

**CHALLENGES AFFECTING THE IMPLEMENTATION OF ONLINE
TEACHING AND LEARNING IN TECHNICAL INSTITUTIONS: A CASE OF
SELECTED TECHNICAL TRAINING INSTITUTES IN NANDI COUNTY,
KENYA.**

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DECLARATION

Declaration by the student

This thesis is my original work and has not been presented for the award of any certificate or degree in any other institution or university. No part of this work should be reproduced without prior permission from the author and/or University of Eldoret.

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Declaration by the supervisor

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DEDICATION

I wish to dedicate this thesis to my parents, wife Edith Jepchirchir Kurui, and my Daughters Victoria Jebet Koech and Daisy Jeptoo Koech, for their encouragement and support for my studies.

ABSTRACT

Information and Communication Technology has grown significantly and affected education practice globally. Institutions use the learning management system to aid online learning. eLearning still faces challenges for its effective use. This study assessed challenges in the implementation of online teaching and learning in selected TVET institutions in Nandi County, Kenya. The objectives of this study were; to assess the trainers' competence in online learning use, to examine trainees' ability to access eLearning platforms, to determine the Institutions' ICT infrastructure preparedness for online learning, and to determine technician's ICT skills in the implementation of online learning. A descriptive research design was used in this study. Data were collected using questionnaire and interview schedules. A sample size of n=475 for trainers , n=76 trainees, n=8 ICT technicians and n=5 principals were used in this study. Questionnaires were administered to trainees, trainers, and ICT technicians to assess their competence level in eLearning while the principals were interviewed. Data were managed, coded, and analyzed using IBM SPSS version 26. The study findings indicated that trainers, trainees had challenges on online learning use. Trainers had challenges in e-content development and use of online learning platform, the inability of trainees to use online learning and inadequate infrastructure to boost online learning in technical institutions. The study revealed that the technicians were competent in facilitating eLearning due to their field of specialization. Institution ICT infrastructure such as slow internet speed, and poor network coverage limited the use of technology for online learning content delivery. Implementing online teaching and learning requires the stakeholders to come together to make online teaching and learning successful. There is a need for the Kenya government to come up with a clear way and guide for proper implementation of eLearning. The study is important for implementation of online teaching and learning in technical institutions.

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LIST OF ABBREVIATIONS AND ACRONYMS

ELearning	Electronic Learning
EMIS	Education Management Information System
ICT	Information and Communication Technology
KENET	Kenya Education Network Trust
LAN	Local Area Network
LMS	Learning Management System
Moodle	Modular Object-Oriented Dynamic Learning Environment
PCs	Personal Computers
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TV	Television
WebCT	Web Course Tools
WWW	World Wide Web
TVET	Technical and Vocational Education and Training
COVID-19	Infectious disease caused by the SARS-CoV-2 virus

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

According to UNESCO (2020), more than 1 billion and 575 million trainees in approximately 188 countries worldwide were affected by the closure of schools and universities due to the preventive measures countries took against the spread of COVID-19 (Infectious disease caused by the SARS-CoV-2 virus). Experts recommended that self-isolation, social distancing, and prohibition of persons from assembling in large numbers had been confirmed by researchers as the main measures to combat the spread of COVID-19. Due to isolation, ICT technology has been considered the most appropriate alternative to keep educational systems functional in many parts of the world during this period (Mbunge et al., 2020). Natural pandemic such as COVID-19 has been an eye opener to allowed us to adopt to online learning as education systems and to be up-to-date with the rapid emergence of new technologies, thus making it a necessity in higher learning institutions in Kenya and the world. Natural disasters can stimulate our motivation to adopt highly innovative communication technology and eLearning tools (Tull et al., 2017). Tamrat and Teferra (2020) posited that shifting to online learning was not a simple task, especially in a continent with only 24% of the total population accessing the internet, where there's poor connectivity, unreasonably high costs to access the internet, and also frequent power interruptions. Online learning is facilitated and supported with the help of Information and Communications Technology (ICT) through the internet.

Unlike the developed world that has increasingly embraced eLearning, this is not the case in Africa. As cited by Houlden & Veletsianos, 2020, in Africa eLearning adoption has been slow because few scholars are familiar with online teaching.

According to (Kasse & Balunywa, 2013), in Uganda, the absence of an internet connection, technical incompetency, and negative attitudes have limited eLearning adoption. Kenyan scholars have identified inadequate training and heavy workloads as the key reasons for reading materials being uploaded to eLearning platforms rather than having actual audio-visual online teaching (Tarus, Gichoya & Muumbo, 2015). Studies by Kashorda & Waema, 2014, Bagarukayo & Kalema, 2015 have advocated adequate funds, policy, and infrastructure as the key pillars for eLearning success. Most technical training institutions in Kenya have blended online learning with face-to-face learning. They have lagged in its full implementation since they are experiencing challenges in using the platform.

1.2 Background of the study

The COVID-19 pandemic forced educational institutions such as universities and technical institutes to shift rapidly to online learning. Online learning is not new to learners, nor is distance learning. However, COVID-19 revived the need to explore online teaching and learning opportunities. According to UNESCO (2020), universities, technical institutes, and school closures have several adverse consequences on trainees, such as interrupted learning, which results in trainees and youth being deprived of opportunities for growth and development. Therefore, online digital learning systems address this problem with easy access and offer fast internet connections.

eLearning systems can assist learning providers in managing, planning, delivering, and tracking the learning and teaching process. Furthermore, it aims to help instructors, schools, and universities facilitate student learning during school holidays, long-distance learning and in cases of calamities that limit human interaction. In addition, most of these systems are accessible, thus ensuring continuous learning.

The provision and usage of online learning materials in an eLearning system was the main challenge for many technical institutes during the pandemic and post-COVID-19 pandemic. An eLearning system is an essential source of information due to its ubiquity (availability anywhere and anytime), low cost, ease of use, and interactive character. ELearning systems such as Blackboard, moodle, Zoom, and Google-meet have several fantastic features that would be valuable during pandemics.

The success of the eLearning system depends on the trainees' willingness and acceptance to use this eLearning system (Almaiah and Jalil 2014; Almaiah and Alismaiel 2019; Shawai and Almaiah 2018). There has not been a thorough analysis on the factors that affect the implementation of online learning during the COVID-19 pandemic in technical training institutes; since most courses require hands-on skills. Therefore, this research investigates the challenges that hinder the success in implementation of online teaching and learning in technical institutions.

1.3 Statement of the problem

According to UNESCO (2020), the COVID-19 pandemic affected all countries globally, with majority of services either stopped or the mode of operation transited from face-to-face to virtual interfaces. The education sector in Kenya was affected mainly by the Covid-19 pandemic, which prompted the closure of all academic institutions to curb the spread of COVID-19. The government of Kenya directive through the ministry of education recommended the adoption and utilization of online teaching and learning. Some institutions in the country failed to kick off learning due to technological challenges encountered. On the other hand, technical institutions were heavily affected by the COVID-19 pandemic since most courses require face-to-face interaction to deliver course content. According to (TVETA, 2020), There was a slow implementation of online learning due to lack of a well-established legal

framework and standards to guide a proper roll-out of eLearning. Most trainees and trainers were faced with challenges with the dynamics (use of ICT technology) surrounding online learning. Online learning was marked with low attendance and slow course coverage. The evolving nature of online teaching and learning was linked with the diverse needs and ICT backgrounds of trainers and trainees which emphasize the urgency of comprehensive research study to address these critical challenges. The study seeks to investigate these issues with the sight of providing valuable insights and recommendations to elevate the effectiveness and inclusivity of online teaching and learning experiences.

The above problems prompted this study. The study, therefore, aims to assess challenges that affect online teaching and learning among the selected TVET institutions in Nandi county Kenya.

1.4 Research objectives

1.4.1 Main Objective

The study's purpose is to assess the challenges that affect online teaching and learning implementation in selected technical institutions in Nandi County, Kenya. Thus, gaining comprehensive understanding of the various obstacles and difficulties faced by these institutions in transitioning to an online learning environment.

1.4.2 Specific objectives

The specific objectives of the study are:

- i. To assess the trainers' competence in implementing online teaching and learning in technical institutions in Nandi County, Kenya.
- ii. To examine trainees' challenges in accessing online training in selected technical institutions in Nandi County, Kenya.

- iii. To determine the ICT technicians' competence in adopting and facilitating online teaching and learning in Nandi County, Kenya.
- iv. To determine the Institution's ICT infrastructure preparedness in implementing online teaching and learning in Nandi County, Kenya.

1.5 Research questions

- i. What competence do trainers possess in implementing online teaching and learning in technical institutions in Nandi County, Kenya.?
- ii. What is the trainee's ability in accessing online teaching and learning in technical institutions in Nandi County, Kenya.?
- iii. What competence do ICT technicians have in adopting and facilitating online teaching and learning for trainers and trainees?
- iv. What ICT infrastructure preparedness do technical institutions have in implementing online learning in Nandi County, Kenya.?

1.6 Significance of the study

This study serves as an important baseline on the status of adoption and utilization of online learning at technical training institutes in Nandi County and other region in Kenya. This will play an essential role in the growth or decline of eLearning in selected technical training institutes in Nandi County.

The national government of Kenya will benefit from the findings of this research by being aware of factors that affect eLearning adoption and implementation across other institutions in the country. This information would guide the government to make informed decisions about providing the necessary support to facilitate eLearning adoption and utilization in order to widen access to higher education.

Further, the findings of this study will significantly benefit eLearning system developers in understanding the attitude of eLearning users and adopters. With this understanding, the eLearning system developers can customize the eLearning platforms to suit the needs of the individual users and their target organizations, as the findings would unveil ways to increase users' and adopters' involvement in eLearning. The findings of this study will also help curriculum and textbook developers to determine the entry behavior and eLearning self-efficacy of trainees. This would help them to draw up a curriculum that will meet the needs of the diverse trainees pursuing distance learning.

The findings obtained from this study will not only help the trainers establish their current ICT skills needed to effectively utilize eLearning but would also help them to develop the right mix into blending online teaching and learning and normal class learning setup.

Finally, the findings will be important in solving challenges faced on online learning. It will also will benefit researchers interested in other aspects of eLearning adoption and utilization that have not been covered under this study.

1.7 Justification of the study

This study supports the International Labour Organization's (ILO) standardized nomenclatures for identifying industries and occupations, and UN Global Goals Aim for everyone to have access to inclusive education by 2030. Article 26 of the Universal Declaration of Human Rights states that; everyone has a right to education. Education shall be directed to fully develop the human personality and strengthen respect for human rights and fundamental freedoms.

Vision 2030 focuses on the social pillar that aims at transforming the eight sectors for the betterment of the lives of the people of Kenya, namely, Education & Training,

Health, Water & Sanitation, Environment, Housing & Urbanization, Gender, Youth, Sports & Culture. The provision of online learning in all education sectors, irrespective of the challenges, were in line with the policy reforms enacted to improve the educational standards in Kenya. However, despite the online implementation in technical training institutions, transmitting hands-on skills through online platforms remained challenging. Therefore, this study aims to assess challenge in implementation of online teaching and learning in selected technical training institutes in Nandi county, Kenya. ELearning will help improve the productivity and competitiveness of education in the constantly changing global market (Gyambrah, 2008). Therefore, most institutions in the country and globally have implemented eLearning initiatives to promote the training, development, and use of eLearning technologies (Khoury, Eddeen, Saadeh, & Harfoushi, 2011). The emergence of eLearning will transform the way education is offered and promote information management in institutions of higher learning (Ani & Ahiauzu, 2008). In Kenya, not much has been achieved in addressing the factors affecting the implementation of ELearning user acceptance in universities and institutions. This study's findings will promote acceptance of ELearning by all stakeholders, hence providing avenues for diversifying technical education. This will reduce challenges that have emanated from the traditional face-to-face mode of learning and provide an environment of student-lecturer interaction on an anywhere-anytime-anyhow basis (Björk, Ottosson & Thorsteinsdottir, 2008).

1.8 Scope and Limitations of the study

Although the need for inclusion of all aspects of online teaching and learning would have been more interesting, studying every aspect of online teaching and learning is practically impossible within the available time. This meant that the study needed to

be narrowed down to perceived attributes of online teaching and learning, institutional, trainee's competencies, trainer's competencies, and factors influencing the adoption and utilization of online teaching and learning.

The limitation of eLearning in the context of technical training institutions of learning is wide and complex. Study requires adequate time and logistics to conduct a comprehensive research. However, the resources are highly inadequate to conduct an online learning study. The research was, therefore, conducted in selected technical training institutions in Nandi County, conducting online learning.

Because of the selected sample size and the regional distribution of the target population, there was a question of whether the findings could be generalized to other technical training institutions. This study captured the diversity of the variables from the target sample, which helped to identify commonalities of experiences of eLearning adoption and utilization at a technical training institute in Nandi County. Indeed, inductive generalization requires further in-depth studies with a larger sample size. Furthermore, eLearning operates in a technologically dynamic environment, which may render some findings ineffectual over time. Therefore, generalizations of the findings to other technical training institutes should be done with caution.

1.9 Assumptions of the study

The researcher further assumed that no respondent was at a disadvantage due to gender or physical disability, or geographical location. The researcher and the research assistants could access the respondents in the centers allocated to them without difficulty.

The assumptions to be taken during the study were:

- a. All the respondents would answer all survey questions honestly and to the best of their abilities.

- b. The results would not be affected because respondents pursue different technical courses.
- c. The data collected from the study research instrument were normally distributed.
- d. Researcher assumes that no respondent was at a disadvantage because of their gender, physical disability or geographical locations.

1.10 Conceptual Framework

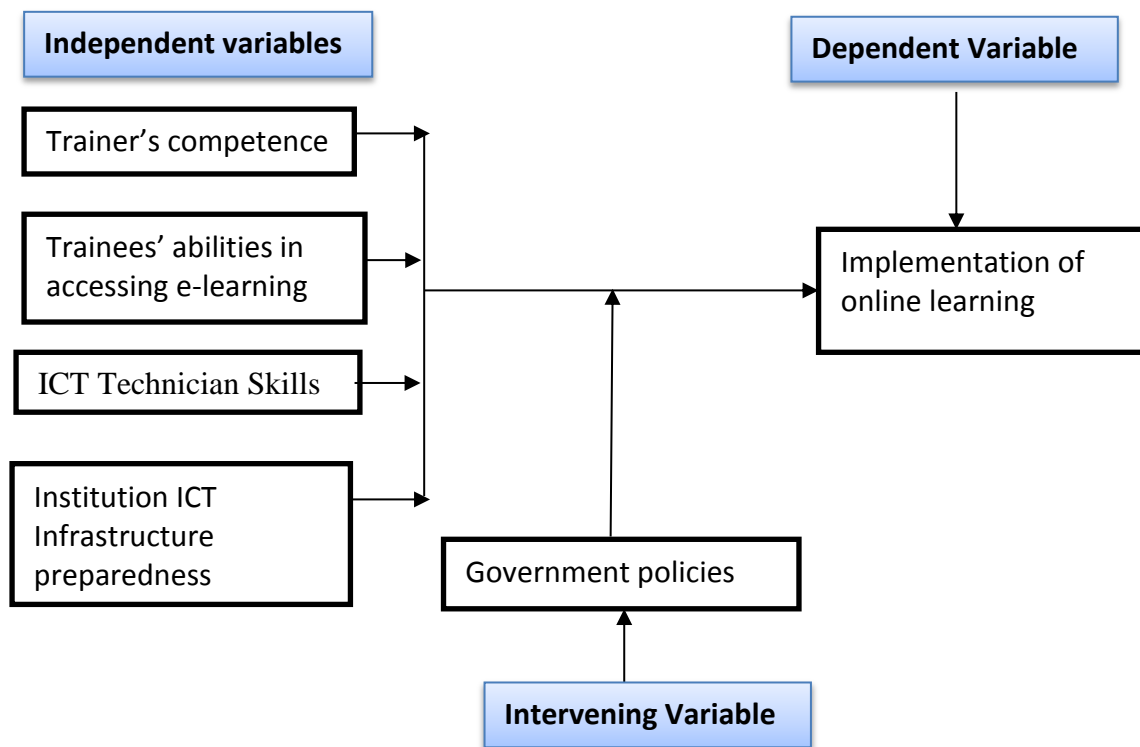


Figure 1.1: Figure showing the conceptual framework

(Source: Author, 2021)

Trainees abilities in online learning refers to the skills, attributes, and technological use abilities that enable a learner to effectively engage with digital educational resources and succeed in eLearning environment. Trainees abilities enable them to fully benefit from online teaching learning by increasing their independence, adaptability, and effectiveness in their quest for knowledge and academic success. Trainers' competence in eLearning is essential as it entails the capabilities and proficiency that trainers possess to effectively designing, delivering, and management of online courses. Trainers are important part in the success and implementation of online learning. ICT technicians are essential for the effective deployment of online learning. Their technical expertise, troubleshooting skills, security measures, and tool integration abilities all help to create a strong and efficient online learning

environment. Additionally, they play a critical role in guaranteeing connectivity, offering support, and keeping up with technological developments, all of which have a big impact on how well the online learning environment functions as a whole.

Institutional ICT infrastructure preparedness is the level of readiness and the capability of an technical institution to support effectively online learning and implement technology-driven learning initiatives. a well-developed ICT infrastructure is crucial for the success of online learning initiatives. It creates the foundation for delivery of high-quality online education and ensuring a smooth learning experience for trainers and trainees. Government policies relates to online teaching learning and plays an important role in creation of framework and regulations that governs the implementation of online teaching learning.

Independent variable, intervening variables and dependent variables are interconnected ecosystem in that each component plays an important role in the successful implementation of online teaching and learning. Government policies provide the overarching framework within which the online learning operates. Collaboration and coordination among trainers, trainees, ICT technicians, proper ICT infrastructure are essential for effective online teaching learning.

1.11 Operational definition of terms

ELearning/online learning/eLearning: The methods of learning that use electronic instructional content delivered via electronic media such as the internet or Intranet. This is all forms of electronically supported, mediated, or enhanced learning through computers or other electronic devices. eLearning uses information and communications technology (ICT) to enhance and/or support learning in tertiary education (OECD, 2005). A web-based educational system (Learning Care

management system) that utilizes IT and computer networks (internet and intranet) (Hezbollah and Idris, 2009).

E-platform: The interface of the eLearning system that the users interact with. Virtual Learning Environments (VLE) are electronic platforms that can be used to provide and track eLearning courses and enhance face-to-face instruction with online components.

(Frimpon, 2012).

Innovation: An idea, practice, or object perceived as new by an individual or other unit for adoption.

Lecturers/Trainers: Faculty members engaged in teaching of trainees

LAM: It is a web application for designing, managing and delivering online learning using collaborative learning activities

Trainees/Trainees: a person formally engaged in learning, especially one enrolled in an institution who is learning and practicing new skills.

Wi-Fi: Technology that allows an electronic device to exchange data wirelessly (using radio waves) over a computer network.

WiMAX: (Worldwide Interoperability for Microwave Access) is a wireless communications standard that provides 30 to 40-megabit-per-second data rates.

Utilization: The rate at which trainers and distance learners use the eLearning platform.

Blended learning is also referred to as hybrid learning, a method of teaching that integrates technology and digital media with traditional instructor-led classroom activities, giving trainees more flexibility to customize their learning experiences.

ICT: Information and Communication Technology

1.12 Chapter one summary

This chapter provides a comprehensive overview of the challenges and implications of implementing online learning, particularly in the context of technical training institutions in the wake of the COVID-19 pandemic. The chapter begins by citing UNESCO's staggering statistic of over 1.5 billion affected trainees across 188 countries due to the closure of educational institutions in response to the pandemic. It emphasizes the importance of self-isolation, social distancing, and the use of technology in combating the spread of COVID-19.

The chapter underscores the critical role of Information and Communications Technology (ICT) in enabling continued education during this period, especially in regions where internet access is limited. It highlights the significant hurdles faced in Africa, where only 24% of the population has internet access, and issues like poor connectivity, high costs, and power interruptions pose significant challenges.

The chapter also points out the slow adoption of eLearning in Africa, citing factors such as limited familiarity with online teaching among scholars and technical incompetency in regions like Uganda. Additionally, the absence of proper internet infrastructure and challenges related to attitudes towards eLearning are noted.

The chapter then delves into the specific challenges faced by technical training institutions in Kenya, where a blended approach of online and face-to-face learning is being utilized. The identified hurdles include inadequate training, heavy workloads, and limited internet access. The study emphasizes that technical institutions have been slower in fully implementing online learning due to difficulties in using the platform effectively.

The chapter outlines the research objectives, focusing on assessing trainers' competence, trainees' ability to access online learning, ICT technicians' proficiency,

and institutional readiness for online teaching and learning. It formulates research questions aligned with these objectives to guide the study.

The significance of the study is highlighted, including its potential impact on policy-making, curriculum development, and the overall improvement of eLearning adoption and utilization. It underscores the importance of inclusivity and accessibility in education, especially during times of crisis.

The chapter concludes by presenting the conceptual framework, which illustrates the interplay between competent trainers, trainees' abilities in accessing e-learning, and the successful implementation of online learning. It serves as a visual representation of the key factors that contribute to effective online education.

In summary, this chapter provides a thorough foundation for understanding the challenges and factors influencing the implementation of online learning in technical training institutions, with a focus on the unique circumstances in Kenya and Africa as a whole.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section examines Online Learning literature review, focusing on challenges affecting online learning implementation in technical institutions. Past studies review the implementation of eLearning from a global perspective to a national level. A summary of empirical literature on eLearning has been done that points out the research findings of each researcher and the knowledge gaps identified. The identified knowledge gaps gave direction to this research work.

2.2 ELearning

Chokri (2012) studied issues contributing to adopting eLearning technology in teaching and learning by trainees in the university. The study considered the technology acceptance model (TAM) developed by Davis as its reference model (Davis, 1989). Study results showed that the influencing factors of trainees' positive opinion about the use of eLearning technology could be grouped into three key factors: expertise of learners in ICT technologies for learning, the design of eLearning adopted by trainers, and the usability of the ELearning platform. The results study revealed that the study was inclined to variables linked to the Davis model that influenced trainees' opinions about eLearning technology in teaching and learning. The study did not consider other factors such as ICT infrastructural preparedness, trainers' ICT skills, and technical skills possessed by ICT technician, which influence the rate of ELearning adoption and affect the continuous user acceptance of ELearning systems. Jan, Lu & Chou (2012) conducted a study on the acceptance of ELearning based on an institutional theory; to understand the social drives that influence employees attitudes and intentions of eLearning acceptance in an institution.

The study suggested a model study of three social and environmental factors of coercion, norms, and derivative pressures within the ELearning context. According to Jan et al.,(2016) the study results indicated that norms and derivative pressures primarily affected the attitude and intention of accepting eLearning, while coercion appeared not to. Findings also indicated that attitude mediated between norms, derivative institutional pressures, and eLearning acceptance. For organizations, the results suggest that managers should establish an eLearning community to create norms and provide a good culture for high-profile employees' eLearning experience to promote the acceptance of their eLearning.

The analyses showed that the study was inclined to human social forces exerted on employees in an organization which influenced and accelerated the rate of eLearning adoption in an organization. However, the study did not consider the influence of the technology acceptance model by Davis (Davis 1989) on ELearning adoption. Additionally, the study did not address the challenges of ELearning user acceptance, which may be influenced by factors such as ICT infrastructural preparedness, prior ICT knowledge by trainees, trainers' ICT skills, and technical skills possessed by ICT technician on eLearning systems.

Al-Malak & Alnawas (2011) conducted a study on measuring the adoption of eLearning by

trainers; to understand their attitudes toward the system. The research outcome was a proposed model, which indicated a positive relationship between perceived usefulness, ease of use, computer knowledge, intention to adopt, and management support. However, there was a negative relationship between normative forces, anxiety about using computers, and intention to adopt; all these proved to be significant issues affecting users' behavioral intentions toward accepting a new

system. Johnson et al. (2011) found out that; 1) ELearning provides learner flexibility but requires careful design and monitoring, 2) eLearning tools can help bridge the gap between trainees' conceptual thinking and the natural world, and 3) some trainees do not like using technology as it challenges them to conceptualize new ways of learning. According to Johnson et al. (2011), the design and structuring of ELearning content is a vital component of eLearning system design. Additionally, the issues of technology use pegged to Technology Acceptance Model (TAM) by Davis (1989) is important when planning the adoption of any eLearning system. However, the research did not address the challenges facing eLearning implementation that may be influenced by ICT infrastructural preparedness, prior ICT knowledge by university trainees, lecturers' ICT skills, and technical skills possessed by ICT technician on eLearning systems.

Al-Jaghoub et al. (2009) researched eLearning adoption in institutions of higher learning in Jordan; to explore changes and challenges Al-Ahliyya Amman University faced in its quest to implement its eLearning program from an information system project point of view. According to Al-Jaghoub et al., the original eLearning project plan to offer online courses faced issues due to the underlying methodology, which included; 1) Higher education was subject to the laws and regulations of the Ministry of Higher Education (MoHE), which stated that a certain percentage of any course was to be delivered using traditional teaching methods. 2) Developing an online course proved difficult and time-consuming and lacked key functionalities between trainees and trainers. 3) There was a high turnover of human resources, which resulted in changes within the project team. Finally, 4) Technological uncertainty due to the time gap between the signing and actual implementation of the project made it necessary to review the original specifications for the IT infrastructure, which seemed

obsolete. From the above findings, the study suggests that rolling out practical eLearning projects needs a well-planned plan on several issues to guarantee the safe delivery of intended objectives. From the analysis of the findings, the study considered government policies, human resources, availability of technology, and time aspects as the critical factors for the success of the eLearning project. However, the study did not address the challenges facing eLearning implementation, which may be influenced by factors such as prior ICT knowledge by technical training trainers, trainees, trainers' ICT skills on ELearning systems, and technical ICT skills.

Russell (2009) studied a framework for managing eLearning acceptance in universities. The study aimed to explore the various methods individual trainers use in adopting ELearning within their area of specialization work environments, hence developing a framework for analyzing university learning and teaching. From the findings, the study recommended a framework that suggested that a change in the university learning process required coordination across all activities previously handled separately in universities.

2.3 ICT infrastructural preparedness

According to Oketch, Njihia &Wausi (2014) and Tarus & Gichoya (2015), ICT infrastructure is insufficient to support ELearning use in Kenya's institutions of higher learning. The concept of ICT infrastructure represents all the technological resources necessary for effective eLearning in institutions of higher learning. Such resources include equipment, media, connectivity devices, and energy sources (Mulwa & Kyalo, 2012). According to Fares (2008), ELearning requires a modern and effective ICT infrastructure that provides reliable high-speed access to wired and wireless networks and the internet. The network infrastructure should support audio, video, and collaborative learning environments.

Mtebe & Mtebe (2014) stated that the cost of acquiring, managing, and maintaining ICT infrastructure had been identified as the major hindrance in the deployment and adoption of eLearning by institutions of higher learning. ICT infrastructure such as the internet, extranet, intranet, and Local Area Networks (LAN) is considered one of the biggest challenges in implementing eLearning in Institutions of higher learning, particularly in developing countries (Fares, 2008). According to Al-adwan & Smedley (2012, p.122), technological obstacles in an ELearning environment often occur in one of three essential components: hardware, software, and bandwidth capacity. Institutions of Higher Learning need to provide wireless and wired networks with high connectivity “bandwidth” to avoid adversely affecting eLearning initiatives (Fares, 2008). According to a survey by Kashorda & Waema (2014) on online learning readiness, universities in Kenya still experience challenges using eLearning technologies. Such difficulties include lack of access to computers, slow internet connectivity, electrical power outages, lack of ICT literacy skills, and inadequate technical ICT technician.

Table 2.1: Demographic data and Internet availability sub-indicators for 17 universities– 2008 and 2013

Year of survey	Total Trainees	Total PCs owned by trainees	Total bandwidth (Mb/s)	Internet bandwidth per 1,000 trainees	PCs per 100 trainees	% of trainees with PC access at home
2008	162,319	8,907	70.8	0.436	5.5	27
2013	339,418	13,815	1,431.5	4.22	4.07	30.4

(Source: KENET E-readiness data 2008 and 2013).

2.4 Prior computer knowledge of eLearning by technical institute trainee/trainees.

According to O'Donnell, Sharp, Wade & O'Donnell (2014), university trainees with ICT knowledge are more receptive to open and distance technology-enhanced learning. In this regard, universities with a long history of positive success with open and distance technology-enhanced Learning were much more receptive to new ELearning technologies than those without such a historical background.

Due to the ever-changing technological environment, Danner (2013) argues that trainees will need computer and communication technology skills to fit in a knowledge-based society successfully. Additionally, regardless of the availability of technology available in the lecture rooms, the key to how trainees use ICT infrastructure and related technologies is the level of ICT knowledge the Student possesses; therefore, teachers must be competent enough and have the right attitude towards technology so that they can transfer the same skills to their trainees. Bebetos & Antoniou's (2008) studies also found that female trainees have negative attitudes towards ICT technologies; as a result, they often tend to shy away from these technologies hence being less computer literate than their male counterparts.

Nash (2009) stated that it is essential for trainees to be equipped with digital literacy skills to take advantage of information resources that the electronic age produces. Additionally, although high school graduates use electronic devices frequently (for instance, smartphones), they may not have necessarily acquired the computer knowledge necessary for their university education (Nash, 2009). In this regard, there is an urgent need for ICT training to be given to fresh university trainees to obtain successful learning outcomes from using ICT and satisfy the needs of ELearning and even their future employers.

2.5 Trainers ICT skills in eLearning systems

According to Namisiko, Munialo & Nyongesa (2014), besides trainers having trained in their areas of specialization, they require ICT skills for successful interaction with ELearning systems in higher learning institutions. A study by DeMaagd et al. (2011) recommended that integrating ICT technologies in learning institutions would require significant constant instructor training in basic computer literacy skills and ELearning technologies; this would promote effective deployment and adoption of eLearning systems.

According to Nagunwa & Lwoga (2012), universities should create awareness by training staff to integrate eLearning technologies into their curriculum delivery. To create awareness of the eLearning technologies, the universities should inform trainers about the existence of eLearning technologies through all available communication forums and also integrate ICT literacy and eLearning into university curricula where all first-year undergraduate trainees are taught, post online tutorials on eLearning and ICT literacy aspects and create links of all eLearning sources at the university. Nagunwa & Lwoga (2012) stated that introducing eLearning programs at higher learning institutions had brought a paradigm shift for trainees and trainers with various levels of academic experience. Trainers should possess specific ICT skills to restructure their courses for successful integration into ELearning systems (Pirani, 2008).

2.6 Technical skills Possessed by ICT technician on ELearning Systems

The work for the ICT technician in eLearning systems has faced much dynamism and new demands in terms of the required skills. This transformation has been brought about by the constant emergence of relevant new technologies (Quadri, 2012). ICT technician must constantly embrace new technologies to adapt their skills in the ever-

changing ELearning technologies to keep up-to-date with new technological advances. As a result, the profession exists in a state of uncertainty along with the emerging technologies, with traditional teaching methods being increasingly replaced by modern methods which deviate from the notion of a four-walled classroom; therefore, their job descriptions keep changing (Quadri, 2012).

2.7 Technical institution eLearning Policies

Brown, Anderson & Murray (2008) and Conole (2010) state that an eLearning policy to guide educational technologies is vital to promoting and managing ICT technologies within pedagogical limits. Before implementing eLearning technologies, the universities should review the ICT policies to integrate the eLearning policy. Additionally, Brown et al. (2008) stress that ICT policies and strategic plans should promote technologies for teaching and research purposes. The strategic plans should address ELearning milestones in a given time frame. In contrast, ICT policies should address ICT infrastructure security, user administration, content development, staff training, copyright, infrastructure, partnerships and collaborations, and evaluation and monitoring of eLearning systems at the university. Nagunwa & Lwoga (2012) states that ICT policies should create avenues to encourage educators and trainees to use ELearning by specifying a favorable environment to enhance the use of these technologies.

2.8 The effects of eLearning perceived attributes on the adoption of online teaching and learning.

Sam and Reeve (2003) conducted a study entitled: Diffusion of eLearning Innovations in an Australian Secondary College: Strategies and Tactics for Educational Leaders. The study's results strongly support the research hypothesis, which indicates that high

eLearning perceived attributes such as its relative advantage, compatibility, trial ability, observability, and less complexity predict eLearning adoption.

The study of Sam and Reeve (2003) could be criticized on the ground that the issues associated with eLearning adoption are not one-dimensional but multi-dimensional. To develop effective strategies for adopting eLearning, one needs to know the key factors influencing its adoption, considering the different stakeholders' perspectives. One limitation of that study is that it failed to consider eLearning adoption from the perspective of administrators and decision-makers. Another limitation of the study is the sample size, consisting of only seventy-five teachers. It is not easy to assume that the same conclusion could be reached if the responses were drawn from a larger sample. It is, therefore, necessary to use the same methodology but target administrators to ascertain the predictability of eLearning adoption based on its perceived attributes. In a related research article, Noor and Rubaiyat (2011) studied the adoption of e-commerce by SMEs in Bangladesh. They found that perceived relative advantage, compatibility observability, and trial ability positively correlate with the adoption intention of e-commerce.

On the other hand, perceived complexity negatively correlates with the adoption rate. It was observed in the study that Noor and Rubaiyat over-relied on only the quantitative data collection method and, therefore, missed some important issues that might surface if group interviews were considered complementary to the questionnaire. Thus, combining qualitative and quantitative methods for a more extensive study would probably produce different findings. These limitations make it very difficult to generalize the findings of their study.

The findings of Noor and Rubaiyat are consistent with Sam and Reeve (2003). Thus, both kinds of research have validated the role of eLearning attributes in predicting

eLearning adoption. While empirical support has generally been established for the hypothesis outlined by Noor and Rubaiyat (2011) and Sam and Reeve (2011), others have not yielded results consistent with the theoretical predictions. For example, in a similar study conducted by Tan, Chong, and Uchenna (2009), on internet-based ICT adoption: evidence from Malaysian SMEs, it is interesting to note that trialability has no significant associations with ICT adoption. As Tan, Chong, and Uchenna reported, many SMEs think that the trialability of software is not an essential indicator of ICT adoption, as pirated software is widely available and is believed to be used by enterprises. This finding is, therefore, inconsistent with the findings of Sam and Reeve (2003) and Noor and Rubaiyat (2011). In conclusion, this study considered these limitations and inconsistencies in the existing empirical literature regarding eLearning attributes and how these attributes influence the adoption rate of eLearning in the two universities under the study.

2.9 Challenges affecting implementation of online teaching and learning in

Technical Institutes in Kenya

Online teaching has become indispensable in the wake of the COVID-19 pandemic. In Kenya, as in many other countries, schools, including polytechnics, face the urgent need to switch to online teaching models. This literature review explores the challenges hindering the effective implementation of online teaching and learning in technical institutions in Kenya.

One of the main challenges of using online education in Kenya is limited access to reliable internet services (UNESCO, 2020). According to statistics from the Kenyan Ministry of Communications, only 43% of the population has access to the internet as of 2020; There is inequality between urban and rural. This digital divide hinders the ability of students, especially in rural areas, to engage in online learning.

Many universities of technology in Kenya do not have the necessary technological tools to support online learning (Tarus et al., 2015). Lack of computers, outdated software, and students' and faculty's limited access to hardware hinder the delivery of online education.

Both teachers and interns often face challenges related to digital literacy and skills (Tamrat and Teferra, 2020). It can be difficult for teachers to adapt to online classes and use effective e-learning tools. Similarly, students may face difficulties while navigating online platforms and attending virtual classes.

Lack of training and professional development for online teachers and effective use of technology is a problem (Kashorda and Waema, 2014). This limits their ability to create online courses and deliver quality lectures.

Converting traditional content for online distribution can be a difficult task (Kasse and Balunywa, 2013). Making content engaging, interactive, and aligned with learning objectives is a key component of successful online teaching.

Kenya lacks complete legal frameworks and standards for e-learning, hindering the effectiveness of online teaching and learning (TVETA, 2020). Lack of rules and clear instructions can lead to poor quality and delivery of online courses.

It is difficult to develop quality assessments for online courses that measure learning outcomes (Bagarukayo and Kalema, 2015). Teachers may have difficulty creating assessments that measure critical thinking, problem solving, and performance in an online environment.

It can be difficult to engage and motivate students in an online environment (Houlden and Veletsianos, 2020). Without face-to-face interaction, it can be difficult for students to stay motivated and engaged in the learning process.

Technical institutions in Kenya often face electricity and infrastructure issues that can hinder online courses (Tamrat and Teferra, 2020). Unstable power will disrupt online classes and disrupt continuing education.

Using online courses at Kenya Institute of Technology is fraught with challenges. Overcoming these challenges requires a multifaceted approach, including technology development, teacher development, policy frameworks, and strategies to encourage student engagement. By recognizing and mitigating these challenges, colleges of technology can work to create more effective and inclusive online learning opportunities for students. Online teaching has become indispensable in the wake of the COVID-19 pandemic. In Kenya, as in many other countries, schools, including polytechnics, face the urgent need to switch to online teaching models. This literature review explores the challenges hindering the effective implementation of online teaching and learning in technical institutions in Kenya.

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2.10 Theoretical Framework

According to Park (2009), the factors influencing user acceptance of technology have been thoroughly researched. Several theoretical frameworks have been developed to explain the variables influencing the intention to use a specific technology. The theoretical framework adopted for the study was the Technology Acceptance Model (TAM) by Davis (as cited in Shroff, Deneen, and Eugenia, 2011). Appropriate constructs were made for factors affecting the implementation of online learning in selected technical training institutes

2.10.1 Technology Acceptance Model (TAM)

The theoretical framework in this study is based on the eLearning technology integration model, a modified model of the original technology acceptance model TAM by Davis (as cited in Shroff, Deneen, and Eugenia, 2011), which was meant to examine trainees' behavioral intention to use an electronic portfolio system with the aim of understanding how trainees use and fit it within the specific framework of a course. The study indicated that individual behavior to use electronic systems (for example, e-Portfolio) is driven by behavioral intention, where the behavioral intention is a function of an individual's attitude toward the behavior and subjective norms surrounding the performance of the behavior. Therefore, behavior is a function of both attitudes and beliefs.

The TAM model is chosen due to its solid framework for identifying issues that affect user acceptance of a wide range of end-user computing technologies that provide technical solutions.

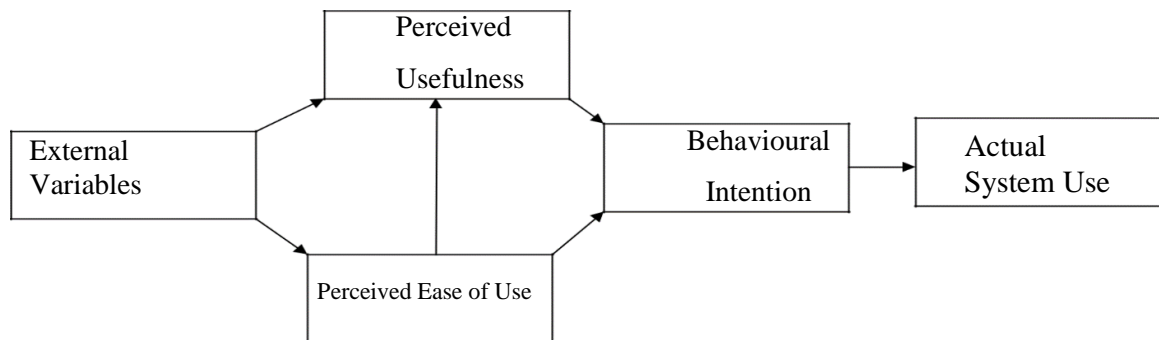


Figure 2-0-1: Technology Acceptance Model

Davis (as cited in Shroff, Deneen, and Eugenia, 2011) proposed the TAM to understand and predict the usage and adoption of information technology in a working environment but later was used to study user acceptance of services derived from systems such as eLearning. In TAM, perceived usefulness and perceived ease of use are two main determinants of technology acceptance. Perceived usefulness is defined as “the degree to which an individual believes that using a particular system would enhance his or her productivity,” while perceived ease of use is defined as “the degree an individual believes that using a particular system would be free of effort” (Davis, 1989).

Although many universities across the world have incorporated eLearning systems, the success of their implementation requires an extensive understanding of the end-user acceptance process (Park, 2009). Research on challenges facing user acceptance of eLearning systems at the University of Nairobi and Kenyatta University was therefore well suited to apply this framework as it deals with user perception and usage of the system (Farahat, 2012; Alharbi & Drew, 2014). Many universities that provide eLearning face enormous difficulties (Al- Adwan & Adwan Smedley, 2013). With the growing reliance on information systems and the increasing rapidity of the

introduction of new technologies into the learning environment, identifying the critical factors related to user acceptance of technology continues to be an essential issue (Farahat, 2012).

2.11 Knowledge gap

Most studies reviewed have indicated that ELearning technology has been embraced as a modern way of delivering the learning process globally by many higher learning institutions. Further, the advent of ELearning has brought a paradigm shift in the education system by bringing onboard learning styles that cater to various learning groups' specific needs (McConnell, 2008). However, the introduction of eLearning technology in the learning process has faced several challenges that tend to frustrate the process. In Kenya, all institutions have not fully adopted and relied upon eLearning. There are still challenges on some courses which are disadvantaged considering the technicality of the courses offered, which require hands-on demonstration to effect the learning process. Technical institutions must be fully aware of the challenges of their integration into the learning process.

As the field of technical education continues to evolve, especially during and after the COVID-19 pandemic, the use of online teaching and learning in technical schools has become a major focus. Despite the progress, some important knowledge gap remain in this field. There is a knowledge gap regarding effective teaching strategies, especially for online education. Research on how to create and present content virtually to ensure it is engaging, interactive and effective is still limited.

Research on appropriate methods for assessing intelligence in an online environment is lacking. Traditional tests cannot measure performance of skills, so other methods need to be explored.

Research is needed to address the inequities and accessibility issues faced by diverse student populations, including underserved students, students with disabilities, and nontraditional students. This includes research on interventions and policies to address these gaps.

Technical training often requires laboratory and meeting experience. There is a difference in understanding of how to effectively replicate and evaluate performance in the laboratory and online testing environment.

There is also research on effective training and professional development for teachers transitioning to online teaching. This includes understanding their unique needs, challenges, and best practices in teaching online.

Despite rapid changes in online education, uncertainty remains in determining the long-term and dynamic nature of online education technology. This includes infrastructure, resources and financial considerations.

Research is needed on ethical issues related to online learning technology, including issues of privacy, data security, and religious integrity in virtual learning.

Understanding how to effectively and motivate students to learn technology skills in an online environment is an important skill. This includes exploring new teaching methods, games and communication technologies.

There are differences in research comparing the effectiveness and outcomes of blended learning (combining online and face-to-face) with traditional online technology learning models.

There is research on career and business planning among students who complete online technology courses. It is important to understand how online education affects graduates' success in the business world.

To improve the quality and effectiveness of online education in technology companies, it is crucial to define rigorous research and collaboration experience. It will also lead to a broader discussion about the future of education technology in a rapidly changing digital environment.

2.12 Chapter summary

The Chapter looked at the existing literature on the subject. The chapter investigated existing literature on the Challenges affecting eLearning implementation in technical training institutes. This included the trainers' competencies, trainees' abilities, and ICT technician skills in facilitating online teaching and learning.

Technological factors include perceived ease of use and ICT infrastructure. The study also looked at the capacity and reliability of ICT infrastructure as significant factors for implementing eLearning.

This chapter provides a comprehensive review of various studies on the adoption and use of e-learning technologies in schools, especially technical institutes. These past studies have examined factors that influence students' perceptions of e-learning, including their ICT skills, the creation of e-learning materials and their current use on e-learning platforms. In addition, it also explores the social factors that influence trainees' attitudes towards adopting e-learning in an organisation. In addition, this chapter also explores the factors that influence the use of online courses at Kenya Technical Colleges. The challenges highlighted from previous studies include; lack of access to reliable internet services, inadequate technology, low digital literacy among trainers and trainees, and inadequate faculty training in online teaching. In addition, the lack of a legal framework and standards for e-learning and problems related to energy instability are also considered important problems. However, although these studies provide important information, there are still uncertainties regarding the

general use of e-learning technology in Kenya Technical Colleges. This chapter concludes by highlighting the need for institutions to recognize and address these challenges in order to create effective and inclusive online learning for students.

Addressing these challenges requires a multifaceted approach, including technological development, trainer training, the establishment of policy frameworks, and strategies to enhance trainee engagement. By recognizing and mitigating these obstacles, technical institutions in Kenya can work towards creating more effective and inclusive online learning opportunities for students.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter outlines the methodology used in the study. The following topics are discussed; research design, study area target population, sampling procedure, data collection methods and instruments, data analysis, reporting, and ethical consideration.

3.2 Research design

The research adopted a descriptive design to guide the research process. Research is a systematic inquiry to describe, explain, predict, and control the observed phenomenon. In contrast, a research design is an overall strategy in that one chooses to integrate the different components of the study coherently and logically, thereby ensuring one addresses the research problem (Johnson, Adkins, & Chauvin, 2020). The research design constitutes the blueprint for data collection, measurement, and analysis (Creswell, 2002). The descriptive survey design was used in preliminary and exploratory studies to allow the researcher to collect, summarize, present, and interpret data for clarification. According to Englander (2012), descriptive research determines and reports how things are and attempts to describe possible behavior, attitude, values, and characteristics. The researcher gathered qualitative and quantitative data using questionnaires and interview schedules, enabling the researcher to analyze the challenges affecting the implementation of ELearning in selected technical training institutes in Nandi county, Kenya.

3.3 The study area

Nandi County is a county in Kenya in the North Rift, occupying an area of 2,884.4 square kilometers(Refer to appendix xi & xii) . Its capital, Kapsabet, is the largest

town in the county while other towns include Mosoriot, Tinderet, Kobujoi, Kaiboi, Kabiyeet and Nandi Hills. According to a 2019 census, the county had a population of 885,711, made up of a number of Kenyan communities, the majority of whom belong to the native tribe called Nandi

The study was conducted in selected technical training institutes in Nandi County under the Ministry of Education, state department of TVET, offering TVET courses at Higher Diploma, Diploma, Certificate, and Artisan levels. Geographically, the unique jug-shaped structure of Nandi County is bound by the Equator to the south and extends northwards to latitude 0034'N. The county's major area is covered by the Nandi Hills.

Nandi County serves as a compelling study area for investigating the challenges in the implementation of online teaching and learning in technical institutions because it hosts various educational institutions which cater for diverse student population pursuing technical and vocational training thus this diversity offers insights into the specific challenges faced by technical institutions in adopting online learning. Also the socio-economic diversity provides an opportunity to explore how economic factors impact the implementation of online teaching and learning. Nandi County, like many other regions in Kenya, may face challenges related to technological infrastructure such as internet connectivity, availability of computers, and access to reliable power sources. These factors are critical in understanding the practical limitations of implementing online education.

TVETs are registered, accredited, and regulated by the Technical and Vocational Education and Training Authority (TVETA), which is a public, corporate agency established under the Technical and Vocational Education and Training (TVET) Act No. 29 of 2013 to regulate and coordinate training in the country through licensing

and registration. The registered technical institutes under TVETA in Nandi County are; ACK Bishop Muge College, AIC Diguna Rainbow Polytechnic, Aldai Technical training Institute, Cheptarit Vocational Training Centre, Emsos Technical Training Institute, Kaiboi Technical Training Institute, Kaplamai Vocational Training Center, Kapsabet Bible College, Kaptel Vocational Training Center, Kurgung Vocational Training Center, Mirror School of Hair and Beauty, Mugen Vocational Training Center, Ol'lessos Technical Training Institute, Sigilai Vocational Training Center, Sirwa Yala Vocational Training Center, ST. Augustine Kipsebwo Vocational Training Center and Tengarawet Vocational Training Centre.

3.4 Target Population of the study

The study targeted trainers in selected Technical and Training Institutes in Nandi County, trainees in selected Technical and Training Institutes in Nandi County, ICT technicians from various departments pursuing different courses, and principals in selected institutions in Nandi County. The selected institutions that is Ol'lessos technical training institute, Kaiboi technical training institute, Aldai technical training institute, Tinderet technical training institute and Emsos technical training institute were sampled using purposive sampling. The study was carried out on the institution's trainees, trainers, ICT technicians and principals engaged with online teaching and learning.

Table 3.0.1 Table showing the total population

SN	Institution	Number of Trainees /trainee using online learning	Number of Lectures/ Trainers Using online learning	ICT technician	principals	TOTAL
1.	Ol'lessos technical training institute	2,500	180	4	1	2685
2.	Kaiboi technical training institute	1500	100	3	1	1604
3.	Aldai technical training institute	500	70	1	1	572
4.	Tinderet technical training institute	150	15	1	1	167
5.	Emsos technical training institute	100	15	1	1	117
Total Population		4750	380	10	5	4645

(Source: Author, 2021)

3.5 Sample Size and Sampling Procedure

A sample is a subset selected from the accessible population and should represent the actual population. As noted by Cohen (2003), factors such as expenses, time and accessibility frequently prevent researchers from gaining information from the whole population. The sample size used for this study was based on Krejcie and Morgan (1970) sample size determination formula. The formula adopted in the study is given as (equation 1):

$$n = \frac{X^2 * N * P(1 - P)}{(ME^2 * (N - 1)) + (X^2 * P * (1 - P))}$$

Equation: 1

Where;

n=Sample size

X²=Chi Square for the specified confidence level at 1 degree of freedom=
(3.841) from tables

N=Population size

P=Population proportion (.50 in the table)

ME=Desired margin of error (expressed as a proportion=0.05).

From the above calculation, the total sample size for trainees used was n=475 respondents, n=76 respondents for the trainers, n=7 technicians and n=5 for the principals. Purposive sampling was adopted for trainers, ICT technicians and principals involved in the study. The technique enabled the selection of respondents who had specific characteristics or experience in the implementation of online teaching and learning (Table 3.2). According to (Cresswell & Plano Clark, 2011), purposive sampling entails identifying and selecting groups or individuals knowledgeable about phenomenon research of interest.

Table 3.2 Table showing sample size population

S N	Institution	Traie nee	Trainers Using online learning	ICT technician	Principals	TOTAL
•	Ol'lessos Technical	250	36	3	1	290
•	Kaiboi Technical Training Institute	150	20	2	1	173
•	Aldai Technical training institute	50	14	1	1	66
•	Tinderet Technical Training Institute	15	3	1	1	20
•	Emsos Technical Training institute	10	3	1	1	15
	Total Population	475	76	8	5	564

(Source: Author, 2021)

3.6 Research Instruments

The research instruments for this study were questionnaires and interview schedules.

3.6.1 Questionnaire

The questionnaire designs were based on the objectives of the study. Each respondent category that is trainees, trainers and ICT technicians were issued with specifically designed questionnaire to meet the research objectives.

The questionnaires had two broad parts; introduction, where the researcher introduced himself, the research topic, objectives, and instructions for answering the questions in the questionnaire (Appendix, 1). Closed-ended and open ended questions were used, and the questionnaire items were obtained from the study's objectives. Multiple choices and five-point Likert-scale questions were provided in which respondents were required to tick the appropriate choice.

3.6.2 Interview Schedule

The researcher designed an interview schedule to direct the interview process during the interview sessions with the principals. The document had two sections. Part one had the salutation of the interviewee and an introduction to the research topic and objectives. Part two had four sections addressing issues affecting ELearning implementation in selected technical training institutes, ICT infrastructural preparedness, prior competence by trainees, trainers' ICT skills on ELearning systems, and technical skills possessed by ICT technician. The interview schedules had twenty-eight predetermined questions from which follow-up questions were made using probing and prompting.

3.7 Validity and Reliability of the Instruments

3.7.1 Validity of the research instruments

Validity in research refers to the extent to which a tool or instrument measures what it is intended to measure. It is a critical aspect of research methodology, as it ensures that the findings accurately represent the concept being studied.

Pretests were conducted on a trainers, trainees and ICT technicians at Rift Valley Technical Training Institute which acted as the studys' pilot site. Rift Valley Technical Training Institute provided the necessary context and environment to address the research questions. The demographics, socio-economic status, cultural diversity, and other relevant characteristics of the population in the selected location were essential for understanding how findings could generalize to broader populations. The study adopted the common rule of thumb on pretest sample size of around 10% of the main study sample size. Items inappropriate for measuring the variables were modified or discarded to improve the quality of the research instrument, thus increasing its validity.

Questionnaires were issued to the selected participants to fill out and provide feedback on their experience with the data collection process, any difficulties they encountered, the clarity of the questions, and any suggestions for improvements.. It assisted in knowing whether the instruments were clear, precise, and comprehensive. After pretesting, corrections were made to the items. The researcher's supervisors also reviewed the research instruments to ensure there is content validity of the instruments.

3.7.2 Reliability of the research instruments

This refers to the consistency and stability of measurements or observations. It indicates the extent to which a research instrument yields the same results when applied repeatedly under the same conditions.

The pilot study was conducted at Rift valley technical institute in Uasin Gishu County. The institution was chosen due to its resemblance with the sampled institutions in Nandi County. The instruments needed to be pre-tested to ensure reliability and validity. Pre-testing of the instruments was carried to test the questionnaire's reliability and determine the consistency of the scales used to measure the study variables. Cronbach's coefficient alpha, a formula in the IBM statistic package for social science version 26.0, was used to test the internal consistency of the data collected. A reliability coefficient of 0.812 ($\alpha = 0.812$) was achieved and was considered reasonable for consistency levels; this meant the instruments were reliable, according to (Dunn, Baguley & Brunnsden, 2013), to measure challenges affecting the implementation of online teaching and learning in technical institution.

The design and development of the survey instrument were completed in June 2022. At the onset of the field study, the questionnaires were pre-tested with 30 respondents to detect weaknesses and ascertain the respondents' general understanding and ability to respond to the questions. A review was done to incorporate changes to the weaknesses identified.

3.8 Data Collection Techniques

Data collection refers to gathering information to serve or prove some fact (Kombo & Tromp 2006). After the instruments for the study were thoroughly refined, the

research assistants were engaged with the task of how to collect the required data for the study.

Questionnaires were utilized as the primary data collection technique due to their efficiency in gathering responses from a large and diverse sample within a relatively short period. A structured questionnaire was designed to capture both demographic information and responses to specific research questions.

In-depth interviews were conducted to gain deeper insights into participants' experiences and perceptions on the implementation of online teaching and learning. A semi-structured interview guide was developed, allowing flexibility in probing for detailed responses.

3.9 Data collection

The study was conducted in August/September 2022, the questionnaires were administered to trainers, trainees and ICT technicians at Ol'lessos, Kaiboi, Aldai, Tinderet, and Emsos technical training institutes. The respective principals were interviewed. The questionnaires were distributed to the selected trainers, trainees and ICT technicians using hardcopy questionnaires. A letter explaining the purpose of the research and requesting respondents' participation was attached to all questionnaires. The respondents were given two weeks to complete the questionnaires, after which they were collected. To ensure a high response rate, all respondents were assured of confidentiality, and information received would be disseminated to them in appreciation of their participation. The researcher did follow-up for responses through emails and telephone calls. The deadline was extended twice, and those who had not completed it were sent reminders

3.10 Data Analysis and Presentations

Data analysis refers to generating value from raw data (Baxter & Jack, 2009). Since the study employed questionnaires and interview schedules, data were analyzed using IBM SPSS v26 and presented using frequency tables, percentages, and bar graphs.

3.10.1 Questionnaire Data Analysis

Quantitative data was collected through the questionnaire provided then coding was done.

Coding was done to ascertain similarity patterns and answers identified. Errors from the data collected were checked, unanswered questions identified, and then data was keyed into the analysis program IBM SPSS V26). Quantitative data was analyzed using descriptive and inferential statistics. Statistics tools employed include graphs, percentages, frequency tables, etc.

3.10.2 Interview Data Analysis

Interview was based on an analysis of meanings and the outcome from the respondent's information. According to Devetak et al. (2010), “qualitative data involves; knowing your data, focusing on analysis, categorizing your information, identifying the pattern and the connections between the categories and the interpretation.”

Interview data was analyzed through a systematic process of organizing, categorizing, and interpreting the information gathered from participants.

3.11 Ethical Considerations

Ethics is concerned with defining norms of conduct that distinguish between acceptable and unacceptable behavior (Resnik, 2011). It demands that ethical considerations are made when conducting studies that involve human beings. These

considerations include; consent, courtesy, respect, treating people equitably, privacy, safety, and freedom to withdraw consent and discontinue participation in research (Hammersley & Traianou, 2012). The research adhered to these considerations by ensuring that the study was conducted professionally.

A permit from NACOSTI was sought and granted before the commencement of the study. Verbal and written informed consent was sought from potential subjects before engaging them. The respondents were also sensitized of the freedom to withdraw from the study if they felt like or withhold any information, they felt could cause harm.

A risk assessment was conducted before the commencement of the research as a way of ensuring the safety of the participants. All the participants were treated equitably with dignity and respect. Privacy and confidentiality were ensured by using codes instead of the names of the respondents and reporting only aggregated data.

Confidentiality: The participants were guaranteed that the disclosed information was kept confidential for its intended purposes.

Permission: The researcher sought permission from NACOSTI and the University of Eldoret to conduct the research.

Informed consent: The prospective research participants were fully informed about the procedures involved in the research and were asked to consent to participate.

Anonymity: The participant's anonymity was kept throughout the study by utilizing by using numbers to identify the respondents and even to the researcher to guarantee privacy.

3.11 Chapter Summary

This chapter outlines the methodology used in the study, including research design, the study area, target population, sampling procedure, data collection methods and

instruments, data analysis, reporting, and ethical considerations. The study adopted a descriptive design to guide the research process. Descriptive research aims to describe, explain, predict, and control observed phenomena. The design provides a blueprint for data collection, measurement, and analysis. The sample size was determined using Krejcie and Morgan's sample size determination formula. Purposive sampling was used to select trainers, ICT technicians, and principals who had specific characteristics or experience related to online teaching and learning.

The research instruments included questionnaires and interview schedules. Questionnaires were designed for trainers, trainees, and ICT technicians, while interview schedules were used for principals. Validity and reliability were ensured through pretesting the instruments with a pilot study at Rift Valley Technical Training Institute. Feedback from respondents was used to refine the instruments, and the internal consistency of the data was assessed using Cronbach's coefficient alpha. Data analysis involved coding and organizing the collected data. Quantitative data from questionnaires were analyzed using IBM SPSS v26, and results were presented using tables, percentages, and graphs. Qualitative data from interviews were analyzed through a systematic process, including open coding and thematic analysis.

The chapter provides a comprehensive overview of the research methodology used in the study, ensuring that ethical standards were followed, and data collection and analysis methods were appropriate for the research objectives.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

4.1 Results and discussions

The chapter covers the analysis of data, its presentation of the major outcomes of the statistical analysis that sought to meet the following objectives; Institution infrastructure preparedness, trainee abilities in online learning, trainee's competence in online teaching and learning, and ICT technician's competence in online learning.

4.2 Response rate

The study was conducted in five technical institutions in Nandi County; Ol'lessos, Kaiboi, Aldai, Tinderet, and Emsos technical training institutes (Table 3.2). The overall response rate for this study was 99% (n=473) for trainees, 100% (n=76) for trainers, 100% (n=5) for principals and 87.5% (n=7) for ICT technicians (Figure 4.1). According to authors Mugenda and Mugenda (2009) a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. Thus, the study response rate was efficient for analysis and reporting.

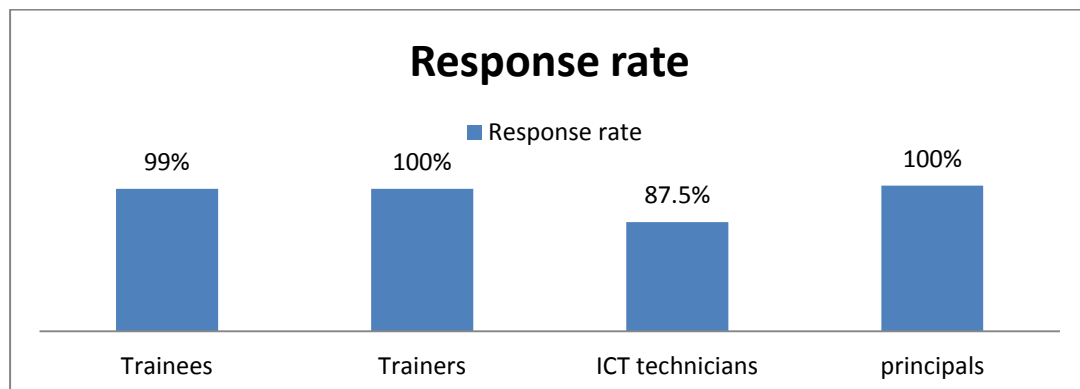


Figure 4.1 Response rate for trainers, Trainees, ICT technician and Principals

4.3 Demographic Information

The study findings revealed that the response for trainers' gender were; male 81.5% (n=62) and female 18.5% (n=14), trainees' gender male 44.4% (n=210) and females 55.6% (n=263) as shown in Fig 4.2. ICT technicians respondents were male 81.5% (n=62) and female 18.5% (n=14), whereas the principal gender were male 80% (n=4) and females 20% (n=1) shown in Figure 4.3. Mitchell, Clayton, Gower, Barr, and Bright, (2005) reported that there were no gender differences in the levels of adoption of eLearning. Thus, the study considered the gender distribution as appropriate since it doesn't affect the outcome of the results.

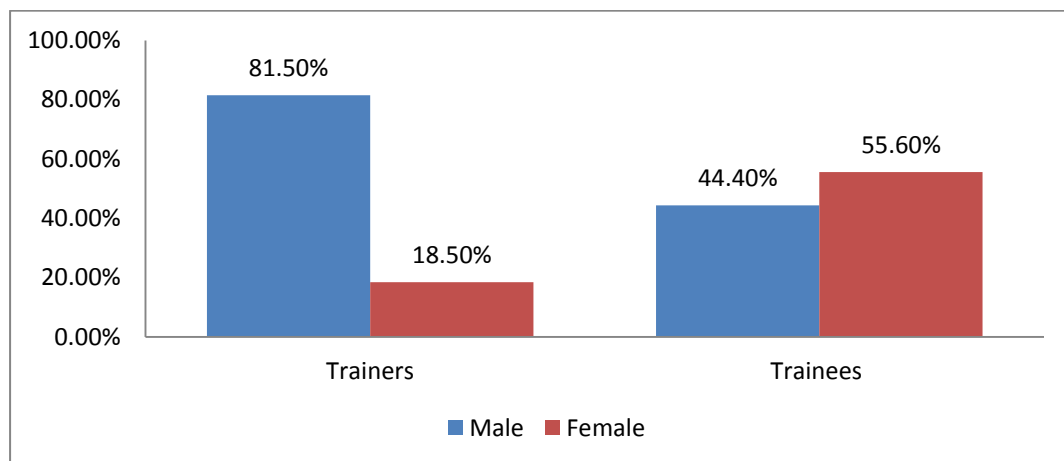


Figure 4.2 Gender of the trainees and trainers

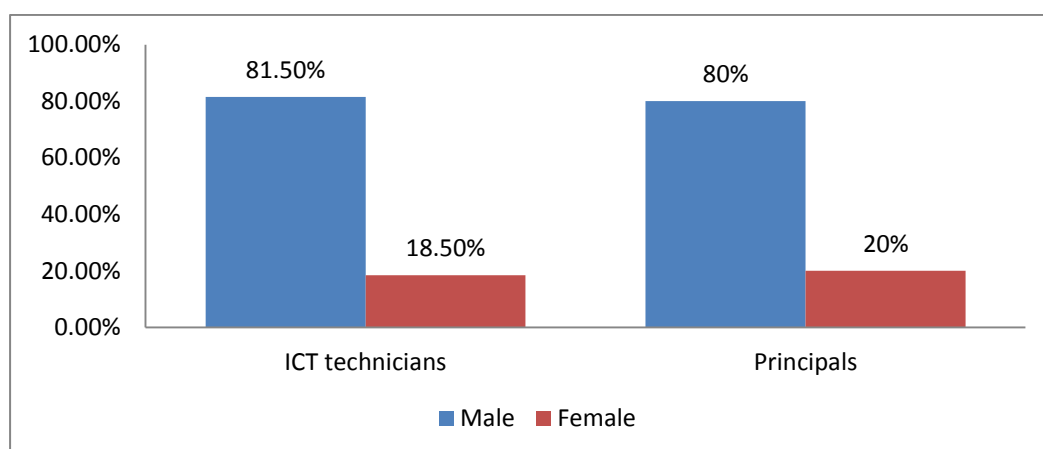


Figure 4.3 Gender for ICT technicians and Principals.

4.3.1 Respondents age

The age of trainers ranged between 21-25 years 6.6% (n=5), 26-30 years 26.3% (n=20), 31-35 years 51.3% (n=39), 36-40 years 7.9% (n=6), 41-45 years 5.3% (n=4), and 51-55 years 2.7% (n=2). The trainee's respondents age ranged between 16-20 years 16.3% (n=77), 21-25 years 70.8% (n=335), 26-30 years 11.4% (n=54), 31-35 years 0.8% (n=4) and 36-40 years 0.6% (n=3). The ICT technicians aged between 21-25 years 42.8% (n=3), 31-35 years 28.5% (n=2) and 41-45 years 28.7% (n=2), whereas for principals 46-50 years 20% (n=1) and 51-55 years 80% (n=4) (Figure 4.4).

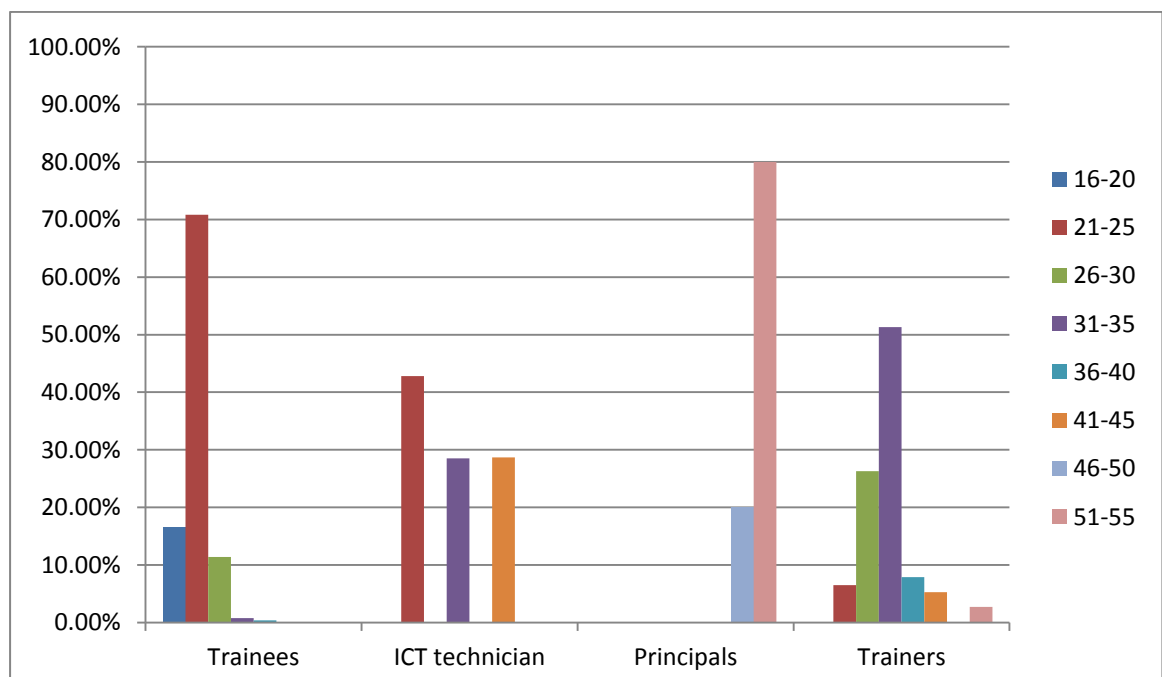


Figure 4. 4 Age of Trainers, Trainees, ICT technicians and Principals

All respondents who participated in this study were confirmed to be bona fide trainees and technician of the sampled institutions by use of Institution, trainees provided identification cards and work tags for the technicians. The study respondents showed

that most were youths between 16 and 30 years old, which agrees with studies by Bond, Marin, Dolch, et al. (2018) that reported a mean of 24 years.

4.4 Education level of the respondents

The education levels of the trainers' level of education and trainees' course of study in the institutions sampled are shown in table 4.2 and figure 4.5 respectively. Trainees course level of study showed, 10.4 % (n=49) of trainee's respondents were pursuing higher diploma, 70% (n=331) diploma, 18% (n=85) certificate and 1.6% (n=8) artisan courses Figure 4.5. 73.2% (n=346) of the student respondents reported taking technical courses, while 26.6% (n=126) took business courses (Figure 4.6).

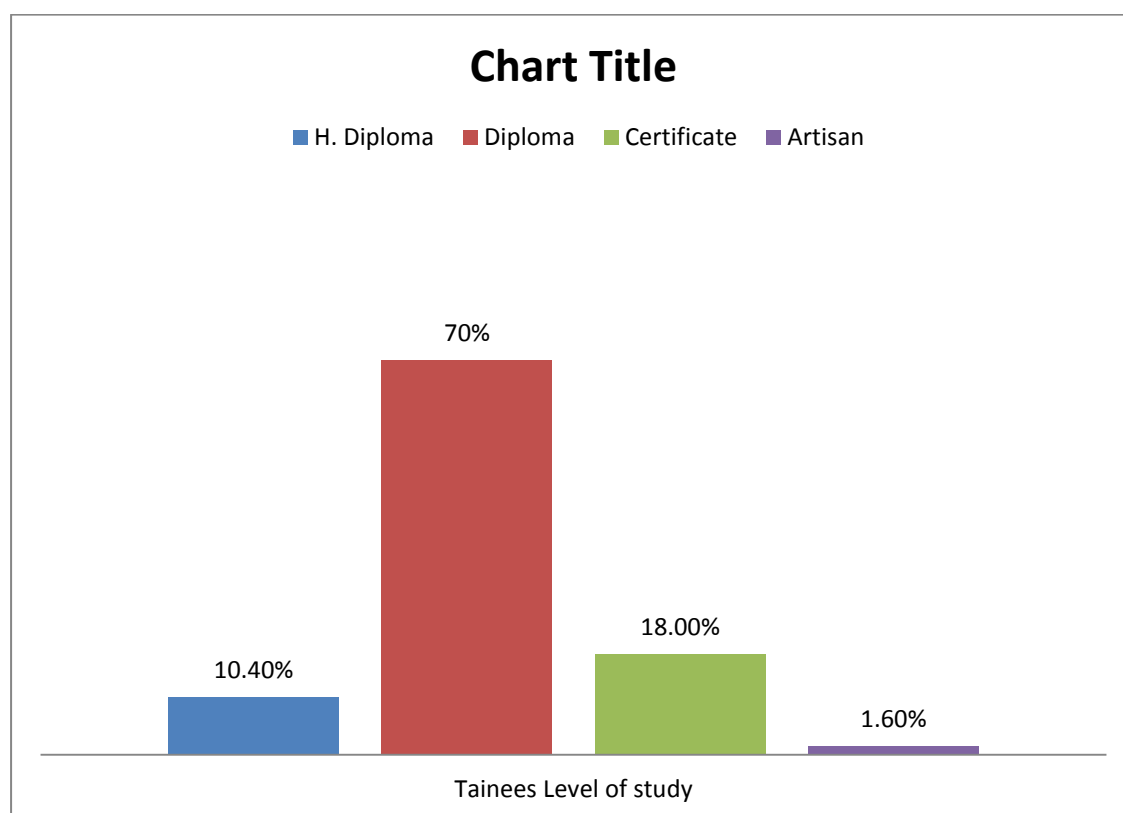
Trainers' education levels were as follows; Ph.D. (3.9%), Masters (16.9%), Bachelor's degree (58.4%), higher diploma (16.9%), and diploma (3.9%), as shown in Table 4.2. ICT technicians' education levels vary, it ranges from certificate, diploma, and higher diploma. 71.4% (n=5) of the technicians had a diploma and 28.6% certificate (Table 4.1).

Table 4.1: ICT Technicians academic qualifications

Education Level	Frequency	Percent %
PHD	0	0
MASTER'S	0	0
BACHELOR DEGREE	0	0
HIGHER DIPLOMA	0	0
DIPLOMA	5	71.4
CERTIFICATE	2	28.6
TOTAL	7	100

Table 4.2: Trainers academic qualifications

Education Level for trainers	Frequency	Percent %
PHD	3	3.9
MASTER'S	13	17.1
BACHELOR DEGREE	45	59.2
HIGHER DIPLOMA	13	17.2
DIPLOMA	2	2.6
TOTAL	76	100.0

**Figure 4.5 Trainees level of study**

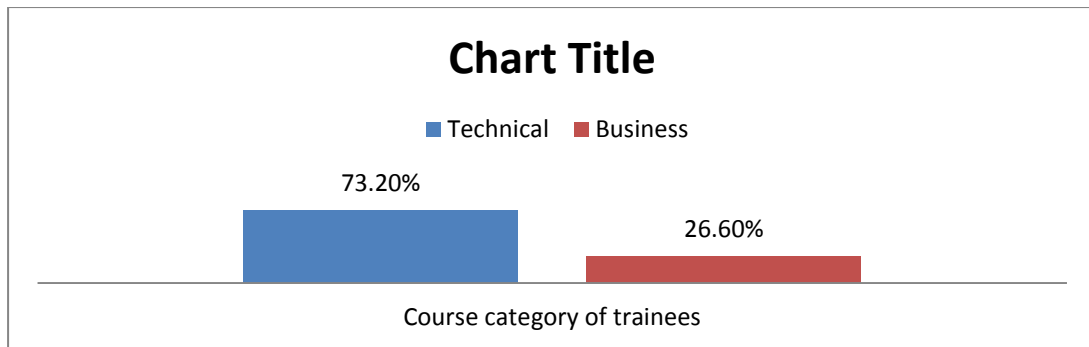


Figure 4. 6 Course categories of the trainees

4.5 To assess the trainers' competence in implementing online teaching and learning in technical institutions in Nandi County, Kenya.

The research second objective sought to assess the trainers' competence in implementing online teaching and learning in technical institutions in Nandi County, Kenya. The finding shows that;

4.5.1 Teaching experience

The study revealed that 85.5 % (n=65) of the trainers had 1-10 years, 10.5% (n=8) had 11-20 years, and 4% (n=3) had 31-40 years of teaching experience, respectively (figure 4.7). Of the 76 trainers' respondents, the study found that 92.2 %(n=71) of the respondents had personal computers at home or the workplace. The availability of personal computers eases the ability to deliver ICT-related content if one has the technical know-how to handle the device.

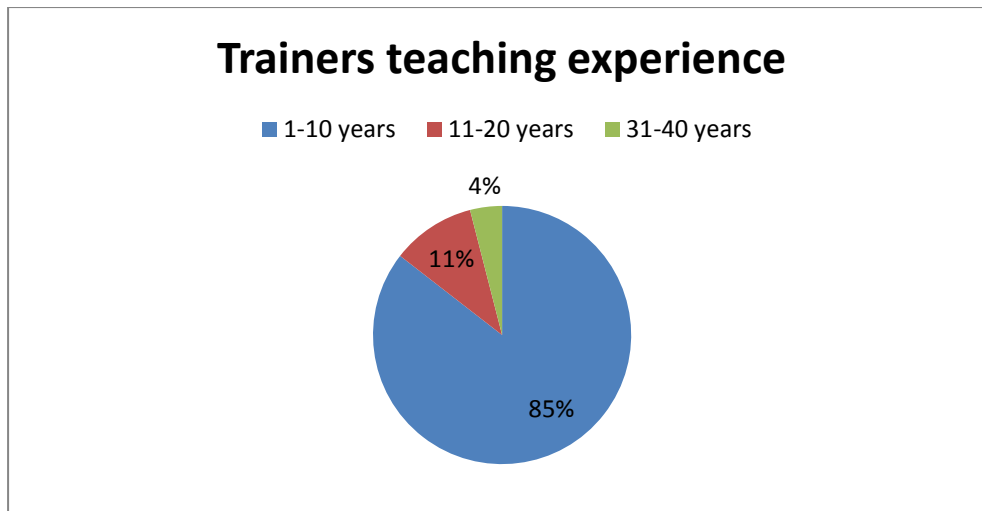


Figure 4.7 Trainers teaching experience

The findings showed that trainers in all the institutions began using eLearning technologies intensively after the Covid-19 pandemic. Some uses reported included; course delivery, exam administration, and communication with trainees.

“Most trainers did not have adequate skills to deliver the online training to trainees, and the institution management organized training to help the trainers acquire the knowledge and skills to deliver the course content,” one principal reported. According to the study, all institutions reported that their trainers in the institution were trained on online teaching and learning and included; setting the class attendance enrollment keys, the introduction to the online learning platforms, preparing and uploading lecture notes, setting continuous assessment tests (CATs), End terms exams, setting response used to track exam cheating, marking and uploading of results. A study matched with findings by DeMaagd et al. (2011) that integrating ICT technologies in learning institutions would require significant constant instructor training in basic computer literacy skills and ELearning technologies; this would promote effective deployment and adoption of ELearning systems.

4.5.2 Technical capacity for trainers

Venkatesh, Morris, Davis, and Davis, (2003) described performance expectancy as degree to which an individual believes that using the system will help him or her attain gains in job performance. The study sought to understand whether the trainers had basic ICT skills since it was linked with the technological ability to handle online sessions of technical subjects to their learners. The study revealed that 10.5% (n=8), 31.6% (n=63) strongly agreed and agreed respectively. 51.3% (n=39) were not sure and 6.6% (n=5) disagree to have ICT skill to facilitate teaching and learning (Table 4.3). The study finding matched with (Pirani, 2008), where trainers should possess specific ICT skills to restructure their courses for successful integration into eLearning systems.

Interview sessions revealed that most lecture halls lacked whiteboards, projectors, and limited laptops. For example, one department one laptop and can be shared by all trainers to teach and run administrative functions at the same time. Most trainers are forced to own a personal computer to deliver the course efficiently.

The finding agreed with findings by Al-adwan & Smedley (2012, p.122), technological obstacles in an ELearning environment often occur in one of three essential components: hardware, software, and bandwidth capacity.

The finding attributes respondents' participation in eLearning programs to their preparedness to deliver online course content at technical institutes. The study agrees with Agufana's (2021) research that showed the importance of education for trainers to adopt information communication technologies when teaching trainees from technical training institutes. Research shows that technical courses are offered mainly on skill-based and hands-on experience, making it hard to offer the course online. However, technical training institute trainers are reported to complement the use of

ICT to facilitate their lectures since ICTs make trainees attentive during instruction. ICT's use in instruction can revolutionize learning experiences, and ICT's use motivates learning (Agufana, 2021).

Table 4.3 Trainers' technical ability to offer online learning

Are advanced ICT skills among trainers useful in facilitating online teaching and learning using ICT resources?

		Frequency	Percent	Valid Percent
Valid	Strongly Agree	8	10.5	10.5
	Agree	24	31.6	42.1
	Not Sure	39	51.3	93.4
	Disagree	5	6.6	100
	Total	76	100.0	100.0

The study also assesses trainers' knowledge of eLearning resources to determine whether they fit to deliver teaching and learning through online platforms. The study findings in Table 4.4 below show that 67% (n=59) of the trainers used eLearning resources in teaching and learning at the institution. Tarus (2015) study reported a lack of technical skills in eLearning and e-content development by the teaching staff as a challenge hindering the implementation of eLearning. According to Nanayakkara, (2007) the five essential factors for eLearning adoption fall within the system and organisational factor groupings and included release time, training and support.

Table 4.4 Trainers' knowledge of eLearning resources

	Frequently	More frequently	Not sure	Rarely	Very rarely
1. How often do you use eLearning resources in teaching and learning at the institution	19.7% (n=15)	57.9% (n=44)	5.3% (n=4)	15.8% (n=13)	
2. I have enough ICT skills to facilitate teaching and learning using ICT resources	37.7% (n=29)	59.7% (n=45)	1.3% (n=1)	1.3% (n=1)	
3. How often do you use computers and related ICT technologies in your lesson preparation, teaching, and learning	19.5% (n=15)	71.4% (n=54)	1.3% (n=1)	6.5% (n=5)	1.3% (n=1)

4.5.3 Trainers training on online learning

The study sought to determine if trainers had attended online learning workshops and training. The study revealed that trainers had been trained after the online learning began and training was done once. From the study 35.5 % (n=27), 43.4% (n=33) Strongly agreed and agreed respectively, 5.3% (n=27) were not sure, 11.8% (n=9), 3.9% (n=3) disagree and strongly disagreed respectively (Table 4.5). The result showed that the trainers did not have confidence on the training they had received.

Table 4.5 Trainers eLearning awareness training/workshops

E-Learning awareness training/workshops

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid strongly agree	27	35.5	35.5	35.5
agree	33	43.4	43.4	78.9
not sure	4	5.3	5.3	84.2
disagree	9	11.8	11.8	96.1
strongly disagree	3	3.9	3.9	100.0
Total	76	100.0	100.0	

4.5.4 Challenges trainers face when implementing online learning

Through the principal's interview schedules, the study found that despite the various abilities of technical institutions to make online learning successful, it was evident that the majority of the trainers struggled with the online platforms, accessibility of eLearning equipment such as whiteboards, projectors, low internet connectivity, and inadequate training skills. Some mentioned too much workload, thus being unable to follow up with trainees considering the workloads, and the challenge of teaching a technical course online made it difficult for trainees to understand the concept, which translated to trainees performing poorly when they sit for their Kenya National Examination Council examinations. This study agrees with Kibuku, Ochieng, and Wausi (2020) and Tarus (2015) findings on eLearning challenges faced by universities in Kenya, including the lack of technical and pedagogical competencies and training for e-tutors and e-learners. The same study noted other challenges, including the lack of an eLearning theory to underpin the eLearning practice, budgetary constraints and sustainability issues, negative perceptions towards eLearning, quality issues, domination of eLearning aims by technology, market forces and lack of collaboration among the eLearning participants. The results also agreed with finding by Yusuf and Balogun (2011), that the use of information and communication technology as a tool for enhancing trainees' learning, teachers' instruction, and as catalyst for improving access to quality education in formal and non-formal settings become a necessity.

4.6 To examine trainees' challenges in accessing online training in selected technical institutions in Nandi County, Kenya.

The second research objective sought to examine trainees' challenges in accessing online training in selected technical institutions.

4.6.1 ICT knowledge of trainees of selected technical institutions in Nandi County

The study showed that 47.1% of trainees respondents (n=223) had basic ICT skill, while 52.4% (n=248) did not have any basic ICT skills (Table 4.6) shows the student responses to ownership of ICT resources and accessibility to troubleshooting skills. The study showed that despite the ownership of the skill the online platform operated differently and was new to trainees. The interview with the principals revealed that technical institutions had minimal computer laboratories, not enough for the student population.

ICT knowledge prevalence was assessed in technical institutes to understand how efficient the trainees were when attending online lectures.

According to the interview sessions with principals, the study found that the institution mainly depended on the library and ICT laboratories to offer trainees opportunities to access the eLearning platforms and use the computers for personal use. It was reported that trainees used the computers for an hour each to allow other trainees to use the same computer. However, the time limit is not enough for trainees to meaningfully use the computer to meet their educational demands, especially for those trainees who do not have personal computers.

Table 4.6: Trainees basic ICT knowledge

Trainees basic ICT skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	223	47.1	47.1	47.1
	No	248	52.4	52.4	99.6
	4.00	2	.4	.4	100.0
	Total	473	100.0	100.0	

4.6.2 Trainees' access to ICT-related resources

According to the study, 91.3% (n=432) of the respondents had smartphones whereas 8.7% (n=38) did not have smartphone. The study results indicated that majority of the trainees (91.3%) were able to get communication through the online platform (Table 4.7).

Table 4.7: smartphone ownership among trainees

Smartphone ownership among trainees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	432	91.3	91.3	91.3
	No	38	8.7	8.7	100
	Total	473	100.0	100.0	

Trainees respondents revealed that they encountered technical difficulties while using ICT resources. The frequency of technical occurrences was reported as follows; frequently 27.5 % (n=130), very frequently 15.2 %(n=72), not at all 14.2% (n=67), rarely 36.2% (n=171) and very rarely 7% (n=33). Only 47.14% had basic ICT-related troubleshooting skills, as shown in table 4.8.

Table 4.8: Trainees technical difficulties using ICT resources**Trainees technical difficulties using ICT resources**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Frequently	130	27.5	27.5	27.5
	More Frequently	72	15.2	15.2	42.7
	Not at all	67	14.2	14.2	56.9
	rarely	171	36.2	36.2	93.0
	Very Rarely	33	7.0	7.0	100.0
	Total	473	100.0	100.0	

Despite owning a smartphone, it was evident that trainees only used the phones for communications and social media platforms and minimally used the phone to access educational content. Also, it was noted that not all smart phones had the desired specifications for accessing e-platforms.

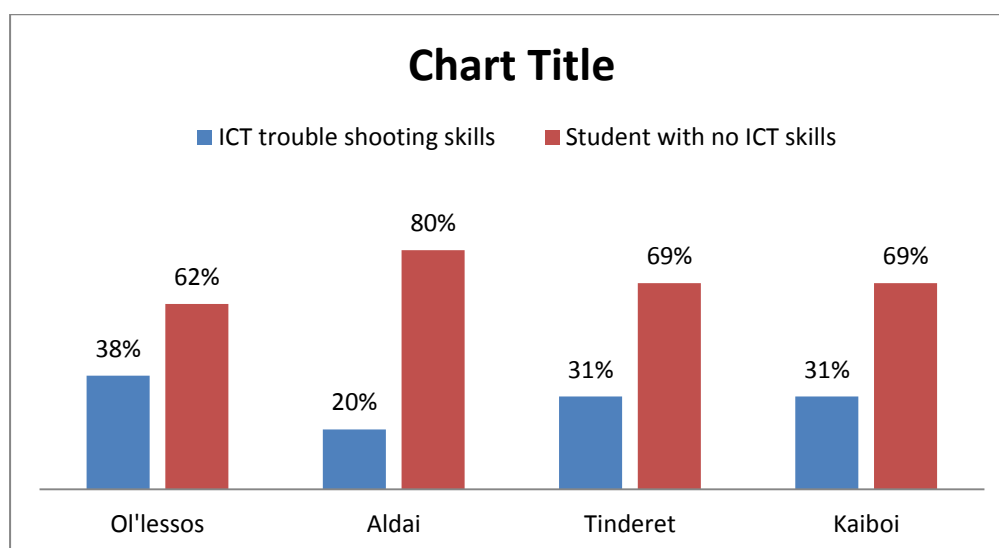


Figure 4.8; Basic ICT troubleshooting skills among trainees of selected technical institutions in Nandi County.

According to figure 4.8, 38% (n=130) of the student respondents had ICT-related troubleshooting skills from Ol'lessos, 20 % (n=12) from Aldai, 31%(n=3), 31%(n=9) Tinderet, and 31%(n=69) from Kaiboi technical training institutes respectively. 62% (n=189) of the student respondents did not have ICT-related troubleshooting skills from Ol'lessos, 62 % (n=35) from Aldai, 80%(n=31), 69%(n=9) Tinderet, and 69%(n=9) from Kaiboi technical training institutes respectively.

Based on the study finding, less than half of the student population has the knowledge and skills to troubleshoot or solve ICT-related challenges. For example, some trainees reported challenging issues such as password reset and often sought third-party assistance to reset their institutional or Gmail passwords. Other trainees reported challenges in sending and receiving emails and usually sought cyber cafe assistance when sending emails or sending their assignments to their trainers for marking.

4.6.3 ICT usage among trainees

Table 4.9 shows internet usage among trainees in sampled institutions. According to this study, 21.4 % (n=101) of the respondents downloaded educational content from the internet frequently, and 14.8 % (n=70) downloaded it more frequently. Based on these findings, a total of 36.2% (n=171) had the knowledge and know-how on internet usage to access learning materials, while 25.4 % (n=120) not at all, 27.5 % (n=130) rarely and 10.8% (n=51) very rare, of the respondents, respectively reported not being able to download the educational material from the internet.

Table 4.9: Table showing internet usage among trainees in institutions

	Frequen tly	More frequen tly	Not at all	Rarely	Very rarely
1. How often do you download educational content from the internet?	21.4% (n=101)	14.8% (n=70)	25.4% (n=120)	27.5% (n=130)	10.8% (n=51)
2. How often do you use messaging and discussion tools	54.5% (n=258)	16.7% (n=79)	8.9% (n=42)	16.5% (n=78)	3.4% (n=16)
3. How frequently do you use your social communication tools online? (e.g., Facebook and WhatsApp)	63.6% (n=301)	19.9% (n=94)	5.3% (n=25)	9.5% (n=45)	1.7% (n=8)
4. How frequently do you encounter technical difficulties using ICT resources	27.5% (n=130)	15.2% (n=72)	14.2% (n=67)	36.2% (n=171)	7% (n=33)

4.6.4 Trainees experience on internet use

The study sought to establish trainees experience on internet use, 32.1% (n=152), 46.7% (n=221) strongly agreed and agreed respectively. 10.6% (n=50) were not sure where as 7.2% (n=34) disagree 3.4% (n=16) to have experience for using the internet (Table 4.10).

Table 4.10 Table trainees experience in searching and accessing information from the internet

I am experienced in searching and accessing information from the internet

		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	152	32.1	32.1	32.1
	Agree	221	46.7	46.7	78.9
	Not Sure	50	10.6	10.6	89.4
	Disagree	34	7.2	7.2	96.6
	Strongly Disagree	16	3.4	3.4	100.0
	Total	473	100.0	100.0	

The respondents' data per institution are shown in figure 4.7. According to the figure, Ol'lessos technical training institute had the highest number of student respondents, n=55 and n=36, followed by Kaiboi technical training institute, with n=33 and n=26 trainees downloading educational content frequently and more frequently, respectively. Other institutions, such as Aldai, had n=7 and n=5, Emsos had n=3 and n=0, and Tinderet had n=3 and n=3, had their trainees downloaded educational content frequently. The data shows that trainees from Ol'lessos technical had the competence to access the educational content from the internet. In contrast, Aldai, Emsos, and Tinderet had the majority of their trainees reporting their inability to download educational content online, as shown in figure 4.5.

The results showed that approximately 70% of the respondents had used messaging and discussion tools; 54.5% (n=258) used them frequently, 16.7% (n=79) used them more frequently, 8.9% (n=42) did not use them at all, 16.5% (n=78%) rarely, and 3.4% (n=16) very rarely (Table, 4.3). A total of 71% (n=336) of respondents used messaging and discussion tools frequently and more frequently respondents were from Ol'lessos technical training institute, 6% (n=29) were from Aldai technical training institute, 1.2%(n=6) were from Emsos technical training institute, 2.95%(n=14) were from Tinderet technical training institute, and 23%(n=112) were from Kaiboi technical training institutes respectively.

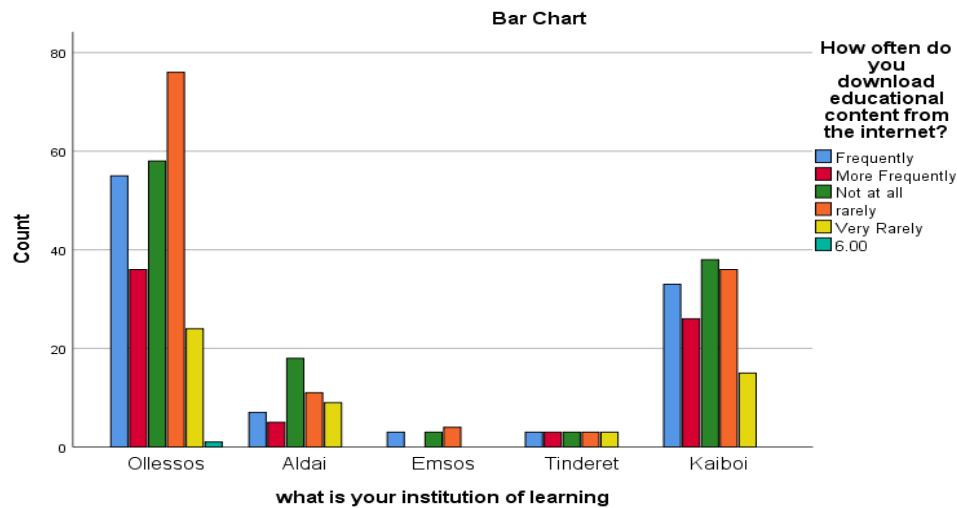


Figure 4.7: Figure shows trainees' ability to download educational content from the internet

The majority, 83.5% (n=395) of the respondents, used social communication tools online, e.g., Facebook and WhatsApp (Figure 4.8). Of the respondents, 43.5% (n=205) were from Ol'lessos technical training institute, 9 % (n=43) were from Aldai technical training institute, 1.2% (n=6) were from Emsos technical training institute, 2.9% (n=14) were from Tinderet technical training institute, and 26.85% (n=127) were from Kaiboi technical training institute.

The study attributed the student competence in using tools such as WhatsApp groups, emails, and Facebook groups to share educational content such as lecture notes, assignments, and information from the administration, such as milestone requirements of units such as business plans, proposals, and project reports. The trainees reported that these messaging platforms were vital since they received real-time information and allowed them to work towards meeting the deadlines with ease.

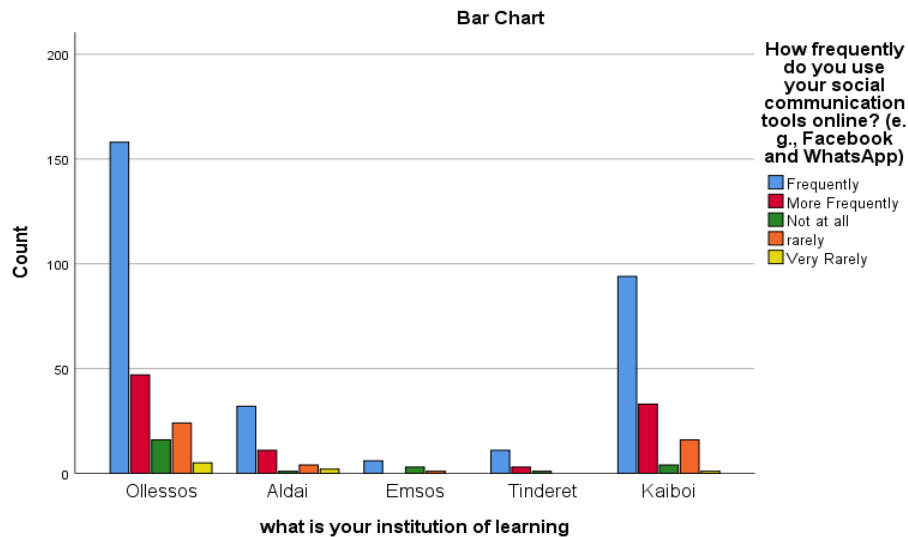


Figure 4.8: Figure showing the frequency of social communication tools online.

4.6.5 Student's perceptions of internet use

Table 4.11 and 4.12 shows the trainees ability to utilize the internet for educational content. The study found that 32.1% (n=152) strongly agreed, and 46.7 % (n=221) agreed that the respondent had experience searching and accessing information from the internet. 15.2 % (n=72) strongly agreed, and 35.5% (n=168) agreed to post questions on online blogs/portals constantly. 32.8 % (n=155), strongly agreed, and 35.5% (n=168) agreed always to download and upload notes and assignments from the learning portal. 15.9% (n=75) strongly agreed, and 35.1% (n=166) agreed to have participated in online discussions (for example, using a chatbox and blogs) to search for educational content relating to their respective courses. Approximately 79% of the respondents use their social networks daily. Jung (2017) observed that learner motivation (intrinsic and extrinsic) is crucial to the learners' success in an online coursework environment.

Table 4.11 Student perception of internet use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	152	32.1	32.1	32.1
	Agree	221	46.7	46.7	78.9
	Not Sure	50	10.6	10.6	89.4
	Disagree	34	7.2	7.2	96.6
	Strongly Disagree	16	3.4	3.4	100.0
	Total	473	100.0	100.0	

Table 4.12 download and upload notes and assignments from the portal**I always download and upload notes and assignments from the portal**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	155	32.8	32.8	32.8
	Agree	168	35.5	35.5	68.3
	Not Sure	65	13.7	13.7	82.0
	Disagree	60	12.7	12.7	94.7
	Strongly Disagree	25	5.3	5.3	100.0
	Total	473	100.0	100.0	

4.6.7 Challenges faced by trainees during online learning

The study sought to understand the challenges faced by trainees during online learning in selected technical training institutions in Nandi County. The trainees reported that some of them did not have basic computer skills, and thus was hard for them to access the lessons. Technological know-how is essential to ensure success in eLearning. Inadequate computer literacy hindered many learners from accessing learning materials and joining online classes on time (*Table 4.10.1*).

The interview from the principals showed that; *‘Technical training institutions offer courses requiring trainees to use their handwork; offering online sessions barred the*

trainees from gaining practical skills in some courses such as mechanical engineering, automotive, electrical, and building. Trainees from these departments have reported challenges in understanding the concepts independently, despite the presence of YouTube tutorials; they needed their technicians' guidance to help them understand the skill'.

The study revealed that trainees used their smartphones to access online lectures, emails, and lecture notes. However, phones do not offer good visibility, with limited features compared to computers. Trainees noted that when using the phone to join an online lecture via zoom or skype, there are many disruptions such as phone ringing, message notifications, and email alerts, which increases their anxiety levels of accessing the information in the said notification, thus reducing their concentration in class.

Table 4.10.1 Table showing smartphone use among trainees.

Do you have a smartphone or other means for your internet access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	432	91.3	91.3	91.3
	No	38	8.0	8.0	99.4
	3.00	1	.2	.2	99.6
	4.00	1	.2	.2	99.8
	11.00	1	.2	.2	100.0
	Total	473	100.0	100.0	

Another challenge reported by student respondents indicated the inability to access adequate bundles or stable internet bandwidth (Table 4.20). The trainees reported weak internet speed within their institutions, forcing them to buy their data bundles to access the materials and join lectures.

4.7 To determine the ICT technicians' competence in adopting and facilitating online teaching and learning in Nandi County, Kenya.

The research objective of the study was determine the ICT technicians' competence in adopting and facilitating online teaching and learning in Nandi County, Kenya. The study finding shows that;

4.7.1 ICT technicians experience.

The study revealed the technicians had good experience in ICT. According to the table 4.13, 14.3% (n=1) had 1-5 years of experience, 42.8% (n=3) 6-10 years' experience, 28.6% (n=2) 11-15 years and 14.3% (n=1) of the technicians had 16-20 years' experience.

Table 4.13: Table showing ICT technician's years of experience

Years of Experience	Frequency	Percent	Cumulative Percent
Valid 1-5	1	14.3	14.3
6-10	3	42.8	51.7
11-15	2	28.6	85.7
16-20	1	14.3	100

4.7.2 Technician's knowledge of ELearning

The study findings revealed that ICT technicians in all institutions were able to perform the tasks shown in Table 4.14 with ease. Technicians could give technical support for online learning sessions for trainers. On technical support 57.1% (n=4), 28.6% (n=2) strongly agreed and agreed respectively they can give technical support to online learning and 14.3% (n=1) not sure. 85.7% (n=6) and 14.3% (n=1) of the technician reported they have attended online learning training and workshop. The study findings agreed with Kibuku, Ochieng & Wausi (2020), who reported that

despite the ability of the ICT technicians to perform various activities, they were still limited by ICT-related infrastructure and financial constraints to oversee the success of online implementations.

Table 4.14 Technicians' knowledge of eLearning

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. I give technical support to online learning	57.1% (n=4)	28.6% (n=2)	14.3% (n=1)		
2. I have attended eLearning awareness training/workshop	85.7% (n=6)	14.3% (n=1)			
3. I can prepare, upload and download eLearning content	85.7% (n=6)	14.3% (n=1)			

4.8 To determine the Institution's ICT infrastructure preparedness in implementing online teaching and learning in Nandi County, Kenya.

The fourth objective of the study was to determine the Institution's ICT infrastructure preparedness in implementing online teaching and learning in Nandi County, Kenya.

Guided by the objective the results showed that;

4.8.1 Computer Laboratories in the institution

The research aimed to establish the rate at which the trainees accessed the computer laboratories weekly for ICT practice use. From trainees responses study revealed, 18.2% (n=86) access the computer laboratory once a week, 7.5% (n=57) access the computer laboratory twice a week, 6.3% (N=30) accessed computers thrice week and 63.4% (N=300) did not have access to computer laboratory. Figure 4.9 shows the frequency of computer laboratory access. The study findings from trainers revealed

that 32.9% (n=25) and 10.5% (n=8) of the trainees access computer laboratories once a week and twice a week respectively, 43.4% (n=33) did not have access to computer laboratories. The principal from the interview reported that; *“Recently there have been increase in number of trainees in the institution and computer available are inadequate for all students”*.

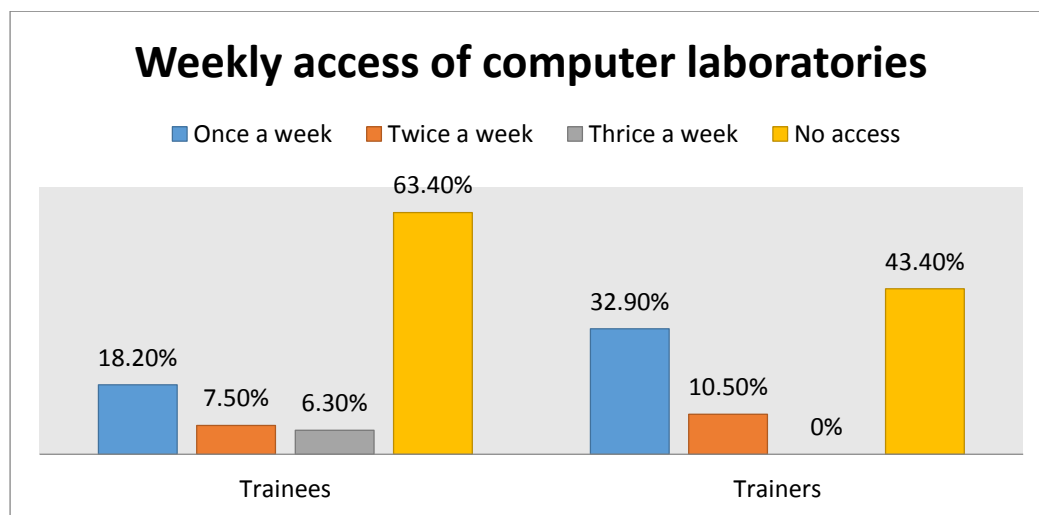


Figure 4.9: Figure showing the frequency of Access to Computer Laboratories

This confirmed the inadequacy of computers of computer laboratories in the selected institution. The above study agreed with Kahorda and Waema (2014), who found that the ratio of computers to the student population was comparatively small.

4.8.2 Local area networks and Wide area network availability

The research sought to determine if the technical training institutes in Nandi County were equipped with LAN and WAN internet connections that could efficiently support online teaching and learning. Trainers responses showed that; 14.5% (n=11), 46.1% (n=35) strongly agreed and agreed respectively on LAN availability. 23.7% (n=18), 15.7% (n=12) were not sure and disagreed respectively (Table 4.15). The study revealed from trainees response that; 14.8% (n=70), 77.4% (n=366) strongly agreed and agreed respectively on LAN and WAN availability in the institutions.

1.5% (n=7) were not sure whereas 6.3% (n=30) disagree (Table 4.16). From the interview the principals reported that; *“Despite the availability of the local area network, it could not cover the whole institution. The local area network was only limited to the administration, computer laboratories, and library. The institution did not cover a few sections of the library and the rest of the areas”*.

The findings agreed with Mtebe & Mtebe (2014) that the cost of acquiring, managing, and maintaining ICT infrastructure had been identified as the major hindrance in the deployment and adoption of eLearning by institutions of higher learning. ICT infrastructure such as the internet, extranet, intranet, and Local Area Networks (LAN) is considered one of the biggest challenges in implementing eLearning in Institutions of higher learning, particularly in developing countries (Fares, 2008).

Table 4.15 Figure showing Trainers response on local area network availability.

Trainers responses on local network and wide area network availability in the institution

		Frequency	Percent	Valid Percent
Valid	Strongly Agree	11	14.5	10.5
	Agree	35	46.1	42.1
	Not Sure	18	23.7	93.4
	Disagree	12	15.7	100
	Total	76	100.0	100.0

Table 4.16 Figure showing Trainees response on local area network availability

Trainees responses local network and wide area network availability in the institution

		Frequency	Percent	Valid Percent
Valid	Strongly Agree	70	14.8	14.8
	Agree	366	77.4	92.2
	Not Sure	7	1.5	93.7
	Disagree	30	6.3	100
	Total	473	100.0	100.0

From the interview with the principals, the following responses were noted:

"Local area Network and wide area network is available in the institution, but we have restricted to some areas to put the most use where necessary. We have internet in the library for trainees to use, and few computer labs can access the internet at fair internet speed".

"...Local area network and wide area network is available, but we are working on expanding the network within the institution. Currently, we have internet in the administration and library only". "...Local area network is available and currently covers 55% of the institution".

Of the responses, more than 95% had a local area network, but the use was limited. The finding matched the study by Fares (2008) that established that online teaching and learning requires both local and wireless area networks for the internet.

4.8.3 Internet reliability in the institution

The research aimed to establish internet reliability among the selected technical training institutes. The respondent gave out different responses depending on the demographic location of the respective institution. From the study 2.6% (n=2) and 73.7% (n=56) of the trainers reported the internet was reliable and less reliable

respectively. 23.7% (n=18) were not sure of the internet reliability (Table 4.17). From trainees' response the study revealed, 14.8% (n=70) and 81% (n=383) of the trainees reported the internet was reliable and less reliable respectively. 3.8% (n=18) were not sure of the internet reliability (Table 4.18). Furthermore 42.9% (n=3) and 57.1% (n=4) of the ICT technicians reported that the internet was reliable and less reliable respectively (Table 4.19).

The presence of free Wi-Fi in institutions enhanced the ability of the trainers and trainees to access the learning materials on the respective platforms. The technical training institute implemented the eLearning policy by the ministry of education despite the complexity of handling technical courses on online platforms that mainly requires hands-on experience. One principal noted that “... *the internet is very slow in the institution, and we have difficulty downloading content*”. The results matched the finding (Aboagye et al., 2021) that established the challenge of internet connectivity among college trainees.

Table 4.17 Table showing trainers responses on internet reliability

Trainers responses on Internet reliability in the institution.

		Frequency	Percent	Valid Percent
Valid	Very reliable	0	0	
	Reliable	2	2.6	2.6
	Not Sure	18	23.7	26.3
	Less reliable	56	73.7	100
	Total	76	100.0	100.0

Table 4.18 Table showing trainees responses on internet reliability**Trainees responses on internet reliability in the institution**

		Frequency	Percent	Valid Percent
Valid	Very reliable	2	0.4	
	Reliable	70	14.8	15.2
	Not Sure	18	3.8	19
	Less reliable	383	81	100
	Total	473	100.0	100.0

Table 4.19 Table showing ICT technicians responses on internet reliability**Internet reliability in the institution.**

		Frequency	Percent	Valid Percent
Valid	Very reliable	0	0	0
	Reliable	3	42.9	42.9
	Not Sure	0	0	0
	Less reliable	4	57.1	100
	Total	7	100.0	100.0

From the technicians responses the study established 28.6% (n=2), 28.6% (n=2) had internet bandwidth of 1-25 megabits per second (Mbps) and 26-55Mbps respectively. 42.9% (n=3) had 56-75 Mbps (Table 4.20) . From the interview it was reported that Only two institutions (25%) had their institutions connected to the fiber optic cable, whereas 87.5% (n=3) of the institutions interviewed accessed their learning management system platform frequently. Other ICT infrastructures recorded in institutions during the study period included blackboard, Moodle, skype, google meet, Zoom, and discord. Communication between trainees, trainers, and ICT technicians occurred mainly on WhatsApp, with lecture notes and assignments sometimes exchanged through email.

Table 4.20 Range of internet bandwidth

		Range of internet bandwidth (Mbps)?			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-25	2	28.6	28.6	28.6
	26-55	2	28.6	28.6	57.1
	56-75	3	42.9	42.9	100.0
	Total	7	100.0	100.0	

The interview sessions conducted with the principals of respective institutions revealed that most of the institutions sent their ICT technicians for training annually to help them equip themselves with the technological changes and innovations in the market. However, the training frequency varied based on the market demand and the emerging technologies relevant to a particular setting. One ICT technician respondent reported to be frequently trained on ICT technologies. He gave an example of the new Kenya National Examination Council (KNEC) that has online student registration, online result submission, and the milestone of projects and business plans. He further stated that such policies within the technical and vocational training centers warrant frequent training and skills acquisition to meet the institutions' demands.

All respondents agreed to subject their staff to online training as the need arises. For example, the library department has been shifting to allow trainees access self-services; national and international firms trained all librarians and ICT officers within the institutions during the transitional period of indexing all the books, journals, and reports to the systems.

On the other hand, trainees were also trained mainly on how they could use the institution's e-library. ICT technician respondents reported being skilled and knowledgeable on eLearning system resources and were essential in helping the

trainers and trainees overcome ICT challenges they would encounter daily. 50% of the ICT technicians attended eLearning workshops at institutions and online platforms to equip their skills and enhance their performances. 75% of the technicians reported being able to track communications between the trainees, trainers, ICT systems and handle bugs that cause errors during learning sessions. 62% of the ICT technicians were knowledgeable and had the technological know-how to protect and encrypt data, thus preventing the institution from online hacking and fraud.

4.9 Challenges of eLearning in technical institutions

The fourth objective of the study was to determine the Institution's ICT infrastructure preparedness in the technical institution to implement online teaching and learning. The study findings found several challenges hindering the implementation of online learning in selected technical institutions in Nandi county, and they included;

Inadequate ICT infrastructure; the selected technical training institutes are located in rural parts of Nandi county and lack the significant infrastructural development required for an effective and efficient eLearning program. This study finding was in posit with Kibuku, Ochieng & Wausi (2020), who found that Kenya has a rural-urban digital divide regarding ICT infrastructure and internet connectivity. The urban areas are reported to have more advanced ICT infrastructure and internet connectivity with high speeds ranging from 3G to 5 G, while internet connectivity in rural areas is challenging.

The selected technical training institutions were located in rural areas, which affected the successful delivery of online learning since rural areas have problems with internet connectivity. The rural areas are mainly 3G network coverage zones, while some have poor global mobile communication systems, thus incapable of internet

connectivity within the regions. Trainees from home areas who do not have GSM often miss the eLearning sessions, a factor that reduces their performances in their practical and theoretical grading systems. According to the Kenya digital economy blueprint of 2019, about 580 sub-locations in Kenya are below 50% global system for mobile communication, while 160 sub-locations do not have mobile signals. It is evident from this study that some of the areas without mobile signals could be part of Nandi County, where the institutions are located.

Lack of institutional policies in the selected technical training institutes in Nandi county. The study agreed with Tarus (2015), who found that a lack of operational eLearning policies is among the challenges hindering the implementation of eLearning in Kenyan public universities. Nanayakkara (2007) pointed out that to achieve real progress, eLearning development should tie back into the institution's mission and that institutions must have strategies that are enterprise-wide in scope. He emphasized that the need for institutions to invest in a strategic plan for eLearning development across the Institute is critical to the successful adoption of eLearning and that any strategic plan developed needs to incorporate an investment plan to redevelop the organization's administration and support systems to meet distance learning needs. The study further reveals that lack of funding has handicapped infrastructure implementation, such as equipping labs with computers and maintaining the LMS network. Poor network connectivity and Internet bandwidth have also hampered quality use. Tarus, Gichoya, and Muumbo (2015) observed that these technological components play a critical role in facilitating accessibility to eLearning by users and should be adequate. There are also reports about a lack of adequate training, policy for developing, using, and securing eLearning, lack of training in LMS and course development, and low motivation for the instructors and administrators. These results

are consistent with Kashorda and Waema's (2014) and Bagarukayo and Kalema's (2015) studies, which advocated for funding, policy, and infrastructure as key pillars for eLearning success.

4.10 Chapter Summary

The chapter focuses on the analysis of data related to challenges in implementing online teaching and learning in selected technical training institutes in Nandi County, Kenya. Data was collected from various stakeholders including trainees, trainers, ICT technicians, and principals through questionnaires and interviews. The research objectives guided the analysis, interpretation, and presentation of the data. The questionnaires addressed topics such as institution infrastructure, student abilities in online learning, trainee competence in online teaching and learning, and ICT technician competence in online learning. The study was conducted in five technical institutions in Nandi County, achieving a high response rate of 99% for trainees, 100% for trainers, and 99% for ICT technicians, indicating efficient data collection for analysis and reporting. According to established standards, this response rate is considered excellent.

The study identifies several significant challenges impeding the implementation of online learning in selected technical institutions within Nandi County. The technical training institutes, located in Nandi County, lack the necessary technological infrastructure for effective eLearning. This aligns with previous research highlighting a digital divide between urban and rural areas in Kenya, with urban areas boasting superior ICT infrastructure and internet connectivity.

Limited funding hampers the implementation of essential infrastructure, such as computer-equipped labs, and the maintenance of Learning Management System

(LMS) networks. Inadequate network connectivity and bandwidth further hinder the effective use of online resources. Overall, the study highlights the multifaceted nature of challenges faced in the implementation of online learning in technical institutions within Nandi County, underscoring the need for comprehensive solutions addressing infrastructure, policy, funding, and training.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the study findings reported in line with the objectives. In addition, the chapter includes recommendations, a conclusion, and important suggestions for future and further research. The chapter presents the research findings based on the objectives and research questions. The study aimed to determine challenges affecting the implementation of online teaching and learning in technical institutions in selected technical institutes in Nandi County, Kenya. The objectives of the study were to:

- i. To assess the trainers' competence in implementing online teaching and learning in technical institutions.
- ii. To examine trainees' ability to access eLearning in selected technical institutions in Nandi County, Kenya.
- iii. To determine the ICT technicians' competence in adopting and facilitating online teaching and learning.
- iv. To determine the Institution's ICT infrastructure preparedness in the technical institution to implement online teaching and learning.

5.2 Summary of the Findings

The overall finding of this study is that challenges exist in implementing online teaching and learning in technical training institutes in Nandi County. The following summary focuses on the sub-headings that formed the study objectives:

5.2.1 To assess the trainer's competence in implementing online teaching and learning in technical institutions.

The interview results from the principals responses showed that trainers in all the institutions began using eLearning technologies intensively after the Covid-19 pandemic. Some uses included course delivery, exam administration, and communication with trainees. “Most trainers did not have adequate skills to deliver the online training to trainees, and the institution management organized training to help the trainers acquire the knowledge and skills to deliver the course content,” one principal reported. According to the study, all institutions reported that the ICT online training module contents conducted on the trainers included; setting the class attendance enrollment keys, the introduction to the online learning platforms, preparing and uploading lecture notes, setting continuous assessment tests (CATs), End terms exams, setting responds lockdown used to track exam cheating, marking and uploading of results to the trainees.

The research objective sought to establish the trainer’s competence in online teaching and learning in technical training institutions. The study established that most trainers were not competent in implementing online teaching and learning. Through the trainer's questionnaire and principal’s interview schedules, the study found that despite the various abilities and potential of technical institutions to make online teaching and learning successful, it was evident that the majority of the trainers struggled with the online platforms, accessibility of learning equipment’s such as whiteboards, projectors, low internet connectivity, and inadequate training skills.

The trainers also lacked technical skills that could assist in online e-content development. This was a major challenge in implementing online teaching and learning in the technical institution. Despite some trainers having basic computer

skills, it was inadequate for application in developing and delivering the eLearning content to the learners. Wanyembi (as cited by Tarus, 2011, p. 138) found out that academic staff in learning institutions have low ICT skills because they were trained in an environment without ICT facilities.

The research also found that trainers lacked commitment to using the eLearning platform in teaching and learning. The principals also reported that trainers needed the motivation to focus on online teaching and learning. The motivation results from extra charges that trainers may incur during non-teaching hours, and trainees need more assistance to use the eLearning platform.

Some mentioned too much workload, thus unable to do a follow-up with trainees considering the workloads and the challenge of teaching a technical course online made it difficult for trainees to understand the concept, and this was translated to poor results in their module Kenya National Examination Council examinations.

The research found that the trainers required a longer time to create the online content to deliver to the learners, hence an obstacle to online teaching and learning in technical institutions. The availability of online course content in a few courses was a success since, once uploaded to the e-platform, it can be easily used and updated. According to Tarus, (2011), “it requires a longer time, resources, and reliable internet connectivity to create eLearning content.”

The research found that the major hindrance to online teaching and learning institutions in Nandi County was the lack of adequate internet bandwidth. The respondent also noted the high cost of internet bandwidth, thus rendering it unaffordable to most institutions and higher than developed countries.

5.2.2 To examine trainees' ability to access eLearning on technical courses in selected technical institutions in Nandi County, Kenya.

The second objective of the study was to examine trainees' ability to access eLearning in selected technical institutions in Nandi County, Kenya. The study revealed that trainees encountered technical difficulties while using ICT resources. Despite owning smartphones, it was evident that trainees only used the phones for communications and social media platforms and minimally used the phone to access educational content.

Less than half of the trainee population had the knowledge and skills to troubleshoot or solve ICT-related challenges. On the other hand, technical training institutions offer courses that require trainees to use their handwork. Offering online sessions barred the trainees from gaining practical skills in studies such as mechanical engineering, automotive, electrical and building, and Civil engineering courses. Trainees from these departments reported challenges in understanding the concepts independently, despite the presence of YouTube tutorials; they needed their technicians' guidance to help them understand the skill.

5.2.3 ICT technicians' competence in online teaching and learning adoption and utilization.

The third research objective was to determine the competence of ICT technicians in online teaching and learning adoption and utilization. Study showed that ICT technicians were frequently trained depending on the market demand and upcoming technologies. The interview sessions conducted with the principals of each institution revealed that most of the institutions sent their ICT technicians for training annually to help them equip themselves with the changes in the market. ICT technician respondents reported being skilled and knowledgeable about eLearning system

resources. They were important in helping the trainers and trainees overcome the ICT challenges they would encounter daily.

5.2.4 Institution ICT infrastructure preparedness in implementing online teaching and learning in technical institutions.

The fourth objective of the study was to determine the Institution's ICT infrastructure preparedness in the technical institution to implement online teaching and learning. The research found that the ICT infrastructure available in technical institutions, Aldai Technical training Institute, Emsos Technical Training Institute, Kaiboi Technical Training Institute, and Ol'lessos Technical Training Institute, were inadequate for eLearning. The responses from the interviews showed that a range of 4-8 was sufficient for online teaching and learning to progress well. Each laboratory had an average of 20 computers in respective institutions. Some of the respondents who were interviewed gave the following suggestions. Few of the departments had computer labs, and some trainees doing artisan courses required physical hand skills; hence do not require computers for online teaching and learning. The results were consistent with Tarus & Gichoya's (2015) finding that showed the inadequacy of computers in Kenyan institutions.

The servers of some institutions were weak and when the trainees accessed them, the system could either slow down or display the error 404. The research found that the major hindrance to online teaching and learning institutions in Nandi county was the lack of adequate internet bandwidth. The respondent also noted the high cost of internet bandwidth, thus rendering it unaffordable to most institutions and higher than developed countries.

The study revealed that ICT infrastructure was key to online teaching and learning success. The research showed that infrastructure such as; the computer laboratory, internet connectivity, and network were inadequate to support many trainees in the institution. The principals' response showed that the institution's internet users could not support a large number of trainees. According to ESIB 2003, “learning institutions using online teaching and learning must provide stable internet connectivity, computers, and technical support to the trainers and trainees.”

The response from the interview showed that financial constraint was a major hindrance in implementing online teaching and learning. The initial infrastructure cost was very high, depending on the technology and the capacity needed. The government has been unable to allocate funds to the institution to support online teaching and learning. The institution could not support adequate training of trainers, maintenance of infrastructure, and eLearning content development due to limited funds available. The research found that some of the infrastructure available is funded by a well-wisher and county government.

The respondent in the study revealed that the technical institute in Nandi county do not have eLearning policies to guide the proper implementation of online learning. The institution, therefore, does not have a good guide and ways of approaching online learning. The study indicates that the ICT infrastructure is inappropriate for online teaching and learning. The finding matched the finding by Kashorda & Waema (2014) “Institutions have challenges in eLearning readiness and experience difficulties of inadequate ICT infrastructure in the institution. The results clearly show that most institutions were not fully prepared to offer eLearning for technical courses.

5.3 Conclusion

In conclusion, this study offers a comprehensive assessment of the challenges faced in implementing online teaching and learning within technical training institutes in Nandi County. The objectives of the study were meticulously pursued, yielding valuable insights into various aspects of this endeavor.

The findings underscore the critical role of trainer competence in the successful implementation of online teaching and learning. While the availability of personal computers proved beneficial, a significant portion of trainers struggled with technical intricacies. The onset of the Covid-19 pandemic prompted a surge in eLearning adoption, revealing the need for targeted training to enhance trainers' proficiency. The study shed light on the challenges encountered by trainees in accessing eLearning resources. Despite owning smartphones, their usage was primarily limited to communication and social media platforms, rather than educational content. Additionally, technical courses necessitated hands-on experience, a requirement not fully met through online sessions.

The competence of ICT technicians emerged as a pivotal factor in addressing the challenges faced. Their frequent training and expertise in eLearning system resources played a crucial role in assisting both trainers and trainees in overcoming daily ICT-related hurdles. The study concluded that there are inadequacies in the available ICT infrastructure, including computer labs, internet connectivity, and network capabilities. Insufficient resources hinders the smooth progression of online teaching and learning, necessitating improvements in both quantity and quality.

In conclusion, this study underscores the pressing need for strategic interventions to address the identified challenges. Adequate trainer training, trainee training on ICT

use, enhanced ICT infrastructure, and sound policy frameworks are imperative to foster effective online teaching and learning. As we move forward, it is essential to prioritize these areas for the betterment of online teaching and learning in technical institutes in Nandi County.

5.4 Recommendations

The following are strategies and recommendations that the technical institutions in Nandi county should implement for the success of online teaching and learning successfully.

According to the study, challenges encountered enumerated in the results and discussion section of this study are the main reasons why eLearning has not been successful in technical training institutes in Nandi county, Kenya.

Therefore, this study recommends that technical training institutes identify early the challenges that hinder the implementation of eLearning before fully embracing it.

Some of the strategies that the technical institution can adopt to address the challenges that hinder the implementation of eLearning include;

5.4.1 Improve ICT Infrastructure

The study showed that ICT infrastructure in implementing eLearning is one obstacle. The study shows that the institution's infrastructure plays an essential role in eLearning success. The respondent cited that the infrastructure, such as computers, computer laboratories, and internet connectivity, is inadequate to support eLearning because many trainees in the institution need to access the eLearning platform.

The study showed that some institutions had been equipped with appropriate ICT infrastructure but did not meet the demand due to the high enrollment of trainees.

Aldrich (2005) eLearning involves a comprehensive combination of computer and network infrastructure to improve one or more reasonable parts of a learning value chain comprising management and delivery.

The institutions in respective technical training institutes needs to improve the internet speed, network coverage, electricity backups, and wireless network coverage. Appropriate infrastructure will enable trainers and trainees to access online learning with ease. With the current increase of learners joining technical training institutes, there is a need to increase eLearning resources for access to learning. The resources for eLearning include computers, laboratories, Local area network coverage, Wide area network, bandwidth connection, etc. The resource should be adequate for the student to use at the appropriate time.

The institution also needs to prioritize the funding of the eLearning section. It allows proper budgetary allocation for eLearning in the institution, thus, its stability. The government should also partner with network providers to provide affordable internet for learners. It reduces the overdependence on the available institutional network. The government also need to provide affordable laptops to trainees. The project on subsidized laptop purchase for university student was initially done in the year 2010 (Wezesha program) that allowed student to purchase laptops at a lower affordable price. It was able to provide a laptop to university trainees at an affordable price. The laptops will reduce computer users within the institution's computer laboratories.

The government should also work with the ministry of education and information communication department to formulate policies that will guide all the institutions to harmonize eLearning across all the institutions. Institution policy will also give trainees a clear understanding of what the trainers expect from them. The institutional

policy will guide eLearning activities and give clarity by posting a well-detailed policy document in an important section of the course site. The policy will also assist trainers and trainees since it will make the management of eLearning easy.

5.4.2 Training trainers on the eLearning platforms used

The institution should ensure that the trainers are trained frequently in eLearning. Regular training will enable trainers to be familiar with the platform used in eLearning, and it will enable trainers to upgrade their skills due to changing technology and regular system updates. The institutions should also give monetary payment for the extra hours that trainers may take during eLearning. It encourages trainers to use the eLearning platform frequently. There is also a need to recognize the need for skill among trainers. It should be recognized as essential for teaching electronically since ICT training among trainers gives confidence in the online platform.

5.4.3 Training of ICT Technicians on ELearning Systems

The technical institutions should train its ICT technician regularly to prepare them to handle system challenges at any time and be conversant with new technologies. Well-trained ICT technician ensures that the system works without or with minimal interruption.

5.4.4 Compulsory eLearning course for trainees

The institutions should introduce a compulsory ICT curriculum and eLearning courses for all the trainees. It should be integrated with those joining the first years to improve the trainees' ICT and eLearning skills.

5.4.5 Formulation of ELearning policy

Institutions should form policies to guide trainers, trainees, and the institution for uniform eLearning. The policies created should be in line with government ICT policies. The policies range from ELearning Policies in the Course Syllabus; to Student Privacy Policies, E-Mail Policies, Discussion Policies, Software Standards Policies, Assignment Policies, Getting Technical Help Policies, Student Code of Conduct Policies, and Intellectual Property Rights Policies.

5.4.6 Trainer's motivation

The institution should find a way of motivating the trainers using eLearning. It should encourage trainers to make eLearning content that consumes much of their time.

There should also be an award for the most performing course taught online. It goes a long way in encouraging trainers to do better in the extra task that may occur.

Trainers should also be provided with a data bundle they may use as they work remotely with trainees.

5.5 Further research

The following are the recommendations for future studies on online teaching and learning;

This study was limited to “*challenges affecting the implementation of online teaching and learning in selected technical training institute in Nandi County, Kenya.*”

- Further research should be extended to other technical training institutes in other counties in Kenya, both public and private.

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APPENDICES

Appendix I: Letter of Introduction

FRANK KIPKOECH
 UNIVERSITY OF ELDORET
 P.O. BOX 1125 30100,
 ELDORET.

TO
 THE PRINCIPAL

 P.O BOX _____

 Dear Sir/Madam

RE: REQUEST TO CONDUCT A RESEARCH

I am a postgraduate (MEd) student at the University of Eldoret, Main Campus, I am conducting a research study on; **“Challenges in the implementation of online teaching and learning in technical institutions: A case of selected technical training institutes in Nandi county, Kenya.”**

I am kindly requesting your permission to conduct the research at your institution. I am also requesting the respondents in your institution to respond to the attached questionnaire. Information gathered in the research will be treated with the utmost confidentiality and is meant for study purpose only. Honesty and accuracy will be highly regarded.

Thank you in advance

Yours faithfully

Appendix II: Informed Consent

FRANK KIPKOECH
UNIVERSITY OF ELDORET
P.O. BOX 1125 30100,
ELDORET.

Dear Respondent,

You have been selected to participate in a research/ study on; **“Challenges in the implementation of online teaching and learning in technical institutions: A case of selected technical training institutes in Nandi county, Kenya.”**

Your confidentiality and anonymity will be upheld.

Thank you for your assistance and co-operation.

Frank Kipkoech

Appendix III: Questionnaire for Trainees

Introduction

Dear Respondent,

I am a master's student at the University of Eldoret researching on; "**Challenges affecting the implementation of online teaching and learning in technical institutions: A case study of selected technical training institute in Nandi county Kenya.**" I am requesting you to assist me in completing this questionnaire to achieve the research objective for my master's thesis. The information provided will be purely for academic purposes and is strictly confidential. This questionnaire consists of **two (2) parts**, Part A and B.

PART A: BACKGROUND INFORMATION OF THE RESPONDENTS

Please select the correct answer by ticking (√) appropriately in the provided brackets. You are requested to complete this questionnaire as honestly and objectively as possible.

- 1) Please indicate your gender. Male () Female ()
- 2) How old are you? _____
- 3) What is your course of study? Technical () Business ()
- 4) What is your study level? Higher diploma () Diploma () certificate () Artisan ()
- 5) what is you years of study 1st () 2nd () 3rd ()

PART B: ONLINE / ELEARNING QUESTIONS

Information about Prior Computer Knowledge on ELearning Systems by Trainees.

1. Do you have a personal computer for work, recreational or educational purposes?

Yes [] No []

2. How often do you use your computer at home or the institution? (Please tick one)

Frequently [] more frequently [] not at all [] Rarely [] Very rarely []

3. How often do you use messaging and discussion tools? (E.g., Email, blogs, Skype, forums, and phone texting)

Frequently [] more frequently [] not at all [] Rarely [] Very rarely []

4. How frequently do you use your social communication tools

online? (e.g., Facebook and WhatsApp) (please tick one)

Frequently More frequently not at all Rarely Very rarely

5. Do you have a personal online space other than a social network (E.g., Web pages)

Yes No

6. How often do you download educational content from the internet? (please tick one)

Frequently more frequently not at all Rarely Very rarely

7. How frequently do you encounter technical difficulties using ICT resources? (e.g.,

computers, internet, and projectors)

Frequently more frequently not at all Rarely Very rarely

8. Do you have basic ICT-related troubleshooting skills?

Yes No

9. Do you have training on online learning/use

Yes No

10. Do you have a smartphone or other means for your internet access?

Yes No

11. The following categories describe your previous experience with computers and related technologies: (Please tick one on each statement)

1- Strongly agree, 2-Agree, 3- Not sure, 4-Disagree,

5- Strongly disagree

S.NO	STATEMENT	1	2	3	4	5
1.	I am experienced in searching and accessing information from the internet					
2.	I always post questions on online portals/blogs					
3.	I always download and upload notes and assignments from the portal					
4.	I participate in online discussions (for example, using a chatbox, blogs)					
5.	I use my social networks daily.					

12. How frequently do trainees experience challenges during eLearning sessions?

Frequently more frequently not at all Rarely Very rarely

13. Do the institution have adequate ICT infrastructure to administer eLearning trainees?

Yes No

14. Do the ICT technician give the required support to trainees during the learning sessions?

Yes No

15. How frequently do trainees have practical's on the content delivered through eLearning?

Frequently More frequently Not at all Rarely Very rarely

16. How often do the trainees do physical practical skill on ELearning content?

17. What are the challenges faced on eLearning?

18. What are your recommendations to improve eLearning in the institution?

Appendix IV: Questionnaire for Trainers

INTRODUCTION

Dear Respondent,

I am a master's student at the University of Eldoret researching on; "**Challenges affecting implementation of online teaching and learning in technical institutions: A case study of selected technical training institute in Nandi county, Kenya.**" I am requesting you to assist me in completing this questionnaire to achieve the research objective for my master's thesis. The information provided is purely for academic purposes and is strictly confidential. This questionnaire consists of two (2) parts, Part **A** and **B**.

PART A: BACKGROUND INFORMATION OF THE RESPONDENTS

Please select the correct answer by ticking (√) appropriately in the provided brackets. You are requested to complete this questionnaire as honestly and objectively as possible.

Demographic information

1) Please indicate your gender Male () Female ()

2) Highest qualification () PhD () Masters () Degree () Diplomas () Others ()

Specify (Others).....

3) How old are you? _____

4) Indicate your Department _____

5) How many years of experience in teaching do you have? _____

PART B: ELEARNING QUESTIONS

Information about Trainers' Computer skills on ELearning Systems.

6. Do you have a personal computer at home or the workplace?

Yes [] No []

7. Have you ever received any technical or further training in an eLearning program?

Yes [] No []

8. How often do you use computers and ICT technologies in lesson preparation, teaching, and learning?

Frequently more frequently not at all rarely Very rarely

9. How often do you use ELearning resources in teaching and learning in your Institution?

Frequently more frequently not at all Rarely Very rarely

10. The following categories of statements describe your level of computer skills on ELearning systems: (Please tick one on each statement)

1- Strongly agree, 2-Agree, 3- Not sure, 4-Disagree, 5- Strongly disagree

S.NO	STATEMENT	1	2	3	4	5
1.	I have enough ICT skills to facilitate my teaching using ICT resources					
2.	I can use the internet to communicate with my trainees and peers					
3.	I have attended ELearning awareness training/workshops					
4.	I can prepare, upload and download ELearning content					
5.	I can set and administer assignments, CATs, and exams online					
6.	I communicate exam/ CATs results to trainees online					
7.	I interact with trainees through communication tools such as email blogs, Skype, Facebook, and WhatsApp					
8.	I regularly attend computer/ICT-related refresher courses					

11. Do ICT technician give required support of eLearning?

Yes No

12. Do the institution have adequate infrastructure to facilitate eLearning?

Yes No

13. How frequently do trainees require ICT support assistance for eLearning?

Frequently more frequently not at all Rarely Very rarely

14. Do you often organize physical practical for respective eLearning subject thought?

Yes No

15. How frequently do trainees have difficulty in handling physical practical skills after e learning?

Frequently More frequently Not at all rarely Very rarely

16. What Challenges have you faced in online teaching and learning?

What are your recommendations to improve online teaching and learning?

Thank you for your participation in this very important study

Appendix V: Questionnaire for ICT Technicians

Introduction

Dear Respondent,

I am a master's student at the University of Eldoret researching on; “**Challenges affecting the implementation of online teaching and learning in technical institutions: A case study of selected technical training institute in Nandi county, Kenya.**” I am requesting you to assist me in completing this questionnaire to achieve the research objective for my master's thesis. The information provided is purely for academic purposes and is strictly confidential. This questionnaire consists of two (2) parts, Part A and B.

PART A: BACKGROUND INFORMATION OF THE RESPONDENTS

Please select the correct answer by ticking (√) appropriately in the provided brackets. You are requested to complete this questionnaire as honestly and objectively as possible.

Demographic information

- 1) Please indicate your gender Male () Female ()
- 2) How old are you? _____
- 4) How many years of experience as a technician do you have? _____

PART B: ELEARNING QUESTIONS

I. Information about ICT infrastructural preparedness on ELearning.

1. How many computer laboratories are in the Institution? (please tick one)
1-3 [] 4-6 [] 7-9 [] Above 9 []
2. What is the average number of computers held in each
laboratory _____
3. How frequently do trainees access the computer laboratories every week at the
Institution? Once [] twice [] thrice [] more than thrice []
4. Do you have a local area network in your Institution? Yes [] No []

5. Is the institution equipped with enough computers for trainee learning?
Yes No
6. How reliable is the internet connectivity at your Institution?
Very Reliable Reliable Not Sure Less Reliable
Not Reliable
7. What is the range of internet bandwidth at your Institution in Megabits per Second (Mbps)? 1-25 26-55 56-75 76-100 above 100
8. Is your Institution connected to the fibre optic cable? Yes No
9. How often do you access Learning Management System (LMS) Platform?
Frequently more frequently not at all Rarely Very rarely
10. If yes to question 7, please tick the available LMS platform in your Institution from the list below. WebCT Blackboard Moodle Claroline
Others Specify
.....
11. Which communication tools are used by trainees and staff at the Institution?
Email Skype Whatsapp Messaging Blog
12. Indicate the level to which you agree with the following statement concerning the ICT infrastructural preparedness in your Institution.
1- Strongly agree , 2-Agree , 3- Not sure , 4-Disagree ,
5- Strongly disagree

S.No	Statement	1	2	3	4	5
1.	There are adequate computer laboratories in the Institution.					
2.	There is no easy access to computers by trainees and Trainers for ELearning at the Institution.					
3.	There is an available network connection in Institution that encourage trainees and trainers to download, upload and share learning materials from portals					
4.	There are adequate communication tools in the Institution Local Area Network					

12. ELearning policy can guide the successful implementation of ELearning at the Institution.

Strongly agree [] Agree [] not sure []
Disagree [] Strongly Disagree []

13. I am aware of the existence of an ELearning policy in our Institution.

Strongly agree [] Agree [] not sure []
Disagree [] Strongly Disagree []

II. Information about technical skills possessed by ICT technician on ELearning Systems.

The following statements test the technical skills possessed by ICT technician on ELearning Systems at the Institution. (Please tick one on each statement) 1-

Strongly agree [], 2-Agree, [] 3- Not sure, [] 4-Disagree [], 5- Strongly disagree []

S.No	Statement	1	2	3	4	5
1.	The ICT skill I have are adequate to enable me to interact comfortably with eLearning system resources					
2.	I regularly attend ELearning training/workshops at the Institution					
3.	I need more training on ELearning systems and related technologies					
4.	I can design, develop and upload content on the ELearning platform at the Institution					
5.	I can track the communication between trainees and trainers on ELearning platforms at the Institution					
6.	I can protect the content on the ELearning platform by enforcing security measures					
7.	I can import and export materials of different file formats to an ELearning platform at the Institution					
8.	I know to customize and update the ELearning platform to fit the users' requirements at the Institution					

13. How frequently do trainers request ICT support on eLearning?

Frequently More frequently Not at all Rarely Very rarely

14. Are the trainers well-trained to facilitate online teaching and learning?

Yes No

15. How frequently are the trainees trained on eLearning use?

Frequently more frequently not at all Rarely Very rarely

16. What are the Challenges that you face in online teaching and learning?

What are your recommendations to improve online teaching and learning?

Thank you for your participation in this very important study.

Appendix VI: Interview Schedule for Principals

Introduction

Good morning/afternoon/evening.

Dear Interviewee

I am a master's student at the University of Eldoret researching conducting a research study on; **“Challenges in the implementation of online teaching and learning in technical institutions; A case study of selected technical training institutes in Nandi county, Kenya.”**

You have been selected to participate in this Interview. The information provided is purely for academic purposes, and any information will be kept strictly confidential.

This interview session is based on three sections. Section one has questions on ICT infrastructural preparedness on ELearning systems, section two has questions on the effects of trainers' ICT skills on eLearning, and section three has questions about the technical skills of ICT technician on ELearning systems. Please feel free to ask questions where they may not be clear.

I look forward to your support and cooperation. Thank you.

Date of Interview -----

Section I: Demographic Information

- 1) Observe gender Male [] Female []
- 2) How many years have you served as a Principal? _____
- 3) How many years have you been in the current institution? _____
- 4) Does your Institution Have internet access?
_____speed/bandwidth_____
- 5) Does the institution use eLearning?

6) Do trainers in your institution have prior training in eLearning?

7) What support does the institution provide to the trainers and the trainees on online learning?

10) Does the institution have adequate infrastructure for eLearning?

11) What support does the institution give to ICT technicians to facilitate eLearning?

12) What approaches do you have to ensure that the trainees have the ability to access online learning?

13) Do you think remote eLearning is suitable for the trainees?

14 a) What measure are put in place to improve the infrastructure for online learning?

b) Do you think online learning affected their performance?

15) What challenges does the school management face while implementing remote learning?

16) Does the institution have an ELearning policy that can guide the successful implementation of ELearning at the Institution?

16) What are your recommendations for online learning?

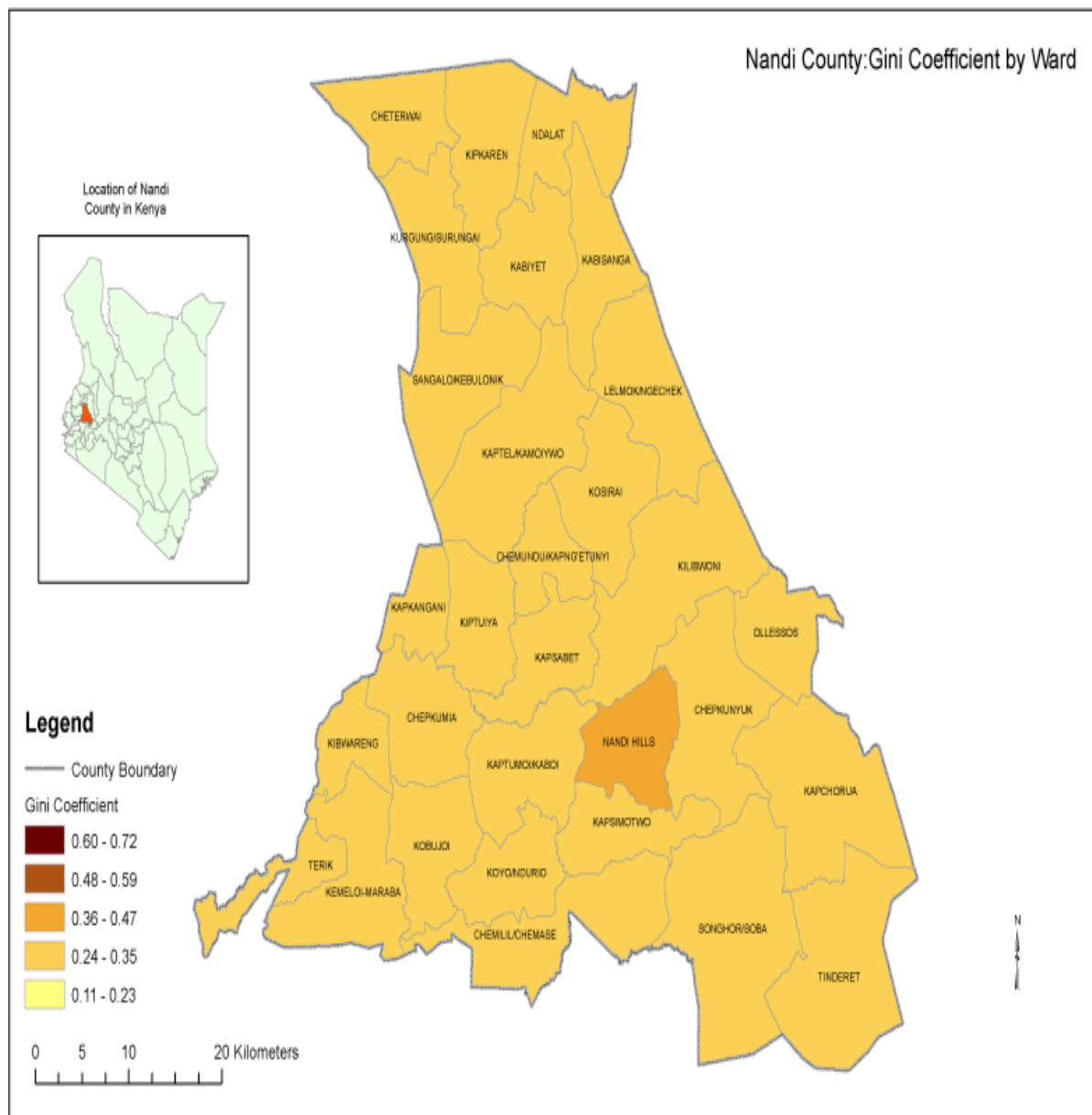
Thank you for your participation in this very important study.

Note

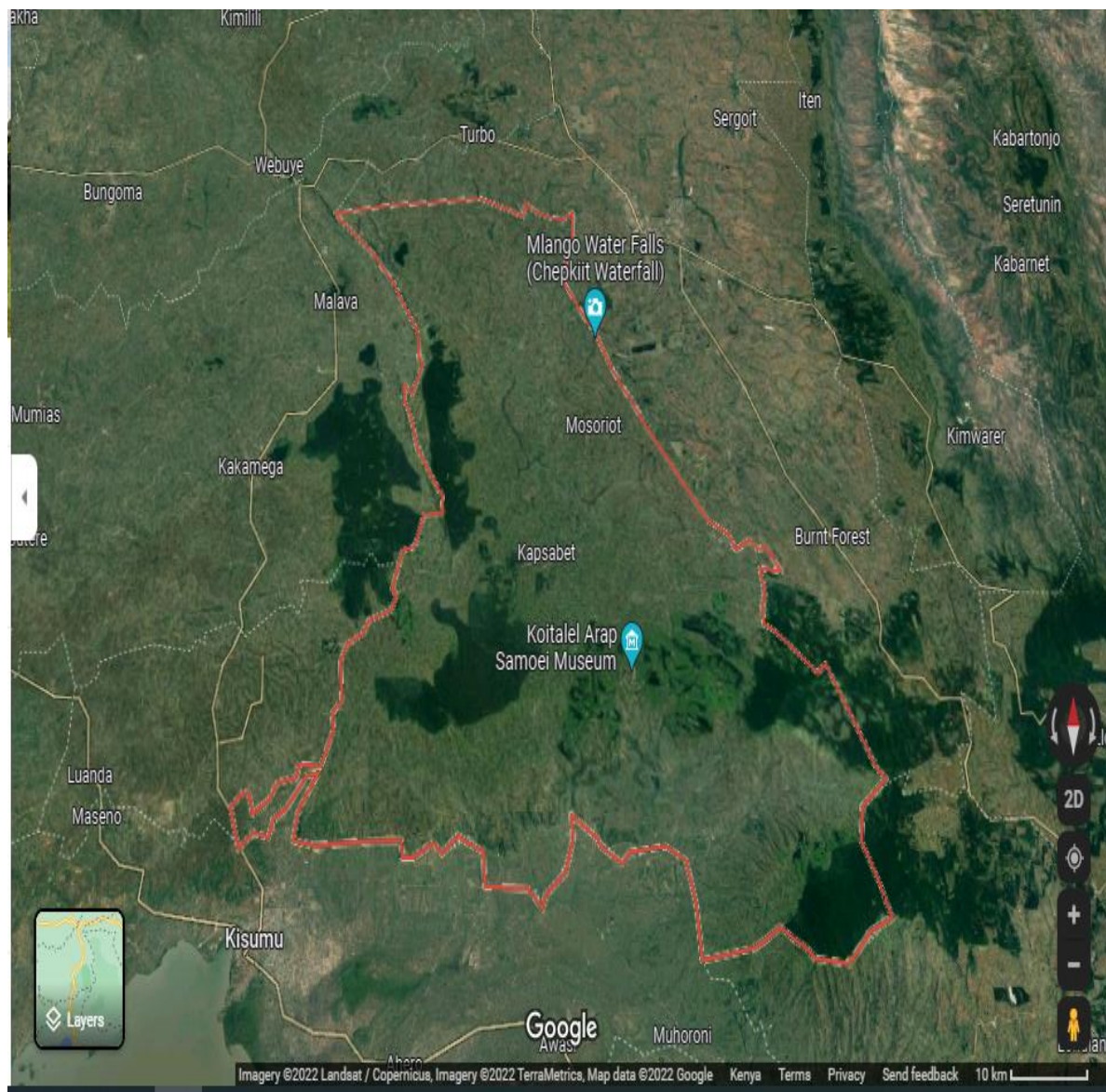
This is just a guide; certain questions may not be asked depending on responses from the interviewee.

Thank you for your support and cooperation.






Appendix VII: Map of the Study Area



Appendix VIII: Map of the Study Area Nandi County



Appendix IX: Research Permit

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 532909	Date of Issue: 25/February/2022
RESEARCH LICENSE	
	
This is to Certify that Mr.. Frank Kipkoech of University of Eldoret, has been licensed to conduct research in Nandi, Uasin-Gishu on the topic: FACTORS AFFECTING THE IMPLEMENTATION OF ONLINE TEACHING AND LEARNING IN TECHNICAL INSTITUTIONS: A STUDY OF SELECTED TECHNICAL TRAINING INSTITUTES NANDI COUNTY KENYA. for the period ending : 25/February/2023.	
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532909 Applicant Identification Number	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
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3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearance from relevant Government Agencies
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E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix X: Letter of Research from UOE



P.O. Box 1125-30100,
ELDORET, Kenya
Tel: 0774 249552
Fax No. +254-(0)53-206311 Ext 2232

School of Education Department of Technology Education

Our Ref: UOE/B/TED/PGR/065

DATE: 31ST January, 2022

The Executive Secretary,
National Council for Science, Technology & Innovation
P.O.BOX 30623-00100,
NAIROBI.

Dear Sir/Madam,

SUBJECT: RESEARCH PERMIT FOR FRANK KIPKOECH -SEDU/TED/M/009/20

This is to confirm that the above named student has done course work of his Master of Education in Technology Education: Building and Construction Technology Option.

He is currently preparing for his field research work on the thesis entitled: *"Factors Affecting the Implementation of Online Learning in Technical Institutions: A Study of Ol'Lessos Technical Training Institute, Kenya"*. He has successfully presented the proposal and has been approved by the university.

Any assistance accorded to him to facilitate successful conduct of the research and the publication will be highly appreciated.

Yours faithfully,



DR. HOSEAH KIPLAGAT
HOD, TECHNOLOGY EDUCATION

Copy to: Dean, School of Education



Appendix XI: Similarity Report

University of Eldoret	
Certificate of Plagiarism Check for Synopsis	
Author Name	Frank Kipkoech SEDU/TED/M/009/20
Course of Study	Type here...
Name of Guide	Type here...
Department	Type here...
Acceptable Maximum Limit	Type here...
Submitted By	titustoo@uoeld.ac.ke
Paper Title	CHALLENGES AFFECTING THE IMPLEMENTATION OF ONLINE TEACHING AND LEARNING IN TECHNICAL INSTITUTIONS: A CASE OF SELECTED TECHNICAL TRAINING INSTITUTES IN NANDI COUNTY, KENYA.
Similarity	11%
Paper ID	1032792
Submission Date	2023-10-18 08:29:15
Signature of Student	Signature of Guide
 Head of the Department	
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