and e-learners, the challenges experienced, their resolution strategies, how fast they are resolved, and by what mode of interaction.

4.4.1 e-Content Design

It emerged that e-content design in both universities is based on behaviourist and cognitivist theories that generally encourage recalling and reproducing content given by the e-tutors (Tomic, 1993). Therefore, it does not include higher cognitive learning tasks and learning by discovery.

Secondly, the e-learners perceive e-content should only originate from the e-tutors, hence complained when the e-tutors delay disseminating it. Thirdly, from the observations of the LMS, the learning materials are mainly in text formats such as WORD, PPT, and PDF. Notably, multimedia materials such as audio and video are missing. Fourthly, the unit of learner involvement in e-content design is individualistic instead of collaborative, thus lacking the social presence of learning.

4.4.2 e-Content Challenges and Coping Mechanism Sub-Category

Raspopovic et al. (2014) defined the quality metrics of e-content uploaded on the LMS by the e-tutors. Quality attributes include completeness, accuracy, inclusion of multimedia, easy-to-understand, clarity, organization, presentation, format, and currency of the e-content. However, it emerged that some e-content did not meet these quality criteria. According to Andersson and Grönlund (2009), content tops the list of e-learning challenges and argue that there is a need to design content specifically for e-learning to address these challenges specifically. Figure 4.9 captures the summary of the e-content challenges experienced by the e-learners.

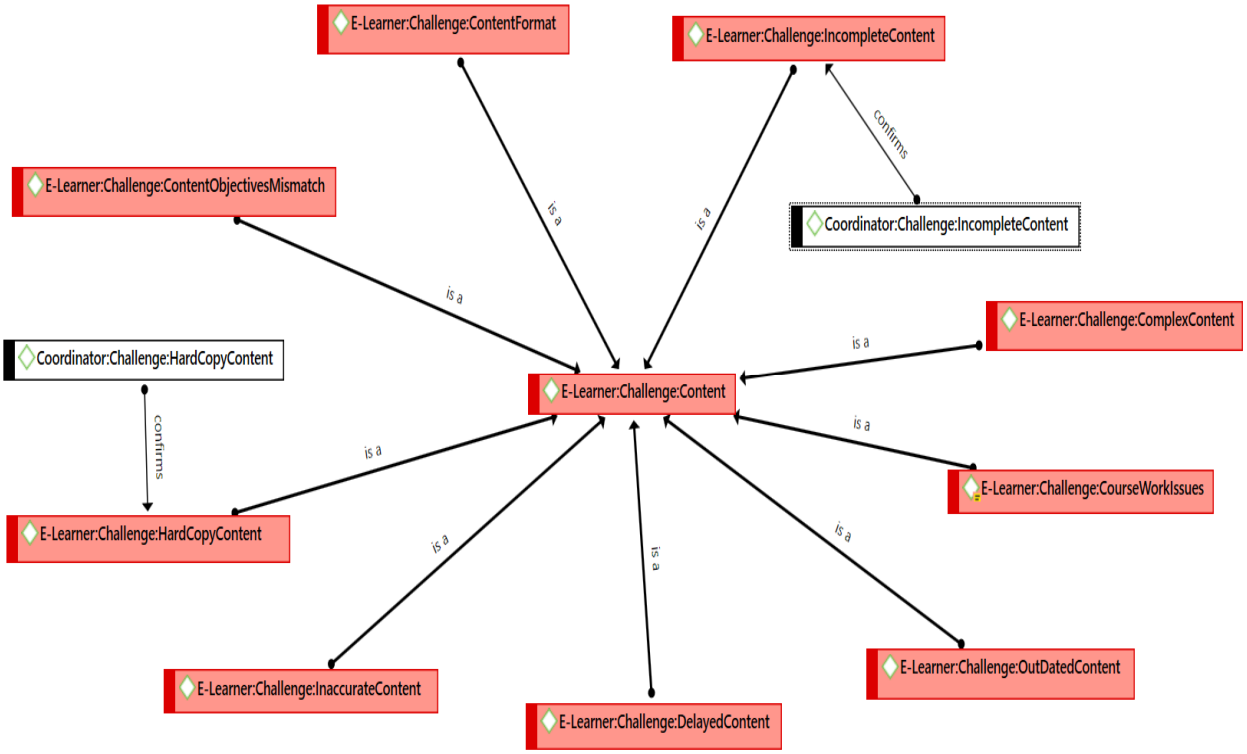

Figure 4.9: e-Learner Content Challenges

a) Complex Content- All the participants, indicated having experienced complex or challenging e-content and tests from time to time. One participant said, *"I do experience difficulties with content; every student does, or maybe many students do"*. In dealing with complex e-content, it emerged that some e-learners sought help from the e-tutors. However, this option was not popular among e-learners; hence preferring alternative sources of content help as follows:

i. Primarily e-learners sought content help from online sources. One participant said, *'I just google it up',* yet another one said, *"I go online and conduct a search of videos on YouTube"*. Notably, the ***e-library*** is an online source of content help that is used marginally, and the main complaint is that it was not working. Limited use of the e-library hinted at the dying culture and interest in reading in present-day learners with a preference for listening, hence their heavy reliance on YouTube.

ii. Some sought e-content help content within their small informally constituted groups. This finding aligns with the connectivism stance where the e-learners are supposed to learn from each other in real-life situations (Kop & Hill, 2008).

iii. Some sought content and coursework help from external tutors (besides their formally allocated e-tutors), colleagues with whom they work in the same profession, and freelance academic writers. Seeking academic assistance is consistent with constructivism and connectivism stances that advocate situating learning within the learners' environment (Amineh & Asl, 2015; Downes, 2008). However, it raises ethical issues, such as cheating, especially when the assisting party is paid to do the work on behalf of the e-learners. For example, one participant said, *"for the complex content and coursework, I went to another tutor from a different university, and I paid him"*. This result was corroborated by the e-tutors who expressed fears that someone else might be doing the coursework for them. The fears were justified because they argued that they perform so well in the coursework compared to the examinations.

iv. Some indicated that they occasionally used the physical library to address their complex content issues due to their proximity to the library.

Figure 4.10 is a summary of complex content help sources.

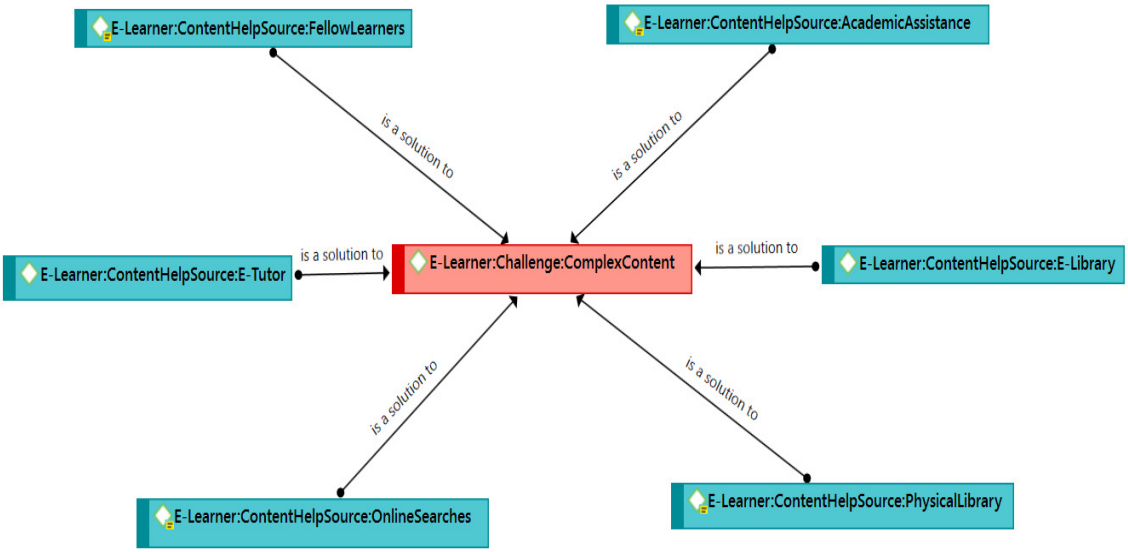

Figure 4.10: e-Learners' Complex Content Help Sources

b) Delayed Content- Some participants cited ***delayed content*** as a challenge. One participant said, *"there is also late dissemination of lecture notes and coursework with a short notice thus denying me adequate time to do them"*. This is interpreted to mean two things in this research:

i. That e-learners have formed an attitude and perception that e-content can only originate from the e-tutors. In constructivism, social constructivism and connectivism, e-learners are supposed to be co-creators of content just like their e-tutors (Foroughi, 2015; Kalpana, 2014). There should be a shift in e-learners perceptions to embrace the responsibility of co-creating e-content from the many sources at their disposal and up-dating their e-tutors as advocated by Andersson and Grönlund (2009).

ii. The delayed e-content is disseminated later towards the end of the semester, leaving them with little time to study. This leads to cognitive overload since the e-learners have to study the delayed materials within short notice. The delay coupled with work and family commitments overwhelms them. One participant said,

> *Sometimes the lecture notes and the coursework are uploaded towards the end of the semester. The e-tutor requires us to do all the coursework and submit it on short notice, which is usually very overwhelming since I also have other responsibilities.*

c) Inconsistent Content- Some participants indicated having experienced mismatched e-content and objectives provided in the course outlines. One participant said, *"there was no relationship between the course outline and the learning materials"*. Another one said, *"in one*

unit, there was no matching between the content and the objectives". Though such inconsistencies may be corrected later on, they end up confusing and wasting e-learners' time. The same participant decried, *"imagine for six weeks I had been reading irrelevant things that wasted my time"*.

d) Incomplete Content- Some e-learners indicated having encountered incomplete, inadequate, shallow, and sketchy content once in a while. One participant said, *"the modules are too shallow, and besides, some courses don't have full manuals to explain the sketchy notes"*. Some sought help from online sources to cope with this challenge, yet others sought extra reading materials from other universities with equivalent conventional classes. One participant said, *"to remedy the shallow notes; I sought* conventional *students whose notes were more detailed and also supplemented them with University-4 e-learning study packs"*.

e) Inaccurate Content -Though it was not rampant, some e-learners indicated encountering erroneous content, which confuses the e-learners. One participant said, *"there was one mathematics course with wrong calculations, which was misleading"*.

f) Out-Dated Content- Though it was also not rampant, it emerged that some e-tutors sometimes disseminated outdated content as one participant said, *"I don't know whether they regularly update our notes"*. On further probing as to why s/he quipped about outdated notes, the participant said, *"it's based on the fact, when I check the conventional programs, their notes are up-to-date than ours"*.

g) Hard Copy Content- We discovered that some e-tutors were still providing hard copy content in one university. One participant said, *"even some courses have their notes in printed modules. So during the tutorial, the e-tutor gives a hard copy and asks us to photocopy from that copy"*. One coordinator corroborated this finding, saying, *"there are e-tutors who still have their notes in very old foolscaps and others who just photocopied the book"*. The e-learners buy the printed modules/manuals or photocopy the available copies in such a situation. The research followed up this matter with e-learning managers and coordinators, and it emerged that there is an assumption by the universities that the e-tutors have the know-how to create e-content. Although both universities have e-content design training, some e-tutors could not create e-content due to the following reasons:

i. Some e-tutors lacked e-content creation skills; thus, they do not know how to convert their hard copy notes into electronic form. One manager said, *"there are those without adequate*

knowledge about putting materials in electronic form so that the e-learners can access them on the e-learning platform".

ii. Even where the e-tutors have skills, because they are demoralized by poor pay and inadequate and/or lack of technical facilitation, they do not see the added value in spending their time to convert their content into electronic form. This is best captured in the words of one manager who said,

> *If they find that teaching with the technology is not helping them get an extra coin in their pocket, they won't see the need to use it, and that is the point at which they behave as if they don't know how the technology works.*

iii. Most e-tutors mainly fail to attend the in-service training where most of these skills are taught. One manager lamented, *"training experiences a lot of apathy because many e-tutors do not attend".*

Figure 4.11 summarizes the e-contents' concept in terms of its attributes, themes, and dimensions.

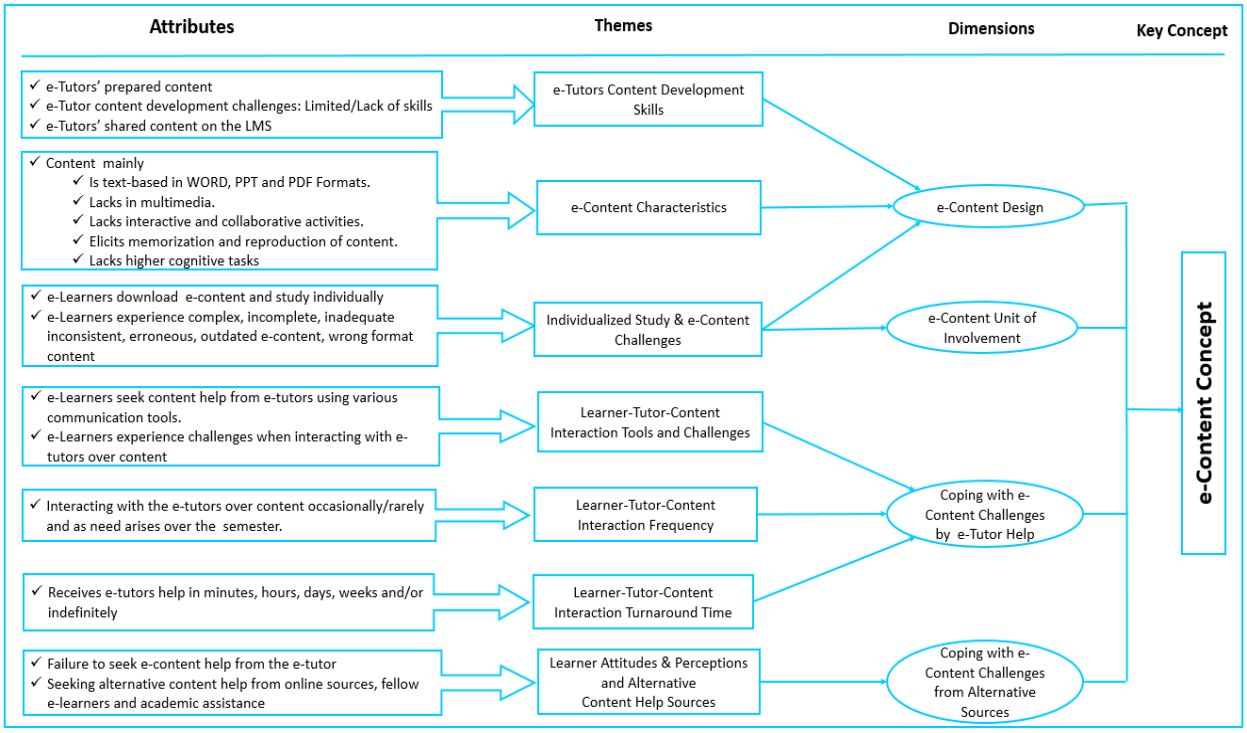

Figure 4.11: The e-Content Concept

4.5 LEARNER-LEARNER INTERACTION CATEGORY

Social interaction is anchored in constructivist, social constructivist, and connectivist theories. It takes the form of learner-learner and learner-tutor interaction. This section deals with learner-learner interaction. This research established that minimal interaction happens among the e-learners via the tools provided on the portal. However, outside the e-learning portal, many exchanges are going on. The research sought to know the interaction reasons, how they interacted, the frequency of such interactions, and their challenges during the interactions.

4.5.1: Learner-Learner Interaction Reasons

From the research, it was possible to tell that all the e-learners experienced loneliness and isolation. Perhaps this is best captured in the words of one participant who said, *"e-learning is a very lonely way to learn, I am alone like lone ranger"*. Loneliness is mainly attributed to e-tutors' failure to design e-content, coursework, and practicals with an eye towards collaborative learning. This principle would go a long way to reduce the feelings of loneliness. This finding is consistent with Mwaniki et al. (2016), who reported that the e-learners study individually since the e-content is not designed to emphasize interactivity and group working. To cope with loneliness and isolation, e-learners reach out to each other to seek moral support, which emerged as the most prevalent reason for the learner-learner interaction. Interaction and collaboration are sought within their small informally constituted groups, as shown in Figure 4.12.

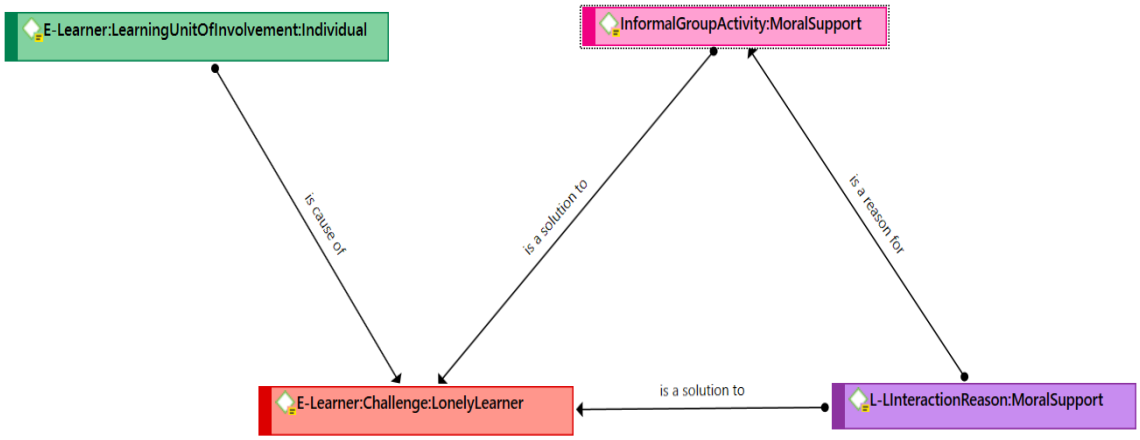

Figure 4.12: Learning-Unit-of-Involvement, Isolation, and Moral Support Relationship

The interactive and collaborative activities undertaken during learner-learner interaction include dealing with complex content, sharing knowledge, seeking coursework support, solving general e-

learning problems, doing practicals, preparing for examinations, and clarifying notifications and alert messages.

Figure 4.13 shows the interactive activities undertaken in the informal collaborative e-learning context.

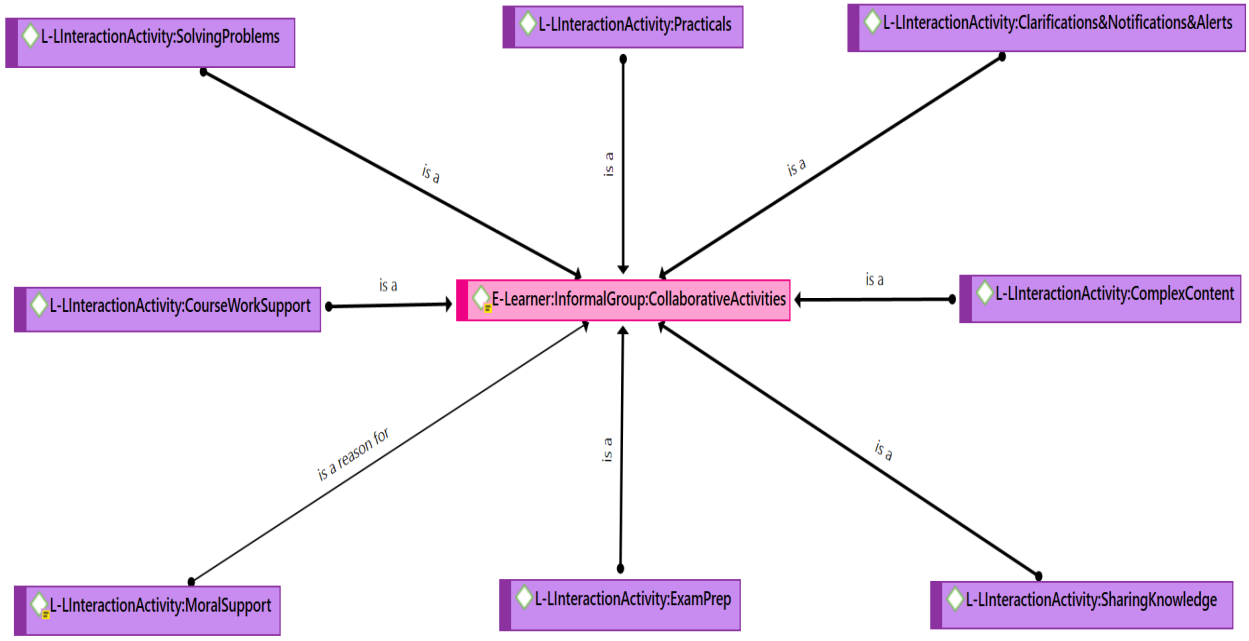

Figure 4.13: Informal Collaborative Activities

4.5.2 Learner-Learner Interaction Frequency Sub-Category

To pin down the extent of e-learner isolation, the research sought to establish how frequently these e-learners interacted amongst themselves. It turned out that some e-learners interacted *'daily'*, others *'weekly'*, others *'monthly'*, and others *'as the need arose'*. Interestingly, some had never interacted with anyone under the guise that they do not know their classmates. An observation of the LMS in both universities reveals a design oversight. Though there is a list of class members on the unit profile, it lacks key contact information like telephone and e-mail. Therefore, e-learners meet each other for the first time during the tutorials or examination periods which is already too late. Most e-learners indicated that they desire more frequent interaction amongst themselves, communication challenges notwithstanding as described later in section 4.5.4 ahead.

4.5.3 Learner-Learner Interaction Modes

The research was also interested in establishing interaction modes between the learners. WhatsApp is the most prevalent, followed by phone calls and SMSes. Phone-based communication modes were popular due to their accessibility since the phone is at hand. LMS-based modes such as the chats and discussion fora were not popular in University-1 because they are not mandatory. Though there are traces of their use, the e-learners reported non-responses from the intended recipients. In University-2, the use of chats and forums was mandatory, with marks associated with participation in the e-tutor-planned sessions. However, outside the planned chats and forums, the tools largely remained unused. All these modes of communication were alternatives means of communication to WhatsApp, as shown in Figure 4.14.

WhatsApp as an interactive and collaborative e-learning tool combines the social and educational aspects and provides a quick and easy means of communication. However, one coordinator criticized its use (and other social media) in e-learning because it is not structured like the chat and forums, which makes it impossible to track the e-learners interactive and collaborative activities in the following words,

> *WhatsApp is not included in the LMS, so whatever they discuss in WhatsApp is not captured on the portal. The LMS creates logs of how many e-learners have logged in, what time they logged in, how long they were online, and what activities they engaged in.*

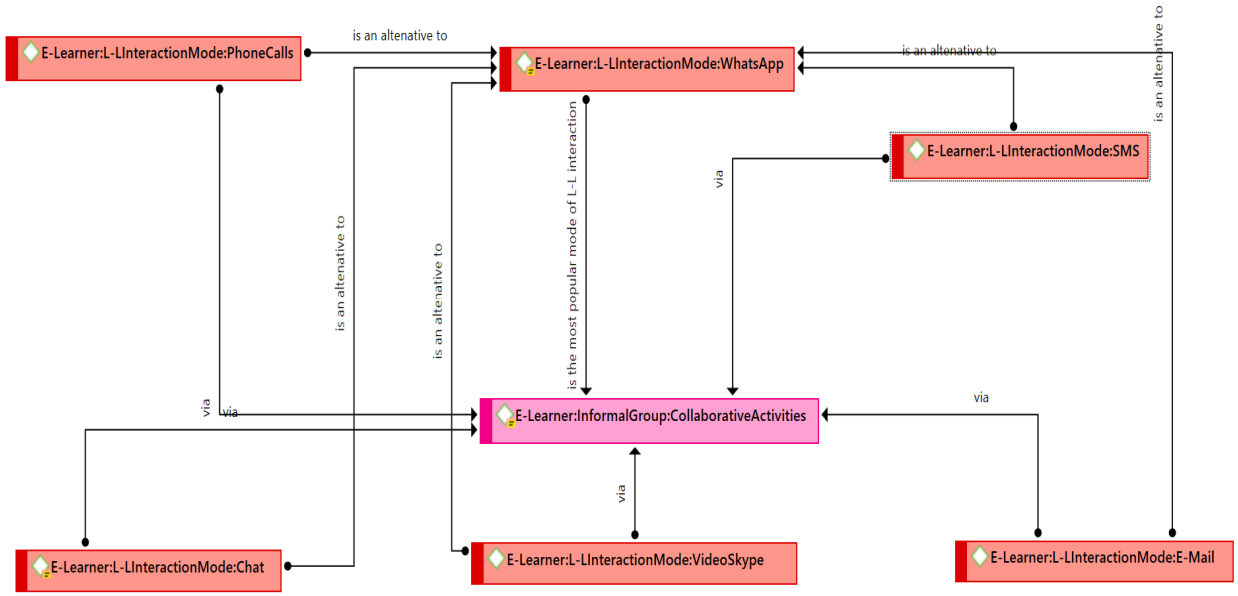

Figure 4.14: Learner-Learner Interaction Modes

4.5.4 Learner-Learner Interaction Challenges

It emerged that learner-learner interaction is hindered to a certain extent by several challenges, which include: -

i. Lack of e-learner contact details like phone number and email on e-learners' profiles. This design issue prevents the e-learners registered in the same class from knowing and engaging with each other. However, from the e-tutors profile, the contact details for the class members are available.

ii. Many e-learners do not respond to the chat messages, so those who desire to use the chat get frustrated since the dialogue does not pick up. When probed why they do not like using the chats, they argued that chats are not readily accessible since they are not always on the e-learning platform.

iii. There are too many communication tools for one to keep tracking, to the extent that one participant wondered whether there was a way of combining them into one entity. Perhaps this explains why other social media platforms such as Facebook, Skype, and Twitter are not used. Instead, similar communication goals can be achieved via WhatsApp, giving it a higher ***relative advantage*** [in the ***PE*** factor of the UTAUT model (Ahmad, 2014; Venkatesh et al., 2003) than the other social media tools available.

iv. Work, family, and social commitments left the e-learners with little time for interaction.

v. Unreliability and/or lack of internet in e-learners' locations makes it hard to access the portal; hence, it is impossible to engage with fellow e-learners in discussions via chat and forums.

vi. Inadequate training on using the interaction and collaboration tools provided on the LMS.

Figure 4.15 summarizes the learner-learner interaction concept in terms of its attributes, themes, and dimensions.

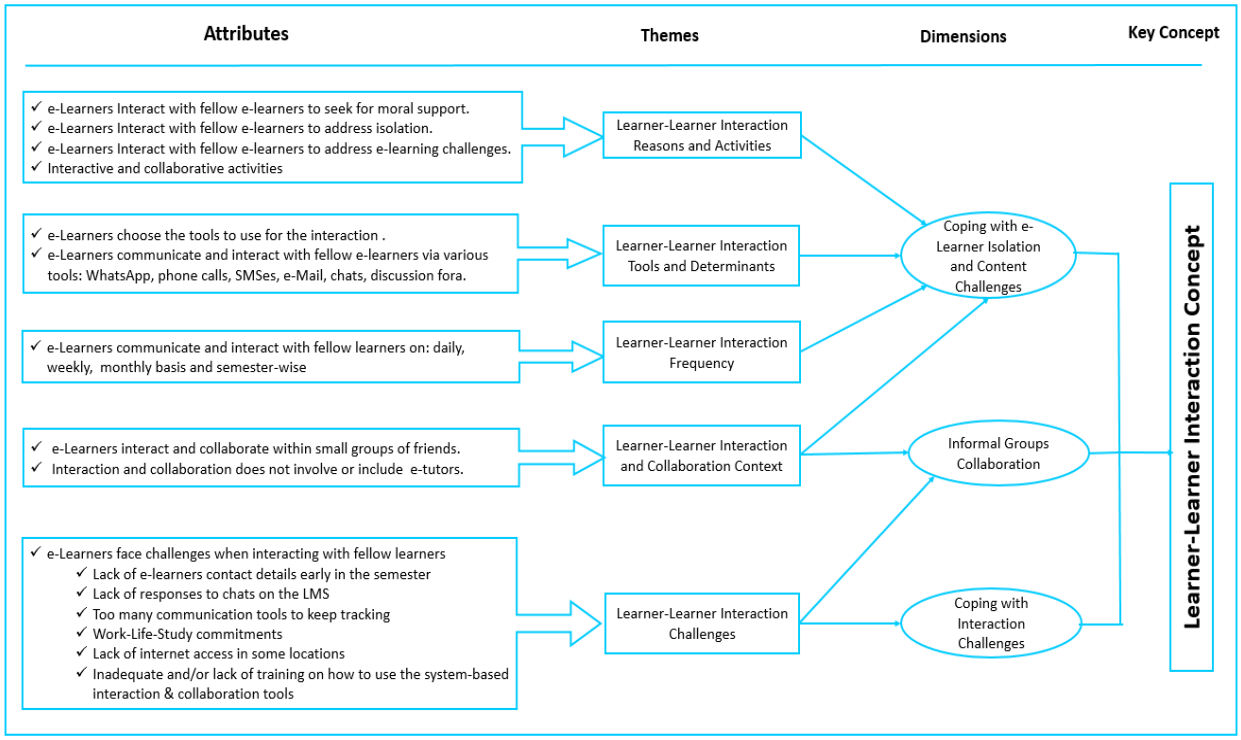

Figure 4.15: The Learner-Learner Interaction Concept

4.6 LEARNER-TUTOR INTERACTION CATEGORY

The e-learners should always feel confident to contact their e-tutors when issues arise in the e-learning process because the e-tutors are figures of authority and content experts. On the other hand, the e-tutors require interaction with e-learners to communicate the e-content, resolve e-learning challenges and obtain feedback about the e-learners' progress. Therefore, the research was interested to know the nature (unit-of-involvement) of interaction between the e-learners and the e-tutors. It also sought to establish the reasons for interaction, who initiates the interaction, interaction flow, the frequency of interaction, the interaction tools and their effectiveness and the status of the e-learner after the interaction. The research was also interested to know about the tutorials' attendance, activities, and challenges.

4.6.1 Learner-Tutor Interaction Reasons Sub-Category

The e-learners were the main initiators of the learner-tutor interaction. The following are the reasons for learner-tutor interaction:

a) From the e-learners and e-tutors, it emerged that coursework issues are the main reason for learner-tutor interaction. Such issues include unclear instructions, activity deadlines, delayed tests, and lack of feedback.
b) e-Learners mainly initiate interaction sessions to resolve complex content. Notably, e-tutors rarely initiate such interactions. This is based on e-tutors' perception that the e-learners should initiate these interactions since they experience the problem(s). One e-tutor said, *"the e-learner is the one who is supposed to look for help. As an e-tutor, I have so many e-learners, so I cannot keep prompting all of them"*. This perception is not valid since there is a need to prompt the e-learners to give feedback about their challenges. However, some e-tutors initiated discussions on complex content. One e-tutor said:

   I do initiate discussion on complex concepts within topics; in fact, the online activities are geared towards those key areas of content. Concepts that I know that even if I have provided all the notes, they will not understand when they read them independently. So I create questions or activities around such parts of content on the chats and discussion forums.

   Equally, the research also observed a category of e-learners, especially in University-2, who believed that the e-tutor should initiate content interaction on chats and discussion forums. This perception resulted in a 'wait and see' situation of who will go first. By the end of the semester, no interaction has happened between the two parties outside the mandatory chat and discussion fora.
c) Besides complex e-content, other e-content issues that spurred learner-tutor interaction included delayed content, incomplete content, missing content, and mismatched objectives.

4.6.2 Learner-Tutor-Content Interaction

Since the e-tutors are the authors of the e-content disseminated to the e-learners via the LMS, it is expected that if the e-learners have a problem with e-content, they should first contact their e-tutors. However, that was not the case, and the research sought to know why. There emerged two reasons:

a) As reported earlier, some e-learners did not see the need to bother their e-tutors because they had alternative sources of e-content help. The key source being online sources such as YouTube and Google. Upon further probing, most e-tutors were wary about the growing trend

of YouTube content consumption by most e-learners, especially its validity. However, although they did not entirely condemn the trend, they indicated that e-learners should authenticate and validate such online content against the course outline provided by the e-tutors. Further, the e-learners can seek their e-tutors' approval of online materials to avoid overwhelming or underwhelming their curriculum requirements.

b) Some e-learners failed to consult because they had formed perceptions about the e-tutors. For example, it emerged that some of them found it okay to mainly contact their e-tutors for other reasons but not for complex content. Three kinds of perceptions persisted among the e-learners:

   i. Some of them were afraid of the e-tutors. This was captured by the words of one participant who said, *"but I am afraid that if I keep asking questions, the e-tutors might feel like I am exposing or evaluating them to be poor e-tutors on a public platform"*.

   ii. Some e-learners argued that they did not know their e-tutors; hence, they did not have a student-teacher relationship. This is echoed in the words of one e-learner who said, *"I think it's just the distance. And it's not just the physical distance but also the psychological distance of calling this faceless person"*. Yet another one said, *"I do not contact the e-tutors over content because I feel there is no relationship between them and me"*.

   iii. Some e-learners had formed a perception that the e-tutors are indifferent to their problems. Such a perception might be justifiable, especially if they had previous unpleasant experiences with the e-tutors. For example, one participant said, *"I have never because from experience, my complaints are never treated seriously, e-tutors are hard to get. They are forever teaching in the conventional programs, so I don't think they have time for me"*. However, such a perception about e-tutors may not be entirely accurate because some reached out to their e-tutors and got the help they were seeking.

   Moreover, others never contacted their e-tutors over e-content issues but still perceived e-tutors as indifferent. One such participant said, *"I don't know whether it's just me, and this is my personal view; most of the e-tutors have an attitude such that when I want to contact them and ask them a question, they are not willing"*. In response to such sentiments, one e-tutor wondered, *"how can e-learners accuse e-tutors of indifference*

yet they have not tried to ask. It would be better if they ask because they are hiding behind technology where the e-tutor can not see them?"

4.6.3 Learner-Tutor-Content Interaction Frequency and Turnaround Time

Although complex e-content was not the leading cause of learner-tutor interaction, this research sought to know how often those who interacted with their e-tutors over content did so. It emerged that the e-learners contact their e-tutors *"when the need arose"*, which again was rarely or occasionally, a finding that is corroborated by the e-tutors. Further, in conventional learning, content problems are resolved in real-time or within the shortest time possible due to the proximity of the two parties (Monika, 2013). However, that may not be the case in e-learning, and so the research sought to know how promptly e-content help was provided. e-Tutors responded within minutes and/or hours, which is quite commendable. Some responded in days and/or weeks which was understandable given the heavy workload since they double up as conventional tutors and e-tutors. On the other hand, some take an indefinite amount of time to respond, with some never responding. Response time is crucial because it determines how happy/satisfied the e-learners will be and if they will ever return to the e-tutors in the future for more content-interaction or not. Figure 4.16 summarizes e-learner content challenges and the turnaround time of the help from the e-tutor.

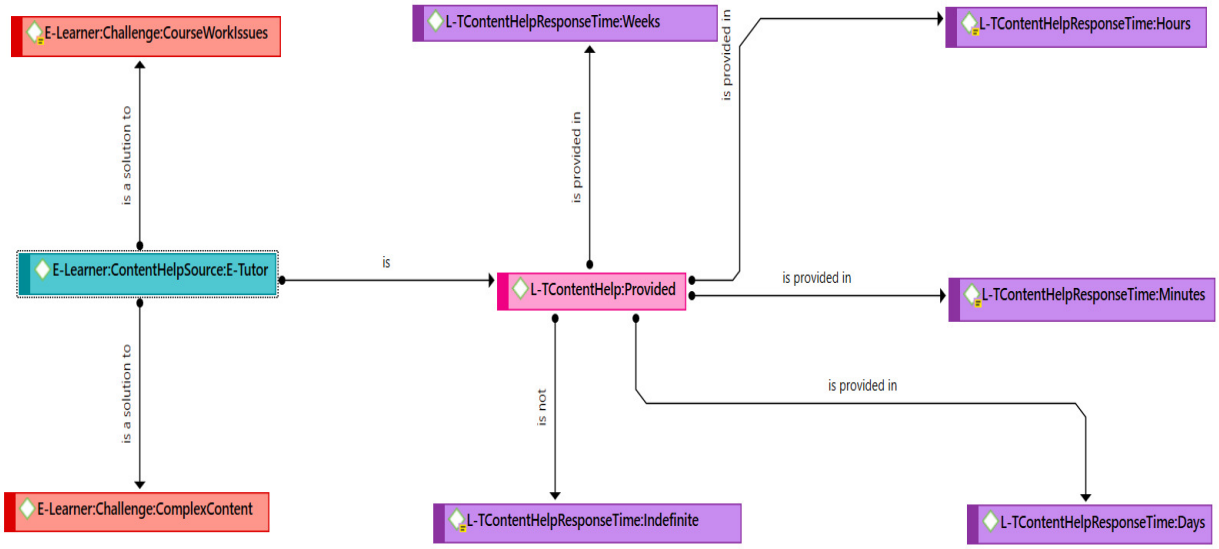

Figure 4.16: Learner-Tutor Content Challenges Resolution

4.6.4 Learner-Tutor Interaction Modes Sub-Category

Learner-tutor interaction happened via various modes depending on the need as follows: -

i. Phone Calls are the most preferred mode of interaction where e-learners call their e-tutors, especially for immediate needs arguing that phone calls give them quick and direct access to the e-tutors since it is at hand. This finding is generally corroborated by the e-tutors saying that e-learners call them mainly. Thus, telephone calls have a higher ***relative advantage*** in reference to the ***PE*** factor than other communication technologies available for interaction between e-learners and e-tutors (Ahmad, 2014; Venkatesh et al., 2003).

ii. e-Mail is the second preferred mode of communication, especially for critical matters, arguing that it's formal and has a 'trail'; hence, it can be traced should the matter at hand be unresolved. The e-tutors again confirmed that they have communicated with e-learners via email. In this case, e-mail has a higher ***job-fit*** in reference to ***PE*** factor than the other forms of communication tools described in UTAUT (Ahmad, 2014; Venkatesh et al., 2003).

iii. Chats are not popular among the e-learners in both universities. In University-2, the e-learning calendar demands that e-tutors plan and initiate chats regularly throughout the semester. However, outside the mandatory use, the chats largely remain unutilized. In University-1, there is no mandatory use of the chats; hence they are barely used. One e-learner remarked, *"I rarely use the chat since they are never replied, so I avoid it"*. Although all the e-tutors indicate that they have used the chat facility, they decried that the e-learners have not responded to their chats.

iv. SMSes are used upon e-tutors' request after calling and finding them engaged in conventional classes. One participant said, *"when I call the e-tutors and find them in class, I am advised to write a text message"*. Some e-tutors also corroborated this finding.

v. Discussion forums are nominally used, and participation mainly happens in University-2, where forums are mandatory. The e-tutors initiate the discussions on fora, and the e-learners contribute to the subject of discussion.

vi. WhatsApp is the least used mode of interaction because it is not perceived as a formal means of communication between e-learners and e-tutors. One participant said, *"WhatsApp and Facebook are not formal means for communicating in a learning environment between e-learners and e-tutors"*. However, some e-tutors indicated having responded to several e-

learners' WhatsApp messages. Those who used it argued that it has quick access since it is at hand and hence used for urgent matters. Other social media platforms like Facebook, Twitter, and Skype are absent in learner-tutor Interaction.

4.6.5 Learner-Tutor Interaction in Tutorials

The face-to-face tutorials are not popular among the e-learners going by the high level of absenteeism observed. Some e-learners attended without failure, others mainly attended, and others rarely attended. Mainly, the e-tutors attended without failure, with some admitting to missing occasionally. Tutorials help bridge the physical and psychological distance between the e-learners and the e-tutors. One e-tutor said, *"e-learners should not take tutorials for granted, because they can interact face-to-face with the e-tutors and get to know each other better, which is not possible with online virtual interaction"*. Another e-tutor said, *"during the tutorials, I thrash out issues they might be having with the content"*. This finding was corroborated by one e-learner who said, *"for my survival, I have attended all of them without fail, I have to"*. When probed what "survival" meant, the participant said, *"you see, the entire semester I have been learning on my own, and there is a concept that I did not understand, so the tutorial allows me to get clarifications from the e-tutors"*. This was corroborated by one e-tutor who said, *"if I were an e-learner, I would attend them without failure. Because if I had problems understanding when reading alone, now I will have the opportunity to seek further clarification and understand"*.

4.6.6 Tutorial Activities

The research sought to know the activities undertaken in the tutorials; it established that mainly the e-tutors give a *'topical highlight or summary'* of the unit. Others engage the e-learner in a *'question and answer'* session. Others address *'complex e-content'*, while others utilize the sessions for *'examination prep'* in readiness for the forthcoming examinations, especially in University-1. Finally, some e-tutors in Science, Technology, Engineering, and Mathematics (STEM) subjects utilize the session *'performing practicals'* in the laboratory. Notably, these tutorial approaches are not mutually exclusive; hence e-tutors combine two or more of these approaches to enrich the tutorial experience.

4.6.7 Tutorial Challenges Subcategory

Certain challenges were associated with the tutorials as follows: -

a) e-Learner absenteeism is the main challenge; having underscored tutorial importance, this research sought to know why the e-learners predominantly missed the tutorials. Two other problems exacerbate absenteeism: -

   i. Since the bulk of the e-learners are working-class, the primary reason for their absenteeism was the failure to secure study leave from their respective employers. This problem is further compounded by the need for more leave days to sit for examinations which is not feasible from their employers' perspective.

   ii. There was a category of e-learners that indicated that the investment in attending tutorials is prohibitive, which includes the cost for transport, food, and accommodation.

b) There is a general agreement among the participants that the time allocated for the tutorials is inadequate for any meaningful engagement between the two parties and for all the activities lined up. Thus, tutorials ended up being crash programs that exert undue pressure on the e-learners as the e-tutors try to recap and revise everything covered over the entire semester. One participant said, *"you see, I come for a tutorial, and a unit has a big manual; and say ten sets of lecture notes. How do I study a whole semester work in 3-4 hours?"*. However, some participants felt that the tutorial time is adequate if both parties have diligently done their part over the semester. One such e-learner said, "*if one has covered the syllabus well, then they will see things flow very well in the tutorial. If not, by attending the tutorial, one will be mixed up and confused all the more than if they had not attended"*.

c) From the e-tutors' it emerged that the e-learners are ill-prepared to interact in the tutorials. One e-tutor said,

> *I don't like the tutorials because the e-learners expect me to cover the whole semesters' work in one session. Yet, many of them* have not *read the manuals and the notes provided online, so they expect me to perform some miracle.*

One e-learner confessed this challenge in the following words, *"the problem is that most of us would open our notes for the first time in the tutorial, so we didn't have questions to ask*

since you can't ask about what you don't know". But, according to this research, this is interpreted as e-learners' academic indiscipline.

d) From e-learners, e-tutor absenteeism and lateness emerged as a concern. This was corroborated by some e-tutors, agreeing that they occasionally failed to attend the tutorials. Given the investment involved in attending the tutorials, e-tutors' absenteeism was not taken kindly by the e-learners. It is worse when not communicated in good time to allow adjustments of e-learners' itinerary. One disgruntled e-learner lamented,

Some e-tutors failed to come for tutorials, and it's when we are seated in class waiting for them at 9:00 am, we get to know that they are not coming. I travelled daily from here [Muranga town is 84.6 km to Nairobi] to attend the tutorials. So it was quite an investment and a big challenge because to be in Nairobi at 7:00 a.m. from here, I must have woken up at 4:00 am, and then someone takes the tutorial so casually.

4.6.8 Tutorial Schedule Preference Subcategory

The participating universities schedule tutorials at different times during the semester: early, mid, and end. Though each tutorial timing has its advantages, not all e-learners and e-tutors were comfortable with the tutorial timings in the academic calendar. Given that some participants had already complained that the tutorial time was inadequate, some went ahead to propose the number of tutorials they perceived to be adequate and where they preferred them to be placed within the semester as follows: -

a) Some e-learners and e-tutors suggested that there should be two tutorials at the beginning and middle of the semester. One participant said,

Split tutorials into two sessions, one week at the beginning of the semester to introduce the course and familiarize with e-tutors and the other in the middle of the semester to capture progress and plan for the remaining part of the semester.

b) Some preferred mid-semester tutorials because they give e-learners time to familiarize themselves with the content. They also allow e-tutors time to get e-learner feedback and arrest any content issues, thus easing the pressure associated with end-semester tutorials. One e-

learner participant justified mid-semester tutorials saying, *"they will allow the review of what has been learned by mid-semester and highlight what is remaining to the end of the semester"*.

c) Most participants suggested that tutorials be held twice: mid-semester and end-semester. One e-learner participant justified it by saying, *"mid-semester tutorial to arrest students' problems early enough instead of deferring them to the end of the semester, and end-semester tutorial to summarize and wind it up"*.

d) Some e-learners suggested monthly tutorials, which some e-tutors corroborated. They argued that there is a need to progressively address e-content problems over the semester instead of dealing with the entire semesters' issues in the tutorial meetings when they were already time-constrained.

e) Though some e-learners suggested weekly tutorials, no e-tutor corroborated the proposal due to the pressure that is likely to exact on them. Weekly tutorials would be equivalent to turning e-learning into conventional learning. Furthermore, weekly tutorials are not feasible given that the main reason e-learners took up e-learning was the lack of time to commit regularly.

f) A few e-learners preferred early semester tutorials, a proposal supported by most e-tutors. One e-tutor said, *"early semester tutorials are good because we will familiarize with each other, hence form a tutor-learner relationship that will enable us to interact freely going forward"*. Another e-tutor said, *"early semester tutorials are better because we will lay the foundation of the course early enough which the e-learner can build upon when they go back home to study on their own"*.

g) A few e-learners prefer end-semester tutorials, and no e-tutor favoured it because it puts a lot of pressure on both parties as the semester comes to a close.

h) Most e-tutors suggested that online tutorials should replace face-to-face tutorials. Some e-learners were of the same view. Given the tutorial challenges and the fact that it is impossible to get a tutorial timing agreeable to all, this research proposes online tutorials as the solution.

Figure 4.17 summarizes the learner-tutor interaction concept in terms of its attributes, themes, and dimensions.

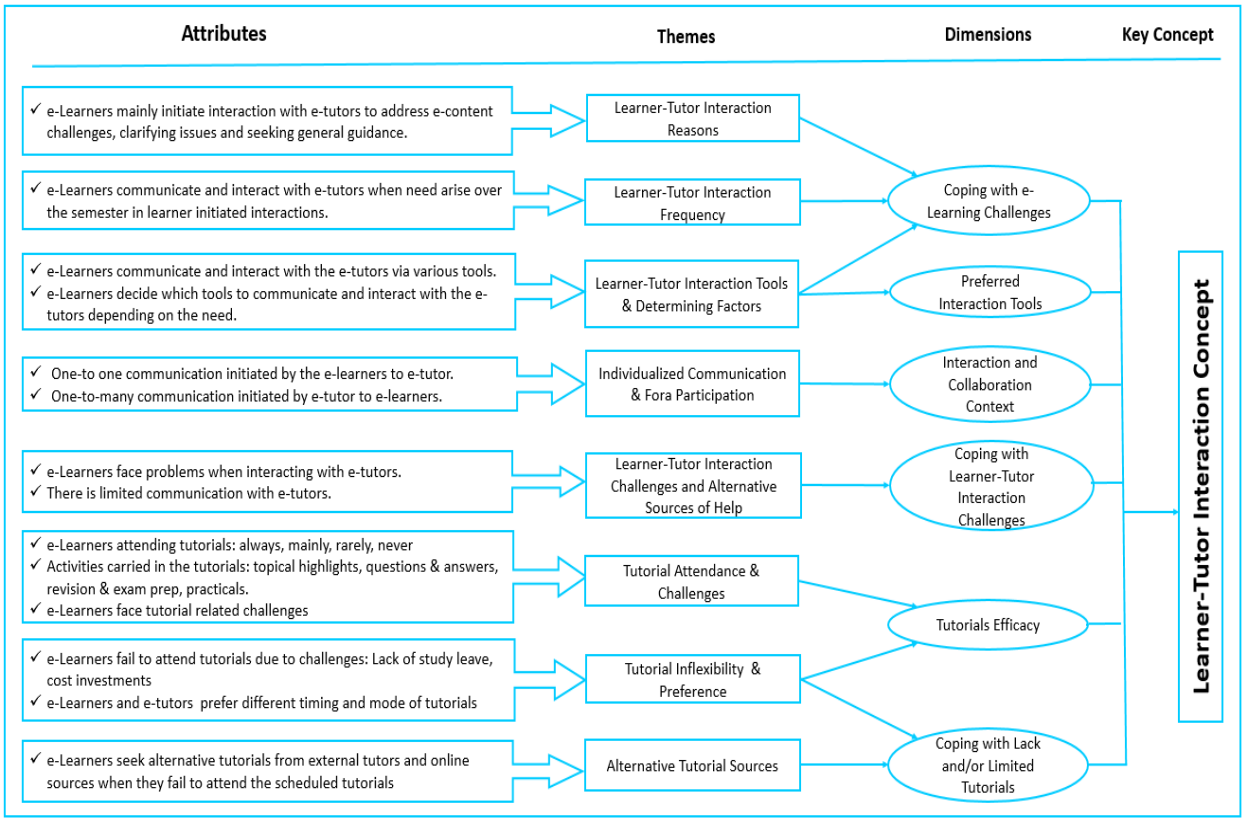

Figure 4.17: The Learner-Tutor Interaction Concept

4.7 THE E-LEARNING CONTEXT CATEGORY

e-Learning occurs within the organizational and national context defined by certain facilitating or constraining factors. At the national level, such factors include the national ICT and e-learning policies, regulatory agencies, and national ICT infrastructure. At the organizational level, such factors include the organizational ICT and e-learning policies, the organization ICT infrastructure, technical capacity, and resource base.

4.7.1 National and Organizational ICT and e-Learning Policies

Besides the uptake of new ICTs in e-learning, another integral component crucial to the delivery of e-learning is the presence or absence of a guiding policy framework (Kibuku et al., 2020a; Nyerere, 2016). The 2006 national ICT policy that guided ICT enactment in the country for ten years lacked a strategy on e-learning. This policy gap was addressed in the 2016 national ICT

policy (Republic of Kenya [RoP], 2016) that included a section on e-learning policy guidelines. Though this was a plausible effort, there still lacks a well-defined and comprehensive national e-learning policy framework to guide the practice in the county. In the wake of this national e-learning policy gap, the practice is driven by the individual institution's e-learning policies. Hence according to Nyerere (2016), it isn't easy to operationalize these institutional policies without a national e-learning policy framework. National e-learning policy is significant because it would provide individual institutions with a common framework to base their institutional policies for the design, implementation, and provision of e-learning.

Further, in the organizational ICT and e-learning policies, the desired e-learning device provision and training should be defined. Though the two universities that participated in the research have ICT and e-learning policies, they are yet to operationalize them fully due to resource constraints. One manager said, *"the problem is the budget"*. This finding is in line with Tarus et al. (2015), who observed that failure to operationalize the institutional ICT and e-learning policies was occasioned by financial limitations and lack of the relevant ICT infrastructure. Other policies that affect the implementation and delivery of e-learning emanate from regulatory agencies such as the CAK, CUE, and MoE. For instance, though preferred by most e-tutors, the proposal for online tutorials is in contravention of the CUE requirements for face-to-face tutorials.

4.7.2 National ICT Infrastructure

The provision of e-learning hinges on a thriving ICT infrastructure. According to TOE (Baker, 2012) and UTAUT (Ahmad, 2014; Venkatesh et al., 2003) theoretical models, the national ICT infrastructure and associated services form the bedrock of technical ***facilitating conditions (FC)*** for e-learning. However, the country experiences a disparity in the spread of ICT infrastructural installations between the urban and rural areas, with crucial ICT infrastructures concentrated in the urban areas (Ndungú et al., 2019). This, in turn, affects access to the internet and the extent to which the e-learners can interact and participate in e-learning activities. One e-tutor said, *"I also have some e-learners without internet connectivity; when they want to submit assignments, they travel to the nearest town where there is internet coverage which might be many kilometres away"*. Another e-tutor said,

In the rural parts of Kenya, we don't have good internet connectivity and coverage, not even a 3G network. But, unfortunately, on ICT infrastructure penetration, the government does not seem to be serious because it has allowed the private sector to concentrate on profit-making only while serving equal opportunities to all citizens is not emphasized.

Another challenge is the lack of electricity [in some rural areas] needed to power the devices. One e-tutor said, *"some of the e-learners in remote areas are disadvantaged, and it's not only about internet connectivity but also the availability of electricity to charge their phones and tablets to be able to communicate"*. The Kenya Digital Economy Blueprint of 2019 corroborated this finding. However, it also reported that the digital divide had been slowly reducing with some government and private sector initiatives to expand the national ICT Infrastructure (RoP, 2019). These initiatives include laying the fibre optic backbone, connecting to the national electricity grid under the Rural Electrification Programme (REP), and increasing ISPs in the market (CAK, 2018). However, even with these efforts, the penetration and accessibility of ICT infrastructure and associated services are still not satisfactory, hence the need to reduce the digital access gap further to address the geographical and economic inequalities observed so far in the distribution of ICT infrastructure (Awour & Kaburu, 2014; Mutisya & Makokha, 2016; Ndungú et al., 2019).

4.7.3 Organizational ICT Infrastructure

The universities, e-tutors, and e-learners function within the national ICT framework and have contended with the challenges that emanate from the inadequacies described in the preceding section. Nyerere (2016) reported that institutions in major towns generally have superior ICT infrastructures, those in semi-urban areas have modest ICT infrastructures, and those in rural areas have low ICT infrastructures. This is maybe so because the universities can only move at the rate of ICT sophistication proportional to the available national ICT framework. The universities that participated in the study had functional ICT departments, computer networks, and e-learning systems. However, they cited high cost of acquiring the necessary technology, training, accessing the internet, deploying, and sustaining a flourishing e-learning environment. One manager said, *"money is a key constraint towards realizing such an e-learning environment"*. This finding is corroborated by Kashorda and Waema (2014) and Nyerere (2016), who argued that the costs for reliable ICT infrastructures needed for e-learning are usually high. Further, the prohibitive cost of

acquiring and sustaining e-learning technologies hinders the universities from implementing adequate technologies to deliver learning in STEM-based subjects. A fact echoed in the words of one manager who said, *"in Kenya, there are many challenges to contend with, including internet availability, internet affordability, and resources to implement a thriving ICT infrastructural environment and training of staff needed for teaching science-based subjects"*.

4.7.4 Organizational Technical and Pedagogical Capacity

In their respective studies, Nyerere et al. (2012) and Tarus et al. (2015) reported a lack of adequate technical and pedagogical competencies by the e-tutors, which hindered the delivery of e-learning in IHLs. The national ICT policy, 2016, recognized this challenge and proposed further development of the institutional technical and pedagogical capacity of the e-tutors (RoP, 2016). Although there are evident efforts to train the e-tutors, technical and e-learning support staff, the research observed that this challenge persists. One manager said, *"the university management keeps saying 'e-learning is the way to go in the future", if they believe in that remark, then they should train the e-tutors in a manner that will prepare them to do e-tutoring efficiently"*. Inadequate training is attributed to two factors; first, lack of adequate resources to roll out a comprehensive training program. Second, lack of time on the part of the e-tutors to attend the planned training sessions as they are engaged in teaching the conventional classes. Although ***training*** was not included in UTAUT, it emerged as a sub-factor of experience, which is a moderating factor between ***facilitating conditions (FC)*** and the ***use***. It also emerged as a moderating factor between ***effort expectancy (EE)*** and ***intention to use*** e-learning technology.

4.7.5 Organizational Resource Base

From the foregoing discussion, financial resources are a major consideration and a constraint in the deployment and delivery of e-learning. Kashorda and Waema (2014) argued that a high degree of ICT implementation and use enhance learning, teaching, and research. It also supports universities in achieving their academic and managerial objectives. Nevertheless, the higher the level of ICT implementation, the higher the costs for the already financially constrained institutions. Resource constraints, among other factors, make e-learning not to be prioritized in the universities' budgets. About committing resources for carrying out e-learning effectively and efficiently, one e-learning manager lamented that the universities treat e-learning as second-rate

[to conventional learning] in terms of facilitation and prioritization of resources. The manager wondered why the e-tutors were expected to treat it with more weight in the following words, *"to me it seems that 'e-learning is a by-the-way project' of these universities and everything around it is not given the attention that it's due"*.

Further, the Returns On Investments (ROI) from e-learning are nominal; hence universities do not see the need to prioritize it. This has been attributed to the universities' management perception that e-learning is cheaper than conventional programs; thus, its charges are less while actually, the opposite is true. One e-learning manager said:

> *There is something wrong with the e-learning ROI model. The primary problem is that university managements believe that studying online is cheaper because one is not using university facilities. However, the equipment required is more expensive than physical buildings or lecture halls. In fact, learning online should be more expensive than studying in conventional programs because the demand for technology is high and costly. And training is costlier.*

Confounding the matter of cost further is that the technologies are ever-changing. Such changes are sometimes accompanied by new technologies and hence new costs, making it hard for the organizations to keep abreast with these changes (Kibuku et al. 2020a). University-2 witnessed this after upgrading their e-learning platform, thus necessitating increased cost for the new compatible technologies and re-training costs, as shown in Figure 4.18.

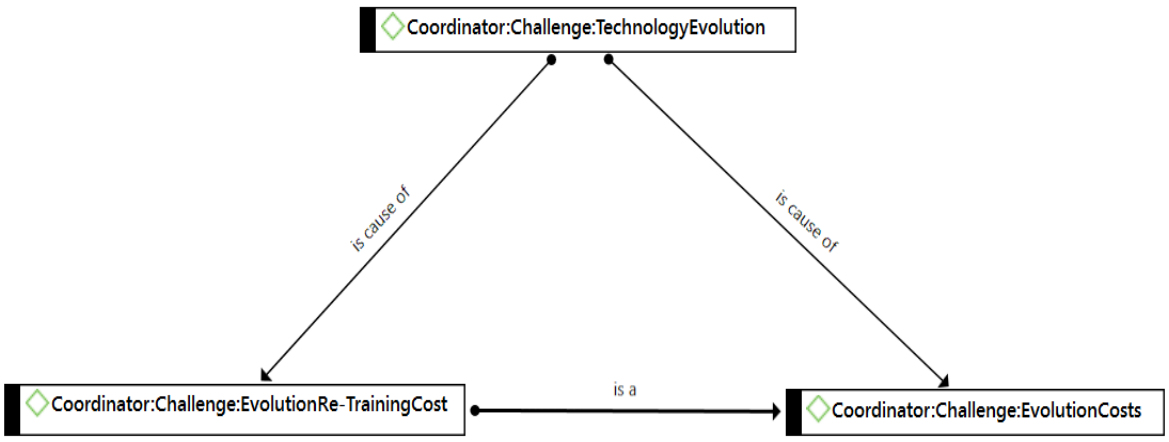

Figure 4.18: Relationship Between Technology Evolution and Costs

According to the TOE framework (Baker, 2012), ***'slack resources'*** is a facilitating factor that falls under the ***organizational context*** construct, interpreted not as a constraint but resources over and above what is needed to acquire and sustain a thriving e-learning environment. However, that is not the case since organizational resources are always perceived as a constraint. Moreover, **TOE's *'slack resources' factor*** only addressed technology from the organization's perspective and not from the individual users affiliated to the organization (Awa et al., 2017). IHLs do not provide e-tutors with devices and a means to access the internet away from campus. The IHLs' management operates under the perception that all the e-tutors have the technical devices needed to carry out e-learning, thus encouraging the BYOD policy. This perception is wrong, and in that case, TOE does not inform what the individual users should do to address that challenge. One e-tutor put it this way, "*management believes that all of us have Internet where we live and a laptop to connect to the internet"*. Yet another one said, *"the institution should provide the resources needed for e-learning apart from the internet, and here I am talking about the devices to connect"*. When such resources are not provided, the e-tutors do not perceive themselves as facilitated [enough] by the university management to carry out their e-learning activities.

Figure 4.19 below shows the summary of the e-learning environment concept in terms of its attributes, themes, and dimensions.

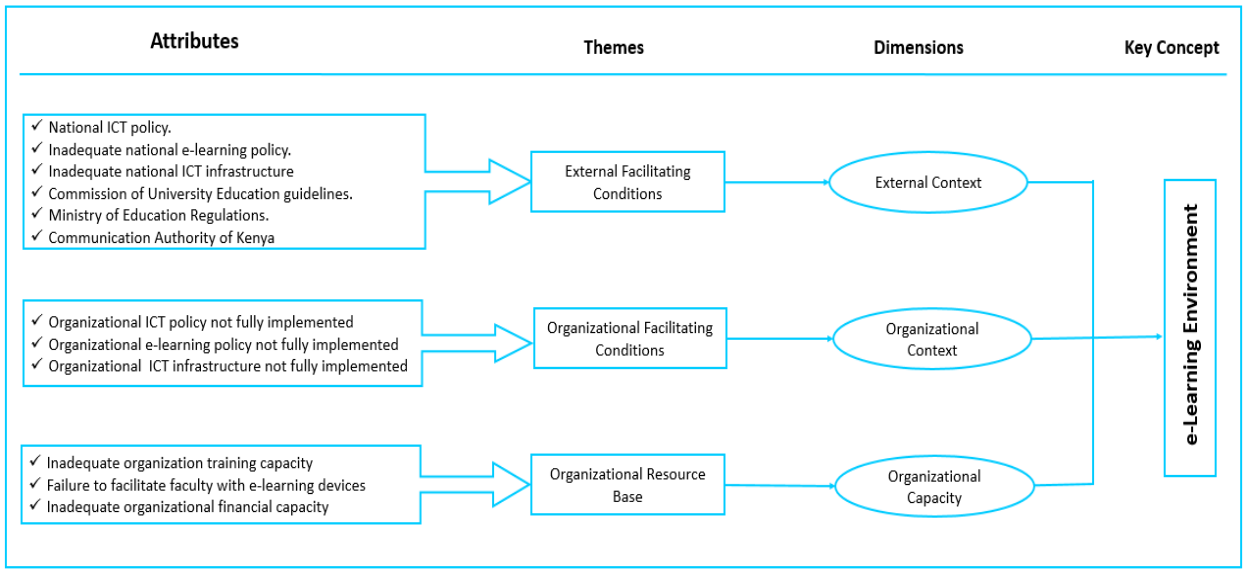

Figure 4.19: The e-Learning Environment Concept

4.8 THE LEARNING CATEGORY

e-Learning is seen as "merely another site for learning" (Andrews, 2011 pp 109). Its argued to be similar to conventional learning, the only difference being the 'e' which seen is as a conduit for delivering the 'learning' (Andrews, 2011). This perspective of e-learning is especially true when it comes to learning experiences and objectives. One manager said, *"the learning outcomes will not change because of the mode of delivering learning"*. Therefore, this concept captured whether equivalent learning (to conventional learning) experiences occur in e-learning. It includes formal collaborative learning, informal collaborative learning, and learning domains.

4.8.1 Collaborative Learning Sub-Category

This category captured the extent to which e-learners collaborated with their e-tutors and fellow e-learners, the collaborative activities they engaged in, e-learners' and e-tutors' motivation to work in groups, group formation and constitution, and the level of participation in these groups. From the research, it emerged that all the e-learners have never engaged in collaborative group work. The e-tutors don't encourage formal group working despite the LMSs (Moodle) having group working tools. This finding is in line with Muuro et al. (2014) and Nyerere et al. (2012), who observed that these tools are yet to be fully utilized. The learning unit of involvement in the design of e-content, exercises, assignments, and practicals, as earlier noted, is individualistic rather than collaborative. This finding is in line with Mwaniki et al. (2016), who observed e-learning in IHLs in Kenya is characterized by limited interaction and collaboration between e-learners and e-tutors. This leads to learner isolation and denies the e-learners the benefits of interaction and collaboration envisioned in constructivism, social constructivism and connectivism (Lister, 2014; Mwaniki et al., 2016). These benefits include co-construction of knowledge and developing critical thinking and problem-solving skills (Muuro et al., 2014; Mwaniki et al., 2016). Yet, a small percentage of the e-tutors are aware of the group working tools.

Upon further probing, the e-learner indicated that they would like to work in formal groups on the condition that they will be trained further since they did not have group working skills. This finding was also corroborated by the e-tutors, who indicated they need to be trained to use group working tools. Training in technology use, as observed previously, is crucial, and from the e-learners' and e-tutors' induction sessions, there was no mention of group working tools; hence e-tutors

understood it to be optional. One manager said, *"in the training of e-tutors, we have not emphasized group working. Once it is left out, it is not practised by the e-tutors"*. However, even though all participants indicated that they would wish to work in virtual groups, some were sceptical about its practicality, especially due to synchronization of group timings and free-rider issues.

4.8.2 Informal Group Learning

Despite the total lack of formal collaboration, the e-learners indicated that they mainly work in informal groups formed amongst themselves without involving their e-tutors. Some e-learners did not participate in group learning, citing failure to know their classmates and their contact details. e-Learners in the same locality went all the way to convene physical meetings. One participant said, *"but our group is informal, and it is a physical group of learners coming from more or less the same region"*. Learning being a social process, the informal learning groups are formed to serve certain e-learners' needs (Lister, 2014). They draw moral support, share knowledge, solve problems, address complex content, support each other with the coursework, do practicals, and prepare for examinations together. The primary mode of interaction is social media (specifically WhatsApp) which they argue is efficient and readily accessible. Figure 4.20 shows the informal group subcategory.

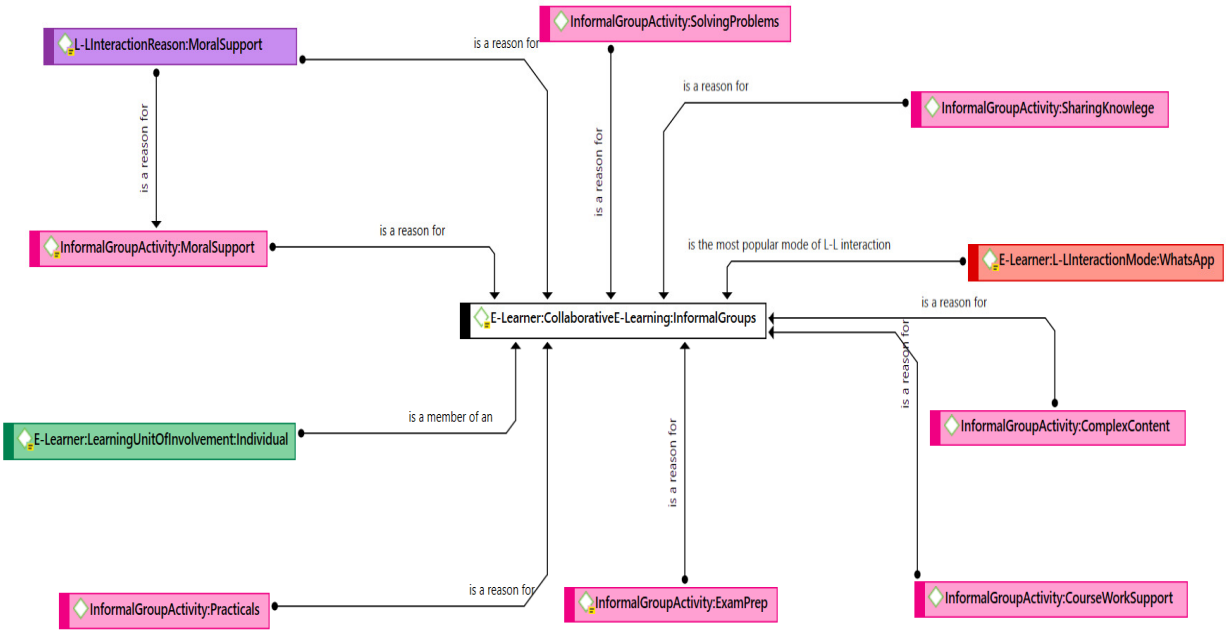

Figure 4.20: Informal Group Sub-Category

4.8.3 Learning Domains Sub-Category

Three learning experiences emerged from the research: cognitive, affective, and behavioural. Cognitive learning experiences are concerned with acquiring knowledge/information through mental processing skills (Bloom, 1956; Hoque, 2016). From the interaction with e-learning participants and observations of the LMSs, the research noted that e-learning is still influenced by behaviourism and cognitivism (Tomic, 1993). This is evidenced by the design of the e-content, which is mainly text-based, lacking in multimedia and collaborative activities. A closer look revealed that the tests especially elicited memorizing the e-content provided by the e-tutors, rote learning, and drilling without (Modtritscher, 2006). Thus, both the e-content and tests do not emphasize higher cognitive tasks and critical inquiry, which are the hallmark of constructivism and social constructivism (Amineh & Asl, 2015). Another observation was that some e-tutors uploaded all the learning materials at once, which caused cognitive overload to the e-learners. It is worse when the learning materials are provided towards the end of the semester because it overwhelms the e-learners when reading, internalising, and preparing for examinations on short notice.

The affective learning experiences strongly emerged in the e-learners' emotions, feelings, and attitudes that emanated from the interactions with fellow e-learners and their e-tutors during the learning process. Affective learning is mainly influenced by constructivist, social constructivist and connectivist theories rich in social interaction aspects of learning (Amineh & Asl, 2015; Seimen, 2005). e-Learners' emotions can positively or negatively impact cognitive learning (Sönmez, 2017; Zajonc, 2006). A negative impact can slow the cognitive learning process, in which case it serves to suppress learning (demotivate the e-learners). In contrast, positive impact helps boost learning (motivate the e-learner) towards achieving learning goals. Some of these reactions were naturally exhibited as the participant expressed satisfaction or displeasure in their experiences. Under the positive emotions, e-learners had good things to report about their interactions with their e-tutors, e-learners, and e-content using words like *"my tutors always respond to my issues and so am happy with them so far ".* Another one said, *"After the tutorial, I felt better prepared to sit the exam".* However, what was worrying was how less prevalent these positive remarks were. Predominantly the e-learners' feelings and emotions were negatively described using terms such as *[very] frustrated, confused, disorganized, felt [very] bad, felt*

pressured, demoralized, unhappy, depressed, surprised, demotivated, worried, heartbroken, anxious, desperate, and *hopeless.* Some used gestures such as shaking their heads to underscore their displeasure and lifting their hands in resignation. Sometimes the affective domain in most learning environments is not given due attention (Sönmez, 2017; Zajonc, 2006). Given that the e-learners are away from their e-tutors and fellow e-learners (and hence are low in external motivation), ignoring the affective part of e-learners can have very severe consequences for learning. Such consequences include loss of interest in subject matter, poor academic achievements and dropping out of e-learning (Sönmez, 2017)

The behavioural (psychomotor) experience involves learning by doing to acquire skills through manual or practical demonstration (Sönmez, 2017). Thus it is influenced by a combination of behaviourist and constructivist theories. This research observed that this domain is not fully developed, especially when considering STEM courses with many practicals that require laboratories and demonstrations. The teaching of STEM-based subjects via e-learning in IHLs in Kenya is a hyperbole. It emerged that the practicals and experiments are largely not done. Sometimes with the help of the e-tutors, little attempts at performing the practicals and experiments happen during the tutorials, which are already inadequate, meaning that they are performed partially. Some e-learners have attempted to do practicals in their informal groups, so they do not involve the e-tutors. Figure 4.21 shows the summary of the psychomotor domain of learning.

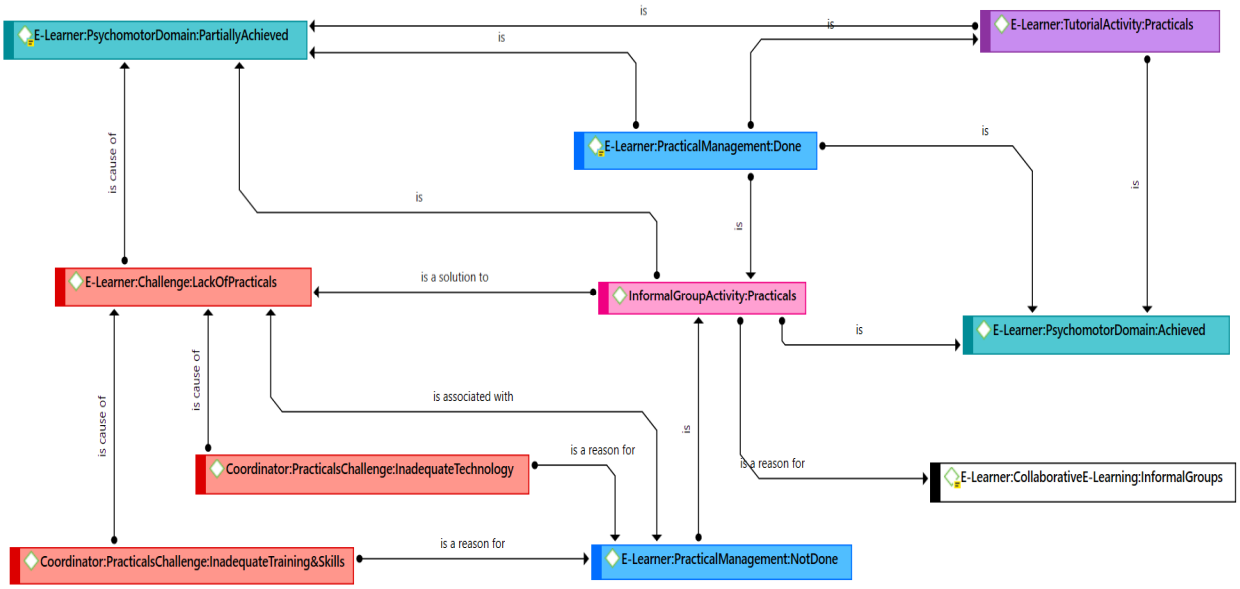

Figure 4.21: Psychomotor Learning Experiences in STEM Sub-Category

One e-tutor expressed reservations about how practical-based courses are taught in the following words, *"but I have some serious worries and questions about e-learning …. I wonder how the practicals are taught?"*. Non-STEM-based e-learning has been around longer than STEM-based e-learning (Bhukuvhani et al., 2012; Herman & Butler, 2019). As a result, some educationists perceive e-learning to be more suited and applicable to social sciences than STEM-based subjects (Arkorful & Abaidoo, 2014). One e-learner expressed frustration with the handling of practicals as follows, *"I was surprised why a science-based course like mine which involves a lot of group work and practicals was offered online, yet the university has no capacity to do that"*. The challenge is the lack of the necessary technology and capacity to deliver STEM-based content via e-learning. One coordinator said, *"the way it is done today is still wanting because the e-learning infrastructure is not mature enough to allow the teaching of practicals online"*. The coordinator further cited a lack of technical preparedness on the part of the e-tutors in the following words, *"the e-tutors are not adequately trained to handle practicals in online classes"*. In the absence of practicals, the e-learners mainly do the practicals individually or in their informal groups without e-tutors' supervision. In contrast, a few e-tutors perform practicals during the tutorials, which are already inadequate. But generally, the e-tutors mainly ignored the practicals.

Figure 4.22 summarizes the learning concept in terms of its attributes, themes, and dimensions.

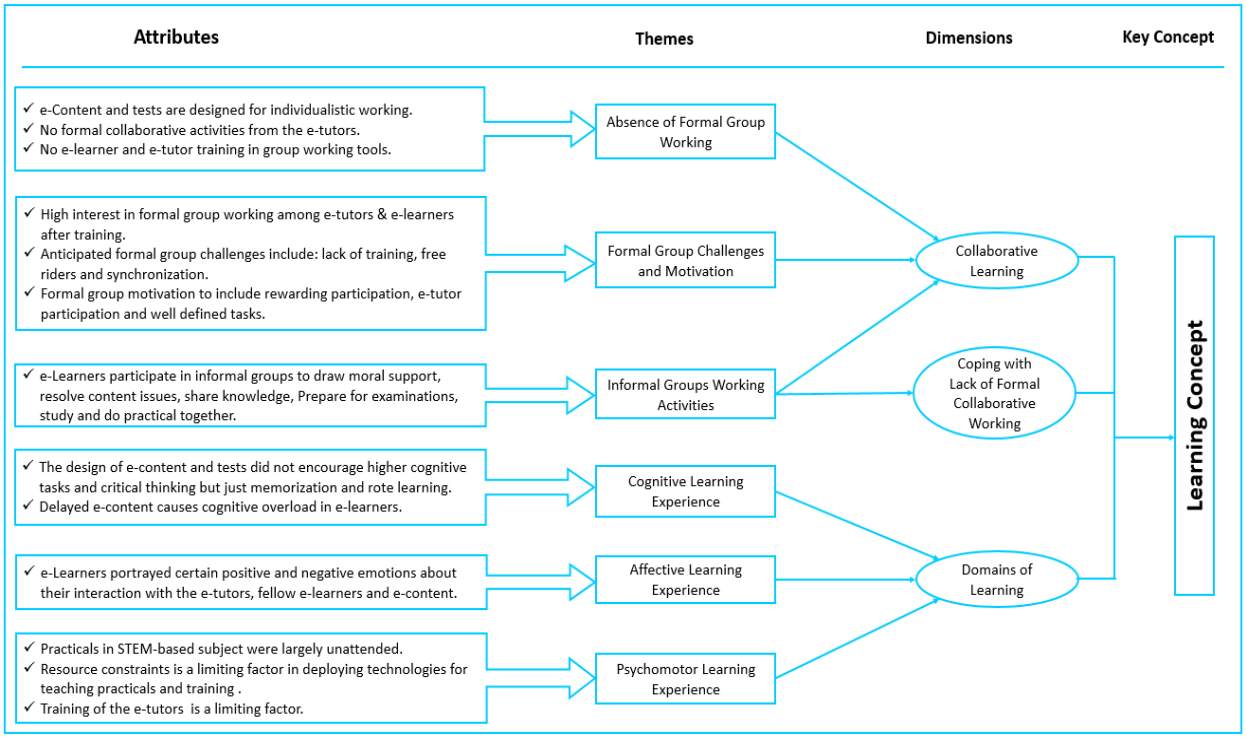

Figure 4.22: The Learning Concept

4.9 CONSTRUCTING THE THEORY

This section presents the key concepts' integration criteria into the core concept/category and summarizes the causal relationships between the key concepts identified from the data. It also presents the constructed theory, which is the output of this research.

4.9.1 Integrating the Key Concepts to Form the Core Concept

After the analysis of data in the preceding sections, eight key concepts emerged, namely: the *e-Learner, e-Tutor, e-Learning Technologies, e-Content, Learner-Learner Interaction, Learner-Tutor Interaction, Learning,* and *e-Learning Environment.* These key concepts are the building blocks integrated to form the core concept or the theory. The integration is based on the researcher's introspection using reflective questions (NB these are not research questions) whose answers collectively captured the *core concept/category.* Such introspection questions included:

i. What personal attributes of e-learning participants influence interaction in e-learning?
ii. Why are the participants interacting?
iii. How do the participants interact? What technologies are they using for the interaction, and what factors determine the choice of those technologies?

iv. When do the participants interact? And how often do they interact?

v. What challenges do the participants experience when interacting, and how do they overcome them?

vi. Are the e-learners learning in the interaction process like their conventional counterparts? If yes, how?

vii. How does the institutional and national context influence interactive e-learning activities?

After moments of reflection and moving back and forth between the memos, *'e-learning theory for interaction and collaboration'* emerged as the core concept/category around which the theory is constructed.

Figure 4.23 shows the theoretical framework for e-learning consisting of the concepts, dimensions, and themes derived from the data

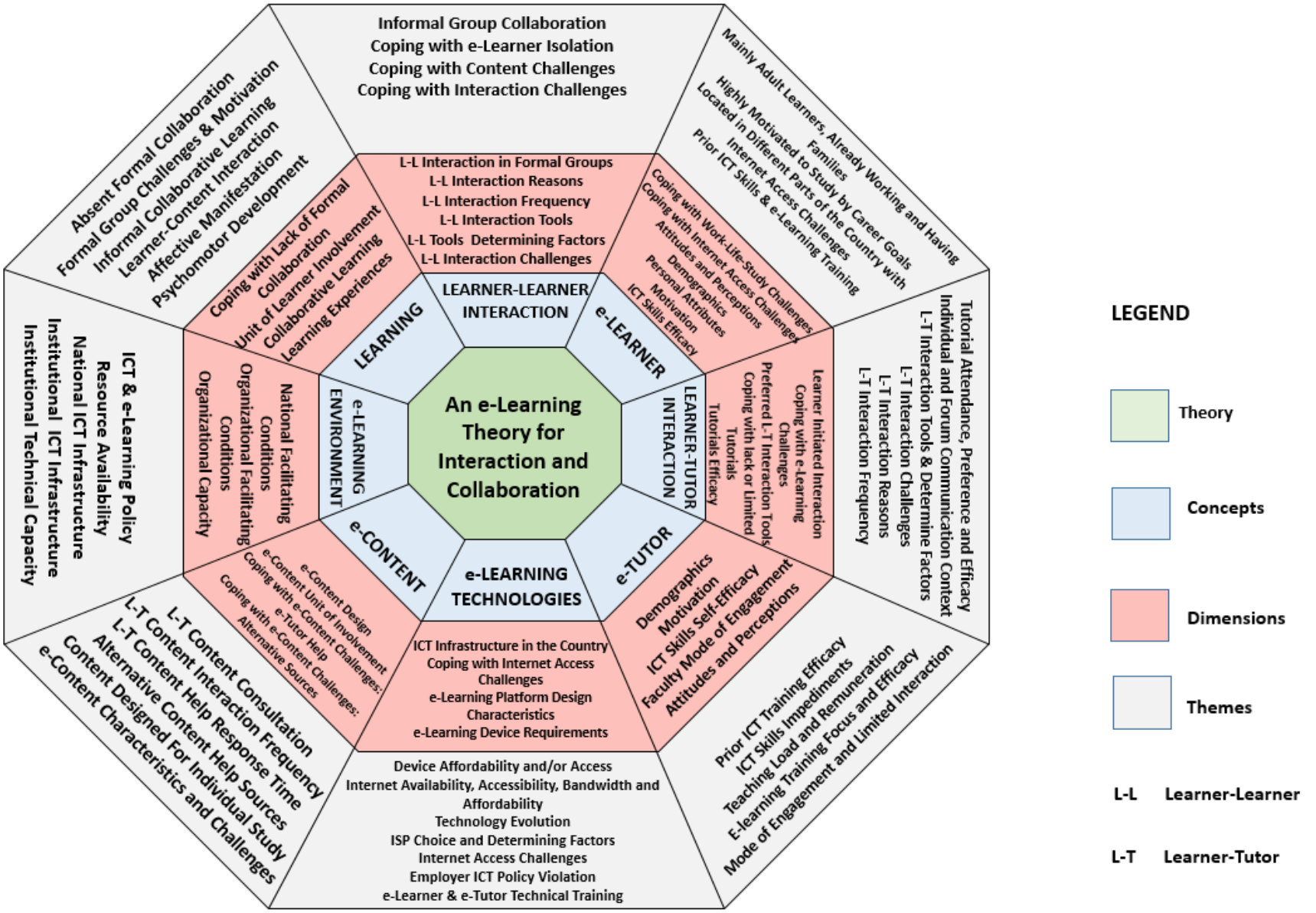

Figure 4.23: The e-Learning Theoretical Framework

4.9.2 Relationships Among Concepts

According to Gregor (2006), Sutton and Staw (1995), and Whetten (1989), theoretical formulation involves identifying the causal relationships between identified concepts. This section presents the hypothesized causal relationships among the eight key concepts depicted in Figure 4.23 in the preceding section. Though these relationships were not quantitatively tested, they emerged as hypotheses from the qualitative data. Notably, the interrelationships between the other seven concepts worked towards the learning concept. This is rightfully so because everything in e-learning is geared towards learning. Each key concept has sub-concepts and/or attributes that emerged from the data. The relationships are as follows: -

R_1: 'Learning' is influenced by the ***'e-Learner'.*** This relationship is moderated by '***e-tutors***' characteristics such as demographics, motivation, attitudes and perceptions, ICT and e-pedagogy skills. It is also moderated by ***'e-Learning Technologies'*** characteristics such as the availability, accessibility, and affordability of e-learning devices and the internet. It is further moderated by ***'e-content'*** characteristics such as the design of the e-content, unit of involvement, and e-content challenges. See Figure 4.24.

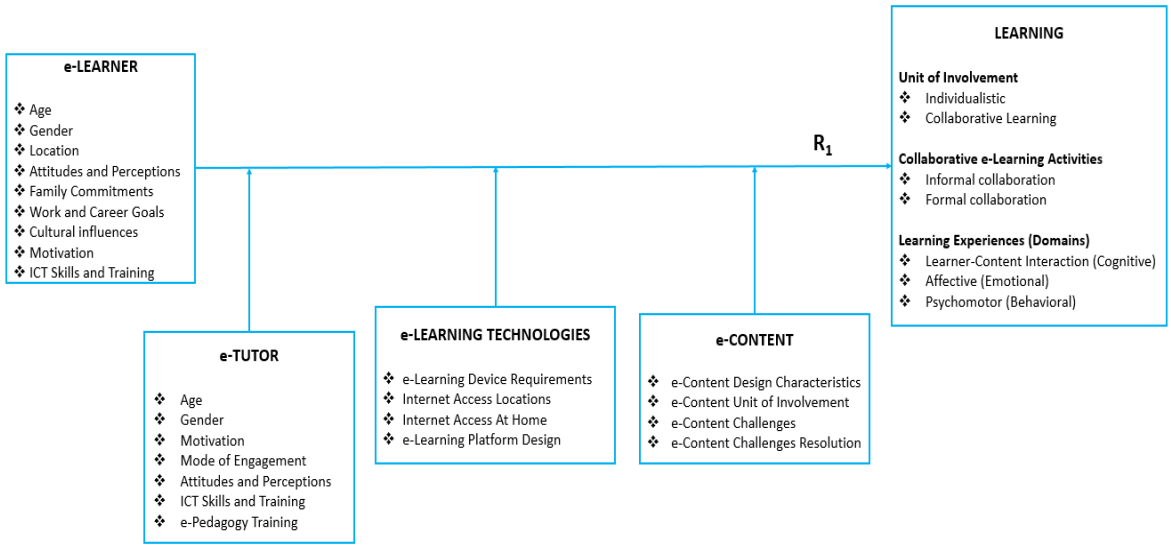

Figure 4.24: Relationship Between e-Learner and Learning

R_2*: *'Learning' is influenced by ***'e-Tutor'***. This relationship is moderated by ***'e-Learning Context'*** and ***'e-Learning Technologies'***. For instance, learning is influenced by e-tutors' attributes such as demographics, motivation, attitudes and perceptions, ICT and e-pedagogy skills.

e-Tutor activities geared towards learning are moderated by the ***'e-learning Environment'*** facilitating conditions such as the availability of ICT infrastructure, resources, training, e-learning and ICT policies. It is also moderated by ***'e-Learning Technologies'*** characteristics such as the availability, accessibility, and affordability of e-learning devices and the internet. See Figure 4.25.

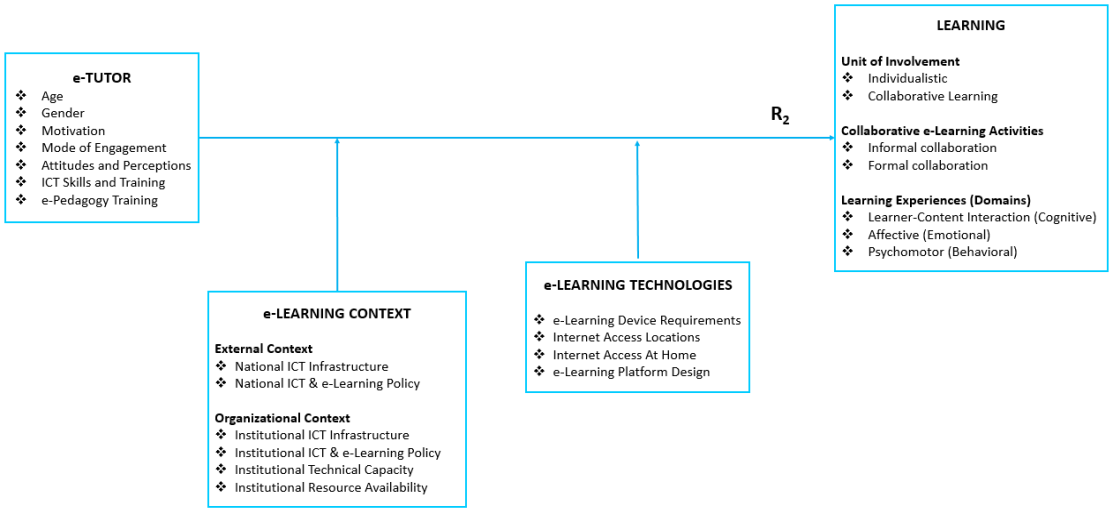

Figure 4.25: Relationship Between e-Tutor and Learning

R_3: ***'Learning'*** is influenced by ***'e-Learning Technologies'*** and moderated by ***'e-Learner'.*** For instance, for learning to occur via e-learning, the e-learners must access the technology in their workplace or residence. They also must acquire ICT skills via training to master the e-learning technology. See Figure 4.26.

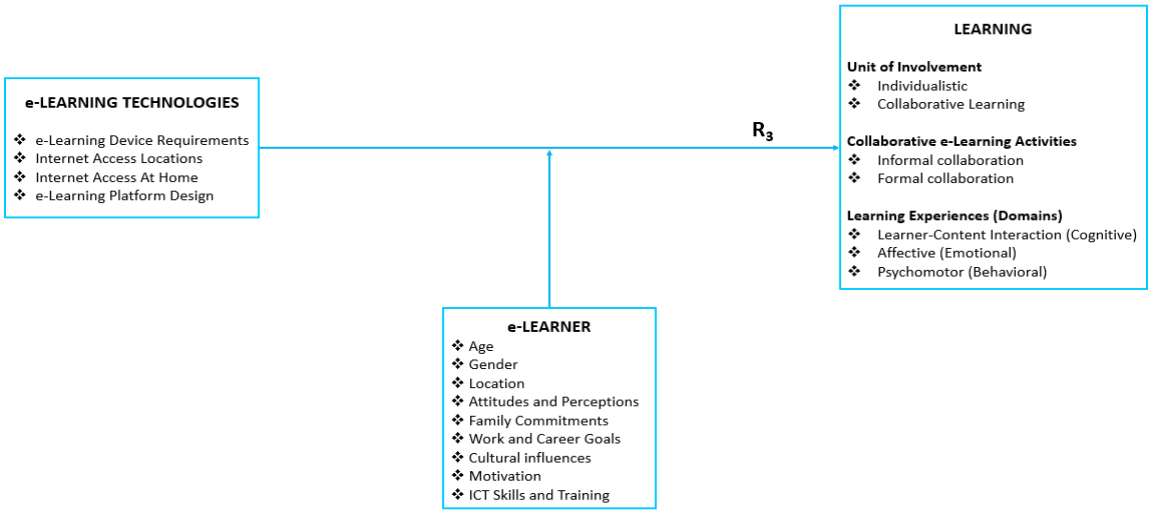

Figure 4.26: Relationship Between e-Learning Technologies and Learning

R_4*: *'Learning'* is influenced by *'e-Content'*.** For learning to occur, there is the e-content. e-Content design characteristics are determined by ***'e-tutors' characteristics such as demographics, motivation, ICT and e-pedagogy skills. This relationship is moderated by ***'e-learners'*** characteristics, such as ICT skills, motivation, work-life-study commitments. See Figure 4.27.

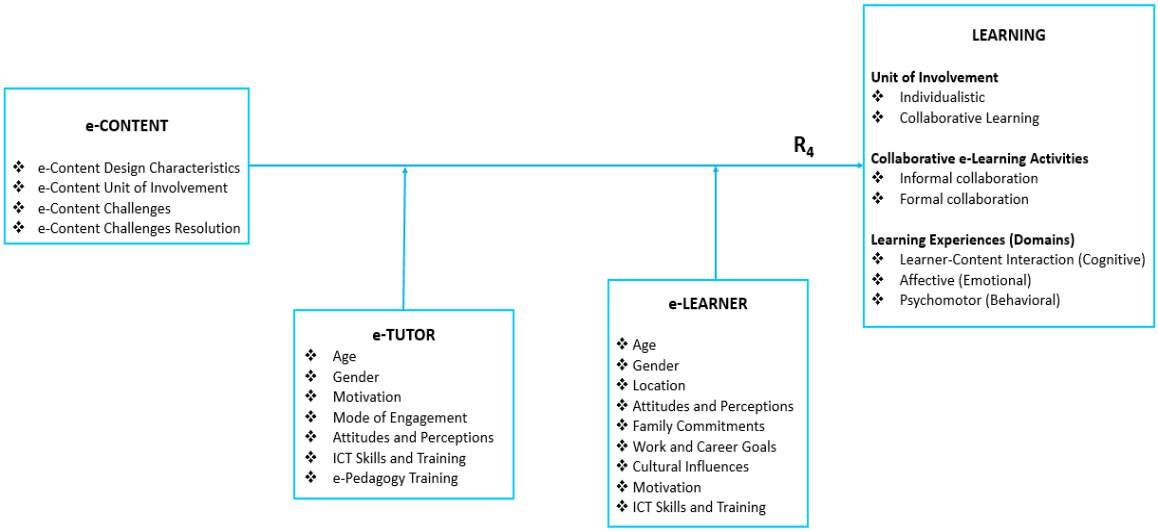

Figure 4.27: Relationship Between e-Content and Learning

R_5*: *'Learning' is impacted by ***'Learner-Learner Interaction'***. There should be learner-learner interaction for learning to occur, moderated by the ***'e-learners'*** characteristics such as ICT skills, work-life-study commitments, location, demographics, attitudes, and perceptions. It is also moderated by ***'e-learning technologies'*** characteristics such as the availability, accessibility, and affordability of e-learning devices and the internet. It is further moderated by ***'e-content'*** design characteristics such as the unit of involvement and the level of complexity. See Figure 4.28.

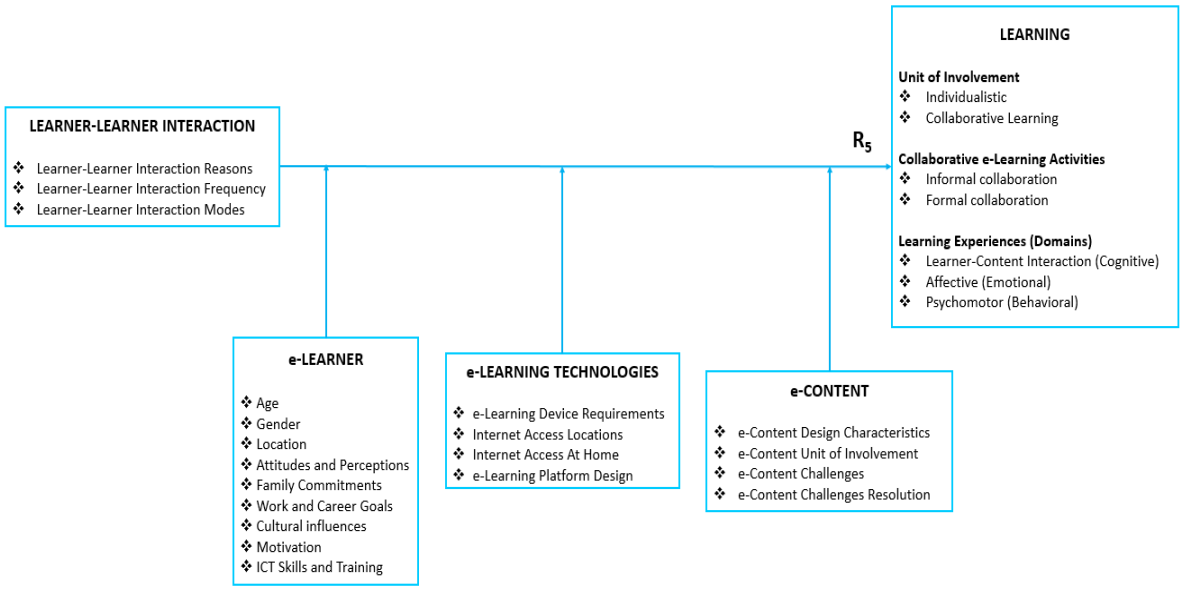

Figure 4.28: Relationship Between Learner-Learner Interaction and Learning

R_6*: *'Learning' is impacted by ***'Learner-Tutor Interaction'***. This relationship is moderated by the ***'e-learners'*** characteristics such as demographics, motivation, ICT skills, and work-life-study commitments. It is also moderated by ***'e-tutors'*** characteristics such as demographics, motivation, ICT and e-pedagogy skills. It is further moderated by ***'e-content'*** design characteristics such as the unit of involvement, the level of complexity, and e-content challenges. Finally, it is moderated by ***'e-learning technologies'*** characteristics such as the availability, accessibility, and affordability of the e-learning devices and the internet. See Figure 4.29.

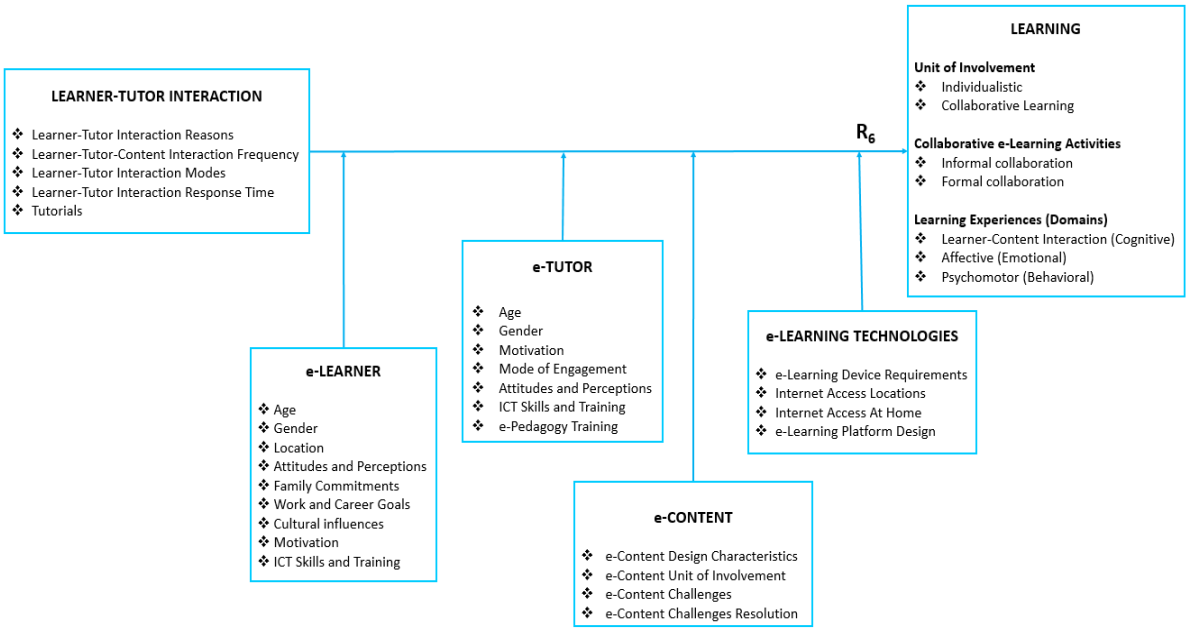

Figure 4.29: Relationship Between Learner-Tutor Interaction and Learning

R_7*: *'Learning' is influenced by the ***'Organizational Context'*** (a sub-concept of the ***'e-Learning Context'***. Learning is influenced by the e-learning context characteristics such as the national ICT infrastructure, national ICT and e-learning policy, organizational ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base. See Figure 4:30.

Figure 4.30: Relationship Between e-Learning Context and Learning

R_8*:** An associative relationship exists between the ***'e-Learner' and ***'e-Tutor',*** which is a two-way relationship necessitated by the need to learn and teach respectively and intervened by the ***'e-Learning Technologies'*** characteristics such as the availability, accessibility, and affordability of e-learning devices and the internet. See Figure 4.31.

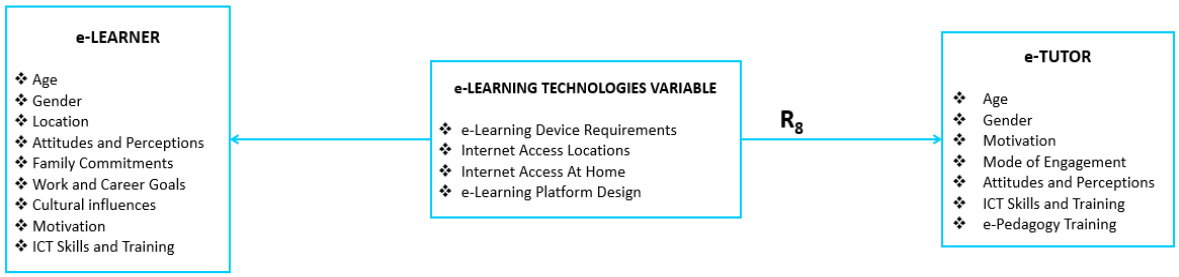

Figure 4.31: Relationship Between e-Learner and e-Tutor

R9: An associative relationship exists between ***'e-Learner'*** and ***'e-Content'*** and moderated by ***'e-Tutor'*** characteristics such as demographics, motivation, attitudes and perception, ICT and e-pedagogy skills. See Figure 4.32.

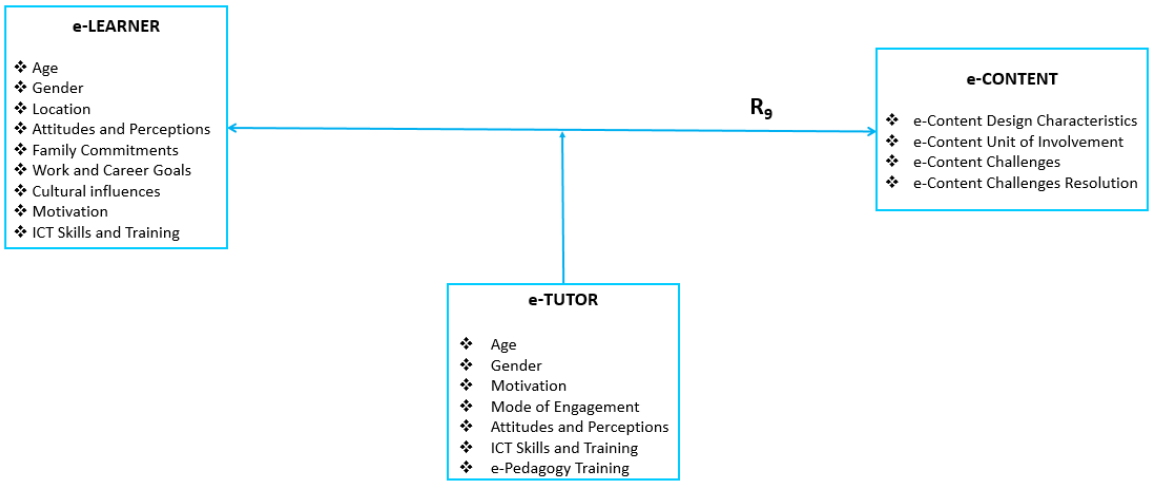

Figure 4.32: Relationship Between e-Learner and e-Content

R10: ***'Learner-Learner Interaction'*** is influenced by the ***'e-Learner'.*** This relationship is **intervened** by ***'e-Learning Technologies'*** characteristics such as the availability, accessibility, and affordability of e-learning devices and the internet. It also intervened by ***'e-Content'*** such as complexity and unit of involvement. See Figure 4.33.

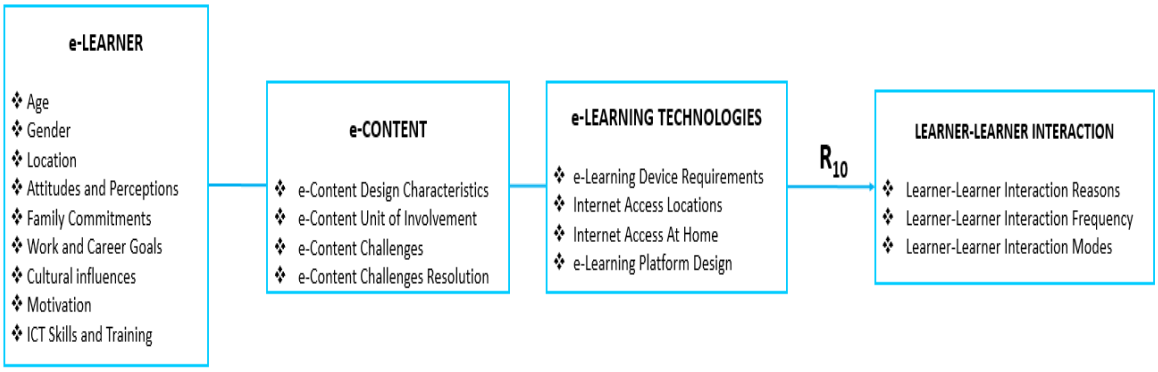

Figure 4.33: Relationship Between e-Learner and Learner-Learner Interaction

R_{11}: 'Learner-Tutor Interaction' is influenced by the ***'e-Learner'.*** This relationship is intervened by the ***'e-Content'*** characteristics such as complexity and unit of involvement. It also intervened by ***'e-Tutors'*** characteristics such as demographics, motivation, attitudes and perception, ICT and e-pedagogy skills. Finally, the relationship is intervened by ***'e-Learning Technologies'*** characteristics such as the availability, accessibility, and affordance of e-learning devices and the internet. See Figure 4.34.

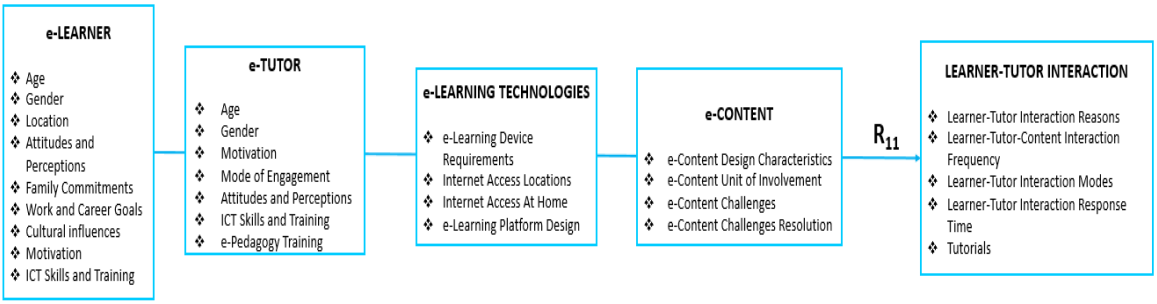

Figure 4.34: Relationship Between e-Learner and Learner-Tutor Interaction

R_{12}: The '***e-Content'*** is influenced by the ***'e-Tutor',*** a relationship moderated by the ***'Organizational Environment'*** (a sub-concept of ***'e-Learning Environment'***) characteristics such ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base. See Figure 4.35.

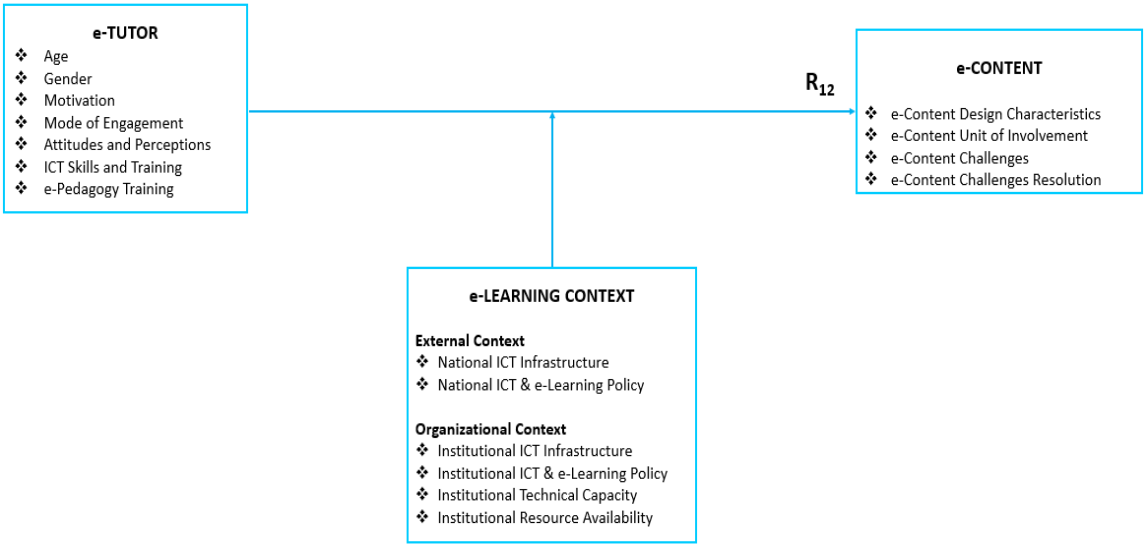

Figure 4.35: Relationship Between e-Tutor and e-Content

R_{13}: '***Learner-Learner Interaction'*** is influenced by ***'e-Tutor'*** and intervened by the ***'e-Content'*** characteristics such as complexity, the unit of involvement, and e-learning challenges. See Figure 4.36.

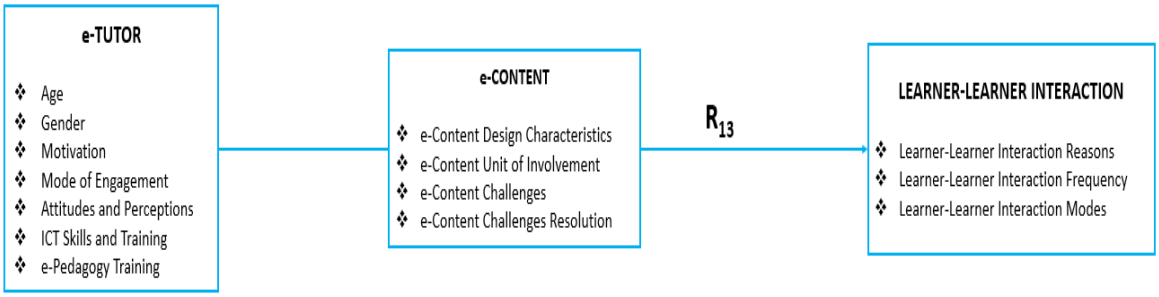

Figure 4.36: Relationship Between e-Tutor and Learner-Learner Interaction

R_{14}: ***'Learner-Tutor Interaction'*** is influenced by ***'e-Tutor'.*** This relationship is moderated by ***'e-Learner'*** characteristics such as location, work-life-study commitments, ICT skills, and training. It is also moderated by ***'e-Content'*** design characteristics such as complexity, the unit of involvement, and e-content challenges. Finally, it is moderated by ***'e-Learning Technologies'*** characteristics such as the availability, accessibility, and affordability of e-learning devices and the internet. See Figure 4.37.

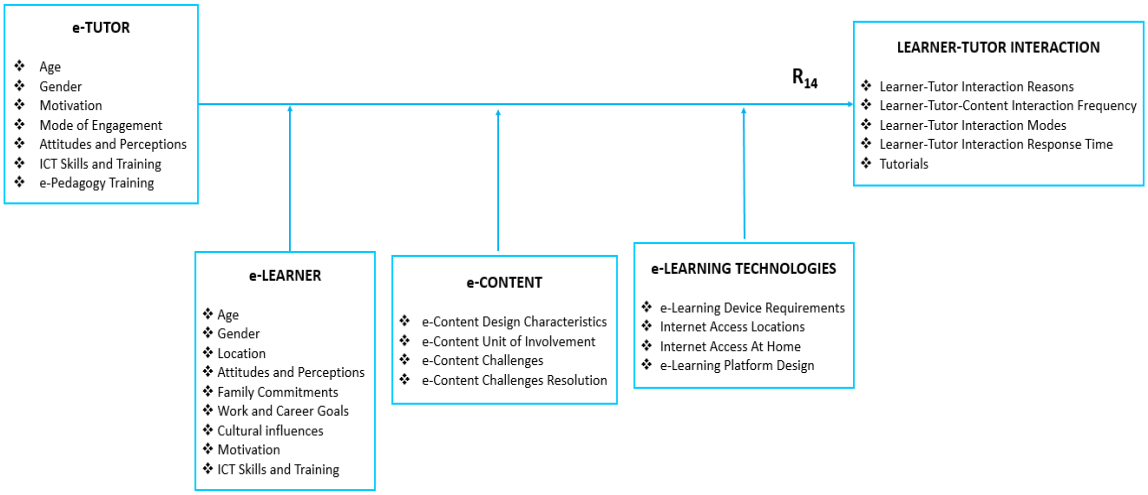

Figure 4.37: Relationship Between e-Tutor and Learner-Tutor Interaction

R_{15}: 'e-Learning Technologies' influence the ***'e-Learner'*** ability to learn**.** For instance, e-learning technologies' characteristics such as availability, accessibility, and affordability influence e-learner's ICT skills. This relationship is moderated by the ***'Organizational Environment'*** (a sub-concept of ***'e-Learning Environment'),*** which determines whether the organization facilitates the e-learners not. See Figure 4.38.

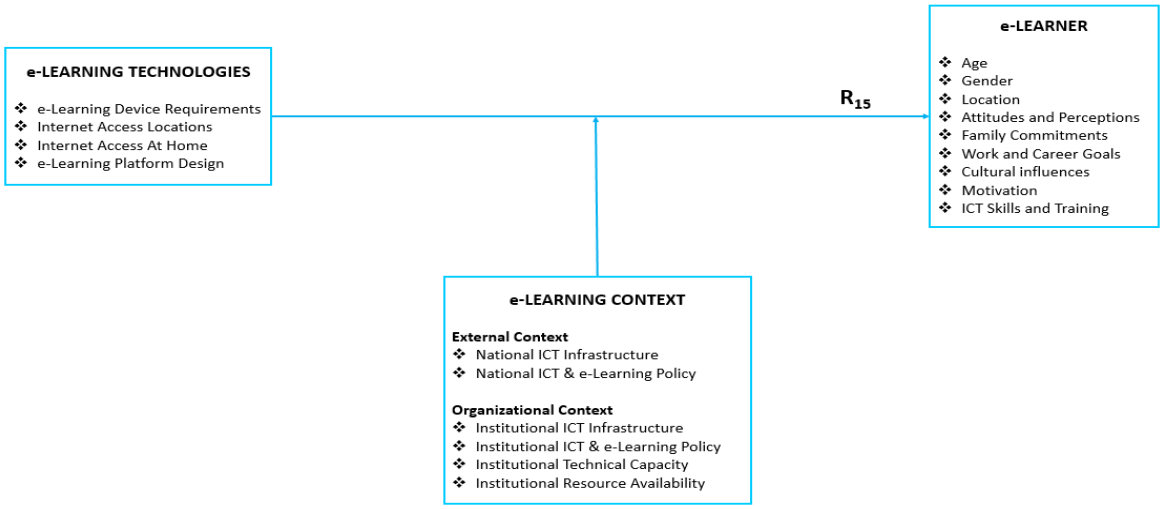

Figure 4.38: Relationship Between e-Learning Technologies and e-Learner

R_{16}: The ***'e-Learning Technologies'*** influence the ***'e-Tutor'.*** For instance, e-learning technologies availability, accessibility, and affordability influence e-tutor's ICT skills. This relationship is

moderated by ***'Organizational Environment'*** (a sub-concept of the ***'e-Learning Environment'),*** determining whether the organization facilitates the e-tutors or not. See Figure 4.39.

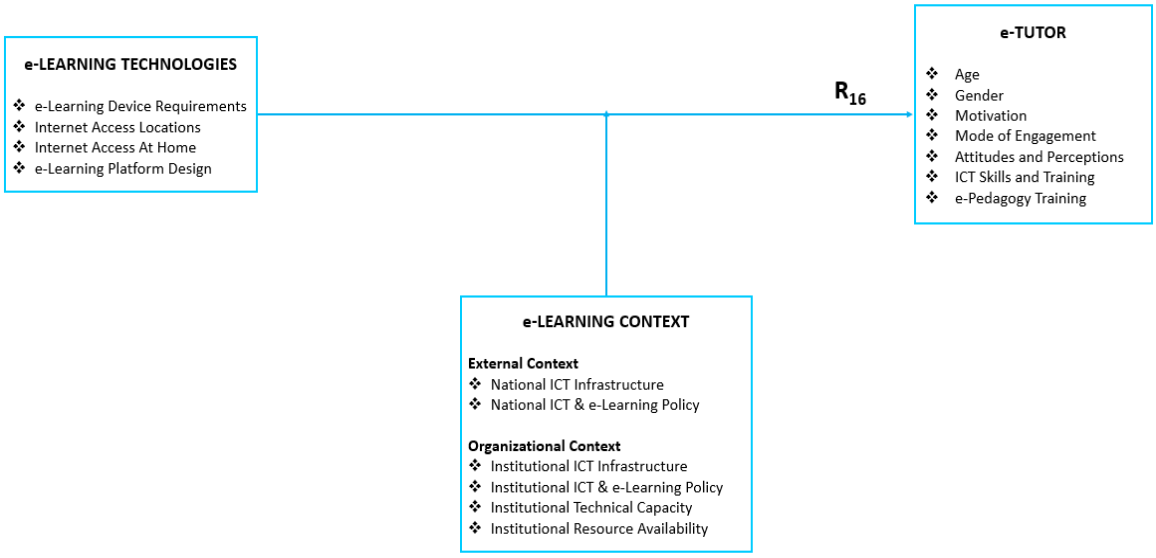

Figure 4.39: Relationship Between Learner-Leaner Interaction and e-Tutor

R_{17}: 'e-Content' is influenced by ***'e-Learning Technologies'***. For instance, the availability, accessibility, and affordability of e-learning devices and ICT skills by the e-tutors affect the design of the e-content. This relationship is moderated by the ***'Organizational Environment'*** (a sub-concept of ***'e-Learning Environment')*** characteristics such as organizational ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base. See Figure 4.40.

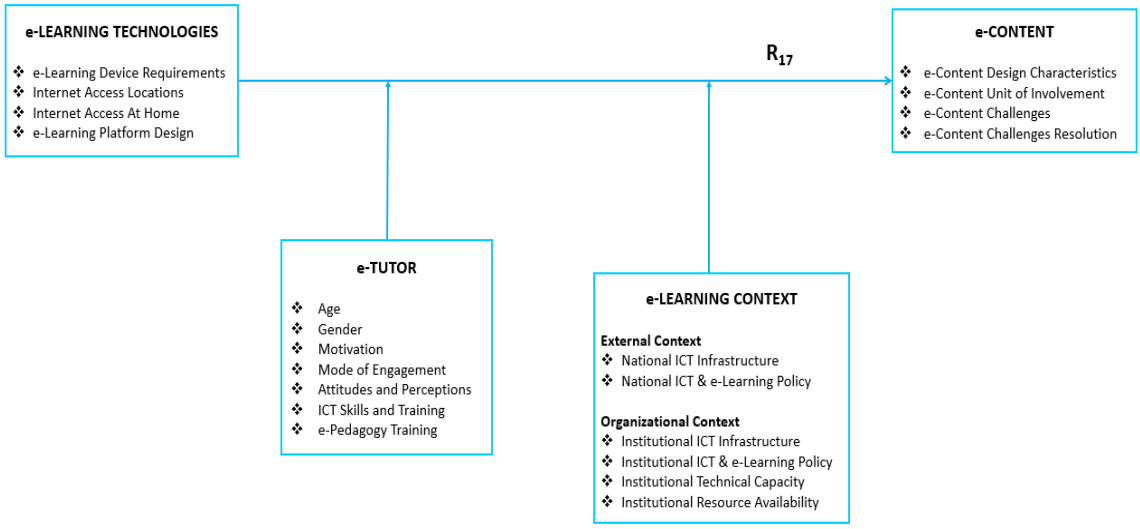

Figure 4.40: Relationship Between e-Learning Technologies and e-Content

R_{18}: 'Learner-Learner Interaction' *is* influenced by the ***'e-Learning Technologies')*** and moderated by ***'Organizational Environment'*** (a sub-concept of ***'e-Learning Environment')*** characteristics including ICT infrastructure, ICT and e-learning policy, technical capacity, and o resource base. See Figure 4.41.

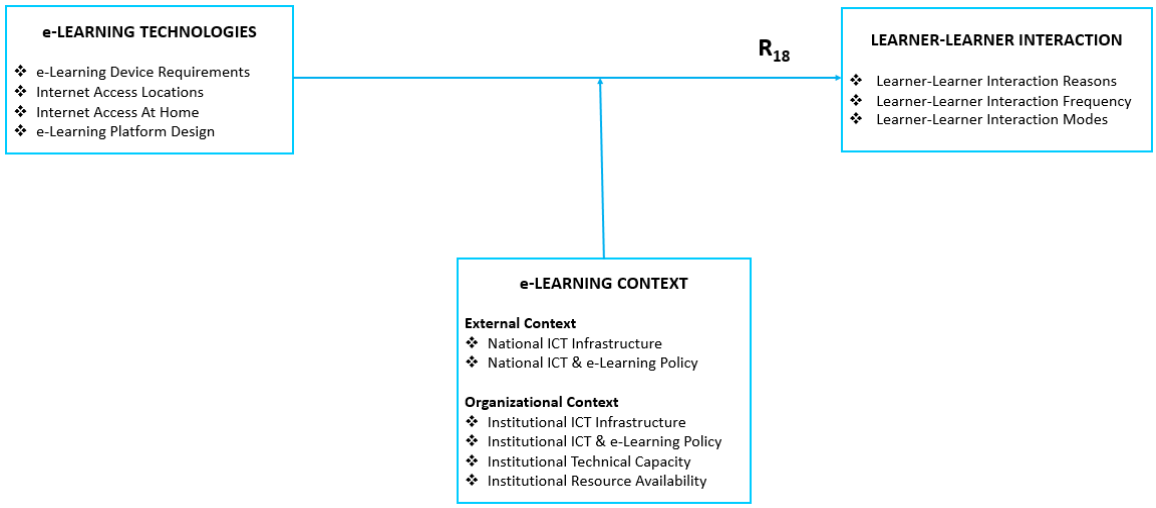

Figure 4.41: Relationship Between e-Learning Technologies and Learner-Learner Interaction

R_{19}: 'Learner-Tutor Interaction' is influenced by the ***'e-Learning Technologies'*** and moderated ***'Organizational Environment'*** (a sub-concept of ***'e-Learning Environment)*** characteristics such as ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base. See Figure 4.42.

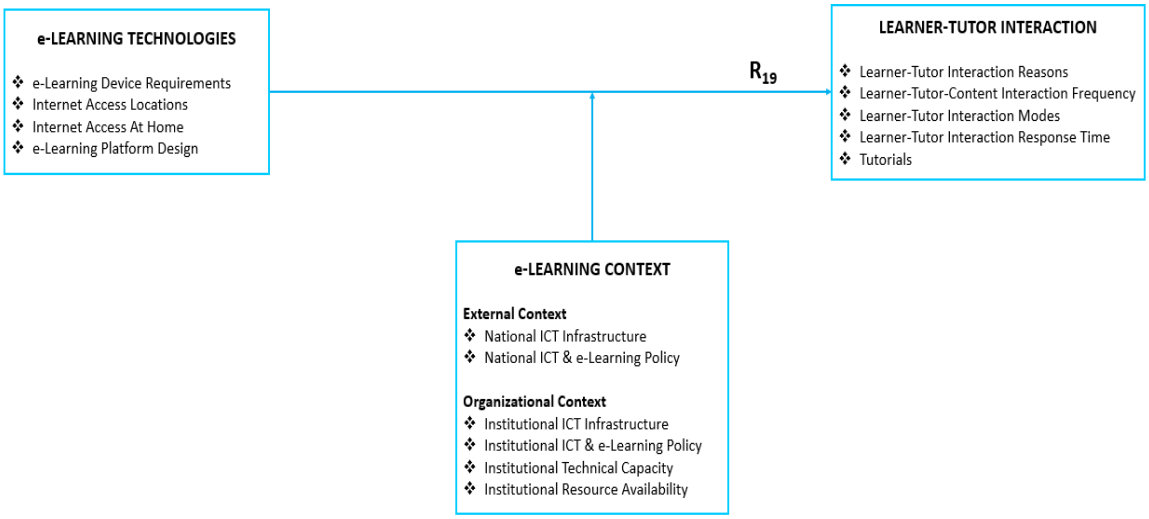

Figure 4.42: Relationship Between e-Learning Technologies and Learner-Tutor Interaction

R_{20}: Learner-Learner Interaction' is influenced by ***'e-Content'***. This relationship is moderated by the ***'e-Learners'*** characteristics such as demographics, motivation, ICT skills and training, and work-life-study commitments. It is also moderated by ***e-tutor's*** characteristics such as demographics, motivation, ICT and e-pedagogy skills. See Figure 4.43.

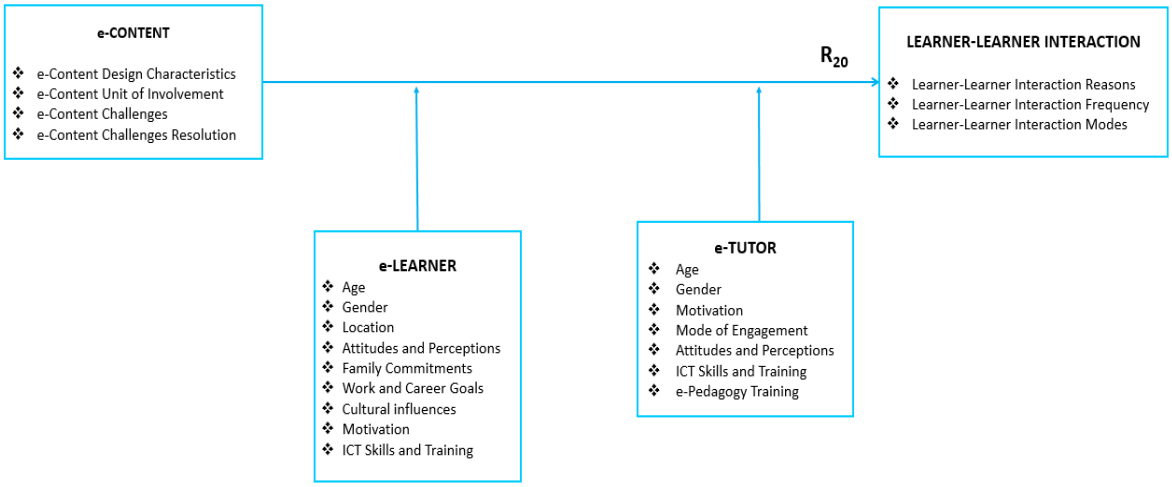

Figure 4.43: Relationship Between e-Content and Learner-Learner Interaction

R_{21}: ***'Learner-Tutor Interaction'*** is influenced by ***'e-Content'*** and is moderated by the ***'e-Learners'*** characteristics such as demographics, motivation, ICT skills and training, and work-life-study commitments. It is also moderated by ***'e-tutors'*** characteristics such as demographics, motivation, ICT and e-pedagogy skills. See Figure 4.44.

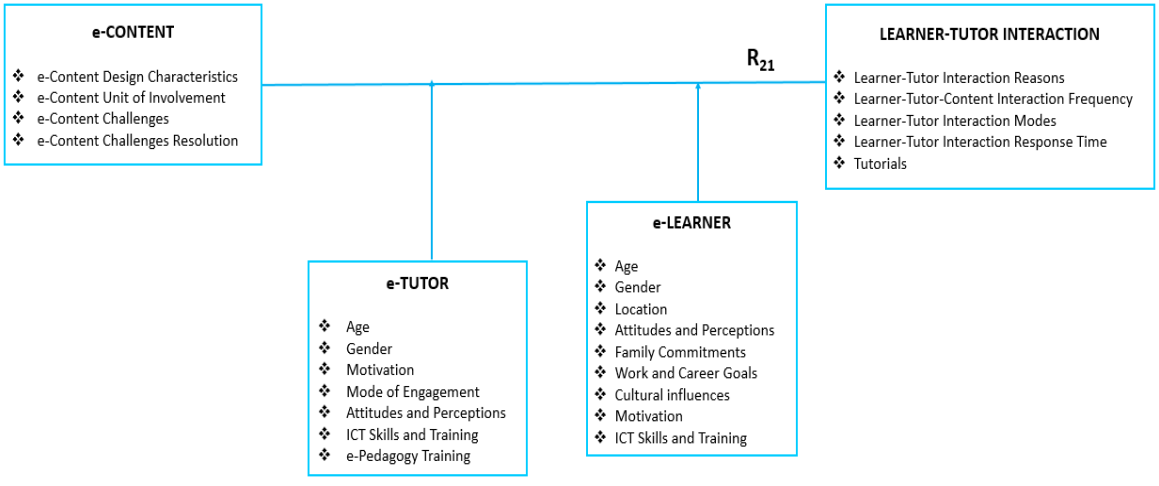

Figure 4.44: Relationship Between e-Content and Learner-Tutor Interaction

R_{22}: 'Organizational Environment' (a sub-concept of ***'e-Learning Environment'***) influences 'e-Learner'. ***'Organizational Environment'*** characteristics such as ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base influence the ***'e-Learner'*** motivation, ICT skills, and training. See Figure 4.45.

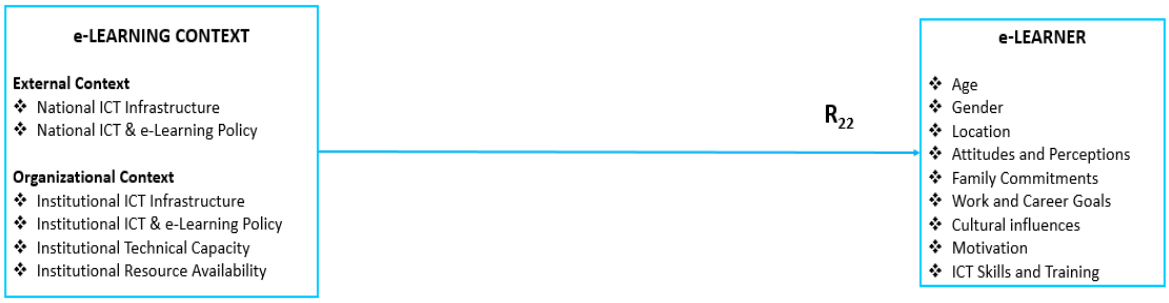

Figure 4.45: Relationship Between e-Learning Context and e-Learner

R_{23}: The ***'Organizational Context'*** (sub-concept of the ***'e-Learning Context'***) characteristics such as ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base influence the ***'e-Tutor'***s motivation, ICT and e-pedagogy skills. See Figure 4.46.

Figure 4.46: Relationship Between e-Learning Context and e-Tutor

R_{24}: ***'Organizational Context'*** (sub-concept of the ***'e-Learning Context'***) characteristics such as ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base determines the ***'e-Learning Technologies'*** factors such as the availability, access, and affordability of the e-learning devices and the internet. See Figure 4.47.

Figure 4.47: Relationship Between e-Learning Context and e-Learning Technologies

R_{25}: The ***'Organizational Environment'*** (a sub-concept of ***'e-Learning Environment'***) influences ***'e-Content'***. For instance, ***'Organizational Environment'*** characteristics such as ICT infrastructure, technical capacity, and resource base influence the ***'e-Content'*** design characteristics such as complexity and the unit of involvement. See Figure 4.48.

Figure 4.48: Relationship Between e-Learning Context and e-Content

R_{26}: The ***'e-Learning Environment'*** characteristics such as the national and organizational ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base influences ***'Learner-Learner Interaction'*** frequency and modes of interaction**.** See Figure 4.49**.**

Figure 4.49: Relationship Between e-Learning Context and Learner-Learner Interaction

R_{27}: The ***'e-Learning Environment'*** characteristics such as the national and organizational ICT infrastructure, ICT and e-learning policy, technical capacity, and resource base influences ***'Learner-Tutor Interaction'*** frequency and modes of interaction. See Figure 4.50.

Figure 4.50: Relationship Between e-Learning Context and Learner-Tutor Interaction

4.9.3 The e-Learning Theory for Interaction and Collaboration

The key concepts were assigned unique identifiers, as shown in Table 4.1.

Table 4.1: Key Concepts' Unique Identifiers

Concept ID	Concept Name
1	e-Learner
2	e-Tutor
3	e-Learning Technologies
4	e-Content
5	Learner-Learner Interaction
6	Learner-Tutor Interaction
7	e-Learning Environment
8	Learning

Figure 4.51 shows the substantive e-learning theory for interaction and collaboration in terms of its concepts and the relationship between them. The following guidelines apply when interpreting the theory and its connections: -

i. The intervened relationships are depicted using links labelled as **RX: I: ID,** where ***RX*** is the relationship code number, ***I*** represent an intervened relationship, and ***ID*** is the unique identifier of the intervening concepts (s).

ii. The moderated relationships are depicted using links labelled as **RX: M: ID,** where ***RX*** is the relationship code number, ***M*** represents a moderated relationship, and ***ID*** is the unique identifier of the moderating concept (s).

iii. The non-moderated and non-intervened relationships are depicted using links labelled as, where ***RX*** is the relationship code number between the participating concepts.

iv. The associative relationships are shown using double-edged arrows, for instance, **R8** and **R9**.

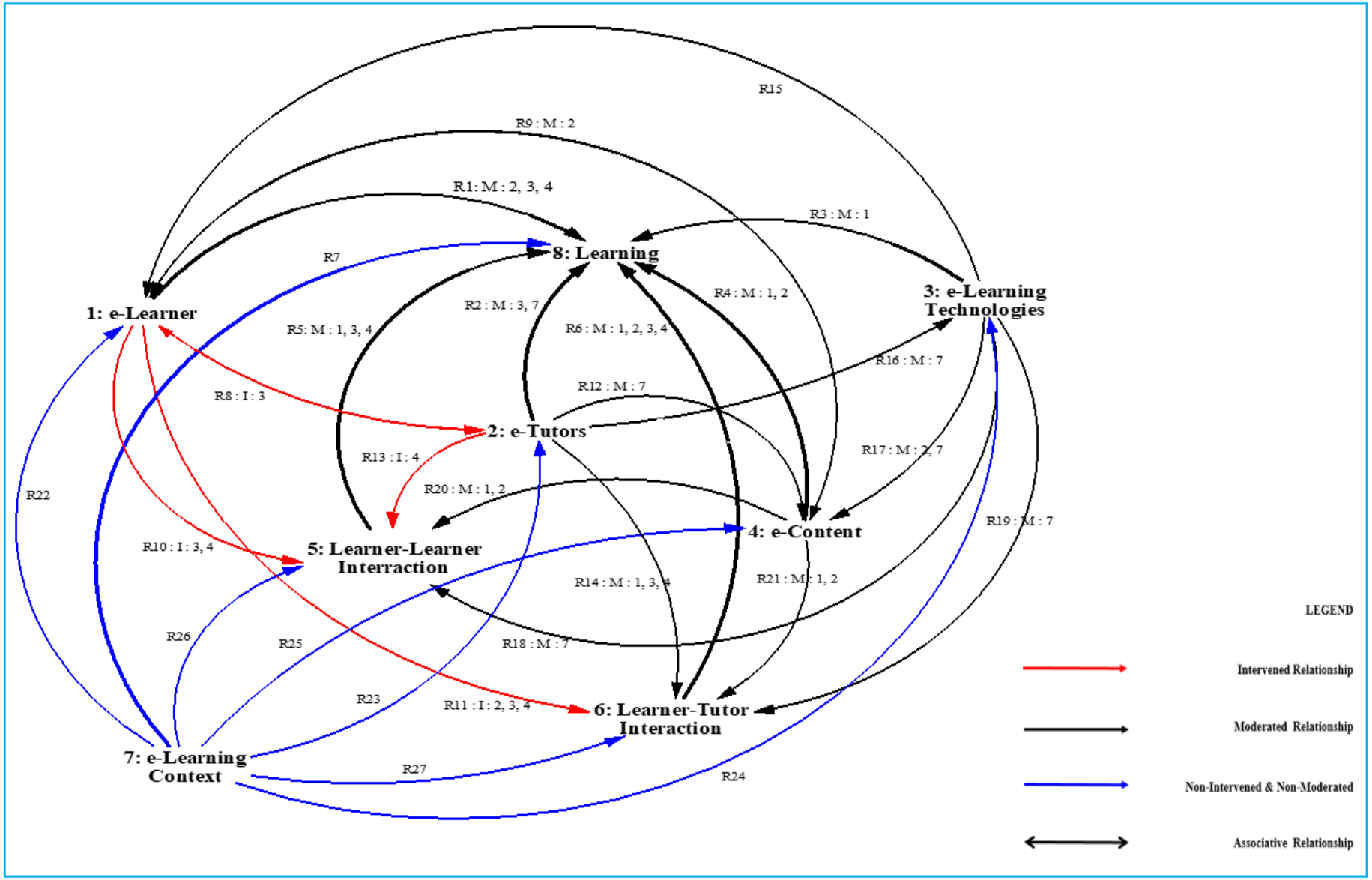

Figure 4.51: The Substantive e-Learning Theory for Interaction and Collaboration

4.10 Results Discussion and Analysis

This section presents the comparison of the theoretical contribution of the research versus the existing learning theories. It also includes an evaluation of the theoretical contribution of the research based on the works of Gregor (2006), Sutton and Staw (1995), and Whetten (1989). The evaluation aimed to establish the extent to which it meets the theoretical formulation and contribution criteria.

4.10.1 Comparison of the Theory Against Existing Learning Theories.

This comparison is based on two relevant CLTs: constructivism and social constructivism. It also includes an evaluation against connectivism, which is a contemporary learning theory. First and foremost, since the CLTs were stipulated in the 19th and 20th centuries, they ultimately lacked the e-learning technology concept (Pange & Pange, 2011). The developed theory included the e-learning technology concept with its sub-concepts and the relevant attributes of the key technological requirements such as e-learning devices, the internet, and the LMS. Second, though CLTs included the learners' concept, they did not consider the global nature of the e-learners. e-Learners come from different cultural backgrounds, have different learning styles, require e-pedagogy and ICT skills, and have different attitudes and perceptions (Bognar, 2015), all of which are included in the developed theory. Third, though the CLTs included the tutors' concept, they did not include e-pedagogy, ICT training, attitudes, and perceptions (Alzaghoul, 2012; Modtritscher, 2006) which this research included in the developed theory. Fourth, constructivism and social constructivism included learner-learner and learner-tutor interaction concepts but from the perspective of the conventional classroom setting (Schunk, 2012b). The developed theory has extended interaction among e-learners and e-learners and e-tutors to the e-learning environment via technology. It further defined interactive and collaborative activities and behaviours, the frequency of such interactions, and the technological tools needed for such interactions, and the roles of the e-tutors and e-learners in the interaction. Fifth, though the CLTs included the content concept, they defined the characteristics of that content to suit the conventional classroom setting (Kalpana, 2014). The developed theory explained the e-content attributes to suit the unique needs of e-learners.

In connectivism, though the technology construct is considered, it is assumed that e-learning technologies are already available (Foroughi, 2015). However, this research observed that this is not always the case; thus, it included the availability, accessibility, and affordability of e-learning technologies and the internet in the developed theory. Furthermore, connectivism also advocated the social connectedness of learners and e-tutors. However, it failed to define interactive and collaborative activities and behaviours, frequency of such interactions, technological tools needed for interactions, and e-tutors and e-learners' roles in the interaction (Sahin, 2012) as defined in the developed theory.

4.10.2 Comparison Against Other Contemporary e-Learning Theoretical Efforts.

The works of Anderson (2008), Nichols (2003), and Serdyukova and Serdyukov (2014) are used in evaluating the output of this research. These past studies did not develop theories; instead, they proposed frameworks to build future theories. This research went beyond frameworks and models and created an e-learning theory explaining and interpreting the causal relationships among its concepts and attributes. The results of this research were consistent with the findings of the study by Nichols (2003) entitled *"A Theory for e-Learning"*, which proposed a ten-principle framework upon which any e-learning theory can be based. However, the proposed theoretical framework lacked the *'e-Learner', 'e-Tutor', and 'e-Learning Environment'* concepts. The '*Learner-Learner Interaction'* and '*Learner-Tutor Interaction*' concepts were mentioned but did not have their respective attributes. It also lacked the attributes that defined the concepts considered in the theoretical framework. The results are also consistent with the research findings by Anderson (2008) that developed *"A Model of Online Learning."* However, this research did not explicitly identify the *'Learning'*, *'Technology',* and the '*e-Learning Environment'* concepts and their respective attributes. The results are further consistent with the research findings by Serdyukova and Serdyukov (2014), which developed an *"e-Pedagogy for Online Education"* but failed to name the 'e-Learner' concept explicitly. However, the study listed the attributes of e-learners. It also failed to include the *'Learner-Learner Interaction'*, *'Learner-Tutor Interaction' 'e-Learning Environment' concepts* and their respective attributes.

Table 4.2 below summarizes the gaps in these studies and highlights the inclusions made resulting from this research.

Table 4.2: Summary of Theory Evaluation Against Contemporary e-Learning Development Efforts

Concepts	Nichols (2003)	Anderson (2008)	Serdyukov (2015)	e-Learning theory for Interaction and Collaboration (2020)
e-Learner	e-Learner concept and its attributes were missing from the framework.	e-Learner concept was present, but the following attributes were missing: - Demographics - ICT skills - Personal characteristics - Motivation - Attitudes & Perceptions	e-Learner concept was named *'Human Development'* and included personal characteristics such as: - e-Learning and ICT Skills - Learning Styles - Motivation - Learner autonomy - Self-Efficacy Attributes missing from the e-learner concept include: - Attitudes and Perceptions - Gender - Age	e-Learner concept is included with the following characteristics: - Attitudes and Perceptions - Gender - Motivation - Age - ICT skills & Training - Location - Mobility - Cultural context - Personal attributes like work and family commitments
e-Tutor	e-Tutor concept and its attributes were missing from the framework.	e-Tutor concept was present, but the following qualities were missing: - Age - Gender - Motivation - Attitudes and Perceptions	e-Tutor concept was present, but the following attributes were missing: - Attitudes and Perceptions - Age - Gender - Motivation	e-Tutor concept is included with the following attributes: - Attitudes and Perceptions - Gender - Motivation - Age - ICT skills - E-pedagogy training - Mode of Engagement.
e-Learning Technologies	e-Learning Technology concept was present but its attributes were not included.	e-Learning Technology concept not explicitly name but attributes considered include: - Cost accessibility - Availability - Choice of technology based on fitness for use	e-Learning Technology concept was present including: - Choice technology technical and e-learning job-fit - e-learning tools requirements - interaction tools However, the following attributes were missing: - Internet access	e-Learning Technology concept is included with the following attributes: - Affordability and access of e-learning device requirements - Interaction tools - Technology choice - Internet access/availability - Internet quality (speed and reliability) - Internet cost - LMS usability - LMS affordance

Concepts	Nichols (2003)	Anderson (2008)	Serdyukov (2015)	e-Learning theory for Interaction and Collaboration (2020)
			- Internet Cost - Internet Quality - LMS Design attributes	- LMS learnability
e-Content	e-Content concept was mentioned but did not have attributes	e-Content concept was available, but it did not have attributes	e-Content concept was largely missing except for the mention for content format such as: - Content presentation in the form of tutorials - Simulation and games - Virtual labs - e-Books	e-Content concept is included with the following attributes - Simplicity - Completeness - Format/design - Presentation - Up-to-date/current - Accurate - Inclusion of multimedia - Consistent with learning objectives

Learner-Learner Interaction	Learner-Learner Interaction concept was mentioned but did not have attributes	Learner-Learner Interaction concept is named '*Student-Student Interaction'* concept only presented the benefits of student collaboration	Learner-Learner Interaction concept is named *'Student-Student Interaction'* concept which only mentioned the social media networks tools as the mode of interaction	Learner-Learner Interaction concept is included the following attributes:
				- Reasons of interaction/ Interaction activities and behaviours
				  - Moral support
				  - Complex content
				  - Sharing knowledge
				  - Solving problems
				- Tools of interaction
				  - Social Media-WhatsApp
				  - Phone calls
				  - SMSes
				  - e-Mail
				- Choice of devices based on
				  - Job-fit (suitability of tool)
				  - Relative Advantage (Immediate Access)
				- Frequency of interaction
				  - Daily, weekly, monthly, As Need arises

Concepts	Nichols (2003)	Anderson (2008)	Serdyukov (2015)	e-Learning theory for Interaction and Collaboration (2020)

Learner-Tutor Interaction	The Learner-Tutor Interaction concept was merely mentioned without indicating its attributes.	Learner-Tutor Interaction concept was named *'Student-Teacher Interaction'* defined the following attributes of communication:
		- Asynchronous
		- Synchronous
		- Roles in communication
		- Flow of communication
		- Frequency of communication
		- Volume of communication
			Learner-Tutor Interaction concept was named *'Student-Tutor Interaction'* only mentioned the social media networks tools	Learner-Tutor Interaction concept is included with the following attributes
				- Reasons of interaction/ Interactive activities and behaviours
				  - Complex content
				  - e-learning issues
				- Modes of interaction
				  - Phone calls
				  - SMSes
				  - e-Mail
				  - Chat
				  - Discussion Forum
				- The choice of tools
				  - Job-fit (suitability of the tools)
				  - Relative advantage (immediate Access)
				- Frequency of interaction
				  - As Need arises.

Learning	Learning concept was present but only included the cognitive domain of learning	Learning concept was named *'Learner-Content Interaction'*, but no attributes are given	Learning concept is named *'Principles and Methods of Learning and Teaching'*, which included the following attributes:
			- Kinds of learning
			- e-Learning activities
			- Quality assurance
			- Interaction and collaboration
			- Content and knowledge creation.
				Learning concept is included with the following attributes:
				- Formal Collaborative learning
				  - Benefits of formal collaboration
				  - Training for formal collaboration
				- Informal collaborative learning
				- Domain of learning
				  - Cognitive learning
				  - Affective learning
				  - Psychomotor learning

e-Learning Environment	e-Learning Environment Concept is missing	e-Learning Environment Concept is missing	e-Learning Environment Concept is missing	e-Learning Environment Concept is included with the following attributes: - National ICT policy - National e-learning policy - National ICT infrastructure - Organizational ICT policy - Organizational e-learning policy - Organizational ICT infrastructure - Organization Resource Base

4.10.3 Evaluation of the Theory

From the inception of this research, a theoretical gap in e-learning was observed in the literature. This gap led to the formulation of the general research question, which is *"what key concepts should be considered in the development of the e-learning theory and how do they relate to each other?"*. This evaluation is based on theoretical contribution frameworks defined by Gregor (2006) in '*The Nature of Theory in Information Systems',* Sutton and Staw (1995) in *'What Theory is Not'* and Whetten (1989) in '*What Constitutes a Theoretical Contribution?*'. The theory was evaluated at two levels: first, by assessing whether it meets the structural criteria, second, on its 'theoretical contribution' as defined in the three evaluation frameworks.

4.10.4 Components of the Theory

The three evaluation frameworks agree that theory constitutes four components. Whettten (1989) referred to these components as the building blocks of a theory, and Gregor (2006) referred to them as structural components. Whetten (1989) defined four essential elements of a theory: *What, How, Why,* and *Who-Where-When.*

The *'What?'* element comprises the factors/concepts/constructs considered part of the investigated phenomena. Gregor (2006) and Sutton and Staw (1995) referred to this element as 'constructs' that make up a theory. The output of this research was a theory with eight key concepts, namely: the '*e-learner', 'e-tutor', 'e-learning technologies', 'e-content', 'learner-learner interaction', 'learner-tutor interaction', 'learning',* and *'e-learning environment'*.

The *'How?'* explains the *relationship* between the concepts/constructs/factors and their constituent attributes (Sutton & Staw, 1995; Whetten, 1989). Gregor (2006) referred to the '*how'* element as the *interactions* among the constructs, while Sutton and Staw (1995) referred to them as *connections*. Taken together, the *'what'* and the *'how'* describe the theory (Gregor, 2006; Whetten, 1989). The three frameworks agree that verbal or written representation of a theory should be accompanied by visual representation using diagrams, graphs, mathematical formulae, prototypes, models, tables, and/or pictures. This research identified and documented the relationships found among the attributes and presented them diagrammatically, as demonstrated throughout chapter 4. Similarly, the relationships between the concepts are summarized and presented in section 4.9.2.

The *'Why'* offers reasons causing the constructs to be connected (Sutton and Staw, 1995). Therefore, it depicts the underlying social, psychological, and economic reasons that justify the causal relationship (Whetten, 1989). Further, it indicates the effects of the causation (Gregor, 2006). This research explained the justification of the trends/patterns/themes (***whats?*** and ***hows?***) observed from the data and presented them as a set of propositions as demonstrated throughout Chapter 4 and summarized in section 4.9.2. Two forms of causality manifested during the development of the theory: *counterfactual and manipulation causality* (Gregor, 2006). The counterfactual relationship involves the causation of an event B by another event A happening (A→B), which means that if A did not happen then, B did not occur. For instance, lack of technical facilitation, time constraints, and low remuneration cause low motivation among the e-tutors, which is associated with low learner-tutor interaction as shown in Figure 5.1.

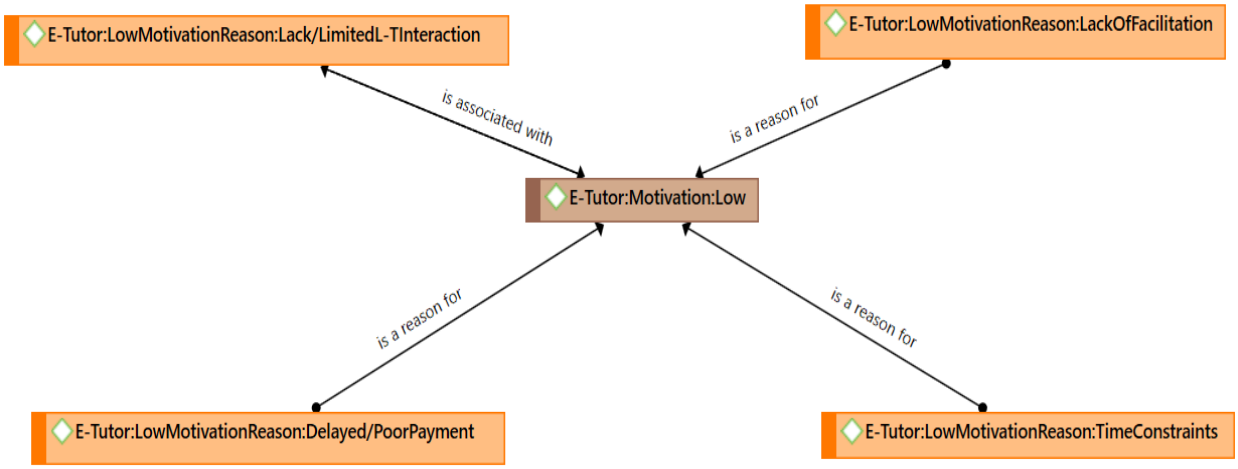

Figure 5.1 Counterfactual Causal Analysis Example

Manipulation causal analysis involves intentional events that produce the desired output. This form of causality was mainly manifested in the training of the e-learners. e-Learner training directly influenced the learnability, affordance, and usability of the LMS and the learning concept, as shown in Figure 5.2. This means that increased training resulted in higher learnability, affordance, usability, better interaction on the e-learning platform, and improved learning experiences.

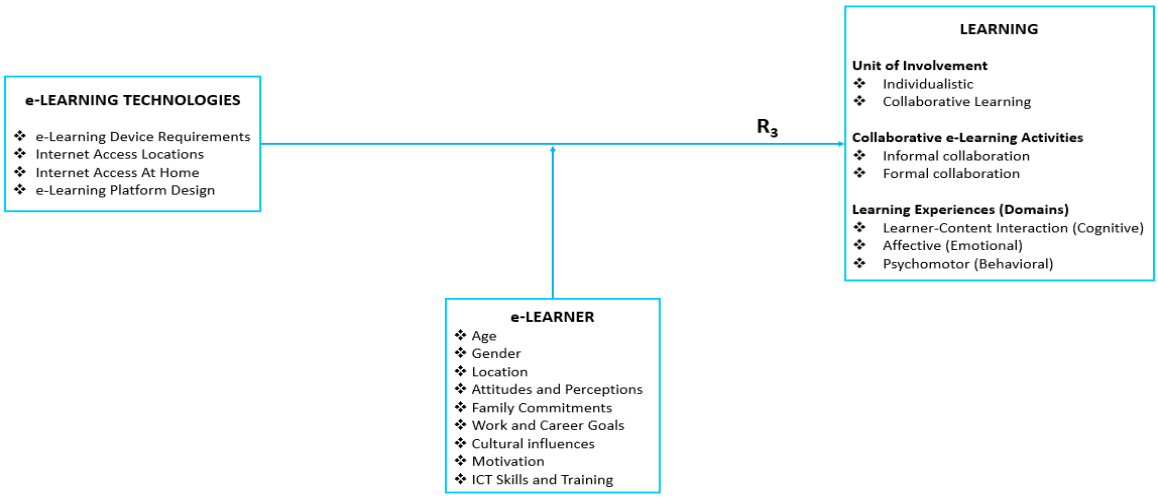

Figure 5.2: Manipulation/Teleological Causal Analysis Example

The '*Who-Where-When?'* gives the generalizability of the theory. Sutton and Staw (1995) argued that explaining the *what, how, and why* in the form of propositions/hypotheses does not constitute a theory. Instead, the researcher should complete the theory by providing intelligible reasons why certain future events (prediction) are expected to be true by relying on the precedence of past events (generalizability). The **'***Who-Where-When'* element also refers to limiting conditions in the range of applicability of the theory regarding the beneficiaries, time, and place (Whetten, 1989). Gregor (2006) defined a theory's scope of universality to include the spatial and temporal boundaries where the theory is anticipated to hold. According to this research, the beneficiaries of the theory include the e-learning providers and practitioners in IHLs, e-learners, e-tutors, policy and decision-makers, academia and researchers, and e-learning system designers. Further, the application of this theory is expected to transcend the Kenyan boundaries to include in other developing countries and some parts of developed countries. This is anticipated to be so, especially when considering the *'e-learning technologies'* and *'e-learning environment'* concepts that include the ICT infrastructure available in each country. Finally, the theory is anticipated to hold as long as the conditions under which the empirical observations were made and the theory developed persists.

4.10.5 Theoretical Contribution

This research believes that it has made theoretical contributions on several fronts. It used the seven-point criteria in the form of questions defined by Whetten (1989) to demonstrate its theoretical contribution as described hereafter.

The answer to the first question, *'what's New?'* lies in the value-added contribution(s) to the current thinking and perspectives (Whetten, 1989) among the e-learning scholars. From the onset of the research, it was observed that there lacked an e-learning theory (ies) specifically developed to explain e-learning. The practice has been using CLTs, which lacked the technology concept because they were designed long before we had e-learning with its contemporary technologies. A theoretical gap had been observed in the relevant CLTs that explain interaction and collaboration in e-learning. These theories include constructivism, social constructivism, and connectivism. The following pedagogical issues stemmed from their failure to explain:

i. What are the desired online interactive and collaborative activities and behaviours?
ii. How and when should those activities happen?
iii. Who should initiate those activities?
iv. What is the desired level of interaction and collaboration among the e-learners and between the e-learners and e-tutors?
v. What technologies are to use during the interaction?
vi. How do the chosen technologies suit the intended use?
vii. What the challenges faced during these interactions?

These issues led to the observation that e-learning systems are mainly characterized by limited or the lack of interaction and collaboration, causing the e-learners to be isolated. Thus this research developed an e-learning theory to explain interaction and collaboration. The value addition of this theory is summarized in the following highlights:

i. The theory has made an explanation of how the e-learner characteristics influence interaction and collaboration. Such characteristics include demographics, attitudes and perceptions, ICT skills and training, motivation, work-life-study balance, and e-learners physical location.

ii. An explanation of the influence of e-tutors' characteristics on interaction and collaboration has been made. Those characteristics include demographics, ICT and e-pedagogical skills, workload, motivation, attitudes, and perceptions.

iii. The theory included the '*e-learning technologies'* concept missing in the CLTs. This concept has three sub-concepts: *'internet', 'e-learning devices', and 'e-learning platform'*. The key highlight in the '*internet'* sub-concept is how the internet attributes such as availability, accessibility, affordability, speed, and reliability influence interaction and collaboration. It also explained the coping mechanisms that the e-learners employed to circumnavigate the internet challenges. The key highlight in the '*e-learning platform sub-concept'* is the influence of the design attributes such as learnability, affordance, and usability on interaction and collaboration. It also highlighted the impact of technical and pedagogical training (or its lack thereof) of e-learners and e-tutors on interaction and collaboration. The key highlight in the '*e-learning device sub-concept*' is the influence of its characteristics such as availability, accessibility, affordability, rate of evolution, and mobility requirement on interaction and collaboration.

iv. The theory has explained the influence of e-content quality characteristics such as completeness, accuracy, currency, consistency, format, inclusion of multimedia, simplicity, and adequacy on interaction and collaboration. Another key highlight is the challenges with e-content, their causes, and the coping mechanisms that the e-learners employed to overcome them.

v. An explanation of learner-learner interaction activities has been made, the frequency and preferred technological tools for interaction and collaboration. This explanation included a description of the challenges that hindered learner-learner interaction and the coping mechanisms.

vi. The theory explained learner-tutor interaction activities, the frequency, and preferred technological tools for interaction and collaboration. In addition, this explanation included an explanation of the challenges that hindered learner-tutor interaction and the coping mechanisms.

vii. An explanation of the factors that affect learning in e-learning has been presented. Specifically, it has explained how formal and informal interaction and collaboration boosts cognitive, emotional/affective, and behavioural/psychomotor experiences in e-

learning. Another key highlight is e-learners' affective/emotional experiences after interaction with their e-tutors, e-learners, and e-content. Their emotional status (positive or negative) is determined by factors such as the turnaround time within which e-tutors address their issues, comprehensiveness of the feedback, and interaction frequency with e-tutors.

viii. The theory explained the influence of the *'e-Learning Environment'* on interaction and collaboration. The e-learning environment had two sub-concepts: *organizational and external context*. The key highlights of the *'Organizational Context'* is the influence of its attributes such as ICT policy, e-learning policy, technical capacity, and resource base on learning. The theory explains how these attributes influence the implementation of e-learning and how it affects interaction and collaboration. The key highlight of the 'external environment' is the influence of its characteristics on learning and interaction, and collaboration. Such attributes include national ICT infrastructure, ICT policy implementation, and national regulatory framework

The answer to the second question, *'so what?*' lies in the extent to which the theory will make changes (Whetten, 1989) in the e-learning practice. If and when applied, the theory will make noteworthy changes in how the e-learners and e-tutors engage in their e-learning activities. The influence of e-learners' age, culture, gender, ICT skills, attitudes, and perceptions towards e-learning engagement have been explained. Once intervened on, they will go a long way in improving interaction and collaboration while at the same time boosting their learning experiences. An equally important factor that merged is the e-tutors' motivation which is paramount in interaction and collaboration with the e-learners. Understanding the factors that influence their motivation is crucial so that there will be increased interaction and collaboration. These factors include better remuneration, reduced workload, increased technical facilitation, and training.

The answer to the third question, *'why so?'* lies in the persuasiveness of the underlying reasoning, assumptions, and supporting evidence (Whetten, 1989). This research did not have a conceptual framework because that would contaminate the theory through pre-conceived constructs. However, it had an unstructured theoretical framework derived from the review of technical literature of the extant CLTs, connectivism, and IS theories. Justifications for underlying

reasoning, assumptions, and supporting evidence around the development of the theory are based on this theoretical framework, the empirical evidence obtained from the data, and the corroboration of the results from the final round of the literature review.

The answer to the fourth question, *'well done?'* lies in the completeness and thoroughness of the methodology used in developing the theory (Whetten, 1989). The research used the CGT methodology proposed by Charmaz (2014). Since GT versions do not advocate reviewing the literature before data collection, the CGT was adapted to include a review of technical literature at the beginning of the process, as described in the research design in Chapter 3, Section 3.6. The review of technical literature was necessary for identifying the knowledge gaps, formulation of the research problem and questions. It also informed the theoretical framework that guided the research from the beginning to the end. The research involved interacting with e-learners and e-tutors to collect data through in-depth interviews, which was advantageous because it allowed the researcher to probe for more data and observe non-verbal cues from the participants. The interviews were conducted in the location of the e-learners, which was advantageous because it allowed the researcher to witness firsthand and relate to the internet access challenges experienced, especially in some rural and remote areas. The methodology also involved observations that complemented the interview method and corroborated the interview data. The research used CGT flexibly to collect data iteratively, which was advantageous because it created room to go back to the participants to clarify issues and collect more data towards saturation. CGT also allowed the research to collect, analyze and write memos concurrently. This was advantageous because it gave room for themes and categories to emerge from the data and reflect on the emerging categories. This served to guide the theoretical sampling process regarding the data needed and where to get it from in the successive interviews. This research believes that the methodology is parsimonious, and the theory is complete in the number of concepts, their respective attributes, relationships, justifications, and applicability of the results.

The answer to the fifth question, *'done well?''* lies in the logical presentation of the theory so that its core ideas are easily accessible (Whetten, 1989). The research methodology yielded the theory presented in Chapter 4. First, data analysis identified the attributes brought together to form the key categories (concepts) of meanings depending on their similarities. In some cases, attributes

formed sub-concepts that eventually formed the key concepts. Second, theory construction entailed identifying the relationships between the attributes and the key concepts, which have also been documented. Finally, the research integrated the key concepts into the core concept (theory), and the integration criteria are presented in Chapter 4, section 4.9.

The answer to the sixth question, *'why now?'* lies in the contemporary relevance of the theory to the stakeholders (Whetten, 1989) in the e-learning field. More than ever before, the development of this theory is very timely because more and more learning is happening through e-learning. In the Kenyan context, this is justified by the following reasons.

i. The government has significantly invested in the national ICT infrastructure by laying the fibre optic cable, expanding internet access to IHLs. It has also formulated the ICT policy regulatory framework, reduced the cost of devices and internet access. These measures have stimulated the implementation and use of e-learning in IHLs.
ii. In response to these government initiatives, IHLs, in an effort to bridge the higher education access gap, have been expanding learning beyond the physical campuses to reach learners who may not be in a position to attend the conventional programs.
iii. In the wake of devolution in the governance structure in the country, more e-learning opportunities have emerged since more workers are distributed in the counties that otherwise would have been concentrated in major cities. Thus, the county employees who are seeking opportunities to improve their education turn to e-learning.
iv. From the research, e-learners and e-tutors feel that universities treat e-learning as second-rate to the conventional learning programs. However, the COVID-19 pandemic has presented an excellent justification for why university managements should give e-learning more prominence and priority. This is because any learning in IHLs during the COVID-19 era has mainly been via e-learning. Moreover, in the post-pandemic period, e-learning presents IHLs with an opportunity to decongest the lecture halls in the physical campuses, thereby making service delivery more efficient.

The answer to the seventh question, *'who cares?'* lies in the stakeholders interested in the theory (Whetten, 1989). The e-learning stakeholders are as follows.

i. e-Learning providers and practitioners will have a theory to appeal to, which provides the concepts and attributes that offer a clear understanding of the implementation and provision of e-learning with an eye towards interaction and collaboration.

ii. e-Learners and e-tutors will benefit from the improved interaction and collaboration in e-learning due to informed policy decisions and designs based on sound theoretical underpinning.

iii. e-Learning policy and decision-makers will benefit because the results explained the pertinent issues to be considered when deploying ICT infrastructure in the country to make equitable access to all regardless of the location in the country. The policy and decision-makers will figure out interventions likely to improve internet quality and drive down costs.

iv. Academia and researchers will benefit from the results because they offer insights into what concepts and attributes forming the e-learning theory and how they interact to influence interaction and collaboration, thus contributing to the current body of knowledge.

v. e-Learning system designers will benefit because the theory offers a reference model when designing systems for usability, affordance, and learnability geared towards interaction and collaboration.

CHAPTER 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0: Introduction

This research has presented the e-learning theory for interaction and collaboration developed based on two universities in Kenya. This chapter begins with a summary appraising the extent to which the research questions were answered. The summary also includes the methodological insights, contributions to IS field and limitations faced in the research. Finally, it ends by making conclusions and recommendations for further research.

5.1: Achievements

From the inception, a theoretical gap in e-learning was observed from the literature leading to the formulation of the general research question, *'what key concepts should be considered in the development of the e-learning theory and how do they relate to each other?'*. The research used the CGT methodology that involved in-depth interviews with e-learners, e-tutors, coordinators, and managers. It also involved observations of the LMS design characteristics and interactions of the e-learning parties in the LMSs. Specifically, the research sought to answer the following questions:

v. What key concepts should be considered in developing the theory to underpin interaction and collaboration?
vi. What attributes of the key concepts should be considered in developing the theory for interaction and collaboration?
vii. How do the relationships between identified attributes and concepts affect interaction and collaboration among e-learners and between e-tutors and e-learners?
viii. How will the key concepts be integrated to form the e-learning theory for interaction and collaboration?

This section demonstrates the extent to which the research questions were answered. The first research question was *'What key concepts should be considered in the development of a theory to underpin interaction and collaboration?'* The researcher carried out a field study in two universities that involved e-learners, e-tutors, coordinators, and e-learning managers in answering this research question. The research used CGT methodology to collect data using in-depth

interviews and observations described in chapter 3, section 3.6. The review of technical literature had earlier identified five provisional concepts; *e-learner, e-tutor, e-content, e-learning technology*, and *learner support*. The researcher further pursued these provisional concepts through theoretical sampling. From the interactions with the research participants and after data analysis, the 'e-learning support concept' was split into two concepts, namely: *'Learner-Learner'* and *'Learner-Tutor Interaction'*. In addition, two new concepts were constructed from the data, namely, *'Learning'* and '*e-Learning Environment'*. Hence making a total of eight key concepts: *'e-Learner', 'e-Tutor', 'e-Learning Technology', 'e-Content', 'Learner-Learner Interaction', 'Learner-Tutor Interaction, Learning'* and *'e-Learning Environment'*.

The second research question was *'What attributes of the key concepts should be considered in the development of a theory for interaction and collaboration?'* To answer this research question, the researcher identified the attributes that pointed to the concepts from the data. The attributes of the concepts are summarized in Table 5.1.

Table 5.1: The Attributes of the Concepts of the Theory

Concept	Sub-Concepts	Attributes -
e-Learner	Demographics	- Gender - Age
	Personal Characteristic	- Location - Motivation - Attitudes and Perceptions - Family Commitments - Work and Career Goals - ICT Skills & Training - Mobility - Cultural Context
e-Tutor	Demographics	- Age - Gender
	Personal Characteristic	- Motivation - Mode of Engagement - Attitudes and Perceptions - ICT Skills & Training - e-Pedagogy Skills &Training
e-Learning Technology	e-Learning Device Requirements	- Accessibility - Availability - Affordability

Concept	Sub-Concepts	Attributes -
	Internet Access	- Home - Work Place - Cyber Café
	Internet Access at Home	- Availability - Accessibility - Affordability - Reliability - Speed
	e-Learning Portal Design	- Learnability - Understandability - Affordance - Usability
e-Content	e-Content Design	- Simplicity - Accuracy - Completeness - Up-to-Date - Format - Inclusion of Objectives - Constancy with Objectives - Inclusion of Multimedia
	e-Content Unit of Involvement	- Individualistic - Group
	e-Content Challenges	- Complexity - Inaccurate - Incomplete - Out-dated - Lacks Multimedia - Hardcopy - Inconsistency with objectives - Lack of Collaboration
	e-Content Challenges Resolution	- e-Tutors - Online Searches (including e-library) - Fellow Learners - Academic Assistance - Physical library
Learner-Learner Interaction	Learner-Learner Interaction Reasons	- Complex Content - Sharing Knowledge - Course work Support - Solving Problems - Examination Preparation - Clarifying Instructions
	Learner-Learner Interaction Frequency	- Daily - Weekly - Monthly - As Need Arose - Never

Concept	Sub-Concepts	Attributes -
	Learner-Learner Interaction Modes	- Phone Call - SMS - Email - Chat - Discussion Fora - Social Media
	Learner-Learner Interaction Challenges	- Internet Challenges - System Design - Work-Life-Study Balance - Lack Training
Learner-Tutor Interaction	Learner-Tutor Interaction Reasons	- Complex Content - Course work Issues - Solving Problems - Clarifying Instructions
	Learner-Tutor Interaction Frequency	- As Need Arose - Never
	Learner-Tutor Interaction Modes	- Phone Call - SMS - Email - Chat - Discussion Forums - Social Media
	Learner-Tutor Interaction Response Time	- Immediately/Minutes - Hours - Weeks - Indefinitely
	Tutorials	- Tutorial Activities - Tutorial Challenges - Tutorial Preference
Learning	Learning Unit-Of-Involvement	- Individualistic Learning - Collaborative Learning
	Collaborative Learning	- Informal Collaboration - Formal Collaboration
	Learning Experiences (Domains)	- Cognitive (Learner-Content-Interaction) - Affective (Emotional) - Psychomotor (Behavioral)
e-Learning Environment	External Context	- National ICT Infrastructure - National ICT & e-Learning Policy
	Organizational Context	- Organizational ICT Infrastructure - Organizational ICT & e-Learning Policy - Organizational Technical Capacity - Organizational Resource Base

The third research question was *'How do the relationships between the identified attributes and concepts affect interaction and collaboration among e-learners and between e-tutors and e-learners?'* To answer this question, the researcher looked out for causality relationships between attributes of the different concepts. The causal connections between attributes and concepts were discussed and documented in Chapter 4 and summarized in Section 4.9.2.

The fourth research question was *'how will the key concepts be integrated to form the e-learning theory for interaction and collaboration?'* The integration of the key concepts into the core concept was based on the researcher's introspection using reflective questions as stipulated in Chapter 4, Section 4.9.1. Therefore, the theory was indeed the overarching theme that ran throughout the research.

5.2 Conclusions

Many benefits accrue from e-learning, but some, if not all, may never be realized mainly because of the challenges assailing the practice. This research developed a theory that clearly explained the concepts, their attributes, and their relationships. From the findings, the research makes some conclusions. First, the research observed that the e-tutors are not facilitated in terms of devices and access to the internet past the regular working hours. A relationship between technical facilitation and motivation towards e-learning was observed among e-tutors. It also found out that e-learning activities happen mainly at home outside the regular working hours, in the evening or over the weekend. According to Venkatesh et al. (2003), ***FC*** in terms of e-learning technologies in the UTAUT model is a factor that positively influences the extent to which users embrace a technology. Therefore, this research suggests that institutions should consider providing e-tutors with devices and access to the internet while at home to motivate them to carry out their e-tutoring activities. Other conditions that the institutions should facilitate include training and resources to afford the technologies.

Second, having observed that the e-tutors also teach in the conventional programs, they are burdened with high teaching loads and conventional teaching pedagogy. Therefore, this research concludes that the institutions need to engage dedicated e-tutors to focus on e-learning. That way,

the e-tutors will be able to put an efficient and effective e-pedagogy that can improve the quality and reputation of e-learning and turn around the ROI for e-learning.

Third, this research observed firsthand the effects of training (a prerequisite for experience) on adoption aspired in the UTAUT model (Venkatesh et al., 2003). On the e-tutors' hand, the in-service training experienced apathy because it happens when they are engaged in conventional teaching. Thus they lacked critical skills, especially in content development and collaborative working tools. Further, this research observed a trend among the senior faculty who had excellent content mastery in their subject areas but lacked the requisite technical know-how to put up an efficient and effective e-pedagogy. Therefore, this research concludes that the universities should consider assigning them ICT-savvy teaching assistants from the younger generation who can focus on the technology part of e-learning. On the e-learners' hand, this research observed their failure to interact through the LMS-based group working tools, a problem attributed to lack of skills. Though the e-learners attended the initial training, they failed to attend in-service training, citing work and family commitments. Therefore, this research concludes that the institutions need to develop a training plan that does not conflict with the e-learners and e-tutors' schedules. Institutions must also figure out ways to make e-learning training mandatory so that the e-tutors can undertake their e-tutelage activities efficiently and effectively. Further, in the past, such trainings are conducted physically; therefore, this research concludes that they should be conducted virtually to eliminate the need to travel to the physical campus.

Fourth, the research observed that interaction between the e-learners and e-tutors over e-content was asynchronous using chats and discussion fora. These interactions are very minimal except in the face-to-face tutorials, which are inadequate for any meaningful interaction. Therefore, this research concludes that to increase interaction and collaboration, the e-tutors should engage their e-learners in online tutorials using the available tools for synchronous interaction as advocated by connectivism (Siemens, 2005).

Fifth, this research observed numerous content-related issues ranging from complex content, untimely/delayed content, outdated content, incomplete content, content lacking in collaborative activities, content lacking in multimedia and hard copy content. Again, these challenges pointed to

e-tutors lack of skills in e-content development and, in some situations, lack of the necessary facilitating conditions to create the e-content to meet the e-learners' unique needs. This research concludes that there is a need to train the e-tutors further in e-content development. There is also the need to provide the necessary technical facilitation to allow for the creation of e-content.

Finally, having observed high ownership of mobile devices among the participants, e-learning initiatives should be designed to meet the e-learners' need for mobility by customizing the e-content and the system for mobile devices.

5.3 Contribution to the IS Field

The contribution to the IS field is two-fold. First, the focus of many IS studies have tended to be technical; however, this research has demonstrated a shift in the focus to include studying social aspects of e-learning as an IS discipline. Such aspects relate to e-learners, e-tutors, institutions, and their management that have a bearing on the design, implementation, and delivery of e-learning. They also have a bearing on the adoption of e-learning. Second, IS research has tended to be "technology-led instead of theory-led" (Ravenscroft, 2001). A study entitled *'Pedagogy Before Technology'* stated that *"the cart has been placed before the horse"* (Watson, 2001, p.252). Having developed a theory to guide the IS field of e-learning, this research has demonstrated that researchers in IS can step backwards and theorize about the technical field they practice.

5.4 Methodological Contributions

Several methodological insights emanated from using CGT methodology in this research. First, since GT versions insist on reading the literature after data collection, the decision to adapt the CGT to include a literature review of extant theories at the beginning of the research allowed the researcher to establish the theoretical framework. This was necessary because it informed the theoretical and knowledge gaps in the existing learning theories, which formed the research's justification and foundation. Second, this research conducted a preliminary study which allowed the researcher to establish the sample variability and get an accurate picture of interaction and collaboration in e-learning. The preliminary study results also guided the design of the interview schedules, without which the ethics and review board would not have authorized data collection. However, the interviewer did not strictly adhere to the interview schedules in the research to avoid

foreclosing participants' views not included in the interview. Third, the decision to interview the e-learners in their duty location allowed the researcher to experience firsthand the work-life-study balance challenges that face the e-learners. It also allowed the researcher to observe and relate to the internet access challenges they contend with. Fourth, conducting the first iteration of the interviews via face-to-face interaction enabled the researcher to familiarize and establish a rapport with the participants. Hence, it was easy to conduct the subsequent iterative interviews through member-checking via telephone calls. Fifth, a segment of the sample was drawn from security officers who were hesitant to narrate their stories. Hesitancy was attributed to their training as investigating officers. Therefore, they were unable to handle the reversed roles. They also seemed to believe that the data they were giving might be used for purposes other than the research. Thus there was the need to keep reassuring them when such feelings of fear arose during the interview. Finally, although GT methodology was initially used to develop context-specific theories in social sciences research, this research has demonstrated that GT is becoming increasingly popular in disciplines outside social sciences such as IS. The use of GT is apparent because there is a need to understand how people/social factors influence technology adoption and use.

5.5 Research Limitations

Time constraints during interviews emerged as a key limitation because most e-learner participants were employees in organizations. Since interviews were conducted during the working days and hours (in compliance with the research ethics guidelines), the e-learners took their employers' time to participate in the interviews. Thus some interviews were interrupted, while others were time-constrained due to the need to go back to work. Follow-up telephone interviews compensated for this limitation. Another limitation is related to the research timeframe since GT studies tend to take longer than other methodologies. Given the timeframe imposed on the program, it became impossible to test the theory quantitatively. Finally, the scope of the generalizability of the results is narrower since the sample size involved two IHLs and 51 participants. Despite these limitations, this research contends that the results were reliable and valid for answering the research questions.

5.6 Recommendations for Further Research

Despite having answered the research questions, some issues outside the scope of this research emerged. First, part of the sample involved e-learners and e-tutors in STEM courses. Such courses

require more interaction and collaboration between the e-learners and e-tutors. However, this was either lacking or inadequate. Thus, further research is needed in the teaching of STEM courses via e-learning to determine how its delivery can be improved. Second, there was an observed trend where e-learners interact and collaborate outside the LMS using social media (specifically WhatsApp). Interaction and collaboration using the LMS-based tools are crucial since it allows traceability of the e-learners activities. Thus there is a need to investigate further how social media can be integrated into the LMS to track their interactive and collaborative activities. Thirdly, this research did not test the theory quantitatively; hence, this research recommends quantitative testing of the theory in e-learning settings. Finally, since the investigation involved two IHLs, this research recommends testing the theory in more IHLs, with different social and technical environments, to expand its generalizability.

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APPENDIX I: e-LEARNER OBSERVATION GUIDE

Respondent Code…… University……..…….. School/Faculty ……..……

Date……Time……..…….…….....…Venue……..…….…….……

Research Questions

i. What key concepts should be considered in developing the theory to underpin interaction and collaboration?

ii. What attributes of the key concepts should be considered in developing the theory for interaction and collaboration?

Concept	Observable Features/Behavior	Remarks
e-Content		
e-Learner		

e-Tutor		
Technology		
Support and Collaboration		

APPENDIX II: e-TUTOR OBSERVATION GUIDE

Respondent Code…… University……..…….. School/Faculty ……..……

Date……Time……..…….…….....…Venue……..…….…….……

Research Questions

i. What key concepts should be considered in developing the theory to underpin interaction and collaboration?

ii. What attributes of the key concepts should be considered in developing the theory for interaction and collaboration?

Concept	Observable features/Characteristic	Remarks
e-Content		
e-Learner		

e-Tutor		
Technology		
Support and Collaboration		

APPENDIX III: e-LEARNER INTERVIEW SCHEDULE

Respondent Code……...……Time…….……..……Venue……..……

Date……University …….…….…… School/Faculty…….……..……

Research Questions

i. What key concepts should be considered in developing the theory to underpin interaction and collaboration?

ii. What attributes of the key concepts should be considered in developing the theory for interaction and collaboration?

Questions	Response	Remarks
General Information Questions		
1. Gender		
2. What is your age category?		
3. What degree course are you enrolled?		
4. What year of study are you currently taking?		
5. What is the primary motivation for taking up e-learning?		
ICT Literacy Questions	**Response**	**Remark**
1. Did you have any training in using computers before enrolling in the course?		
2. (Follow up to Q1) If yes, what level of ICT training have you achieved?		How helpful was the course when you enrolled in e-learning?
3. How often do you use a computer?		
4. Besides e-learning, when else do you use the ICTs in your day-to-day activities?		

5. Did the university train you on using the e-learning system at the beginning of the e-learning program?		If yes, how helpful was the training?
6. How do you rate your ICT usage skills?		
ICT Availability and Affordability	**Response**	**Remark**
1. What electronic devices needed for e-learning do you personally own?		
2. Do you have Internet access at home?		If no, how do you access the internet?
3. (Follow up to Q2 above) if yes, how do you describe the speed of the Internet connection at home?		(Follow up to Q2 above) if yes, how do you describe the reliability of the Internet connection at home?
4. What is the cost (in Kenya Shillings) of Internet connection at home per month?		
5. Other than at home, from where else do you access the Internet?		
6. What is the total cost (in Kenya Shillings) of access the internet from places other than home?		
7. Do you have access to the Internet at your place of work?		
8. (Follow up to Q7) How can you describe the quality of the Internet connection at work?		

9. What are the challenges do you face when using the e-learning system?		How do you overcome the said challenges
10. How can you describe the e-learning platform in terms of its features?		How enjoyable is it to use the e-learning platform?
e-Learner Support and Collaboration	**Response**	**Remark**
1. How often do you contact/communicate/interact with your tutors about content/subject understudy?		
2. (Follow up to Q1) What other reasons exist for contacting your tutor?		
3. When do you contact the tutor? And do you get the help you were seeking? How do you reach them?		How do you communicate to your e-tutors
4. (Follow up to Q3 above.) If the tutor responds, how prompt is the help?		
5. (Follow up to Q3 above. If the tutor does not respond, how does that make you feel?		
6. Follow up-to Q5. If the tutor does not respond, where do you turn for help?		

7. What modern communication tools have you ever used to interact and communicate with your tutors and admin when carrying out your studies and doing assignments?		How do you determine which tools to use and when to use them?
8. Do you occasionally need technical help?		
9. (Follow up to Q8) if yes, what is the nature of technical help?		
10. (Follow up to Q9) Where do you get technical help?		
11. (follow up to Q10) Is the technical help prompt?		How fast can you rate the technical help?
12. How often do you contact/communicate/interact with your fellow learners?		
13. (Follow up to Q12) What are the reasons for contacting your fellow learners?		Why do you reach out to fellow learners?
14. What modern communication tools have you ever used to interact and communicate with your fellow learners when carrying out studies and doing assignments?		

15. Do your tutors give assignments, exercises, and lab practicals that require working in groups or teams online?		
16. (Follow up to Q15). If yes; Do you fully participate in the group work?		Why don't you participate fully in the group?
17. (Follow up to Q15). If No, Are you motivated to work in groups?		
18. (Follow up to Q15) If there is group work, how are the groups formed? Who forms them?		What activities do you carry out in those groups?
19. (Follow up to Q15) What challenges do you face working in groups if there is group work?		
20. (Follow up to Q19) How do you overcome group challenges?		
21. How do you rate your motivation (in %) regarding carrying out your e-learning activities?		What makes you motivated or demotivated?
22. How do you handle lab/practicals, e.g., Computer graphics, databases, mobile programming, etc.?		
23. Do you attend tutorials (two face-to-face session		What activities are carried out in the tutorials
Questions from the Respondents' and Final remarks		

APPENDIX IV: e-TUTOR INTERVIEW SCHEDULE

Respondent Code……..……Time……..…….……..…Venue…….…….……

Date……...University……..……..…….. School/Faculty ……..……

Research Questions

i. What key concepts should be considered in developing the theory to underpin interaction and collaboration?

ii. What attributes of the key concepts should be considered in developing the theory for interaction and collaboration?

Question General Information Questions	Response	Remarks/Follow up Questions
1. Gender		
2. What is your age category?		
3. Are you a part-time or full-time tutor?		
4. Do you also teach face-to-face classroom-based courses?		
ICT Literacy Questions	**Response**	**Remarks**
1. Did you have any training in using computers before your engagement in e-learning		
2. If yes, what level of ICT training have you achieved?		How helpful was your prior ICT training?
3. How can you rate your computer usage skills?		
4. Did you receive any training from the university at the beginning of your engagement as an e-learning tutor?		What was the focus of the Induction Training? How helpful was the Induction training?
5. Have you been receiving in-service ICT training during the period you have been tutoring e-learning courses?		
6. (Follow up to Q5) How frequent is the in-service training?		What has been the focus of the in-service training?

		How helpful was the ICT training in your teaching?
7. How can you rate your motivation level in carrying out your e-tutoring activities?		
8. What challenges do you face when interacting with your e-learners?		How do you overcome the said challenges?
ICT Availability and Affordability	**Response**	**Remarks**
1. Does the university where your e-tutor provide you with a computer to carry out our e-learning activities while at work?		
2. (Follow up to Q1 above) If yes, Is the computer connected to the Internet?		If No, how do you access the internet?
3. (Follow up to Q2 above) How can you describe the quality of Internet connection at your workplace?		
4. Does the university provide you with mobile devices to communicate with your e-learners while away from campus?		
5. (Follow up of Q4 above) If you have been provided mobile devices, which mobile devices?		
6. Which computing/mobile devices do you personally own and can use way from work?		
7. How do you access the Internet while away from the university campus?		

8. Does the university provide you with airtime to connect to the Internet while away from the university?		
9. (Follow up of Q8) How much money (in Kenya Shillings) per month are you provided?		
10. What cost do you incur for the Internet connection per month?		
E-Learner Support and Collaboration	**Response**	**Remarks**
1. Do you include group exercises in your course content, assignments, and practicals?		
2. (Follow up to Q1 above) If not, why don't you include group work?		
3. (Follow up to Q1 above) Do you teach a practical class? If yes, How do you manage it?		
4. How often do you discuss the subject matter covered in various lessons with your students?		If not, why don't you discuss content with e-learners?
5. How do students ask for help in complex and challenging parts of the content?		
6. (Follow up to Q7) Who initiates that discussion? You or your learners?		
7. Do you initiate discussions on the unit discussion forums on the complex and challenging subject matter?		If not. Why don't you initiate discussion on discussion fora?
8. (Follow up to Q9) If yes, do students participate in the discussion?		

9. (Follow up to Q10) If they don't, what do you think is the reason for not participating?		
10. How do you give feedback to students after marking tests and Assignments?		
11. Do you use the Grade and Grade Report to give students their marks once you have marked their CATs and Assignments?		
12. Do you have planned face-to-face (tutorial) sessions with your learners?		If yes, what activities do you undertake in the
13. (Follow up of the Q11 above) When? And what do you discuss?		
14. How do you communicate with your e-learners?		
15. Which modern interaction tools/media such as WhatsApp and Facebook have you used to communicate with your learners?		What determines which tools to use when?
16. Has there ever been a need to call a student? What was nature need?		
Questions from the respondents' and final remarks		

APPENDIX V: ETHICS AND REVIEW BOARD DATA COLLECTION PERMIT

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844,
Nairobi, 00100
Tel: 8710901/12

Our Ref: **KU/ERC/ APPROVAL/VOL.1** (275) Date: 14th May, 2019

Rachael N. Kibuku
P.0 Box 69356-00400
Tom Mboya,
Nairobi

Dear Ms. Kibuku,

APPLICATION NUMBER: PKU/1022/11072 "FORMULATING A THEORY FOR COLLABORATIVE E-LEARNING FOR INSTITUTIONS OF HIGHER LEARNING IN KENYA: A GROUNDED THEORY APPROACH"

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic **"Formulating A Theory For Collaborative E- Learning For Institutions of Higher Learning in Kenya: A Grounded Theory Approach"** received on 29th April, 2019 and discussed on 14th May, 2019

2. APPLICANT

Rachael N. Kibuku

3. SITE

Institutions of Higher Learning in Kenya

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines and **APPROVED that the research may proceed for a period of ONE year from 14th May, 2019**

5. **ADVICE/CONDITIONS**

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this committee immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

KENYATTA UNIVERSITY
P. O. BOX 43844 - 00100 NAIROBI
APPROVED
14 MAY 2019
OFFICE OF THE CHAIRMAN
ETHICS REVIEW COMMITTEE

PROF. JUDITH KIMIYWE
CHAIRMAN ETHICS REVIEW COMMITTEE

I Rachael Njeri Kinyua accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of 14/05/2019 2019.

cc.
DVC-Research Innovation and Outreach

APPENDIX VI: NACOSTI DATA COLLECTION PERMIT

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471, 2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/19/72577/27833** Date: **1st February, 2019**

Rachael Njeri Kibuku
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Formulating an E Learning theory for collaborative learning for institutions of higher learning in Kenya. A grounded theory approach"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **1st February, 2020.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

06/02/2019
COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. Box 30124-00100, NBI
TEL: 341666

The County Director of Education
Nairobi County

APPENDIX VII: MOE, NAIROBI COUNTY DATA COLLECTION PERMIT

Republic of Kenya
MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING & BASIC EDUCATION

Telegrams: "SCHOOLING", Nairobi
Telephone: Nairobi 020 2453699
Email: rcenairobi@gmail.com
cdenairobi@gmail.com

When replying please quote

REGIONAL COORDINATOR OF EDUCATION
NAIROBI REGION
NYAYO HOUSE
P.O. Box 74629 – 00200
NAIROBI

Ref: RCE/NRB/RESEARCH/1 VOL. I

DATE: 6th February, 2019

Rachael Njeri Kibuku
University of Nirobi
P O Box 30197-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

We are in receipt of a letter from the National Commission for Science, Technology and Innovation regarding research authorization in Nairobi County on "***Formulating an E Learning theory for collaborative learning for institutions of higher learning in Kenya. A grounded theory approach***".

This office has no objection and authority is hereby granted for a period ending **1st February, 2020** as indicated in the request letter.

Kindly inform the Sub County Director of Education of the Sub County you intend to visit.

NAIROBI
26 FEB 2019

KINOTI KIOGORA
FOR: REGIONAL COORDINATOR OF EDUCATION
NAIROBI

C.C
Director General/CEO
National Commission for Science, Technology and Innovation
NAIROBI