

**PREPAREDNESS IN CURRICULUM IMPLEMENTATION THROUGH  
ONLINE DISTANCE TEACHING AND LEARNING IN NATIONAL  
TECHNICAL TRAINING INSTITUTIONS IN KENYA**

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Fulfillment of the Requirements for the Conferment of the Degree of Doctor of  
Philosophy in Leadership and Education Management of  
Kenya Methodist University**

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## DECLARATION AND RECOMMENDATION

### Declaration

This thesis is my original work and has not been presented for the award of a degree or any other award in any other university.

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### Recommendation

We confirm that the candidate carried out the work reported in this thesis under our supervision.

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## **DEDICATION**

This thesis is dedicated to my parents late Jacob and Rebecca, my late husband Steve Munene and my children Gakii, Kanana, Gitonga and Bundi.

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I would like to express my deep appreciation to my esteemed PhD supervisors, Dr. Flora Gacheri Ngeera and Dr. Charles Kanyi for their exceptional guidance, unwavering support, and invaluable insights throughout my doctoral journey. Your expertise and mentorship have been instrumental in shaping the success of my research. I extend my sincere gratitude to my dedicated research assistants, Charles Mutungi, Zipporah Gacheru, and Michael Ngota. Your commitment to the research process significantly contributed to the quality of my work.

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## ABSTRACT

Shifts in the access and provision of education have necessitated the adoption of online distance learning in institutions, including Technical and Vocational Education and Training (TVET). The unprecedented changes require a commitment to implementing an appropriate curriculum for the online learning mode. This kind of transformation has, however, been curtailed by the lack of preparedness of TVET institutions in Kenya to implement curriculum through online distance teaching and learning. By exploring the multifaceted dimensions of this transformation, this research sought to investigate the state of preparedness in curriculum implementation in national TVET institutions as they transition to online distance learning with a view to recommending best preparedness practices. The specific objectives focused on the availability of information communication technology (ICT) infrastructure, provision of ICT user training and skills development, availability of appropriate online distance teaching and learning instructional materials, availability of financial support from various stakeholders, and how TVET policy moderates the independent and dependent variables. This study was anchored on constructivism and the theory of equivalency. It utilized a mixed-method approach and convergent parallel design. This study targeted the ten National TVET institutions, where three principals, three heads of Department, 35 trainers and 207 trainees from the Department of Applied Sciences provided the data. The research instruments were interviews for principals and Heads of Departments and questionnaires for trainers and trainees. Documents like the TVET policy and ODeL policy were analyzed. Research tools were pre-tested, and this enabled checking of validity and reliability. Mean, percentage and standard deviation were computed, while multiple regression analysis was used to assess the relationship of constructs. Contents and thematic analysis were to analyze data from documents, interviews and open-ended questions. Results were presented using tables, figures, themes and excerpts. The results indicate moderate preparation towards implementing curriculum through online teaching and learning. This was attributed to inadequate availability of ICT hardware, insufficient resources, and limited access to online instructional materials at national TVET institutions. The moderate level of preparedness was attributed to financial constraints, low levels of financial support for trainees and trainers in accessing affordable internet, and gaps in the capacity building of trainers and trainees. TVET policy stood out as a critical predictor variable in the curriculum implementation through online teaching and learning mode. Policy implementation, infrastructure improvement, collaboration with stakeholders, ICT skills development, continuous training, and financial support were crucial measures for addressing these challenges. The study recommends national TVET institutions foster collaborations with government agencies, industry partners, content providers, open educational resource platforms, and other organizations for funding opportunities, continuous development of online instructional materials, and training linkages. TVETA, and the Ministry of Education should establish clear policy guidelines and standards specifically addressing the implementation of online and distance learning curricula. TVET should also establish monitoring and feedback mechanisms that ensure the effective implementation of policy guidelines. The results of this study contribute new knowledge on institutional preparedness for implementing curricula through online teaching and learning modes.

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## **ABBREVIATIONS AND ACRONYMS**

CBC	Competency Based Curriculum
GOK	Government of Kenya
ICT	Information Communication Technology
KeMU	Kenya Methodist University
MOOCs	Massive Open Online Courses
MSE	Micro and Small Enterprises
NACOSTI	National Commission for Science Technology and Innovation
NCTVET	National Council for Technical and Vocational Education and Training
NSQF	National Skills Qualification Framework
NVQ	National Vocational Qualifications
SDGs	Sustainable Development Goals
TESDA	Technical Education and Skills Development Authority
TVET	Technical and Vocational Education and Training Institutions
UNESCO	United Nations Educational, Scientific, and Cultural Organization

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

In recent years, the field of education in Technical vocational and education TVET institutions in Kenya has witnessed a significant shift towards online distance teaching and learning (Vision 2030). This transition has been expedited by various factors, including the proliferation of digital technologies, increased access to the internet, and the need to adapt to changing educational landscapes, such as the COVID-19 pandemic (ILO, 2023). Online learning, also referred to as e-learning, web-based learning, or computer-based education, is a form of education conducted over the internet. Online education endeavors to revolutionize the structure of the complete educational journey. According to Tynan (2015), several experts in online education and instruction feel that incorporating some form of technology into the classroom is beneficial. According to other academics, it serves as a replacement for online distance education. The use of computers and the internet for learning and education has risen dramatically (Tynan, 2015). This has made it easier to create online courses.

However, there remains a critical need to assess the preparedness of curriculum implementation in the context of online distance teaching and learning within TVET institutions in Kenya. This study addressed the issues about availability of information communication technological (ICT) infrastructure, ICT skills development, availability of online digital materials, finances and the TVET policies. Adequacy and accessibility of technological infrastructure, such as internet connectivity, hardware, and software, in TVET institutions to support online curriculum implementation were also assessed. Digital

skills and competence was investigated to reveal the competence levels of both trainers and trainees to effectively engage with online teaching and learning platforms. Availability of online digital materials used for teaching and learning were examined to find out whether they are adequate in form and structure to support this transition. There are several advantages to online education, such as the freedom to learn whenever, wherever, and at own pace, suitability for trainees with a variety of abilities and limited time, and lower ongoing costs (tuition fees, no travel costs for trainees) (Agbo et al., 2021). In response to the global school closures caused by the coronavirus (COVID-19) pandemic, countries worldwide have embraced remote learning methods.

In New Zealand, university students expressed concerns regarding the financial aspects of online learning compared to traditional face-to-face instruction. Many students preferred direct interaction with their teachers, and as a result, some missed online classes due to financial constraints, different time zones, and limited access to a reliable internet connection, particularly in rural and remote areas (Pather et al., 2020). Furthermore, the shift to online instruction during the Covid-19 pandemic posed job security challenges for instructors. Most educators were more accustomed to in-person teaching, and their limited ICT skills raised uncertainties about their employment security. The use of recorded audio and visual materials in instruction raised concerns about a potential reduction in the need for instructors. Additionally, adapting adult learners to technological changes presented its own set of challenges, as preferences tend to evolve with age, especially in the context of technological advancements (Park & Choi, 2021).

Primary school teachers in New Zealand faced challenges when it came to addressing students' needs online, particularly while working from home. They had to juggle the responsibilities of monitoring and managing their own children alongside overseeing online classes. This dual role created concerns about effectively meeting both sets of demands (Subrahmanyam, 2020).

Furthermore, these teachers reported a sense of social isolation from their students and noted a lack of mentorship during this period (Flack et al., 2020). A study revealed that a significant portion of educators, 39% from Australia and 42% from New Zealand, expressed a lack of confidence in using ICT and online instruction. One teacher likened this experience to being a beginner teacher once again, struggling to determine what to teach, how to teach it effectively, and discerning what methods were most successful in the online environment (Subrahmanyam, 2020).

Despite the global focus on promoting educational equity and access for all, the COVID-19 pandemic exacerbated disparities and academic imbalances between students in urban areas and marginalized regions. An example from the United States highlights how the shift to online learning impacted science courses, particularly in remote areas where students faced challenges accessing educational materials due to limited network coverage and a lack of electronic devices like mobile phones and laptops (Brancaccio-Taras et al., 2021).

Moreover, maintaining examination integrity through invigilation became a significant challenge in the online learning environment. Teachers had a restricted view of learners' surroundings, making it difficult to prevent cheating (Gamage et al., 2020). Additionally,



assessing vocational courses for students with disabilities or those requiring extra time proved to be a formidable task during the COVID-19 pandemic. Some universities resorted to accepting collusion as an unfortunate reality in their efforts to combat exam malpractice. This was exemplified by strategies such as incorporating higher-order questions and adopting open-book exams in assessment methods (Pather et al., 2020).

In India, the higher education landscape underwent significant transformations in vocational subjects following the lockdown imposed due to the COVID-19 pandemic. These changes included the closure of educational institutions. To facilitate the acquisition of necessary competencies, a new approach was introduced, which involved the implementation of web-enabled virtual labs. These virtual labs were designed to offer curriculum-based experiments that could be remotely operated, enabling students to continue their learning (Jena, 2020).

Countries such as Singapore, Finland, South Korea, and the United States have made substantial investments in infrastructure, digital curriculum development, and teacher training to facilitate the adoption of online teaching and learning (Lim, 2018; Sahlberg, 2018; U.S. Department of Education, 2020). Singapore's "Masterplan for ICT in Education," for instance, has served as a blueprint for effective integration of technology in schools (Lim, 2018). Similarly, Finland's success in educational technology is attributed to its holistic approach, emphasizing teacher professional development alongside technology deployment (Sahlberg, 2018). Digital inclusion initiatives like "One Laptop per Child" (OLPC) and public Wi-Fi projects aimed to bridge the digital divide (Cobo et al., 2016). Unfortunately, these efforts faced challenges in Kenya, where digital literacy education and comprehensive teacher training programs to enable effective online

instruction are lacking, beyond the general training provided in teacher colleges and universities.

A research by Barrot et al. (2021), found lack of infrastructure facilities, implementation costs, insufficient funding, limited awareness, inadequate skills, and training deficiencies, a lack of government policies, support for online distance learning and education, and power limitations as some of the factors that have impacted on the integration of ICT into VET in Nigeria. In 2020, when educational institutions in Kenya were forced to close their physical campuses due to the COVID-19 pandemic, stakeholders in the education sector faced the urgent task of ensuring the continuity of learning for students at all levels. In the case of post-secondary Technical and Vocational Education and Training (TVET) institutions, traditional in-person learning came to a halt, and efforts were made to transition to online teaching and learning methods. This shift included training instructors in the use of e-platforms for delivering educational content (United Nations, 2020).

This challenge was particularly severe for trainees hailing from marginalized and remote areas where access to electricity and reliable internet connectivity was limited. In some rural regions, electricity supply was inconsistent, leading to power outages that further hindered online learning efforts. Moreover, a significant number of students, both in urban and rural areas, lacked the digital devices necessary for participating in online classes. Consequently, some students were compelled to defer their studies due to these ICT-related challenges (Chepyegon, 2020).

According to Karani and Mary (2022), TVET institutions encountered significant challenges in adapting to this new mode of instruction. Many of the courses offered in

TVET are hands-on in nature, and a majority of these institutions lack the necessary resources for remote instruction. Even among those institutions that have managed to acquire the required resources, there is a shortage of personnel trained to effectively conduct online classes, as most instructors are accustomed to traditional face-to-face teaching methods and are not familiar with online teaching techniques as explained by Karani and Mary (2022) and also from the Regional Centre for Mapping for Sustainable Development (2021).

In Kenya, both TVET students and instructors faced difficulties accessing e-learning resources, primarily due to financial constraints that prevent them from affording internet connectivity, smartphones, and laptops. As the COVID-19 pandemic forced an abrupt transition to online education worldwide, the challenges and opportunities of online distance teaching and learning in TVET institutions in Kenya became increasingly apparent. The digital divide, technological disparities, pedagogical adjustments, and concerns about equitable access all surfaced as pressing issues. While the pandemic accelerated the adoption of online education, it also underscored the urgency of addressing these challenges comprehensively.

Despite the potential for digital literacy in school curricula to prepare students for the digital age (Sahlberg, 2018), Kenya struggled to achieve meaningful digital learning, largely due to the collapse of the laptop project. However, there is hope for progress in Technical and Vocational Education and Training (TVET) institutions, as the government promises funding support for ICT to promote digital learning. Nevertheless, numerous obstacles persist, such as the digital divide, which exacerbates educational inequalities, especially for students in marginalized communities (Abdulmajeed's & McManus, 2020).

Educators also face challenges in adapting to online instruction, necessitating training and support as explained by Abdulmajeed's and McManus (2020). Both trainees and trainers must develop digital literacy skills to navigate online platforms effectively (Sahlberg, 2018).

While developed countries adopted innovative strategies like OLPC and public Wi-Fi projects to address these challenges (Cobo et al., 2016), less developed nations faced slower progress in transitioning to online distance learning. Ultimately, a holistic approach that combines digital inclusion efforts, teacher training, digital literacy education, funding, and supportive policies is crucial to successfully overcome these hurdles and promote digital learning worldwide. While significant progress has been made, several gaps persist: In Nigeria several factors affect preparedness of online learning. Erratic electricity supply and poverty are some of the factors that hinder online curriculum delivery as explained by Abdulmajeed's and McManus (2020).

The aim (Session Paper No. 1 2020) of TVET is to offer and promote lifelong learning and learning for entrepreneurs. Some of the challenges faced by this sub-sector include: inadequate facilities, lack of standardized national curricula, lack of effective coordination of training policies, inability to reach those who cannot physically attend, and disproportionate production of skilled labor across the country, resulting in the mismanagement of scarce resources. This causes duplication of effort, conflict of responsibilities, underutilized training facilities, unnecessary and redundant competition and inadequate programs (Meeting Paper No. 1 of 2020).

According to Karani and Mary (2020), the current curriculum is inflexible and does not respond to changing labor market needs, some teachers are poorly trained and there are weak supervisory and supervisory services in the sub-sectors. In addition, most teaching materials and textbooks are sourced from outside Kenya, making them expensive and sometimes unsuitable for the local environment, and finally there is a general perception that the private sector is not adequately represented in curriculum design and development (Republic of Kenya Minutes Report, 2015). However, the path to successful implementation has not been without challenges.

This research examined the extent to which these institutions have adapted to the digital learning environment and whether they possess the necessary resources, strategies, and policies to facilitate seamless curriculum delivery in this mode. The findings from this research provide valuable insights into the current state of online distance teaching and learning in TVET institutions in Kenya, identifying areas that require improvement. This, in turn, will inform policymakers, educators, and stakeholders in the field of TVET about the necessary steps to enhance preparedness and effectiveness in curriculum implementation through online distance teaching and learning, ultimately contributing to the advancement of technical and vocational education in Kenya.

## **1.2 Statement of the Problem**

In an ideal scenario for implementing online studies, a set of crucial factors and best practices converge to establish a highly successful and effective online learning experience. First and foremost, a robust technological infrastructure is imperative, ensuring students have access to reliable high-speed internet and the necessary hardware, such as computers, tablets, or smartphones, to engage seamlessly without technical hindrances. Secondly, the

heart of this ideal setup lies in a user-friendly Learning Management System (LMS). This digital platform should be intuitive and easy to navigate, empowering students to access course materials, submit assignments, engage in discussions, and monitor their progress effortlessly. Furthermore, it should foster engagement through well-designed and interactive course materials, including multimedia elements like videos, quizzes, and discussion forums, thereby promoting active learning.

Equally vital are the qualified instructors who are adept in online teaching academic advisors, technical assistance, and tutoring services to address any challenges or inquiries that students methodologies. They play a pivotal role in conveying course content effectively, offering timely feedback, and catering to students' diverse learning needs. Alongside this, comprehensive student support services should be readily available, encompassing may encounter.

In essence, this ideal online learning environment thrives on clear communication, regular assessment and feedback mechanisms, opportunities for collaborative learning, flexibility in scheduling, and a commitment to accessibility, data security, and privacy. Furthermore, it values continuous professional development for instructors, a culture of evaluation and improvement, well-defined policies and procedures, financial support for students facing economic barriers, and active engagement from the wider educational community. Altogether, these elements converge to create an inclusive, engaging, and effective online learning ecosystem tailored to meet the diverse needs of students.

In an ideal situation, learning in Kenya's TVET institutions should have progressed seamlessly during the COVID-19 pandemic as opined by Abuya (2022). Research carried

out by (Kimuge et al., 2021) found out that most institutions started a form of online teaching though not for all courses. Those courses that were highly theoretical were able to progress to some level by trainers sending notes by email and trainees downloading them in cybercafés. Assignments were sent mainly through email because very few institutions had established a learning management system. Most TVET institutions were not able to offer examinations online. This was due to several factors including and not limited to connectivity for trainees, lack of skills to set online examinations by trainers compounded by absence of a learning management system.

There was no policy regarding trainer's uptake of online teaching hence several trainers found no need to spend money to purchase data. Furthermore most trainers had no prior preparation or guidance on how to prepare online lessons compounded by inability to navigate the hurriedly introduced learning management systems. Zoom, google classroom, power point and many other online terminologies were a new phenomenon to the trainers and trainees likewise. Currently though TVETs are funded by the government there is no policy that allocates funds to online distance teaching and learning. This onus is left for the management to allocate funds. Due to scarcity of funds, most resource allocations end up in infrastructure and recurrent expenditure.

Adequacy and accessibility of technological infrastructure, such as internet connectivity, hardware, and software, in TVET institutions to support online curriculum implementation are wanting. Digital skills and competence has not received significant recognition it deserves by any training institution countrywide. After introduction of online studies, the management did not consider digital skills possessed by the trainers and trainees that would reveal their competence to effectively engage with online teaching and learning platforms.

Availability of online digital materials used for teaching and learning has been a thorny issue due to cost and lack of skills to make materials that are relevant and adequate in form and structure to support this transition.

Findings from the study provide valuable insights on the current preparedness of online distance teaching and learning in TVET institutions in Kenya and identify areas that require improvement. This, in turn, will inform policymakers, educators, and stakeholders in the field of TVET about the necessary steps to enhance preparedness and effectiveness in curriculum implementation through online distance teaching and learning, ultimately contributing to the advancement of technical and vocational education in Kenya.

### **1.3 Purpose of the Study**

The primary purpose of this research study was to assess and analyze the level of preparedness for curriculum implementation in the context of online distance teaching and learning within the Technical and Vocational Education and Training (TVET) sector in Kenya. Specifically, this study aimed to investigate the availability and adequacy of technological infrastructure, training and skills development support, availability of instructional resources, and financial support systems for effective curriculum implementation through online distance education in TVET. The study provided recommendations and insights for enhancing the preparedness of TVET institutions in Kenya to effectively implement curriculum through online distance teaching and learning, with the ultimate goal of improving the quality of technical and vocational education in the country.



#### **1.4 Research Objectives**

The research was guided by the subsequent specific aims.

- i. Determine the availability of information communication technology infrastructure in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya.
- ii. Assess the availability of ICT user training and skills development support in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya
- iii. Examine the availability of appropriate online distance teaching and learning instructional materials in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya.
- iv. Assess the availability in financial support from various stake holders in readiness to implement online distance curriculum in National TVET institutions in Kenya
- v. Investigate the extent to which TVET policy moderate the preparedness and curriculum implementation of online distance teaching and learning in TVET institutions in Kenya.

#### **1.5 Research Questions**

- i. What ICT infrastructure is available for use in the implementation of online teaching and learning in TVET Institutions in Kenya?
- ii. What online ICT training and skills development support programs are available for learners and trainers for online teaching and learning in TVET Institutions in Kenya?

- iii. What teaching and learning materials are available for teaching and learning online programs in TVET Institutions in Kenya?
- iv. Are there faculty and learner financial support services for implementation of online teaching and learning in TVET Institutions Kenya?
- v. To what extent does TVET policies moderate preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya?

### **1.6 Justification of the Study**

Technological advancement and natural disasters like COVID-19 pandemic have underscored the critical importance of having resilient education systems that can adapt to technology and unforeseen challenges. This is expounded in the Kenya economic report of 2020. Hence investigating the preparedness of TVET institutions in Kenya for online distance teaching and learning is vital to ensure adaptation to the technological changes and also the continuity of education in times of crises. As the world becomes increasingly interconnected and reliant on digital technologies, the integration of online teaching and learning is a global trend. Assessing the readiness of TVET institutions to embrace this shift aligns with Kenya's education system with international standards and practices (Session paper no 1 of 2019).

Online distance teaching and learning can enhance access to quality education, especially for students in remote or underserved areas. This research has shed light on the extent to which TVET institutions are expanding their reach to provide equitable education opportunities. Identifying the resources needed for successful online curriculum implementation has informed resource allocation strategies. A careful survey of technical institutions revealed there was an urgent need for the provision of ICT infrastructure, as

revealed by the 2018 Training Needs Assessment Survey for effective teaching, particularly online distance learning. The government promises to build the capacity of managers, lecturers, trainers, teachers and instructors to integrate ICT in education, training and research session paper no. 1 of (2019). This research has guided institutions and policymakers in prioritizing investments in ICT infrastructure, skills training, and financial allocations as guided by the national policy.

TVET trainers need specialized skills training to effectively deliver online courses. Investigating their preparedness has highlighted the need for professional development programs to equip educators with the necessary skills for online teaching. This need augurs well with the government policy of session no 1 (2019) that justifies promotion of continuous professional development for TVET trainers;

The research helps foster collaboration among stakeholders, including government bodies, TVET institutions, and technology providers. Engaging these parties can lead to more comprehensive solutions and support for online education initiatives. Online education contributes to economic growth by producing a skilled workforce. Evaluating the readiness of TVET institutions in this context has positive implications for Kenya's economic development.

Assessing the preparedness of TVET institutions can reveal potential disparities in access to online education. This information will guide policies aimed at reducing inequalities and ensuring that no trainee is left behind. The findings from this research have informed the development of a long-term educational strategy for TVET institutions, enabling them to remain adaptable and resilient in the face of future challenges. Research on the

preparedness of curriculum implementation in national TVET institutions in Kenya through online distance teaching and learning has given crucial steps towards improving the quality, accessibility, and sustainability of technical and vocational education. This research will shape policies, resource allocation, and strategies that is beneficial to trainees, educators, and the nation as a whole.

### **1.7 Limitation of the Study**

This study exclusively concentrated on Technical and Vocational Education and Training (TVET) institutions in Kenya that have established and maintain a robust Open and Distance eLearning (ODEL) center. Institutions lacking such a center were not included in the scope of this research. The three national TVET institutions were Kabete National Polytechnic and Meru National Polytechnic and Nyeri National Polytechnic. These three have established ODeL in their institutions and currently offering online classes. The study was limited to the department of applied sciences exclusively. Applied sciences form the basis of many technological advancements and real world applications. The applied sciences are also in high demand and essential in various technologically related careers (Boshale, 2023).

### **1.8 Scope and Delimitations of the Study**

The study was carried in a selection of three National TVET institutions. Results were generalized to cover other national TVET institutions in Kenya. The study was limited to those programs offered online at diploma level in the school of applied sciences. The courses in applied sciences purposively selected are practical oriented and require a lot of hands-on experience.

The study specifically targeted second-year diploma students within the selected TVET institutions. Students from other academic levels were not considered in this research. Diploma trainees were selected because they had an experience in online learning. The results were generalized to other courses at higher national diploma and certificate courses within the TVET institution in Kenya.

The study further considered only those TVET institutions that possess adequate resources, including technological infrastructure and personnel, to effectively support online distance teaching and learning. Institutions lacking these resources were not included in the research. Kabete, Meru and Nyeri polytechnics qualified in all these areas. The research was conducted within a defined time frame of six months to one year, focusing on the preparedness of the selected TVET institutions for online education for a specific period as explained by (Akanle et al., 2020).

Indeed applied sciences are applicable and relevant in all spheres of life today. On the sample choice, the factor of relevance and demand was considered. All the national TVET institutions offer different programs and applied sciences diploma programs were studied because they are offered by all the national institutions. The sciences continue to face severe challenges in preparation of online materials (Obwoye & Okemwa, 2016). Choice of applied sciences is justified by the relevance and demand, compatibility with online learning platforms, the potential for increasing accessibility and inclusivity, and the need to adapt to changing educational landscapes. The programs in applied sciences included fields such as Laboratory technology, applied biology, industrial chemistry, cosmetology, and other practical or hands-on disciplines. Any developments or changes that occurred after this time frame were not considered in the research. Therefore this study focused on

readiness and did not carry out any comparative studies. It also did not assess trainee's performance nor check their cumulative grades achieved online.

### **1.9 Significance of the Study**

From this research, TVET managers will be informed of areas that require improving or attending to if online distance education has to succeed. The findings from this study was to identify gaps present in implementation of online teaching and learning curriculum and form a basis for retraining and capacity building amongst the trainers if need be. The findings also were to enable the policy makers to make informed decisions on the curriculum implementation needs and target the finances to the identified needs. Issues such as connectivity to electricity from the national grid would be enhanced by the government too if the need is identified by the study.

The study findings from learners and would also improve the learning experiences for them. This would also lead to attraction of more of the trainees to these TVETs. The outcomes of this research would serve as invaluable insights for the Kenyan government, specifically the Ministry of Education, Science, and Technology, in formulating well-defined guidelines for the effective implementation of curricula through online learning. The policies would in the future direct the development of uniform procedures and methods for delivering curriculum online.

### **1.10 Assumptions of the Study**

The research was carried out under the assumption that participants would truthfully respond to all survey items of the study, and that the collected data was reliable and effectively evaluated the state of readiness for online distance teaching and learning. It was

also assumed that TVETs in Kenya had a need to know how infrastructure, ICT skills, digital materials and TVET policies influence readiness with the purpose of improving quality of distance teaching and learning. The study also assumed that both trainers and trainees have been inducted and oriented in ODeL mode of study.

### 1.11 Operational Definition of Terms

This study incorporated the following key terms, and their respective contextual explanations are provided below:

**Access:** Provision of education courses anytime anywhere.

**Constructivism:** Teaching philosophy based on the concept that learning is a mental construction.

**Conventional Education:** It describes a typical classroom setting an institution school, where both the trainer and trainees are present in person at the same time.

**Curriculum implementation:** Involves the translation of the curriculum's goals, content, and strategies into actual teaching and learning activities in the classroom.

**Digital learning Material:** These include videos, organized content modules, sample guidelines, and demonstration videos.

**Distance learning Mode:** educational practices in which the instructor is separated from learners by physical distance

**Distance Teaching:** Teacher-centered instruction where the teacher and learner are physically or temporally separated from each other.

**E-learning:** The process of impacting knowledge that is facilitated and enhanced through the utilization of electronic Information Communication Technologies (ICT)



**Equivalency theory:** posits that while distance education may differ from traditional face-to-face education, it can still achieve comparable outcomes and effectiveness.

**ICT infrastructure:** Hardware and software essential for establishing and maintaining communication services, systems, and networks.

**ICT skills:** These include skills in technical competence, managing information, communicating effectively, collaborating well, thinking analytically, being creative, and possessing problem-solving abilities

**Implementation:** is the action of putting into practice a teaching plan, decision, proposal, idea, or policy that has been reached.

**Institution:** An academic institution an organization founded for educational purpose.

**Management:** Academic members of staff who serves at the top-level management and who are involved in most decision-making process. These include the Principal the Deputy Principal and departmental heads.

**Online instructional materials:** Educational content or information disseminated as part of a course. These materials encompass lectures, readings, textbooks, multimedia elements, and various resources integrated into the course's framework.

**Online distance learning:** Learning where students educate themselves without in-person interaction among peers or an instructor.

**Online distance teaching:** An educational approach characterized by the geographical separation of instructors and learners during the teaching process, facilitated by the application of diverse technologies to enable communication between students and teachers.

**Online learning:** Online instruction is offered by faculty through the Internet and consists of both real-time (synchronous) and anytime, anywhere (asynchronous) interactions.

**Preparedness:** Involves putting together a scheme of work, a lesson plan, and the relevant teaching strategies after identifying the learning objectives, teaching resources, and assessment instruments.

**Readiness:** State of mental readiness to teach and learn online.

**Technical:** Refers to subjects that possess a technical essence, encompassing hardware and software components, which involve engaging in engineering procedures

**Training:** Referred to as informal education. It is frequently employed in endeavors aimed at enhancing the skills or knowledge of TVET workforce through initiatives related to reskilling or up skilling.

**TVET policy:** Outlines a structured strategy for attaining a unified and synchronized method towards post-school training.

**Vocational:** Courses that are learnt through hands-on skills within professional trades and frequently referencing practical abilities.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Technical and Vocational Education and Training (TVET) institutions in Kenya have witnessed a significant shift towards online distance learning in recent years. This literature review examines existing research and scholarly work related to the preparedness of curriculum implementation through online distance learning in the context of national TVET institutions in Kenya. The literature was reviewed under the following headings. The concept of online education, availability of ICT infrastructure, availability of user training and support for skills development, availability of online education materials, availability of support services for learners and teachers and the impact of TVET policies and how they influence curriculum delivery. Also included is a theoretical frame work which analyses the constructivist and equivalency theories and how they may be used to tackle the problem under investigation. The section culminates with a subsection dedicated to the theoretical review, conceptual framework, and a concise summary of the study's literature review.

#### **2.2 Online Distance Education**

Distance online education, as a discipline, encompasses the study, development, and application of educational practices and technologies that facilitate learning at a distance, primarily through online platforms. This field delves into the design of effective online courses, the development of engaging digital content, the use of pedagogical strategies tailored for virtual environments, and the exploration of tools and methods for assessing learning outcomes in online settings (Simonson, Smaldino, & Zvacek, 2014). Its

significance lies in its ability to democratize education, making learning accessible to individuals regardless of geographical constraints, providing flexible learning options for diverse student populations, and promoting lifelong learning (Bates, 2019). Additionally, online distance education responds to the ever-evolving demands of the digital age, preparing learners to navigate and thrive in a global, knowledge-driven economy (Bates, 2019). Furthermore, it plays a vital role in addressing educational disparities, widening access to education, and fostering innovation in teaching and learning practices (Allen & Seaman, 2017).

### **2.2.1 Concept of online Distance Teaching and Learning in National TVET**

#### **Institutions in Kenya**

The history of online schooling is a fascinating journey that spans several centuries. While it may appear that online education emerged primarily in the late 1900s, the concept of distance learning can be traced back to the mid-19<sup>th</sup> century, when the U.S. Postal Service played a pivotal role in its development. The notion of reliable, long-distance correspondence during the mid-1800s laid the groundwork for what would later become known as "commercial correspondence colleges." These institutions facilitated educational interactions by distributing instructional materials through the postal service, fostering communication between students and professors. Over time, the landscape of distance education has evolved significantly, thanks to the proliferation of the internet and digital technology. In today's world, elite educational institutions across the globe offer open courseware, online degree programs, and virtual classes, thereby legitimizing and popularizing the concept of education delivered through computer-mediated means.

The year 1953 witnessed a significant milestone when the University of Houston made history by launching the first televised college classes on KUHT, which eventually became known as Houston PBS (OnlineSchools.org). Operating under the motto "The Channel That Changes You," KUHT dedicated a substantial portion of its broadcast time, approximately 38%, to educational content. Many of these courses were scheduled in the evening, catering to the needs of working individuals who sought to access educational material after their daytime commitments.

The World Wide Web (WWW) was introduced in the early 1990s, enabling the creation of websites and online content. This opened up new possibilities for online education, and universities began experimenting with web-based courses and virtual learning environments. Learning Management Systems (LMS) emerged as comprehensive platforms in the late 1990s and early 2000 to manage and deliver online courses. Institutions started adopting LMS platforms to host and organize digital course materials, communication tools, and assessments. Online education gained momentum in the 2000s with the proliferation of internet connectivity, increasing computer literacy, and the development of multimedia technologies. Many universities and educational institutions expanded their online course offerings, making education more accessible to a broader audience (Thomson, 2023).

Following the era of television, the advent of personal computers and the internet marked the next major revolution in distance education. In 1989, the University of Phoenix achieved a groundbreaking feat by becoming the first institution to establish a fully online collegiate institution offering both bachelors and master's degree programs. Subsequently, in 1996, entrepreneurs Jones and Luskin introduced Jones International University,

distinguishing itself as the first accredited and entirely web-based university. These institutions heralded a new era in online education. Massive Open Online Courses (MOOCs) emerged as a significant development in the late 2000s. MOOCs offered free or low-cost online courses to a large number of participants worldwide, leveraging video lectures, interactive assessments, and discussion forums as explained by Chai and Wigmore (2023).

Since the inception of fully online programs and institutions, the landscape of distance learning has continued to expand in diverse directions. In 2003, the Blackboard Learning System reported a significant milestone, with 40,000 instructors teaching 150,000 online courses to over 6 million students across 55 countries, underscoring the global reach of online education. The 2010s witnessed a significant growth in online education, with increasing numbers of institutions offering fully online degree programs. Blended learning, which combines online and in-person instruction, gained popularity as a flexible and personalized approach to education too.

Natural disasters, diseases like Covid-19, and the desire for greater knowledge have all contributed to significant development in the field of online education (Zeng, Bender and Lyon, 2021). Survey results by Zeng et al, revealed that most online courses were well accepted by the students, and 80 % of them wanted to continue with some online instruction post pandemic. In online studies, class boundaries do not exist and teachers' presence in a face to face mode is reduced or minimized. The essential nature of the learning process has experienced a significant transformation due to the emergence of the internet. Learning is now accessible to everyone and outside of traditional classroom settings thanks to the advances in technology. As explained by Santos (2022), even though the trainers and

students are separated from one another in both time and space during the learning process, effective teaching and learning can still occur.

Today, online education has become integral to higher education, with an estimated one in four college students enrolled in at least one online class. In 2009, more than 4.5 million students were engaged in online learning, with the Master of Science in Business Administration (MBA) emerging as one of the most sought-after degrees offered online in the United States. This trend shows no signs of abating, as currently, 83% of all U.S. institutions offering online courses anticipate a further increase in online enrollment in the coming decade, indicating a promising future for online education. In conclusion, online learning has transformed into a mainstream and indispensable component of higher education, offering learners worldwide flexibility and convenience in pursuit of their educational goals.

### **2.3. Availability of ICTs Infrastructure**

The rapid evolution of Information Communication Technology (ICT) has transformed the landscape of education, ushering in an era of online distance teaching and learning. In this digital age, the availability and adequacy of ICT infrastructure are pivotal factors in determining the readiness of educational institutions to effectively implement curriculum through online distance teaching and learning. This literature review examines existing research on the status of ICT infrastructure in educational settings and its role in preparing institutions for online curriculum delivery.

In Japan, Technical and Vocational Education and Training (TVET) institutions are equipped with robust Information Communication Technology (ICT) infrastructure,

featuring high-speed internet access, state-of-the-art computer labs, digital learning platforms, interactive classroom technologies, extensive e-libraries, and online resources. These institutions have demonstrated adaptability by implementing remote learning solutions, ensuring uninterrupted education, even during global events like the COVID-19 pandemic. Moreover, TVET programs incorporate ICT training to equip students with vital digital literacy and ICT skills. Collaborations with industry partners further enrich the learning experience, providing students with practical exposure to cutting-edge technologies and industry trends (Japan MoE, Culture, Sports, Science and Technology, MEXT, 2020)

The availability of Information Communication Technology (ICT) infrastructure in Malawi's TVET institutions may vary, but efforts have been made to enhance digital resources and connectivity in recent years. Malawi's government and international organizations have recognized the importance of ICT in education and have undertaken initiatives to improve access to technology in TVET institutions. These initiatives include providing computer labs, internet connectivity, and digital learning resources.

The availability of robust ICT infrastructure within educational institutions is fundamental to the success of online distance teaching and learning. Studies by Muhammad and Kainat (2020) found in their study that in Kenya internet access problems, and a lack of technological facilities challenge the efficacy of online learning. Studies by Bates (2019) and Smith (2020) emphasized the necessity of well-maintained hardware and high-speed internet access for both trainers and trainees.



According to a study conducted by Hazwani et al. (2017), an institution's infrastructure plays a significant role in ensuring that online learning operates successfully. Poor infrastructure and trainees' inability to access the internet hampers fruitful online distance learning performance. Adequate internet connectivity is a critical component of ICT infrastructure readiness. Alampay (2018) underscores the importance of reliable internet access for uninterrupted online learning. The availability of broadband and affordable data plans is pivotal in ensuring that students and instructors can access online resources without disruption. Recent studies emphasize the significance of preparedness in ICT infrastructure for the successful implementation of online distance studies in TVET.

A study conducted by Hua and Seet (2020) highlighted the importance of reliable internet connectivity and adequate bandwidth for seamless online learning experiences. The study emphasized the need for educational institutions to invest in robust internet infrastructure, ensuring that students and teachers have access to stable and high-speed internet connections. Furthermore, the authors emphasized the need for backup power systems to mitigate the challenges posed by frequent power outages in some regions of Kenya. Amutha (2020) pointed out many countries have substantially improved ICT tools in teaching and learning institutions but challenges remain for teachers and learners at home due to poor internet connection.

A study on electrical connectivity carried out by Gichohi and Osiemo (2022) found out that most national TVET colleges were connected to the mains but was not sure of the presence of emergency measures like availability of back up measures like uninterrupted power supply and electric generators. The study noted that only a few of the TVETs institutions

were able to embrace Open, Distance and E-learning (ODEL). In a recent report by the Kenya news agency, it was noted that with improved internet infrastructure in the technical institutions, the trainees would be exposed to cutting-edge technical technology used in other countries and which they would employ locally (Gichohi and Osiemo, 2022). The research highlighted the necessity of equipping students and instructors with suitable devices such as laptops, tablets, or smartphones to access online learning platforms and resources.

Studies by Haddad (2016) and Lee (2019) delve into the importance of having up-to-date hardware and software resources. Insufficient or outdated equipment can lead to frustrating user experiences and hinder effective curriculum delivery. Another study by Ramadan et al (2018) focused on the hardware requirements for online distance studies in Kenya TVET. The study stressed the importance of institutions providing guidelines and support to ensure students have access to appropriate hardware, thereby reducing barriers to participation and ensuring equity in education. Software infrastructure is another critical aspect of ICT preparedness in online distance studies.

A study by Nzioki et al. (2020) in Kenya emphasized the importance of utilizing learning management systems (LMS) that facilitate effective content delivery, interaction, and assessment. The study highlighted the need for educational institutions to select and implement user-friendly LMS platforms that support multimedia content, collaborative tools, and assessment features. Additionally, the research underscored the significance of ongoing technical support and training to enable instructors and students to navigate the software effectively.

The maintenance and regular upgrading of these resources are essential for readiness.

Digital skills support and training for both educators and learners play a crucial role in the readiness to implement online curriculum. Researchers like Clark (2020) and Taylor (2017) argue that institutions must provide adequate training to ensure that users can navigate online platforms effectively. Additionally, responsive technical support is vital to troubleshoot issues that may arise during online learning.

Zimbabwe has seen exponential growth in mobile and internet usage. Zimbabwe's National ICT Policy (2016) liberalized the ICT sector and since December 2019 the number of internet users in the country has increased with subscription rates exceeding 95%. The policy aims to ensure a dynamic ICT sector to ensure efficient and adequate telecommunications and internet services throughout the country. In conclusion, the readiness of educational institutions to implement curriculum through online distance teaching and learning is intricately linked to the availability and adequacy of ICT infrastructure.

A significant research gap in the provision of ICT infrastructure in TVET institutions in Kenya are the lack of comprehensive studies that assess the specific ICT infrastructure needs of these institutions. Understanding the unique requirements of TVET programs, including specialized software and equipment for technical skills training, is essential for effective integration of ICT into the curriculum. This research investigated the availability of specific ICT tools and resources needed in TVET, as well as the challenges in meeting these needs, as this was valuable in guiding infrastructure development for the stakeholders.

To add to this, there is also a research gap in assessing the impact of ICT infrastructure on the outcomes of TVET programs in Kenya. While there is recognition of the importance of ICT in enhancing vocational training, there is limited empirical research on how the availability and utilization of ICT resources influence student learning outcomes, employability, and the alignment of TVET programs with industry needs. This research investigated the availability of ICT integration in TVET institutions and its role in producing skilled graduates who meet industry demands to inform policy and investment decisions in this sector.

As demonstrated by the literature discussed, the provision of reliable internet connectivity, up-to-date hardware and software resources and technical support are all critical components in ensuring the success of online education. Moving forward, institutions must prioritize the development and maintenance of robust ICT infrastructure to meet the evolving demands of online education.

#### **2.4 Availability of Trainee and Trainer ICT Skills Supports Services**

Natural catastrophes and pandemics have disrupted teaching and learning in unexpected ways, forcing educators to carefully contemplate a future in which the majority of training delivery and assessment may have to be online. However, before committing to this pedagogical shift, there is a need to establish, rank in terms of prevalence and thus address related challenges. This section captures a literature review on preparedness in TVET skills delivery acquisition and assessment in the context of trainees and trainers.

In the United States and the United Kingdom, efforts to enhance ICT skills in Technical and Vocational Education and Training (TVET) have been robust in recent years. In the

U.S., a diverse array of training programs is available through vocational schools, community colleges, and online platforms. Certifications from respected organizations like CompTIA and Cisco are highly valued in the IT industry. Additionally, digital literacy initiatives, often sponsored by states and organizations, aim at providing basic ICT skills to TVET students and educators. These initiatives focus on areas such as computer literacy, internet safety, and proficiency in common software applications. Public-private partnerships are instrumental in narrowing the ICT skills gap, with tech companies collaborating with educational institutions to offer training, resources, and scholarships. Microsoft's partnership with schools to provide access to Microsoft Office and coding programs is a notable example (Future learn, 2018).

In the United Kingdom, apprenticeship programs have played a crucial role in enhancing ICT skills among TVET trainees. These programs offer hands-on experience in IT fields like software development, cybersecurity, and IT support. Government initiatives, such as the "Digital Skills for All" campaign, aim to provide free digital skills courses to adults, including those in vocational education (Open University 2018). Industry-recognized certifications, akin to those in the U.S., hold significant value and are often integrated into TVET programs. Organizations like the British Computer Society (BCS) offer certifications in various IT disciplines. Additionally, online resources provided by institutions like the Open University and Future Learn offer a wide range of ICT courses, some of which are free or available at a low cost (open university, 2018).

These resources are readily accessible to TVET trainees and trainers, serving as valuable supplements to their skill development efforts (Future Learn, 2018). In both nations, the

acknowledgment of the pivotal role played by ICT skills in vocational education is underscored by these diverse initiatives and partnerships. These efforts are aimed at equipping TVET students and educators with the essential skills needed to succeed in an increasingly digital world.

Saka (2021) explains that, Malawi, the government has recognized the vital role of ICT skills in Technical and Vocational Education and Training (TVET). They have taken proactive steps by launching initiatives aimed at supporting both TVET trainees and trainers. These initiatives encompass various activities, including the provision of ICT training programs, workshops, and the integration of digital literacy into the curriculum. Additionally, non-governmental organizations (NGOs) actively collaborate with TVET institutions to offer ICT skills support services. These NGOs provide valuable resources, training, and equipment to enhance the digital capabilities of both trainees and trainers. Furthermore, Malawi benefits from international partnerships with organizations and countries that contribute expertise, funding, and educational resources to strengthen ICT skills in the TVET sector (Saka, 2021).

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In Ghana, the government has spearheaded initiatives to fortify ICT skills within the TVET domain (UNESCO, 2018). These initiatives encompass policy implementation, budget allocation, and the establishment of specialized training centers dedicated to enhancing digital literacy among TVET participants (UNESCO, 2018). Furthermore, the private sector, particularly technology companies and telecommunications providers, actively engage with TVET institutions. Their involvement includes initiatives such as equipping institutions with modern ICT tools, establishing ICT labs, and offering training programs. Additionally, technical and vocational education and training authorities in Ghana play a pivotal role in offering ICT skills support services, ranging from curriculum development to teacher training and certification programs as explained by Buabeng-Andoh (2019).

Nigeria boasts a comprehensive National ICT Policy that outlines strategies for developing ICT skills across various sectors, including TVET (ref). This policy provides a robust framework for integrating ICT into vocational education. Higher education institutions in Nigeria, including universities and polytechnics, contribute significantly to ICT skills support services within TVET. They offer specialized training programs designed to enhance the ICT proficiency of both instructors and students. Moreover, private sector entities in Nigeria, particularly those in the technology and telecommunications sectors, actively collaborate with TVET institutions. Their involvement encompasses the donation of equipment, sponsorship of ICT-related programs, and mentorship opportunities, contributing to the development of a well-rounded ICT skill set among TVET participants.

Overall, in Malawi, Ghana, and Nigeria, concerted efforts involving government initiatives, private sector engagement, and partnerships with educational institutions and international organizations aim to strengthen ICT skills within TVET. These endeavors collectively strive to equip TVET trainees and trainers with the essential digital competencies necessary to excel in today's technology-driven world (Buabeng-Andoh, 2019).

The availability of learner and trainer Information Communication Technology (ICT) trainer skill support services is crucial for successful implementation of curriculum through online distance teaching and learning. Common support services that are typically required include technical skills support that encompasses assistance with technical issues related to the online learning platform such as login problems, troubleshooting issues, and software and hardware issues ensuring a smooth user experience.

ICT proficiency is vital in equipping TVET students with essential skills for the job market. Studies have emphasized its significance in enhancing problem-solving abilities, promoting self-directed learning, and preparing students for technology-driven careers (Maaita, 2021; Kim, 2022). The readiness of TVET institutions to implement ICT integration has been investigated by several researchers. Alkahtani and Ali (2021) examined the current state of infrastructure and technical support in Saudi Arabian TVET institutions, highlighting areas for improvement as ICT skills. In another study, Liu and Wu (2022) assessed faculty readiness and found that targeted training programs on ICT skills significantly improved educators' confidence and abilities to integrate ICT into their teaching.



As noted, most trainees face problems of remote training skills and lack of digital tools due to low socio-economics background (UNESCO-UNEVOC International Centre, 2020). Technical support to such trainees can be offered through email, chat, or dedicated helpdesk services as explained by (Brolpito, 2018). Irfan and Iman (2020) contend that online learning is ineffective and if conducted inappropriately. They demonstrate this with reference to teachers' inability to implement online learning due to lack of ICT skills.

Research conducted by Seif (2020) on the determinants impacting the utilization of information and communication technology (ICT) in the online instruction and learning of science-related subjects revealed that both students and educators in NePAD and cyber e-schools lacked adequate training in ICT skills usage.

As Hua and Seet (2020) explains ,Learning Management System (LMS) skills Support is also necessary as its support is focused on helping learners and trainers navigate and utilize the features of the learning management system effectively. This support includes providing guidance on accessing course materials, submitting assignments, participating in discussions, and taking assessments within the LMS. Ismail et al., (2018) carried out studies on challenges facing vocational trainers. He found out that difficulties arose mainly due to lack of a budget to facilitate studies to enhance their knowledge and skills, and compounded by heavy workload.

On Orientation and onboarding skills, trainees and trainers need proper orientation and onboarding skills to become familiar with the online learning environment. Research shows longer time is needed to prepare teaching materials and improve IT skills before class (Lie et al., 2020). Training can involve introductory webinars, tutorials, or self-paced

modules that explain how to use the platform, access resources, and engage in online activities as suggested by Shatuma (2020).

Research conducted by Naiker and Makigato (2018) suggest that when considering the need for TVET trainers, a comprehensive retraining package should be provided. This research was supported by Mugnai and Ndirangu (2022) who examined the successful implementation of an online curriculum in a Kenyan TVET institution and found out that skills for trainers and trainees need to be enhanced if curriculum was to be efficiently implemented. In another study, Liu and Wu (2022) assessed faculty readiness and found that targeted skills training programs significantly improved trainer's confidence and abilities to integrate ICT into their teaching.

In the area of content support, Liu and Wu (2022) suggest that services could be offered to assist learners and trainers in understanding and interpreting the curriculum materials. This can include providing additional explanations, examples, or resources to supplement the core curriculum and enhance comprehension as supported by Gichohi and Osiemo (2022). According to Naiker (2018), trainers cannot be presumed to have acquired the necessary pedagogical knowledge and skills to guide their teaching practice, much less the technological expertise necessary to incorporate technology into their pedagogy. There is a huge need for TVET trainers to be proficient in both the subject and pedagogical components of their teaching process not forgetting that colleges don't provide enough TVET teachers training in online skills. As their teaching career develops, most trainers require continual assistance.

A study by Kimani et al. (2023) highlighted the need for comprehensive training programs for TVET instructors to equip them with the pedagogical and technological skills required for online teaching. The study emphasized the importance of providing continuous professional development opportunities that focus on instructional design, online assessment strategies, and digital literacy. Kimani et al (2023) recommended partnerships between educational institutions and industry stakeholders to ensure TVET instructors are adequately prepared to deliver high-quality online instruction.

A full time helpdesk service that operates 24/7 goes a long way in supporting the trainees. In online learning environments that operate on a global scale, it can be beneficial to have a dedicated helpdesk service that is available 24/7 to address urgent technical issues or provide immediate support to Trainees and trainers in different time zones as explained by Gopal et al (2021). Financial constraints and limited resources have been identified as significant barriers to skills training (Elçi & Bozkurt, 2021). Resistance from educators to adapt their teaching methods and incorporate technology has also been observed as found out by Rasheed et al. (2021).

On assessment and feedback, Mutebi, et al. (2023) found out that learners benefit from timely and constructive feedback on their assignments, assessments, and overall progress in their research paper. Lack of feedback and real-time interaction between trainers and trainees impacted negatively in trainee's academic progress as explained by Mutebi et al. (2023). Trainers should provide clear grading criteria and offer feedback that helps learners understand their strengths and areas for improvement. On ability to examine, mark and grade online work, Gopal (2021) found out there was as a big challenge in marking and

grading learners work due to failure to configure useful software's that could easily grade essay questions

Professional development programs should be provided to help trainers acquire the necessary skills and competencies for online teaching. This may include training on the application of learning management systems, creating engaging multimedia content, facilitating online discussions, and assessing student learning remotely (Asian Development Bank, 2019).

One major gap in the provision of ICT skills development to trainers and trainees in TVET in Kenya is the limited focus on up-to-date and industry-relevant ICT skills. Many TVET institutions often provide ICT training that may not align with the rapidly evolving technological landscape and industry demands. This gap means that trainers and trainees may not be adequately prepared to work with the latest technologies and tools required by employers, hindering their employability and the overall competitiveness of graduates in the job market. Addressing this gap would require regular updates to the ICT curriculum to ensure it reflects current industry needs and trends, as well as opportunities for continuous professional development for trainers to keep their skills current. This research investigated the availability of ICT proficiency in trainees and trainers.

## **2.5 Availability of ODeI Instructional Materials**

Distance online teaching and learning instructional materials refer to educational resources and materials that are specifically designed for remote teaching and learning through online platforms. The onset of the COVID-19 pandemic led to a surge in the awareness and accessibility of digital instructional materials, as evidenced by reports from Education Week (2020) and UNESCO (2020). With the closure of school in Kenya and elsewhere, a

shift to remote online learning became the norm, replacing traditional in-person education. This abrupt transition prompted educators who had previously been infrequent or non-users of digital instructional materials to quickly adapt and incorporate them into their teaching methods.

These materials are developed to facilitate the delivery of instruction, engagement of students, and assessment of learning in an online environment. No single technology can adequately support all forms of distance teaching and learning. The most effective approach is to integrate a variety of technologies. Utilizing multiple technologies ensures that diverse learning styles are accommodated and creates ample opportunities for interaction between trainee and trainers. Online instructional materials include and are not limited to Digital textbooks, these are textbooks that are available in digital formats, accessible through computers, tablets, or e-readers. These may include interactive features, embedded multimedia content, and hyperlinks to additional resources (Charterjea, 2018).

Lecture notes and presentations form another material used in online distance teaching and learning. Digital documents or slides that provide lecture content, explanations, and key concepts are also included. These materials can be shared with students for self-study or used during synchronous and asynchronous online lectures (Cope, 2021). Video Lectures which may be pre-recorded presentations by trainers or subject matter experts, covering various topics of the curriculum can also be included. These videos can be accessed by trainees at their convenience, allowing them to pause, rewind, and review the content as needed (Yeap et al., 2021). Lie et al.'s research in 2020 highlights that trainers' prior exposure to online learning materials, technological proficiency, pedagogical knowledge, and available support systems significantly influence their level of engagement in online

education. Hoftijzer et al. (2020) also point out that certain hands-on activities necessitate specific equipment, making e-learning less effective compared to traditional methods. In the context of Technical and Vocational Education and Training (TVET), online learning proves most beneficial for theoretical subjects. However, for the practical component of TVET, particularly in applied sciences, additional solutions are required, as emphasized by Majumdar and Araiztegui (2020).

Interactive multimedia resources are materials, such as simulations, animations, virtual labs, and educational games. These resources provide interactive learning experiences, allowing trainees to explore concepts and apply their knowledge in a virtual environment (Cope, 2021). Online quizzes and assessments are Digital assessments designed to evaluate trainees' understanding and progress. These may include multiple-choice questions, short answer questions, or interactive quizzes with immediate feedback (Chartterjea, 2018). In light of the evolving teaching and learning landscape, educators must adjust their pedagogical approaches, strategies, methods, classroom management techniques, and assessment methods to online studies. With the shift towards new norms in education, instructors' preparedness for e-learning is a critical factor. Adequate time is required for them to ready teaching materials, enhance their IT proficiency, and refine their skills in online pedagogy and assessment. These aspects are pivotal for instructors to effectively facilitate their lessons through e-learning (Nasir et al., 2018; Nasir, 2020)

Discussion forums and collaboration tools are online platforms or tools that enable trainees to participate in discussions, ask questions, and collaborate with their peers and trainers. These platforms facilitate communication and interaction, promoting active learning and knowledge sharing as explained by Cope (2021). Learning Management Systems (LMS)

are online platforms or systems that facilitate the management, delivery, and tracking of educational courses. LMSs often provide features for content delivery, assignment submission, grading, communication, and collaboration. Webinars and Virtual Conferences: Live online presentations or discussions conducted through web conferencing tools. These sessions allow for real-time interaction, Q & A sessions, and guest lectures. The availability of online distance teaching and learning instructional materials is crucial for the successful implementation of curriculum through online distance education in Kenya.

On curriculum implementation, effective curriculum implementation through online distance education, it is essential to have appropriate instructional materials available online. These materials may include textbooks, lecture notes, video lectures, interactive quizzes, assignments, and other supplementary resources. They should be designed to meet the learning objectives of the curriculum and be accessible to students through online platforms. Educational institutions, curriculum developers, and teachers should collaborate to create and adapt instructional materials for online distance teaching and learning. This may involve converting existing materials into digital formats, developing new resources specifically designed for online delivery, or utilizing open educational resources (OER). Training and support for trainers should go together with development of online materials. Trainers need training and support to effectively use online instructional materials and platforms. This may include training on the use of learning management systems, creating engaging multimedia content, facilitating online discussions, and assessing student learning remotely (Gopal et.al., 2021).

Quality assurance ensures the quality of online instructional materials is essential. Curriculum developers and educational institutions should maintain quality standards in the design and development of materials. This includes accuracy, relevance, comprehensiveness, and alignment with the curriculum objectives. Regular updates and revisions should be made to keep the materials current and effective. As Binti et al. (2021) explains, collaboration among educational stakeholders is crucial for the availability of online instructional materials. Teachers and institutions should collaborate and share resources, best practices, and experiences to enhance the quality and availability of online distance teaching and learning materials. This can be facilitated through online platforms, communities of practice, and professional networks.

Fu (2013) opines that online distance education support level can be of two types, supporting the institution and supporting the individual users of infrastructure within the institution. These factors can be divided into external and institutional factors. These factors also have an impact on online curriculum delivery. Computer access, sufficient time for course preparation and sufficient administrative and technological members of staff form the external factors. Teacher's skills in online curriculum delivery and their views form the internal factors.

Materials designed and created digitally, or those that have been converted from analog to digital formats, can also be referred to as digital resources. Online resources hosted elsewhere, printed publications, digital media files, and unique digital resources are all included in the library's collection of digital resources. Through its digitization program, the library also makes digital versions of its rare historical resources available to users. Libraries provide access to digital information resources through a collection of other



forms with similar information. The preparedness and inclination of an institution to adopt a digital learning system can be assessed based on the presence of equipment that facilitates digital learning (Basar, 2021).

A participant expressed the following viewpoint: "As an educational institution, we are not adequately equipped for digital learning. We lack sufficient equipment and infrastructure to effectively and comprehensively deliver our lessons digitally. Our computers are outdated and insufficient in number to accommodate all our students. Additionally, we lack electronic boards and computer projectors in all classrooms. Furthermore, we have limited internet access and no Wi-Fi facilities for our students. Consequently, we lack the necessary equipment to effectively and fully implement digital learning." (Participant 3) (Basar, 2021).

Brolpito (2018) suggests that online learning materials should be saved into an online database (cloud server) so that everyone can easily access them. The content should be available for download or streaming at any time by trainers and trainees. Educational materials can be stored on a portable device such as tablets and distributed to TVET institutions and community learning centers in areas where internet access is limited.

Encouraging the implementation of measures, as elucidated by UNESCO in 2022, is essential to enhance the skills of TVET trainers in utilizing digital communication tools and online learning platforms for both online and offline distance education delivery.

TVET curriculum development assessment and certification council (TVET–CDACC) has been actively involved in curriculum development and revision to align TVET programs with emerging trends, including technology integration and online learning. The TVET-

CDACC has been developing digital content and resources to support TVET learning, and it is expected that efforts are being made to adapt these resources for online delivery (TVET-CDACC-2023). Examples of this form of help include investing in more training and support for trainers as well as enhancing trainers ability through coaching from knowledgeable educators. Curriculum, pedagogy, teaching resources, and assessment changes will all need to be made in order for technology to be properly included into TVET (TVET CDACC, 2023).

There are some notions or theories for instance that can be better understood by animation than through written text. Even while the creation of new content is frequently necessary, it is occasionally also a good idea to analyze and update already-existing multimedia and ICT resources. The materials prepared or available for use to implement the online distance curriculum in TVET institutions in Kenya was found wanting by the studies carried out by (Abuya 2021). Similar reactions were also evident in the findings of Kiaritha et al. (2022) that, in developing countries, TVET institutions are yet to be stable and comply with the requirements for online teaching and learning as evidenced by the numerous challenges facing the sector.

Some of the hindrances to effective virtual learning are as a result of limited infrastructure, technology, technical and ICT knowhow and limited funding opportunities. Similar findings were documented by Orji et al. (2020), revealing that in Nigeria, the readiness for Open and Distance Education (ODE) learning after the COVID-19 pandemic was lacking. Moreover, Chibueze et al. (2021) conveyed the viewpoint that TVET institutions encountered challenges in the successful adoption of online learning. These hurdles encompassed inadequate infrastructure, a shortage of specialized technical personnel,

restricted bandwidth, unreliable internet connectivity, insufficient support services, intermittent power availability, and subpar management of the learning system.

The research gap pertaining to the availability of online distance teaching and learning instructional materials for TVET in Kenya is of utmost importance. Despite the increasing adoption of online distance education in TVET institutions, there is a significant lack of comprehensive studies assessing the adequacy and suitability of instructional materials tailored specifically to the unique needs of TVET programs. To bridge this gap, this research investigated the availability and accessibility of materials, evaluating whether digital resources like textbooks, video tutorials, and interactive simulations align effectively with TVET curricula.

Another critical aspect is the quality and relevance of existing instructional materials. It is essential to determine whether these materials meet the specific requirements of TVET programs, which often involve practical and hands-on training. This research assessed whether these materials are and effort is made so that they remain up-to-date, align with industry standards, and incorporate the latest technological advancements.

Additionally, the research delved into the barriers faced by trainers and trainees in accessing online instructional materials. Shamari (2022) explains that the challenges and obstacles to online learning encompassed a range of issues, including but not limited to communication difficulties, the assessment of trainees, the need for adaptation in the absence of established policies, and recurrent technology failures. This study examined issues related to internet connectivity, device availability, and the digital literacy skills required to effectively use these resources. Exploring how TVET institutions customize

and adapt instructional materials to suit their program's unique needs and whether trainers possess the necessary digital literacy and instructional design skills for effective online teaching is central to addressing this research gap. Ultimately, closing this gap is instrumental in ensuring the successful implementation of online distance education in the TVET sector in Kenya, benefiting both trainers and trainees. In conclusion, the research gaps were the motivating factor for this study which delved into finding out availability of online distance teaching and learning instructional materials vital for the successful implementation of curriculum through online distance education in Kenya.

## **2.6 Availability in Financial Support from Various Stakeholders**

In recent years, there has been a growing emphasis on the importance of integrating online distance learning into Technical and Vocational Education and Training (TVET) institutions in Kenya. This shift has been accelerated by the need to adapt to the changing educational landscape, especially in the wake of global challenges such as the COVID-19 pandemic. The digital explosion has also necessitated governments to explore methods of leveraging on this to improve online distance learning in TVET institutions. However, the successful implementation of online distance curriculum in TVET institutions requires significant financial support from various stakeholders. This literature review aims to explore the availability of financial support from various stakeholders for the implementation of online distance curriculum in National TVET institutions in Kenya. It will also look at how other nations globally regionally have been able to fund TVET. A substantial portion of Technical and Vocational Education and Training (TVET) programs in the United States are supported by in-company training. Companies allocate funding for

their employees' training, separate from governmental or educational affiliations (UNESCO –UNEVOC, 2021).

The American Society for Training and Development asserts that in-company training surpasses other sources in terms of investment in TVET. This business-oriented framework predominantly serves as the platform for occupational training and certification for workers (UNESCO–UNEVOC, 2021). For instance, in Singapore, the Ministry of Education (MOE) allocates development and ongoing financial resources to all educational establishments, including those specializing in TVET (MOE Singapore, 2017). In East Asia, students attending technical colleges have the opportunity to access financial assistance through the National Student Financial Aid Scheme (NSFAS) (Schrader-King, 2021).

In Japan, financial support for TVET material development is provided through government funding, industry partnerships, and educational institutions' investments. The government allocates budgets for vocational education enhancement, while industry collaborations and educational institutions also contribute financially to create relevant and high-quality TVET materials (Japan Ministry of Education, Culture, Sports, Science and Technology, MEXT, 2020).

In Malawi, the creation of the Technical, Entrepreneurial, and Vocational Education and Training (TEVET) Fund, as well as the associated levy generating revenue for the fund, was initiated through the TEVET Act of 1999 (Government of Malawi, 1999), with implementation commencing in the 2000/01 period. The TVET Fund operates as a component of the TEVET Authority (TEVETA) and is overseen by it. TEVETA assumes

the roles of both a regulator and a training provider, while also bearing the responsibility of managing the collected training levies (GoK Malawi, 1999).

In Nigeria, insufficient funding for skills development highlights a lack of emphasis on vocational training, further strained by the country's economic recession. This scarcity of financial resources poses a significant obstacle to the effectiveness of vocational training initiatives, as stated by Akpokiniovu Duke Ejaita (2017). Conversely, Somalia faces financial challenges due to a fragile government with limited territorial control, primarily centered around the capital city. Despite a substantial demand for vocational training among its youth population, the availability of funding agencies is restricted. Recognizing the potential for vocational training to enhance human capital and stimulate economic growth, international financial institutions like the World Bank have introduced measures to support these programs, as outlined in the World Bank's report from 2021.

According to a study by Ziderman (2018), most of education systems in sub-Saharan Africa have had to contend with the fact that government financing is decreasing. The study claims that financing for technical training is sporadic and that variations are monitored yearly. This involves a lot of uncertainties and financial limits. Technical institutions cannot rent, buy, or update their programs to match the needs of the industry's technological advancements due to their limited financial resources. The study points out that because Kenya is a developing nation, government financing has probably declined, as it has in other nations, and as a result, the quality of education may also be falling.

In developing countries, budget allocations for ICTs in education are limited (InfoDev, 2022). Due to this high cost, most institutions do not prioritize the setting up of information communication technologies. Automation of ICT is one of the key areas to be prioritized if online learning has to succeed. ICT based programs for online learning delivery require a completely online system of registration, access management and support services. These include access to the library resources, multimedia and web development services and technical troubleshooting areas

One of the key stakeholders in the TVET sector is the government. The Kenyan government plays a crucial role in funding and supporting educational initiatives. Research by (Wachira, 2017) indicates that the Kenyan government has recognized the importance of online distance education and has allocated funds for the development and implementation of digital learning infrastructure. However, the effectiveness of these initiatives and the allocation of sufficient funds for TVET institutions specifically require further investigation (Hamdan & Amori 2022). The objective of educational and vocational training loans is to offer individuals from low-income backgrounds the opportunity to pursue advanced education or vocational training. Studies by Latchem (2017) indicate that it would be very difficult to fund all the TVET institutions in a country unless partnerships with parents and non-governmental organizations were encouraged.

A study was conducted to examine the efforts made to financially support TVET trainers in implementing digital learning in Kenya (Wachira 2017). The study aimed to investigate the strategies or contingency plans in place to educate and assist trainers who face financial challenges in effectively delivering digital learning. The findings revealed that most institutions lacked sufficient financial strategies to support the adoption and use of digital

learning (Wachira, 2017). One participant expressed uncertainty about the existing support strategies for online teaching and learning, emphasizing the need for infrastructure and training before implementation other types of support to be provided. Regarding training and workshops for trainers, the study found no planned financial initiatives for such provisions. Another participant highlighted the absence of institutional initiatives for training trainers in digital learning, suggesting that if the college continues to implement pilot training programs, the government may offer more investment and support for these initiatives (Hamdan & Amorri. 2022).

The review of expenditures for the 2017/2018 fiscal year shows that the authority used the resources allocated mainly for operational costs, leaving a very small percentage for development. The majority of third-party budgets came from requests for funding for creative projects, research, and political support. Donor organizations and non-governmental organizations (NGOs) often play a significant role in funding educational projects in Kenya. These organizations have been known to support initiatives aimed at enhancing access to quality education. A study by (Wachira, 2017) highlights the contributions of donor organizations in financing e-learning projects in TVET institutions. Understanding the availability of financial support from these external sources is crucial for the sustainability of online distance curriculum implementation.

Philanthropic foundations and non-profit organizations that focus on education and skill development at times do offer financial support to TVET institutions. Most have grants programs or initiatives aimed at improving access to quality education. TVET institutions usually explore partnerships and funding opportunities with these organizations to support the implementation of online distance curriculum although it's a tedious exercise as



explained by Wachira (2017). African governments lack resources due to prevailing poverty across the continent as noted by Porter (2000). Such governments therefore need support from other organizations such as Non-governmental (NGO) and private sectors as explained by Onguko and Hennessy (2010) for service provision to the people. As Infodev, (2022) puts it, the initial cost of putting up ICT based learning is quite enormous and of profound concern. However, these costs are usually consumed by one off payment for computer network infrastructure while other sector of funding like material development and skills training are ignored.

The involvement of the private sector in funding and supporting TVET programs is another aspect to consider. Private companies often have a vested interest in a skilled workforce and may be willing to invest in training and education. Existing studies suggest that partnerships between TVET institutions and private companies can lead to substantial financial support for online distance curriculum initiatives. Private companies and businesses, particularly those in relevant industries, can contribute financial support to TVET institutions. They may provide sponsorships, grants, or donations to enhance the institutions' capacity to implement online distance curriculum. This support can be in the form of technology equipment, software licenses, scholarships, or collaboration on specific projects. Getting finances from private sector requires writing of proposal that is followed by rigorous vetting. Most Principles may not be conversant with proposal grant writing or may not prioritize to do that.

Income-generating ventures have been leveraged in various ways to support Technical and Vocational Education and Training (TVET) programs. In Nigeria, government policy mandates every technical college, whether state or federal, to establish a Production Unit.

This initiative serves a dual purpose: providing students with practical hands-on experience, especially in regions with limited industrial opportunities, and generating funds for the institutions. The state government provides an initial grant for the launch of these units, and the resources generated are used to sustain the Production Unit and compensate the relevant departments involved. Oversight and monitoring are conducted by the regulatory body (Idriss, 2020).

Similarly, Kenya can consider adopting a comparable funding approach. In Thailand, public training providers engage in community projects such as small-scale construction, house and facility repairs, and electrical wiring. This strategy was introduced not only to cultivate public awareness regarding the value of TVET but also to generate income to support these programs. TVET institutions can highly benefit from development partners and donors. If approached, international organizations, development agencies, and donors can provide financial assistance through grants or loans to support the implementation of online distance curriculum. These stakeholders at times have specific funding programs geared towards improving education systems and could contribute to infrastructure development, capacity building, and procurement of necessary technology and resources. Kenya benefited from several funding bodies (Wachira, 2017). Exploring partnerships with private organizations, industry stakeholders, and alumni networks to secure funding or sponsorship for online education initiatives should be an ongoing activity. Despite the importance that nations and the global community place on skill development, VET continues to get inadequate funding. Given the high costs of materials, equipment and facilities, they make VET expensive compared to general education. These vocational institutions often receive a smaller share of the public funding than other educational levels.

Funding priorities are hampered by a lack of resources. This is a common concern in many countries.

ICT funding mechanisms in education are many. Educational institutions and Countries can use these sources to cater for high recurrent costs on ICT. Putting up ICT based learning institutions can be quite high. The costs mainly are spent once in computer network infrastructure, quality content development and training of faculty. Budgetary allocations for investing in ICTS in education are limited (InfoDev, 2022). Setting up ICT classes is quite expensive and this may lead to slow uptake or slow setting up of this facility. ICT-enabled programs should have a complete online system for registration, access management, and support services (InfoDev, 2022). This includes academic advice, ordering course materials, multimedia and web development, access to library resources, and staff to help solve technical problems. If ICTs are to be used in realizing effective delivery of online learning, then financial support and readiness to support to support institutions by leaders is very critical. Facilitation of education change is facilitated by institution leaders. The level of awareness of institution managers in matters of online teaching and learning influences their readiness to support the venture (Hamdan, 2021).

The preparedness and inclination to adopt online learning within an institution can also be assessed based on the financial resources allocated to digital learning. Implementing digital learning is a costly endeavor that necessitates substantial financial investments. So, if the institution managers do not support online learning, it means that the lecturers and all those involved would not be supported. The readiness to support by releasing funds affects the success of online teaching and learning directly. Managing of ICT is challenging and requires a lot of determination from all members of an organization to get value for money

for all the financial support from the government (Winston, 2018). The Institution managers must work closely with the government policies to manage online distance teaching and learning. Hence institutions must align its budgetary allocation with the needs of online learning for it to succeed (Basir, 2021). In Kenya, there is a glaring absence of a comprehensive national policy dedicated to budgetary provisions for online learning.

While financial support from various stakeholders is essential, it's important to acknowledge the challenges and gaps in the availability of funds (Maina, 2019) identifies issues related to the equitable distribution of funds among TVET institutions, bureaucratic hurdles in accessing government grants, and the sustainability of funding sources as critical challenges. Addressing these challenges is crucial for ensuring the successful implementation of online distance curriculum in National TVET institutions in Kenya.

The availability of financial support from various stakeholders is a critical factor in the readiness to implement online distance curriculum in National TVET institutions in Kenya. Government funding, support from donor organizations and NGOs, and engagement with the private sector all play crucial roles in financing these initiatives. However no specific funds are placed aside to implement online distance curriculum. Online learning is usually invaluable over print-based form of online learning as Jacksoni (2016) argues. The findings of the research indicate that the implementation of digital learning in TVET colleges faces significant obstacles in terms of funding. The number of young people ready to participate in such training is growing daily, but funding is extremely scarce (Omwenga, 2016). The government can also offer financial incentives for institutions that successfully transition to online education and demonstrate positive outcomes in terms of student learning and achievement. Hence, there are challenges and gaps that need to be addressed to ensure

equitable access to funds and the long-term sustainability of online distance education in the TVET sector.

One financial gap identified was the lack of adequate funding for the development and maintenance of the necessary infrastructure to support online distance learning. This includes investments in robust internet connectivity, computer laboratories, software licenses, and learning management systems. Without proper infrastructure, the effective implementation of online distance education in National TVET institutions becomes challenging, and this gap may hinder the readiness of these institutions to offer such programs.

Another financial gap identified was the limited financial support available for capacity building among trainers and trainees. Training and professional development are crucial for instructors to effectively design, deliver, and manage online distance courses. Funding gaps in this area hindered the acquisition of essential digital teaching skills, course development, and pedagogical strategies required for quality online education. Without adequate support for capacity building, the successful implementation of online distance curricula was getting compromised.

The research was geared towards addressing these financial gaps to ensure that National TVET institutions in Kenya were adequately prepared to implement online distance curricula successfully. Adequate investment in infrastructure and capacity building is necessary to provide students with quality online education opportunities. This study found that trainees are fairly funded by use of higher education loans, constituency donor funds and donor support. This support was in form of Higher education loans and was not enough

to buy items like data bundles which appeared like luxury. However trainers are rarely funded to build their capacity in online preparedness.

## **2.7 Preparedness of ODeL TVET Policies**

A policy refers to deliberate principals used to guide decisions to achieve desired goals. Policies assist in decision making process, making it easier for all concerned to act accordingly. Makoza (2022) emphasizes that global efforts to enhance education quality through online learning necessitate well-trained technical staff capable of proficiently managing computer applications, configuring computer systems, swiftly diagnosing and resolving issues to prevent disruptions to learning. In developed nations, UNESCO (2022) underscores the implementation of teacher training and support policies aimed at equipping TVET instructors with effective online teaching techniques, encompassing both technical competencies and pedagogical strategies. These policies not only facilitate continuous professional growth and support for online TVET instructors but also foster communities of practice, encouraging collaborative sharing of best practices and resources among instructors.

In the USA, Technical and Vocational Education and Training (TVET) policies are primarily governed at the state level rather than by a single federal policy. Each state develops its own policies and regulations related to TVET, including curriculum standards, accreditation processes, and funding mechanisms. However, there are federal initiatives, such as the Carl D. Perkins Career and Technical Education Act, which provides funding and guidelines to support TVET programs nationwide. The act promotes career readiness and partnerships between educational institutions and employers.

In Singapore, Technical and Vocational Education and Training (TVET) policies are characterized by a strong emphasis on skills development and workforce readiness. The Institute of Technical Education (ITE), Polytechnics, and private providers offer TVET programs aligned with industry needs. Singapore's initiative supports lifelong learning and skills upgrading, while various grants and schemes encourage individuals to pursue TVET (Skills Future, 2023).

Nigeria's Technical and Vocational Education and Training (TVET) policies aim to address skill gaps, enhance employability, and promote self-employment. The National Board for Technical Education (NBTE) oversees TVET programs and develops policies to ensure quality and relevance. Nigeria's TVET policies emphasize partnerships with industries to align training with market demands, promote entrepreneurship, and encourage public-private collaboration. The National Policy for Open and Distance Learning in Seychelles. MoE (2015) highlighted challenges, including insufficient collaboration, networking, and partnerships among institutions offering online distance learning programs, hindering the growth of online studies.

In response, Seychelles implemented an online teaching and learning policy aimed at providing continuous support for ICT use in online teaching. However, the policy faced challenges, such as inadequate ICT infrastructure, which needed addressing to enhance access and the quality of online learning delivery (Hamza, 2020).

Existing research (Onwe, 2013) indicates a shortage of comprehensive policies and practices concerning online learning in sub-Saharan Africa. Hamdan (2022) points out that while various education ministries globally express intentions to introduce computers in

Technical and Vocational Education and Training (TVET) institutions, only a limited number have established effective strategies for integrating computer usage as an educational tool within classrooms. Additionally, Makoza (2022) notes the absence of well-defined online distance learning policies in Africa, posing challenges to its growth. However, Seychelles has taken a proactive step by formulating a policy framework for online open and distance learning, with a primary focus on applying ICT in TVET.

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The Kenya TVET Act of 2013 provides a legal framework for TVET in the country. The act emphasizes the importance of using technology in TVET delivery and promotes the integration of e-learning and online platforms as part of the instructional process (TVET act 2013). This recognition indicates a readiness to explore online distance teaching and learning modalities in TVET institutions (TVET, 2013). The integration of Online Distance Education and Learning (ODEL) in TVET programs has gained prominence, particularly in response to the COVID-19 pandemic. A well-executed TVET policy enhances Kenya's global competitiveness by producing skilled workers who meet international standards. This can attract foreign investment and foster international trade (TVET act, 2013).



Quality assurance mechanisms, emphasized by the policy, ensure that TVET institutions adhere to established standards, leading to graduates with recognized qualifications. Moreover, the policy encourages a culture of lifelong learning, recognizing the importance of continuous skill and knowledge updates to keep pace with evolving technologies and industries (TVET act 2013). Adequate resource allocation, encompassing funding for infrastructure, equipment, teacher training, and curriculum development, is vital for the successful implementation of the TVET policy. In conclusion, Kenya's TVET policy holds vast potential to positively impact education, employment, economic development, and social inclusion when effectively executed, fostering growth and providing valuable opportunities to individuals (TVET act, 2013).

Policies governing Technical and Vocational Education and Training (TVET) serve as pivotal elements in preparing individuals for gainful employment and economic development in Kenya (Kang'ethe et al., 2020). It also encompasses sustainable funding mechanisms for training, the development of ICT infrastructure, and the establishment of effective partnerships and networks to facilitate the exchange of resources. Sweney (2021) opines that there is a critical shortage, computers, laptops internet connectivity computer skills and lack of power connection in rural areas in Kenya. So the power connectivity should be a government policy from the word go.

Access and infrastructure policy can ensure equitable access to online TVET programs by investing in reliable internet infrastructure and connectivity in all TVET institutions in Kenya. This would lead to formulation of policies to provide affordable devices and internet access to economically disadvantaged students and those from marginalized areas in Kenya. Kibata's 2021 research findings highlighted that the absence of an implemented

ICT policy framework played a significant role in hindering the adoption of flexible and blended teaching methods in TVET institutions in Kenya. Moreover, some educators resisted this change, pointing out the absence of a policy mandating the integration of technology into their teaching practices.

Kibata (2021) stressed the importance of establishing a policy that compels teachers to incorporate technology into their instructional methods. Consequently, the widespread acceptance of flexible and blended teaching approaches by all TVET educators in Kenya might have been realized had a government or Ministry of Education policy been put in place. Without the implementation of such a policy, achieving the adoption of flexible and blended teaching methods in TVET institutions in Kenya is likely to remain unattainable. It is evident that the enactment of policies remains the sole means of ensuring that instructors adopt flexible and blended teaching methods in TVET institutions in Kenya.

The growth of online teaching and learning has lagged behind because of lack of clearly stipulated online policies (Makoza, 2022). Very few countries have had a clear policy on professional development; Parsons, (2022) opines that spending huge resources on ICT hardware and software without proper trained trainers is a waste of scarce resources. Funding of professional training of trainers should be factored with ICT integration budget as a matter of policy line learning. Njenga (2023) explains that in Kenya, TVET trainers are drawn from the general teaching fraternity of teachers graduating from universities and other training institutions. There is no policy that demands that trainees are computer literate or have special training in online distance teaching.

To provide cost-effective programs and services through open and distance online learning, the Ministry of Education should encourage collaboration. Attachment is given at the institutions terms and willingness to take in interns. A policy on that would encourage partnerships between TVET institutions and industry to align online programs with industry needs and standards would ensure that the trainees get training that is aligned with demands from the industries or their employers. The impact of attachment on students' employability is a key consideration. Research indicates that ODeL programs that incorporate practical skills and industry partnerships have a positive influence on graduates' employability (Kinyua & Musiega, 2019).

Access and infrastructure policy ensures equitable access to online TVET programs by investing in reliable internet infrastructure and connectivity in all TVET institutions in Kenya. This has led to formulation of policies that provide affordable devices and internet access to economically disadvantaged students and those from marginalized areas in Kenya. The current TVET policy on funding gives loans to trainees; however this funding is not enough to assist trainees to purchase laptops and smartphones for their use. Seif (2020) posits that due to emerging technologies, that require reliable connectivity, rural, arid and semi-arid areas are not benefiting from ICT policies due to distances between institutions in large towns and learners in rural arid and semi-arid areas.

Online Distance Education and Learning (ODeL) has emerged as a flexible and scalable approach to education delivery in Kenya that would facilitate access to training programs across geographical boundaries (Mugambi et al., 2020). The implementation of Student Support Services policies is essential for delivering comprehensive support to online TVET students. These policies encompass various facets, including academic advising,

counseling, and career guidance. Additionally, they establish mechanisms to facilitate online student engagement and collaboration, such as virtual study groups and online forums.

Trainer and trainee financial policies if put in place would address the specific needs of marginalized or disadvantaged trainers and trainees, such as providing additional financial assistance and tailored support programs as explained by Mugambi (2020). It is worth noting that the significance of VET is often overlooked in many policy documents, creating a perplexing gap in the overall understanding and recognition of its role. A policy on curriculum and course design would provide guidelines for developing competency-based curricula that align with industry requirements and promote the integration of practical, hands-on training components in online TVET courses through simulations, virtual labs, or industry partnerships (TVET-CDAC).

In the same design, use of multimedia resources, interactive content, and adaptive learning technologies to enhance engagement and learner outcomes policy would also be encouraged. The implementation of ODeL in TVET institutions is not without challenges. These challenges encompass technological limitations, faculty preparedness, student engagement, and the need for innovative assessment strategies (Mulwa et al., 2020). Amutha (2020) opines that success in ICT policy Implementation in TVET institutions requires strong leadership personalities. It is the head of institutions that allocate resources and if they have positive attitude they can prioritize allocation to e-learning activities.

Research and Innovation policy would encourage research and innovation in online TVET by providing funding opportunities and incentives. Such a policy would Support the

development of pilot projects to explore emerging technologies and pedagogical approaches in online TVET while fostering collaboration between researchers, practitioners, and industry partners to drive continuous improvement and innovation in online TVET. To ensure the effectiveness of any policy, it should include built-in mechanisms for implementation, monitoring, supervision, feedback, evaluation, improvement, reorientation, and overall effectiveness. Akindoyeni (2014) and others have emphasized that an effective policy should address a clear and identifiable need, possess a legal framework for implementation with measurable strategies, avoid ambiguous interpretations, allow for periodic reviews, and ensure that the necessary human capital and resources for implementation are in place.

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In the context of Kenya's TVET policy, there are concerns that it does not fully embody these essential characteristics. The Presidential Task Team on Education (FRN, 2011) has noted that policies often face challenges in proving their effectiveness due to uncoordinated changes and inconsistent adherence, influenced more by shifts in administration than rational decision-making. This highlights the need for a more structured and consistent approach to policy implementation and evaluation in the TVET sector in Kenya.

One significant research gap in the context of "Preparedness of ODeL TVET policies on curriculum implementation through online distance teaching and learning in national TVET institutions in Kenya" is the lack of research that investigates the actual implementation of these policies. While there may be policies in place, this study investigated how effectively these policies were being put into practice at the institutional level. The study explored whether TVET institutions were aligning their practices with those policies, what challenges they encountered during implementation, and the extent to which the policies were achieving their intended outcomes. Identifying discrepancies between policy intent and implementation realities helps refine and improve policy frameworks.

It is in this regard that the researcher looked at the preparedness on policy and policy formulation guidelines and strategies that make online distance learning in TVET institutions in Kenya possible. This study therefore focused on policy and policy formulation strategies in Kenya and investigated their readiness in allowing or making it easy for distance online education in these institutions. The findings of this study found out that most policies were haphazardly implemented or not implemented at all due to financial constraints. Based on the literature review, recommendations for enhancing the preparedness of ODeL TVET policies in Kenya can be outlined. These recommendations may encompass policy revisions, faculty training programs, infrastructure development, and stakeholder collaboration (Nyamwange & Omwenga, 2021).

## **2.8 Curriculum Implementation through ODeL**

In response to the COVID-19 pandemic, many educational institutions around the world, including TVET institutions in Kenya, shifted to online distance teaching and learning Masalimova (2022). In fact many TVET educational institutions have changed how they operate to keep up with the demands of everyday life and evolving educational trends. One such adaptation is the adoption of e-learning as a method of reaching out to students who might not have the time to attend classes owing to their lifestyle. This transition has posed several challenges and opportunities for curriculum implementation as discussed below as explained by Masalimova (2022).

Although most institutions would love to have a seamless migration from face to face classroom to online classroom, infrastructure and connectivity has become one of the primary challenges for online distance learning in Kenya as indicated by a study by Mahdi, and Wani (2021). Availability and reliability of internet infrastructure and connectivity, particularly in rural areas has become a great challenge to many institutions. Limited access to the internet and technological resources continue to hinder effective curriculum implementation. TVET institutions in Kenya have to adapt their curricula to suit online learning environments. This involves rethinking practical components and finding alternatives to hands-on training, such as using virtual simulations or remote lab access (Mahdi and Wani, 2021). Curriculum adjustments necessitate the creation of an ODeL office in most institutions to ensure that learning outcomes are still met. It is in this light that the researcher wanted to find out the preparedness of curriculum delivery in such a scenario.

Hua and Seet (2020) explains that effective online curriculum implementation requires adequate training and support for trainers. TVET instructors needed to develop digital teaching skills, familiarize themselves with online learning platforms and tools, and adapt instructional methods to suit the online environment. Capacity-building programs are essential to equip trainers with the necessary competencies. In the midst of the pandemic, improving on training support posed another challenge (Masilimova, 2022).

Edsys (2022) explains that developing appropriate digital content and resources aligned with the TVET curricula is crucial. This includes creating multimedia materials, online lectures, interactive learning modules, and assessment tools. Collaboration with industry partners to develop relevant and up-to-date content is also important to meet the industry needs. All this is required urgently in the background of low or no funds set aside for such an expensive but necessary activity. Adapting assessment methods for online learning is still a significant aspect of curriculum implementation. Pappas (2016) opines that TVET institutions have to design and administer online assessments that effectively evaluate students' practical skills and competencies. Ensuring the integrity of assessments and preventing cheating or plagiarism also requires careful consideration.

TVET institutions need to provide comprehensive support services to online learners. This includes academic advising, counseling, technical support, and platforms for communication and collaboration among trainees. Special attention has to be given to address the specific needs of marginalized or disadvantaged students. Regular monitoring and evaluation of the online curriculum implementation is important to identify strengths, weaknesses, and areas for improvement. This allows institutions to make necessary adjustments, gather feedback from students and instructors, and ensure the quality and



effectiveness of online teaching and learning and hence implementation of the curriculum as explained by Munyaradzi & Arko-Achemfuor (2021).

The current global education system has a significant impact on the agenda for global development in the twenty-first century. By creating efficient and interconnected VET systems, many nations have accelerated their development. Vocational education is training that equips trainees for careers in engineering or accounting at various degrees of trade, craft, technician, or professional position. The majority of occupations are centered on physical or hands-on tasks that are typically not academic in nature and are connected to a certain trade, profession, or vocation.

The majority of TVET institutions in developing nations employ traditional teaching and learning techniques that demand the learner's physical attendance in the classroom and primarily place the onus of content creation on the trainer, with the trainee serving as a passive recipient. The dynamic education environment of today calls for a change in curriculum delivery norms. To progress their development goals, many developing nations largely rely on trained workers, and as many experts stress, vocational training is the most crucial factor in industrial growth.

According to previous studies conducted by Hamdan (2022), there are notable differences in the design of traditional educational institutions and e-learning platforms. With e-learning, information may be shared in a flexible way that is not limited to everyday tasks but can occur anywhere. Through e-learning, TVET instructors can connect with students utilizing a range of ICT tools and environments. This lessens the time, space, and space restrictions that have been the fundamental problems and obstacles in providing education,

particularly for the working class. TVET students will also gain a lot from having a wide range of options for finishing their courses as well as a lot of flexibility in how their training is delivered, which will promote lifelong learning.

The utilization of technology in education has provided various advantages for institutions, including cost savings and increased productivity flexibility (Hall, 2021). This is due to the fact that environments with abundant ICT in schools require fewer infrastructures to accommodate students. Students can now access technology without being restricted to the school complex. Students who learn online become more independent. Institutions that have adopted online teaching and learning also preserve a competitive advantage over their colleagues (Ochieng & Ogejo, 2021). In addition to meeting the educational demands of remote locations, online studies provided students with the opportunity to pursue autonomous study, have a favorable advantage on the learning process, and provide a method for collaborative learning. Online learning benefits individuals and organizations too (Ochieng & Ogejo 2021). However, it is paramount to find out how well these institutions are prepared to offer online distance Teaching and learning to the many institutions' country wide.

## **2.9 Theoretical Framework**

This study was informed by Bruner's Constructivist Learning Theory and Simonsons Equivalency Theory. The two theories are discussed below.

### **2.9.1 Bruner's Constructivist Learning Theory**

Bruner's constructivist learning theory or education philosophy became popular in 1990s when many educators started considering it worth. The central concept in this theoretical

framework revolves around the notion that learning is a dynamic process. Individuals actively engage in constructing novel concepts or ideas by drawing upon their existing knowledge and experiences. Omwenga (2016) agree with Bruner that learning environments do emphasize the quality of constructivism. In this context, trainees merge fresh ideas with their preexisting knowledge to create understanding or resolve any inconsistencies, puzzlement or curiosity. From this we realize that learners construct their own meaning for different phenomena. Dialogue is considered to be the means by which ideas are considered, shared and shaped in this theory. Dialogue is often about getting to know more from the more knowledgeable others as the theory opines.

The theory requires trainees to use prior knowledge or experiences to form the basis for new knowledge and understanding in the course of dialogue. One of the characteristics of distant learners is that they approach the new learning environment with a lot of prior experience according to Kurt (2021). These learners use their prior experience to construct their own knowledge. The aim of the trainer undergoes a transformation from being a transferor of fixed knowledge to that of a facilitator and guide, highlighting the need for trainers to acquire updated expertise and abilities. In this learner-centered environment, trainees assume more responsibility for self-directed learning and collaborative knowledge exchange. Interactions take place among learners, trainers, information resources, and technology. In distance learning, the learner actively constructs meaning rather than passively receiving information from the trainer. Online learning involves learners engaging with various sources of information and data, selecting, organizing, and interpreting them to build new understanding, while also evaluating the quality of learning

materials. Information communication Technologies gives powerful tools to assist the shift from a teacher-centered learning to a learner-centered learning environment.

Using a virtual world that is as close as possible to the real classroom experience, the constructivist theory succeeds in creating a meaningful learning experience. Selection of learning strategies helps in creating meaningful learning experiences. Selected learning experiences should motivate learners, facilitate deep processing of information and build a holistic person. Promoting meaningful learning, interaction and catering for individual differences are taken care of by such strategies. Learners also contribute feedback and enable contextualized learning and assistance throughout the educational journey. With the advent of electronic mail, internet-based forums, webinars, and web conferencing, the learning experience has become highly adaptable, allowing individuals to acquire knowledge at their preferred speed and convenience, regardless of time or location (Kurt, 2021).

Online enabled learning helps students to be actively involved in the learning process and enables the participants to construct their own learning. Constructivism theory laid emphasis on the learner as the central figure in the ownership of the learning process. As Funa and Talaue (2021) states, education is about the learner and online technologies used in distance learning have the capacity to empower the learner to learn without compromising quality. Therefore, application of constructivist approach in online distance learning is one of the key success factors for quality of distance education practices. However, the weaknesses of constructivism theory lie with the fact that it emphasizes on independent learning for learners to construct their own meaning of what they learn. It requires minimal face-to-face interaction with the peers and the trainers and limited learner

support services. Dropout rates increase due to trainees feeling isolated. In addition, distance learners are equipped with prior knowledge and understanding to construct their own meaning of what they learn. Prior knowledge may affect the learner negatively at times hence affecting their learning outcome. Majority if not all distance learners come to distance learning environments from the background of traditional face-to-face learning. Such learners may find it increasingly difficult to fit into the system of self-independence learning. However, despite the weaknesses, the theory of constructivism is still relevant and useful to anchor this study. In addition, the weakness of constructivism theory necessitated the researcher to use equivalency theory which is herein discussed (Funa & Talaue, 2021).

### **2.9.2 Simonson's Equivalency Theory**

This theory originates from American distance education practices. Due to the remarkable technological advancements spanning the last century, distance education has undergone substantial transformations. This evolution has necessitated the emergence of novel theories to guide distance education practices (Simonson et al., 1999). Simonson's perspective underscores that initial concepts for distance learning involved utilizing media like videotapes, CDs, or video streaming to provide trainees with experiences akin to or nearly identical to in-person learning. However, it's unrealistic to expect complete "identical" learning experiences.

The Equivalency theory asserts that while distance education differs from face-to-face instruction, it should still yield equivalent outcomes (Pappas, 2016). This notion implies that, to be effective, distance education should strive to achieve equivalence in learning

experiences. Although these experiences might not be identical, they can be deemed equivalent if they result in comparable learning outcomes (Ngeera 2018). The core of the theory lies in the recognition that each learner's instructional approach may differ. Simonson outlines three key facets of the theory: local and distant learners inhabit distinct environments, learning experiences encompass factors that influence learning outcomes, including observation, and telecommunication systems are employed synchronously and asynchronously.

The Equivalency theory primarily suggests that the development of instructional content for distance learning should aim for "equivalent" learning experiences. The objective of incorporating learning theories in education is to construct effective instructional strategies. Failing to align with well-supported concepts might result in ineffective instruction. Therefore, instructional designers should prioritize creating instruction that maximizes learning effectiveness. This theory aligns with Simonson's Equivalency theory. Initially introduced by Simonson in 1995, this theory posits that while distance education and traditional education are not identical, they should be considered equivalent.

According to Simonson, successful distance education should be rooted in the principle of equivalency. Equivalency, in this context, implies that learning experiences for distance learners should strive to be as comparable as feasible to those encountered by traditional learners, resulting in equivalent learning outcomes. However, equivalency doesn't equate to uniformity; rather, it signifies that learning experiences should yield similar learning outcomes (Simonson et al., 2009), which is supported by Kurt (2021).

Simonson et al. (2009) underscore that the foundations of distance education should rest on principles of equivalency, appropriate application of learning experiences, and learner outcomes. The closer the experiences of distance learners align with those of traditional learners, the more similar the educational outcomes will be for all learners. Curriculum designers should anticipate and provide instructional designs that cater to each learner's unique needs or groups of learners. The responsibility for designing learning activities that offer equal educational value to learners rests with distance education providers (Simonson, 2009).

The notion of appropriate application posits that learning experiences must be tailored to individual learners' needs. Whether for distant or traditional learners, the provided learning experiences should correspond with their expectations and available resources. Instructional design processes should aim to predict and offer experiences most advantageous for each learner or learner group (Simonson et al., 2009). The authors advocate defining learners by their course enrollment rather than geographic location. The outcomes of such learning experiences should be apparent, measurable, and should result in significant cognitive and emotional changes in learners due to their active participation and successful completion of the course or module (Kurt, 2021).

The theory of equivalency posits that learning at a distance can yield comparable results to traditional methods. It asserts that there should be parity in standards between distance and traditional learning. Open and distance learning should produce similar outcomes to traditional learning, with the mode of delivery being the primary distinguishing factor (Funa & Talaue 2021). Similarities between the two modes can be found in institutions offering mixed-mode education, where the curriculum, instructors, and instructional

content remain the same. Quality assurance, standards, and institutional facilities further enhance the similarity. In certain higher education institutions, distance learners undergo the same examinations as traditional face-to-face learners, while management structures cater to both types of learners (Kurt, 2021).

The theory of equivalency falls short in recognizing the unique learning environments of distance and face-to-face learners. Distance learning demands self-paced, independent study, presenting distinct challenges compared to traditional in-person learning. Distance learners must be self-motivated and external factors like their environment and financial constraints can hinder their ability to achieve the same level of equivalency as their in-person counterparts. Unlike in-person learners, distance learners lack a physical classroom, leading to limited interaction with instructors and peers. Some distance learners face difficulties in effectively communicating with their teachers, which impacts the essential continuous feedback required for improved learning outcomes (Funa & Talaue, 2021).

However, despite its limitations, the theory of equivalency underscores the need for education managers to design tailored learning experiences for both traditional and distance learners. Successful equivalent distance learning relies heavily on the effective use of modern interactive information and communication technologies (ICTs). These technologies not only facilitate teaching and learning but also replicate the traditional classroom environment, enhancing the quality of distance education. Online learning tools, like electronic learning systems, enable engaging discussions, Q&A sessions, timely feedback, and hands-on instructions, aligning with constructivist principles and the theory of equivalency, making them highly relevant for this study (Siemens, 2017).

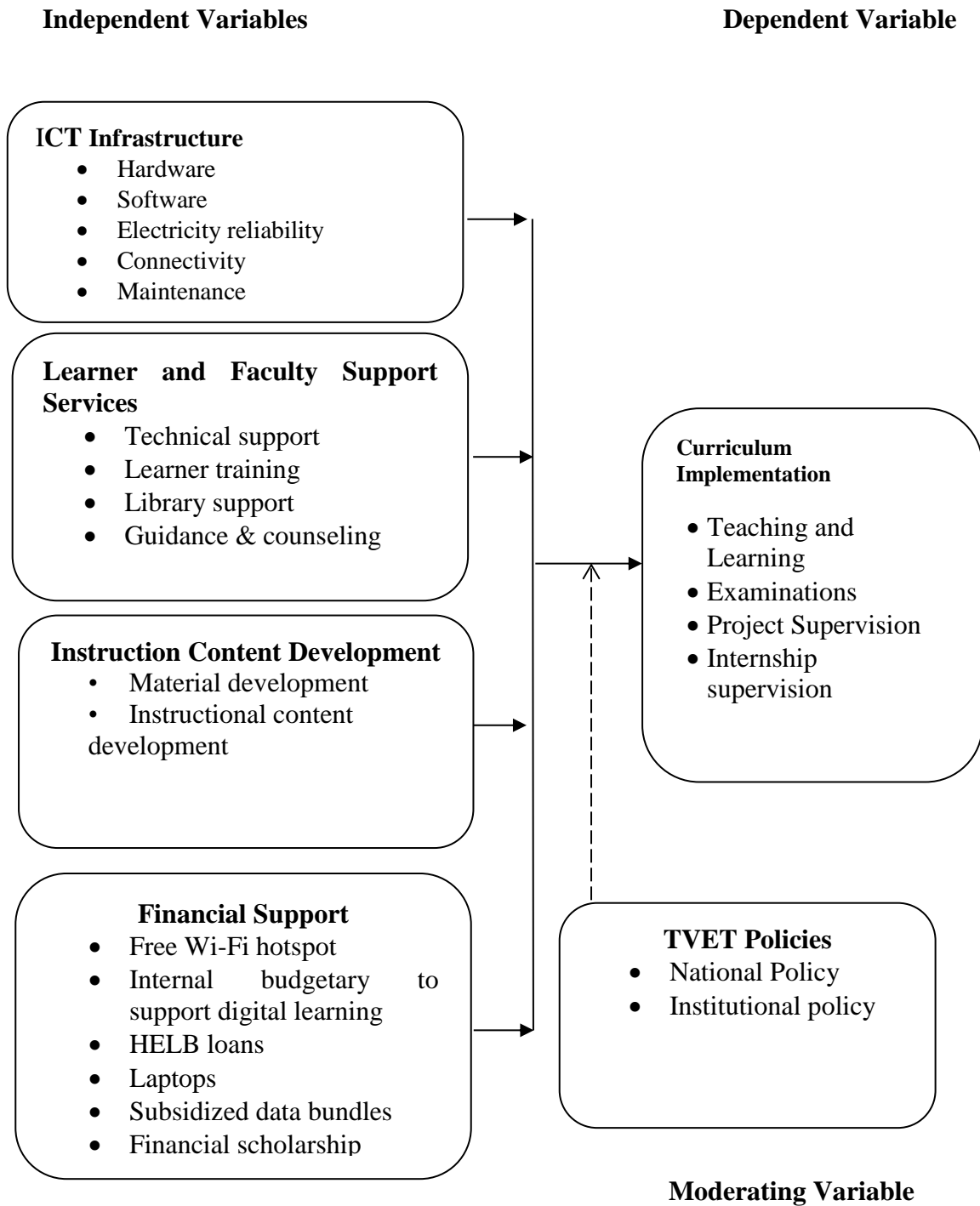


## **2.10 Conceptual Framework**

In this section, the interconnection between the dependent and independent variables is explored, drawing from the existing literature review and conceptual framework. The framework illustrates the various independent variables that influence the dependent variable. This research will adopt a conceptual framework consisting of three variables: an independent variable, a dependent variable, and intervening variables. The relationships and attributes of the independent and dependent variables are indicated.

**Figure 2. 1**

*Conceptual Framework on the variables in the study*



**The independent variable.**

## **2.11 Operationalization of Variables in the Conceptual Framework**

The description below is about how variables of the study were operationalized.

### **2.11.1 The Independent Variables**

In the context of implementing online distance learning in the National Technical and Vocational Education and Training (TVET) system in Kenya, the independent variables play a crucial role in influencing the success and effectiveness of this educational approach. The availability of adequate ICT infrastructure is fundamental for online distance learning. Hardware includes computers, tablets, and internet connectivity devices, while software encompasses learning management systems, educational software, and communication tools. The quality, quantity, and accessibility of these resources can significantly impact the overall effectiveness of online learning.

Consistent and reliable electrical power is essential for online learning. Frequent power outages or fluctuations can disrupt online classes, causing frustration for both learners and instructors. Reliable electricity ensures uninterrupted access to digital resources and online classes. Accessibility to the main electrical grid is critical, especially in remote or underserved areas. Establishing a connection to the main grid ensures that educational institutions in all regions can participate in online distance learning without being limited by their geographical location.

Effective maintenance procedures are essential to quickly resolve technical issues that may arise during power blackouts or outages. Adequate maintenance protocols and personnel are necessary to minimize disruptions and downtime. Supporting learners and faculty members in an online learning environment is crucial. This includes providing technical

assistance, guidance on navigating the online platform, and addressing any concerns or challenges that learners and instructors may face.

Timely technical support for troubleshooting and resolving technical issues related to ICT infrastructure and software is essential to ensure the smooth operation of online learning platforms. Providing training to both instructors and learners on how to effectively use ICT tools and online platforms is vital. This training enhances digital literacy and ensures that all participants can fully engage in online education.

Developing high-quality instructional content materials tailored for online delivery is essential. This content should be engaging, interactive, and aligned with the curriculum to facilitate effective learning. Ongoing support for trainers and learners, including academic guidance and counseling, is necessary to address academic and emotional needs. This support helps maintain motivation and engagement.

Access to digital libraries and resources is vital for research and self-directed learning. Libraries should provide digital resources and support services for learners and instructors. Institutional support from the TVET institutions and relevant government bodies is crucial for the successful implementation of online distance learning. This support includes policy development, funding, and infrastructure development.

In summary, these independent variables encompass various aspects that are integral to the successful implementation of online distance learning in the National TVET system in Kenya. A comprehensive approach that addresses each of these variables can enhance the quality and accessibility of online education, ultimately benefiting learners and educators throughout the country

### **2.11.2 The Dependent Variable**

The assessment of curriculum implementation served as the dependent variable in evaluating the readiness for online distance learning. This evaluation encompassed a comprehensive analysis of various facets concerning how the curriculum was adapted, delivered, and overseen within the online learning environment. Several key measures were considered to assess preparedness in this context.

Firstly, the alignment of the online curriculum with the intended learning objectives and outcomes of TVET programs was thoroughly evaluated. This process aimed to ensure that the digital curriculum remained in harmony with the overarching educational goals and met the specific learning outcomes expected from the programs. Additionally, an assessment was conducted to ascertain the extent to which the curriculum reflected the ever-evolving needs and standards of the industry. This measure was critical to ensure that students were adequately prepared for the job market, equipped with the skills and knowledge relevant to their fields.

The quality, accuracy, and comprehensiveness of course content within the online curriculum were also scrutinized. This entailed a meticulous review of multimedia elements, interactive materials, and available resources to guarantee a rich and valuable learning experience. Furthermore, the instructional design of online courses was examined to confirm that they were engaging, interactive, and conducive to effective learning. This step sought to enhance the overall learning process.

Assessment methods employed in online courses, including quizzes, assignments, projects, and examinations were assessed for both variety and appropriateness. This evaluation was

carried out to ensure that the assessment methods aligned seamlessly with the stated learning objectives and effectively measured the desired competencies. The effectiveness of the learning management system (LMS) in delivering course content, facilitating communication, and managing assessments was a crucial factor in the assessment process. Additionally, the integration of educational technology tools and software into the curriculum to enhance learning was scrutinized for its contribution to the overall effectiveness of online teaching and learning.

To ensure the competency of instructors, the availability and effectiveness of training programs were evaluated, with a specific focus on developing the necessary skills for online teaching. Furthermore, the level of support provided to instructors in designing and delivering effective online courses was examined to facilitate their role in the online learning environment. Financial resource allocation for curriculum development, technology infrastructure, and faculty development for online teaching was scrutinized to ensure adequate support for the implementation of online distance learning. Moreover, qualified personnel with expertise in online education were identified as essential to provide support for curriculum implementation.

The evaluation process also extended to measuring the employability and job placement outcomes of online graduates, gauging their success in securing relevant positions in their respective fields. Stakeholder feedback, including input from students, employers, and industry partners, was collected to gauge the relevance and effectiveness of the online curriculum. Lastly, institutional policies supporting online curriculum implementation, encompassing matters related to data privacy, intellectual property, and online learning

standards, were reviewed to ensure alignment with the overall goals of the online learning environment.

Through these rigorous assessments, TVET institutions and policymakers were able to gauge the level of preparedness and the effectiveness of curriculum implementation in online distance learning programs. This evaluative process not only identified areas in need of improvement but also guaranteed that the curriculum remained responsive to the needs of both students and employers within the dynamic online learning landscape.

### **2.11.3 The Moderating Variable**

The implementation of online distance learning in educational institutions hinges on the presence of a distance online education policy, which can act as an intervening or moderating variable (Zach, 2020). Intervening variables shed light on how independent variables impact online distance learning outcomes, while moderating variables influence the strength and direction of these relationships. A distance online education policy serves as an intervening variable by explaining why certain independent variables, like technical support, affect learning outcomes. Additionally, it acts as a mediator, clarifying the link between independent variables, such as instructor training in online teaching methods, and improved funding and learning outcomes. Furthermore, policies regulate and standardize various aspects of online education, acting as intermediary variables that shape how other factors impact learning outcomes as explained by Zach, (2020). As a moderating variable, policies introduce context-specific conditions that influence how independent variables affect outcomes, such as quality standards and resource allocation.

Practical implications arise from the presence or absence of a distance online education policy. It significantly influences the quality, accessibility, and effectiveness of the online learning environment. Policymakers must align their policies with the goals of online distance learning and consider their impact on independent variables. Educational institutions must also be aware of the policy framework that shapes online learning outcomes. In conclusion, understanding the role of a distance online education policy as an intervening or moderating variable is crucial for the successful implementation of online distance learning. Such policies provide guidance and address various academic, fiscal, geographical, governance, labor management, legal, and student support issues, as noted by Makoza (2022). In this research the intervening variable was not found to have any impact on the dependent and independent variable

A hypothetical variable, called moderating variable, is used to explain causal relationships between variables. Moderating or in other words intermediate variables cannot be observed. In statistics, the intervening variable is usually considered a subtype of the mediating variable. Intervention variables are hypothetical constructs such as policy. Since this is not a "real" variable, the main limitation is that it cannot be measured.

## **2.12 Summary of Literature Review**

The reviewed literature highlights a significant relationship between the preparedness of TVET institutions in Kenya and various factors, including the availability of information communication technology infrastructure, the provision of ICT user training and skills development, the presence of appropriate online distance teaching and learning materials, the availability of financial support, and the influence of TVET policies. The massification of TVET education in the context of the knowledge economy places considerable pressure



on both the government and the private sector to provide accessible education in Kenya. Distance learning, due to its flexibility, has gained popularity, but questions about the level of preparedness for distance education persist.

The theory of equivalency, as discussed by Ngeera (2018), suggests that Open and Distance Learning can produce outcomes equivalent to traditional learning. However, achieving this equivalency requires specific factors to be in place. The literature review identifies a gap in the existing research related to evaluating the readiness of online teaching and learning, with a focus on five key factors: ICT infrastructure, ICT user training and skills development, online instructional materials, financial support, and TVET policies. Overall, the reviewed literature underscores the need for a comprehensive assessment of preparedness to enhance the quality of distance teaching and learning in TVET institutions. The research approach employed to address this knowledge gap is detailed in the subsequent chapter.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter serves as an essential introduction to the research methods employed in this study, offering a comprehensive framework for data collection, analysis, and interpretation. It begins by contextualizing the study's location and backdrop, followed by an exploration of the chosen research philosophy, a mixed-methods approach that underpins the research methods. The chapter elucidates the research approach, rooted in pragmatism, and outlines the research design, encompassing its conceptual framework and methodologies. It precisely defines the target population as diploma trainees in the department of applied sciences, highlighting their relevance to the research objectives. The section on sampling techniques and sample size justification ensures the robustness of the sampling strategy. Detailed explanations of the data collection procedure, instruments, and pretesting activities validate the reliability of the variables measured. The chapter also delves into statistical instruments and measurement scales for quantitative analysis and outlines data analysis methods. Ethical considerations are emphasized, reflecting a commitment to integrity, confidentiality, and participant well-being. In summary, the chapter establishes the foundation of the research endeavor, providing transparency and a clear roadmap for readers to comprehend the study's methodology and data analysis procedures.

### **3.2 Location of the Study**

An established research site is defined by Tate (2022) as the location that the researcher chooses in order to follow up on the ideas generated by research data and is located in an area where control problems are recognized to be common. This study was conducted in Kenya and based on three technical and vocational education institutions TVET which were purposively sampled through. These were purposively sampled from the ten (appendix11) existing ones because they offer online distance learning, they have an applied science department and a functioning ODeL office. The three are, Kabete national Polytechnic, located in Kiamba, Nyeri national polytechnic located in Nyeri and Meru national Polytechnic located in Meru County. In Kenya, the country is divided into counties, with Kiambu, Nyeri, and Meru County being three out of the forty-seven counties.

### **3.3 Research Philosophy**

The concept of research philosophy encapsulates the cognitive approach of the researcher, which directs the attainment of dependable understanding about the research topic. Fundamentally, it forms the bedrock of the research, shaping the choice of research methodologies, formulation of problems, collection and processing of data, as well as the analysis thereof (Walliman, 2018).

This study adopted pragmatism philosophical thought. Pragmatism is a philosophical movement that asserts the truthfulness of an ideology or proposition based on its satisfactory practical outcomes. The meaning of a proposition lies in its practical consequences, and impractical ideas are rejected (Saunders, 2016). Researchers who uses pragmatic paradigm employ innovative and dynamic methods to address research

problems. Pragmatic studies aim to comprehend the various factors influencing individuals' actions within a given context. Consequently, pragmatists acknowledge that their inquiries do not provide absolute certainty since certainty is elusive in the world (Walliman, 2018).

According to Walliman (2018), pragmatic studies prove valuable when unexpected outcomes arise from previous research, as they assist in generalizing data and designing/validating research instruments. These studies also facilitate holistic analysis by incorporating multiple relevant approaches into the study (Battistoni, C et al, 2019). The strengths of pragmatic investigations lie in their easy description and reporting, their usefulness in addressing unexpected results, generalizing data, and designing/validating research instruments.

The study looks at preparedness of TVET institutions in implementing curriculum through online distance learning and this readiness is deemed to have been impacted on or affected by what the communities and the public believe about TVET institutions. With the changing times and technology advancement, TVET institutions will finally find out that online distance education can be easily disseminated if several areas that require preparedness are taken care of.

Consequently, this study relied on the philosophical underpinnings of pragmatism, which contend that ideas are formed through experiential knowledge prior to practice, and that these fundamental principles serve as a basis for deriving ideas (Hooley 2023). Hence, it is essential for a researcher to employ diverse methodologies in order to comprehend the research problem. To bring about best understanding of the research problem, qualitative results are compared with Quantitative results (Hooley, 2023).

However, like any other paradigm, pragmatism has its limitations. For example, preparing and conducting pragmatic studies may require more time compared to traditional paradigms. Discrepancies between different types of data can be challenging to interpret, and determining the sequencing of data collection and when to proceed with sequential designs can be difficult (Mitchell & Education, 2018).

### **3.4 Research Approach**

A research approach refers to the specific methodology chosen by the researcher to collect, analyse, and interpret data. Researchers typically employ three approaches: quantitative, qualitative, and mixed methods. This study used a mixed methods approach (Mitchell & Education, 2018). The mixed methods research involves the integration of data collected from quantitative and qualitative approaches in a standalone study or a several studies to gain a comprehensive understanding of a research problem. By combining or linking data from different approaches, mixed methods research provides a more comprehensive insight into the research problem than either approach alone (Mitchell & Education, 2018). The mixed methods approach was deemed suitable for this research because it allowed for the exploration of different aspects of the investigation through both quantitative and qualitative approaches. Careful consideration was given to the relationship between the two approaches to ensure a clear connection (Mitchell & Education, 2018).

The utilization of mixed methods research proves beneficial when unforeseen outcomes emerge from prior studies. It aids in further delving into the comprehension of quantitative results or refining the applicability of qualitative findings. Moreover, mixed methods play a crucial role in the development and validation of research tools, like questionnaires or

intricate interventions employed in subsequent research endeavours (Mitchell & Education, 2018). Nevertheless, undertaking mixed methods studies comes with challenges due to their intricate nature, demanding researchers to master multiple methodologies. Determining the appropriate timing for employing sequential designs can also pose a challenge (Mitchell & Education, 2018).

### **3.4.1 Triangulation**

In a triangulation design, both quantitative and qualitative data were collected simultaneously with the aim of leveraging the strengths of both methods. The results from each approach were combined and compared to identify inter-relationships. This combination of data sets provided validation by demonstrating similar findings through different approaches. Equal emphasis was placed on both data sets during the overall interpretation (Mitchell & Education, 2018).

### **3.5 Research Design**

This study used the convergent parallel design. This entailed collecting and analyzing both qualitative and quantitative data, followed by a comparison or correlation of the two sets of data, ultimately leading to their interpretation (President and Harvard fellows, 2023). The study then proceeded to examine areas of convergence or divergence between the qualitative and quantitative findings. Conversely, the exploratory sequential design initiated its process by collecting and analyzing qualitative data, gradually transitioning to the collection and analysis of quantitative data, ultimately concluding with the phase of interpretation.

Triangulation of mixed methods was employed, where quantitative and qualitative data were mixed or combined to provide a comprehensive examination of the research problem. Both types of data were collected simultaneously and incorporated into the overall analysis of findings. Additionally, this approach allowed for the integration of smaller data sets into larger ones to explore various issues (Creswell, 2015).

Mixed methods research encompasses gathering both quantitative and qualitative data, merging them together, and employing a variety of approaches. This type of study design is based on the belief that combining qualitative and quantitative methodologies leads to a more comprehensive understanding of the research problem compared to using each method separately. In this study, qualitative and quantitative data were collected concurrently, and appropriate organization, analysis, and interpretation of the data were conducted (Creswell, 2015). As Creswell suggests, qualitative results provided in-depth individual perspectives, while quantitative results revealed general trends and relationships. This study design was chosen because it facilitated a comprehensive description and understanding of the situation, utilizing descriptions obtained from respondents within the selected institutions.

### **3.6 Target Population**

Target population is a big group of people or items that is the subject of a technical investigation, and research is conducted for the profit of the people (Creswell, 2014). The study targeted ten national technical vocational education training (TVET) institutes which had to have trainees in the department of applied sciences and a functional ODeL center. Multistage sampling, or multistage cluster sampling, was used. This technique involved selecting samples from a population in successive stages, using progressively smaller

groups (units) at each step. This approach is commonly employed to gather information from a widespread, extensive demographic in activities such as nationwide surveys.

There are ten national public polytechnics in Kenya (see appendix vii). These are government sponsored Technical Training Institutions. From these ten, the ten principals were targeted together with all the heads of departments in the ten institutions. There were eight (8) functional departments in all TVET institutions giving a total of eighty (80) heads of departments. All the two thousand nine hundred twenty five (2925) trainers in the eight departments were targeted too. The targeted trainees in the National TVET colleges were seventy eight thousand nine hundred and sixty eight (78968). (TVET data-Kenya 2022).

**Table 3. 1**

***Distribution of the units of observation per TVET Institution***

No.	Institution	Principals	HOD	Trainers	Trainees	Total
1)	Kabete	1	8	200	13800	14009
2)	Meru	1	8	225	800	8234
3)	Kisii	1	8	180	3000	3189
4)	Kisumu	1	8	200	3318	3527
5)	Nyeri	1	8	200	13500	1509
6)	Kenya Coast	1	8	150	7500	7659
7)	Sigalagala	1	8	1100	12500	23600
8)	Kitale	1	8	270	4900	5179
9)	North Eastern	1	8	120	650	879
10)	Eldoret	1	8	280	12800	13089
Total		10	80	2925	78968	82893

### **3.7 Sampling Techniques and Sample Size**

Sampling refers to the procedure of selecting a specific quantity of individuals or items from a population, whose characteristics are representative of the entire collective (Heath,



2023). Given the vastness of the population and the researcher's time constraints, it was not practical to gather data on the entire population; hence sampling a few representatives was done. Multistage sampling, or multistage cluster sampling, was used. This technique involved selecting samples from the population in successive stages, using progressively smaller groups (units) at each step. This approach is commonly employed to gather information from a widespread, extensive demographic in activities such as nationwide surveys.

### **3.7.1 Technical and Vocational Education Training Institutions**

This study, focused on assessing the readiness of national TVET institutions in Kenya for curriculum implementation through online teaching and learning platforms. It employed a purposive sampling technique due to resource and time constraints. Out of the ten national TVETs in Kenya, 30% were sampled, resulting in the selection of three institutions. The chosen institutions, Kabete National Polytechnic, Meru National Polytechnic, and Nyeri National Polytechnic, met specific criteria: they offered online distance learning programs, had active ODeL offices, and featured applied sciences departments. These institutions were selected because of their extensive experience in online distance education, supported by the fact that they have been offering these programs for a considerable period. The selection process followed purposive sampling principles, aligning with Creswell's (2014) recommendation to choose a sample that best suits the study's objectives.

### **3.7.2 Academic Departments**

There are eight active departments in all TVET institutions in Kenya. The principal divisions consist of the following departments: Electrical Electronics Engineering,

Building & Civil Engineering, Agriculture & Environmental Sciences, Health Sciences, Applied Sciences, Business Studies, Computer Studies, Mechanical Engineering, and Hospitality Management department. Applied sciences form the basis of many technological advancements and real world applications. The applied sciences are in high demand and essential in various careers (Boshale, 2023). The applied sciences are applicable and relevant in all spheres of life today. The department of applied sciences was purposively sampled from the eight as explained in the scope and delimitation

Applied sciences lend themselves well to online distance teaching and learning due to their theoretical foundations, experimental nature and logical problem solving approaches. Online platforms can effectively deliver lectures, demonstrations, simulations and virtual experiments. These provide students with interactive and engaging experiences. The versatility of online resource and tools allows for effective instruction and assessment of applied sciences in a virtual environment (Theofanidis & Fountouki (2019). On the sample choice, the factor of relevance and demand was considered. All the national TVET institutions offer different programs and applied sciences diploma programs were studied because they are offered by all the national institutions. The sciences continue to face severe challenges in preparation of online materials (Obwoye & Okemwa, 2016). Choice of applied sciences was justified by the relevance and demand, compatibility with online learning platforms, the potential for increasing accessibility and inclusivity, and the need to adapt to changing educational landscapes.

### **3.7.3 Heads of Departments**

The study employed purposive sampling to identify the three Heads of Department (HoDs) responsible for the department of applied sciences within ten institutions. Purposive sampling is a non-probability method, intentionally selecting participants based on specific criteria aligned with the research objectives. In this case, the criteria were individuals serving as HoDs for applied sciences, making them directly involved in the administration of their respective departments. This approach is particularly valuable for qualitative research, such as case studies, where unique insights, like implementing online policies, are sought.

The three HoDs were purposively chosen from the ten institutions as they play a crucial role in the implementation of online distance learning (ODEL) programs within their respective institutions. Unlike typical sampling methods, such as random sampling, purposive sampling entails the complete enumeration of the entire population, engaging all its members rather than just a sample. These HoDs not only interact with trainers and trainees within their departments but also communicate important matters related to the execution of programs in the online distance learning mode to senior management. This strategic selection of participants aligns with the research's focused goals and the unique role these HoDs play in the context of ODeL program implementation.

### **. 3.7.4 Trainers**

Purposive sampling was used to sample all the trainers in the three institutions that teach in the department of applied sciences participated in training of the trainees in the three institutions from the department of applied sciences. They were selected due to their

familiarity with instructing via online distance education and their active engagement in the execution of online distance education methods. All the 35 trainers were sampled from the selected TVET institutions by census method.

**Table 3. 2**

***Trainers Sampling Matrix***

National TVET	Study		Sampling technique	Sample size
	population	%		
Kabete N.P	12	100%	purposive	12
Meru N. P.	11	100%	purposive	11
Nyeri N.P.	12	100%	purposive	12
Total	35			35

Source ODeL directors/coordinators, 2023

### **3.7.5 Trainees**

The researcher employed a combination of sampling techniques to select participants for the study on Open and Distance Learning (ODEL) trainees. Stratified random sampling, as explained by Thomas (2023), was initially used to ensure a representative sample. This method involved categorizing the trainees into homogeneous groups based on their

Technical and Vocational Education and Training (TVET) institution, department, and year of study. By stratifying the students in this way, the researcher aimed to maintain a proportional representation from each TVET institute.

Furthermore, purposive sampling was employed to select participants from the pool of second-year ODeL students pursuing diplomas in applied sciences. The choice of second-year students was deliberate because they had a more extended exposure to the institution and were well-acquainted with ODeL practices. As Thomas (2023) explains, purposive sampling allows researchers to select participants they believe are best suited for the study.

To determine the sample of students to whom questionnaires would be administered, a systematic random sampling technique was utilized. According to Statistics Canada (2023), systematic sampling involves selecting subjects from a list in a specific manner. A random number was initially selected to introduce randomness into the process, and then every subsequent student was chosen until the required sample size was achieved.

It's worth noting that the study's sample size was carefully considered to ensure appropriateness, following the guidance of Thomas (2023) and Statistics online (2023). For descriptive studies, it is recommended that the sample size falls between 10% to 30% of the population. In this case, the three institutions—Meru National Polytechnic (MNP), Kabete National Polytechnic (KNP), and Nyeri, which offered applied sciences—had a combined student population of 690. To adhere to the suggested guidelines, a sample size of 30% was selected for this study. The distribution of the students in the sampling matrix is presented in Table 3.3 for reference.

**Table 3. 3*****Trainees Sampling Matrix***

National TVET	Study population	%	Sampling technique	Sample size
Kabete N. P.	300	30	purposive	90
Meru N. P.	260	30	purposive	78
Nyeri N.P	130	30	purposive	39
Total	690			207

Source ODeL directors/coordinators, 2023

The trainees were systematically sampled (2<sup>nd</sup> year diploma) from the applied sciences department and included a sample size of 90 students from Kabete National Polytechnic and 78 students at Meru National Polytechnic, and 39 at Nyeri national Polytechnic, giving a total of 207 trainees.

### **3.8 Data Collection Instruments**

Data serves as a crucial foundation for informed decision-making and research endeavors. It encompasses an array of facts, figures, symbols, and events from diverse sources. Researchers employ various data collection methods to gather this essential information. Without data, drawing meaningful conclusions and making informed choices would be challenging. In the context of this study, data was collected from various categories of participants, including Principals, Heads of Departments (HoDs), trainers, and trainees, streamlining the process for efficiency.

The research instruments employed in this study were specifically developed by the researcher based on identified research gaps during the literature review. These instruments were thoughtfully selected to ensure a comprehensive and effective data collection process. They include questionnaires, interviews, and document analysis.

Questionnaires played a significant role in gathering structured data from a large sample of participants. This method enabled the collection of standardized responses to predefined questions, making it suitable for obtaining quantitative data regarding various aspects of the research topic, particularly from online distance trainers and trainees. The questionnaires featured a mix of open-ended and closed-ended questions to capture both free-form responses and concise, checkbox-style answers, reducing potential bias.

Interviews were carried out with Heads of Departments (HoDs) and principals to delve more deeply into qualitative insights, offering a more personal and nuanced exploration of the research subject. This approach enabled researchers to unearth comprehensive and detailed information, supplementing the quantitative data collected via questionnaires.

A document analysis guide was employed to systematically review and analyze relevant documents, including TVET policies, institutional policies, online examination reports, and textual materials such as online registration and virtual labs. This method added depth to the research by extracting valuable information from existing sources, complementing the primary data collected through questionnaires and interviews.

By employing this multifaceted approach, the study aimed to offer a comprehensive understanding of the research area, combining both quantitative and qualitative data while leveraging existing documentation to support the research findings. This comprehensive data collection strategy ensured a robust and well-rounded analysis of the applied research project (Statistics Canada, 2023; Kallet, 2018).

### **3.8.1 Questionnaire for the Trainees**

The trainees also had a well-prepared questionnaire administered to them appendix (ii). They were the consumers of the online curriculum. This questionnaire sought to get information on how easily the trainees were getting access to study materials online and how well the materials were useful to them. Readiness or availability of materials when needed, ability to access and tackle online assignments, ability to decipher practical instructions and carry out online practicals and ability to sit online exams (see appendix ii for trainees' questionnaire).

### **3.8.2 Questionnaire for the Trainers**

A structured questionnaire was developed and administered to the trainers. These are the employees that ensure that the curriculum is implemented. The questionnaires collected information on trainers' demographic information, ICT infrastructure in their institutions and how prepared the available infrastructure was for use by trainers and trainees. This questionnaire in addition got information on the institutions support towards making online teaching materials readily available for trainees (see appendix iii for trainers' questionnaire).



### **3.8.3 Interview Guide for the Heads of Departments (HoDs)**

The HoDs were also interviewed. This informed on ICT infrastructure available in the institution and how the available ICT was made readily available for use by trainers and trainees. In addition, these interviews helped in finding out how prepared the trainers were in matters online teaching in the department of applied sciences. These interviews (see appendix iv) were able to gather information on institution support to HoDs in preparing them to tackle online classes. The interviews were audiotaped using smart phones and relevant important information was noted down in a note book carried by the researcher. These two methods of audiotaping and recording data in a note book were used to store and preserve information for use during data analysis.

### **3.8.4 Interview Guide for the Principal**

The key informant interview guide was used to interview the principals. It consisted of two main sections (appendix v). General information about the respondent was gathered in the first section. This included demographic information like participants age bracket, gender and about their management position in the TVET institution. The second section tried to gather information on readiness or preparedness of their respective TVET institution in matters online distance teaching and learning. There was also an interview guide prepared for the principals. This interview guide (see appendix v) was used to understand the in-depth experiences of these key informants in the implementation of the curriculum. Principals also provided strategic direction and challenges faced in the curriculum implementation.

Interview guides for Principals asked face to face questions as explained by Thomas (2023). Interviews allowed in depth exploration of a few participants, the principals and Heads of Departments. These were appropriate in that they gave the principals opinions on level of preparedness. Interviews mainly addressed the issues of readiness of ICT hardware and software and internet connectivity. In addition, the interview helped get information on policies and financial support by the institution on online distance teaching and learning. The interview also assisted in getting answers on learner characteristics and trainee's financial status. The interview elicited information on policies guiding online distance studies.

### **3.8.5 Document Analysis Guide**

A Document analysis guide was used by the researcher to fill in important information about online learning. Document analysis is used in social sciences where the researcher reviews the documents and interpretation is made to give a voice and meaning regarding a phenomenon under investigation. The documents analysis guide sought information on national and institutional online policies, training materials and training schedules (appendix VI). These included online distance teaching and learning instructional materials, training schedules and manuals. Institutions policy and national policy guides documents available in the TVET institution were also analyzed. Document analysis made it possible for the researcher to validate results of questionnaires and interviews.

### **3.9 Pretesting of Instruments**

Prior to data collection, the researcher conducted a pretest at the Kitale National Polytechnic. Kitale national polytechnic is a TVET institution that offers online distance

learning to its trainees. Kitale was randomly selected from the remaining seven national TVET institutions that were not involved in the main research. The questionnaires were pretested with second year diploma students of the department of applied sciences because they have information and more knowledge about online distance learning as a mode of study. The trainers who train in this department were also involved. The HoD applied sciences and the principal were interviewed. The HOD and principal gave information on the ICT infrastructure availability and readiness in the TVET institution. In this piloting, eight students' five trainers, one HoD and one Principal to make a total of fifteen participants were sampled.

This piloting enabled the researcher to ascertain the feasibility of the data collection period, improved the data collection instruments and also used the time to train the research assistants on data collection procedures. The research assistants spoke directly to the respondents sought their consent and provided them with the questionnaire to respond. From pretesting a few items from the questionnaire were revised to remove ambiguity and make them very articulate and specific. Pretesting enabled the validity and reliability of research instruments.

### **3.9.1 Validity of the Research Instruments**

The pilot test was used to examine the reliability of the two data collection tools. An interview guide and a questionnaire are valid when they measure what they were intended to measure. Therefore, the instrument is valid if the degree to which results obtained represent the phenomenon under investigation. Two types of validity were ensured; those were content and face validity. As Middleton (2023) puts it, if the instrument fairly and

comprehensively covered that which it was intended to cover it and qualified for content validity. Comments made by the supervisors and peers were used to improve and refine the validity of the content. Careful sampling of items was used to ensure full representation. Hence completeness, comprehensiveness and appropriateness including the sequence of the questions and wording was checked and validated. A further check was done from findings reported by the respondents (Middleton, 2023).

Face validity was also ensured. Face validity means that there is a possibility that the items in the research instruments are misunderstood or misinterpreted by the participants. Face validity is the degree to which questions asked appear as if they can measure what they were intended to measure (Middleton 2023). A few of the questions were misunderstood by the participants and were adjusted or improved to remove their ambiguity. Face validity was ensured by discussing these research instruments with the supervisors. The researcher went through the instruments to ensure clarity and relevance to the study objectives. Those instruments found inappropriate for measuring the variables were modified or done away with as this was the purpose of pretesting. The HoDs and trainers were contacted when there was need to clarify any of the items in the questionnaire

### **3.9.2 Reliability of the Instruments**

When an instrument measures a variable consistently and yields the same results under same circumstances, it is considered to be trustworthy Heath (2023). To ensure reliability of the study findings, the researcher triangulated the research instruments. Qualitative data was collected alongside quantitative data. Findings were then measured using Cronbach alpha to check for reliability. For social sciences the alpha coefficient does not go below

0.70 (Frost, 2023). This was achieved hence the instruments were reliable and useful for the research.

Interview reliability in qualitative research refers to a fit between what the researcher records as data and what actually occurs in the natural situation that is being researched. It displays a degree of precision and comprehensiveness of coverage. Each participant was asked questions using the same format and wording from the highly structured, printed interview guide. During the pretesting period, mock interviews were done to ensure credibility. Some of the wording for some questions was revised; example the question on availability of wi-fi was adjusted to read provision of wi-fi by the institution. On provision of laptop the researcher changed the statement to provision of computer or laptop by the institution. In some instances the researcher went back to the same institutions to ascertain whether the answers given were correct. One example was on the gender, 70 percent of trainees turned out to be females. The researcher ascertained these figures by talking to the TVET institution management for confirmation of numbers (Frost, 2023). Reliability of the pretested data was worked out.

**Table 3. 4*****Reliability of the data***

Variable	Reliability of questionnaires from Trainees	Reliability of questionnaires from Trainers
• Availability of information communication technology infrastructure	.932	.848
• Availability of ICT user training and skills development support	.896	.871
• Availability of appropriate online distance teaching and learning instructional materials	.889	.918
• Availability in financial support from various stake holders	.834	.854
• TVET policy	.876	.964
• Curriculum implementation	.957	.946

The results show that the Cronbach alpha value for each variable was above 0.7. This means that data collected for each variable was reliable to be used in the intended analysis (Hagman, 2023). This notion is also supported by the recommendation of Selvam (2017) explaining that, Cronbach's Alpha ( $\alpha$ ) coefficient that is above 0.7 qualifies for reliability and hence useful in analysis. A study by Kabir (2018) demonstrated that, an alpha value of 0.70 and above is adequate, .80 good while .90 and above is excellent. Studies by Orina (2022) and Isaboke et al. (2021) also adopted a similar measure to ascertain their data reliability. This implies that the instruments were dependable, uniform, and proficient in

assessing the variables of the study. Appendix XII offers the outcomes of the reliability test.

The use of documents analysis was partial selective and inadequate. This is because they are developed without the intention of giving research information. Therefore, the documents were used to validate pre-existing knowledge and information rather than for creating new knowledge. Open ended and closed ended questionnaires and interview guides were used to ensure reliability of the documents.

### **3.10 Statistical Instruments and Measurement**

The Likert Scale was selected and used as statistical instrument in this study. It gives consisted results showing that it has validity and also easy to use. The Likert scale was used to rate the degree of preparedness of TVET principals in online distance learning and teaching. Likert scale is a five-point scale that ranges from ‘strongly disagree’ to ‘strongly agree’ (Gall et al., 1996). It ascertains their feelings on preparedness by using declarative statements and rating them in terms of agreement or disagreement. Score is usually used as the indicator of the attitude in order to achieve maximum validity and reliability (Black, 1999).

### **3.11 Data Collection Procedure**

The researcher used a cover letter obtained from Kenya Methodist University see appendix (ix) to submit a request for permission to conduct research to the National Commission for Science, Technology, and Innovation (NACOSTI (appendix x)). Authorization letters were applied for and received from the three TVET institutions namely Kabete, Nyeri and Meru. The researcher then booked appointments with the principles of the three TVET colleges

to allow administration of questionnaires, conduct interviews and access various documents after obtaining the research permit. There was an introduction letter to all the respondents assuring them of confidentiality and justification of the study. Permission to access all documents and conduct interviews was also sought and granted. The research assistants were then trained on the process of data collection and what was expected of them.

### **3.11.1 Procedure for Administering Questionnaires**

To collect information from online distance learning trainers and trainees, self-administered questionnaires were used. Class representatives were used to identify and distribute the questionnaires to trainees who took part in the study. This was done during the periods when then online students were in residential campus for tutorials.

The heads of department distributed the questionnaires to the trainers who took part in online teaching by giving the researcher their contacts. The researcher then contacted these trainers by use of their mobile phone numbers and emails and scheduled meetings during their convenient times to issue them with a questionnaire. During residential sessions, there's ease of getting most trainers.

### **3.11.2 Procedure for Conducting In-depth Interviews**

In order to understand the in-depth issues affecting curriculum implementation, the researcher administered the interview guide by booking appointments with the Heads of department who were key informants. Each head of department was invited for a scheduled face to face interview and their responses recorded. The researcher made sure that the interviews were flexible to gain the advantage of in-depth probing. This enabled the



researcher to clear the air on any misconceptions or any misunderstanding that may have arisen. The researcher was able to capture information on views, perceptions and any other issues of concern that was affecting readiness in online distance teaching and learning. This interview took place in the trainer's offices at as per the agreement between the trainer and the researcher and lasted approximately 30 to 45 minutes.

### **3.11.3 Procedure for Studying Documents**

Analyzing documents was a valuable part of research on the preparedness of curriculum implementation through online distance learning. The following documents were analyzed namely curriculum guides and syllabi, institutional and government policies, budgetary allocations and funding documents not forgetting institutional reports.

Curriculum Guides and Syllabi outlined the objectives, content, and structure of the curriculum. Analyzing them provided insights into what topics are usually covered, how they are organized, and the intended learning outcomes. Reviewing government or institutional policies in relationship to online distance learning helped understand the regulatory framework and requirements for curriculum implementation. The policies also provided information on funding, accreditation, and quality assurance standards. Assessment tools like exams, quizzes, and rubrics revealed how trainees learning were evaluated in online courses.

Assessment of budget and funding documents helped reveal financial aspects in relation to online distance learning. Analyzing budget reports helped reveal how resources are allocated for curriculum development, technology, and support services. Reviewing Institutional Reports and strategic plans helped reveal information about the goals and

priorities related to online education, which offered context for curriculum implementation. When analyzing these documents, both qualitative and quantitative data was considered and recorded. Patterns, trends, and inconsistencies helped draw meaningful conclusions about the preparedness of curriculum implementation through online distance learning.

### **3.12 Data Analysis Methods**

On data management, once the questionnaires were received from the field, they were signed. To ensure sample size-based questions and their respective quotas on the sampling frame were achieved. Before data analysis the researcher checked for data completeness to ensure that the recording of the number of the returned questionnaires was made checking of number of interviews made and documents accessed and analyzed made. Data coding took place during this time for easier data analysis. 50 % of responses rate was adequate and acceptable (Bevans, 2023). Diagnostic tests or statistical checks was conducted to determine suitability of statistics that was used before embarking on data analysis as recommended by Bevans (2023). Histograms, Normal P-P regression standardized residual and Normal Q-Q plots were used to confirm whether the data was normally distributed. Others statistical tests were autocorrelation, heteroscedasticity, multicollinearity and linearity (Bevans, 2023).

After data collection exercise and before data analysis was carried out, the researcher checked for data completeness and ensured the recording of a number of questionnaires that were returned, interview responses and documents that were accessed. According to Babbie (2011), 50% of response rate is acceptable. In this case, the response rate was over 50% which was good and acceptable. Before embarking on data, normality test was conducted to determine suitability of statistics that was supposed to be used as

recommended by (Cohen, Manion and Morrison, (2011)). The study tested for normality using histogram, normal P-P regression standardized residual, Normal Q-Q plot and Shapiro-Wilk tests. Data was confirmed to be normally distributed (See Appendix xv). Data was analyzed using both quantitative and qualitative methods.

An excel spreadsheet was updated with the obtained data. The information was subsequently categorized and coded. According to Hagman (2023) the questionnaire data was arranged in insightful analytical units. Coding was carried out by making notes about material that was considered important and coding it to represent each specific segment. As Hagman, (2023) advices, that coding should and was done immediately after the interview. The researcher looked out for all interesting aspects. An external coder was assigned to verify data.

The data was next organized by classifying the codes and deciding on the major themes that would guide how the data was interpreted. SPSS data management tools was used to examine quantitative data. The information was then displayed using percentages, frequency tables, frequency polygons, pie charts, and bar graphs. Data collected was then analyzed using descriptive statistics and thematic analysis.

### **3.12.1 Analysis of Quantitative Data**

The statistical program for social sciences (SPSS) version 21 was used to evaluate the data using descriptive statistics like percentages, means, and frequencies. This is an appropriate and powerful tool for quantitative data analysis. Open ended questions were transformed to quantitative data by counting the number of times themes were repeated in responses. This data transformation ensured that it can be easily compared. After transformation,

quantitative analysis was carried out. These questionnaires helped get ordered responses, binary responses and open ended responses. As Bevens (2023) puts it, the range in an ordered scale like Likert is not quantifiable hence the responses were finally transformed into binary responses in order to make the collected data sensible. Data was collected on 5-point Likert scale where the upper two positive responses were taken to indicate level of agreement to the particular item being measured. The lower two responses and neutral were taken to indicate level of disagreement. The researcher examined and judged the data from open ended categories and divided it into binary categories for quantitative analysis where necessary (Bevens, 2023).

Additionally, multiple linear regression analysis was performed to determine the link between the study's independent and dependent variables. In order to confirm the relationship between the variables under examination, a number of tests were performed to ascertain the strength of the link between the variables. The level of significance was set at 5%. This proved that the model was fit to be tested. Frequency tables and graphs were used to present analyzed data. These descriptive data are easily understood because of their familiarity with means, percentages, and standard deviation (Sudheesh, 2016). In order to interpret the meaning of descriptive statics, inferential statistics was used. Results from interviews and document analysis were used to compare results from the questionnaires to make study conclusions and recommendations.

### **3.12.2 Analysis of Qualitative data**

The in-depth interview provided data that was transcribed from audiotapes to words. Qualitative data was coded after organizing it from research objectives. Coding of

significant and interesting information was done through taking notes. Coding was done immediately after the interviews and the researcher took note of any important and interesting information as advised by Thomas (2023). Findings were then analyzed in thematic forms. Themes were arrived at by identifying codes that were recurring from the interviews. Although repetition was used to identify themes, relevance to the research was highly checked and only data that was relevant was used. (Thomas, 2023). Narrative discussions were used to present the results.

Content analysis was used to analyze data collected using document analysis. The documents that were analyzed include online distance teaching and learning policy, Information communication (ICT) policy, the institution strategic plan, and TIVETA policies. The process of examination, verification, summarizing and reporting written data and making inferences is referred to as content analysis (Bevans, 2023). Coding, creating categories and comparing data were done.

Interview results and document analysis results were used for comparison with the results from questionnaires. These helped draw conclusions and recommendations. Themes emerging from qualitative data were used to validate the quantitative data. Creswell (2015) advises that these two data sources (qualitative and quantitative) be arrayed side by side for comparison. The study determined level of preparedness in online distance teaching and learning in national TVET colleges in Kenya.

### **3.13 Ethical Considerations**

Accessing the respondents can be a challenge as well as satisfying ethical requirements (Creswell, 2014). As Creswell (2009) recommends, the researcher ensured compliance

with code of ethics of all national professional associations involved. The researcher applied for ethical approval from the Kenya Methodist University Ethics Review Committee. Upon receipt of clearance, a research license was sought from the National Commission of Science and Technology (NACOSTI). A further clearance was then sought from the administrative heads of Kabete National Polytechnic, the Meru National Polytechnic and Nyeri National Polytechnic in writing. All issues that erupted at different stages of the research process were responsibly handled by the researcher by ensuring that procedures and controls were well handled in an ethical manner.

Informed consent was also sought from all the participants recruited in the study. This is after they were explained why the research was taking place. Clarification on the benefits to the participants that may accrue from the research was explained. Participants were explained that there was no harm in participating in the research and that the exercise would be fully voluntary. The right to anonymity and confidentiality was elaborately explained. Participant's names were not required in the questionnaire and they had the right to leave some questions unanswered. Participants were informed that they had the right to refuse to be interviewed and or respond to the questionnaires. The researcher made sure that the interview was not stressful or intrusive at all as is the case with the in-depth qualitative investigation. To maintain confidentiality, data collected was safely locked in a cabinet set apart for that work.

Information got from participants was safeguarded. During data analysis and interpretations, the identity of the respondents was safeguarded and kept unknown. Their names were completely withheld. Data received was coded for anonymity and confidentiality maintained. The results were analyzed and reported without any alteration

or falsification. Hence research findings were generalized and declined from the primary respondent to safeguard their privacy (Creswell, 2015). Complete references cited were provided using the American Psychological Association (APA). Dissemination of Research results to the relevant authorities for any actions was prioritized and followed by publication in peer referred journals.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **4.1 Introduction**

The previous section discussed the approach employed to carry out this study. In contrast, the following section presents the outcomes, their analysis, and subsequent discussions. The discussion of the results was done by comparing the findings with previous studies and literature reviewed and presented in chapter two. The outcomes showcased in this chapter have been structured based on the study's variables. The quantitative results are first presented. Then, the qualitative findings are integrated during interpretations to inject other aspects and to aid in explaining an observable phenomenon. Furthermore, the interpretation of facts was also enhanced by data collected from documents through content analysis.

Spearman correlation results are then presented for each variable. This helped to test each variable. After results on each variable are presented, the study provides findings of the multivariate ordinal logistic regression analysis which was conducted to test the overall purpose of the study. The concluding part of the chapter offers insights into whether TVET policy plays a moderating role in the readiness and execution of curriculum via online distance teaching and learning in Kenya's National TVET institutions. The chapter commences by presenting the results pertaining to data reliability, followed by the response rate, and subsequently provides demographic information about the respondents.



## 4.2 Results on Response Rate

The study gathered data from trainees, trainers, HODs, and principals of national TVET institutions. The response rate of the four categories of respondents is provided in Table 4.1.

**Table 4. 1**

***Response rate***

Institution	Response rate for Trainees			Response rate for Trainers		
	Sample size	valid questionnaires	Response rate	Sample size (30%)	valid questionnaires	Response rate
Kabete National Polytechnic	90	67	74%	12	11	91.7%
Meru National Polytechnic	78	64	82%	11	10	90.9%
Nyeri National Polytechnic	39	33	85%	12	10	83.3%
Total	207	164	79%	35	31	88.6%

As shown in Table 4.1, the study involved three national TVETs where out of the 207 students who were selected for the study, 164 of them completed and returned the questionnaires. The results show that the response rate from Kabete National Polytechnic was 67(74%), Meru National Polytechnic 64 (82%), and Nyeri National Polytechnic 33(85%); hence, the 79% response rate. This shows that Kabete National Polytechnic had the highest number of trainees followed by Meru and then Nyeri National Polytechnic. For the trainers attached to this department, the study received responses 31 out of 35. This was 88.6% response rate. This shows that the department was fairly staffed considering that the trainers were also servicing other departments. In agreement, the response rate results by Ongulu (2018) in Nairobi County noted that the rate for trainers was higher

compared to the trainees' return rates. Consequently, Mbolonzi (2021) noted that, TVET institutions found in the city had many trainees compared to other counties in Kenya. The presented findings were moreover, consistent with the recommendation articulated by DJS Research (2023) that, a response rate ranging from 60% and above, is adequate enough for making a representative generalization of findings of a target population in social sciences. The findings also supported the directive given by Mugenda and Mugenda (2003) on the various categories of representative percentage rate of obtained responses.

#### 4.3 Reliability of the Data

To determine the reliability of the data concerning the main variables in this study, Cronbach's alpha values were calculated, and the outcomes are displayed in Table 4.2.

**Table 4. 2**

***Reliability of the data***

Variable	Reliability of questionnaires from Trainees	Reliability of questionnaires from Trainers
• Availability of information communication technology infrastructure	.932	.848
• Availability of ICT user training and skills development support	.896	.871
• Availability of appropriate online distance teaching and learning instructional materials	.889	.918
• Availability in financial support from various stake holders	.834	.854
• TVET policy	.876	.964
• Curriculum implementation	.957	.946

The results in Table 4.2 show that the Cronbach alpha value for each variable was above 0.7. This means that data collected for each variable was reliable to be used in the intended

analysis (Hagman, 2023). This notion is also supported by the recommendation of Selvam (2017) explaining that, Cronbach's Alpha ( $\alpha$ ) coefficient that is above 0.7 qualifies for reliability and hence useful in analysis. A study by Kabir (2018) demonstrated that, an alpha value of 0.70 and above is adequate, .80 good while .90 and above is excellent. Studies by Orina (2022) and Isaboke et al. (2021) also adopted a similar measure to ascertain their data reliability.

#### **4.4 Background Information of Respondents**

The participants of this study were trainers, heads of department, principals, and trainees. Important background characteristics of each category of participants were analyzed accordingly. The demographic information about each category of participants was helpful in enhancing the understanding of the results of this study. A summary of demographic characteristics of each category of participants is presented below.

##### **4.4.1 Demographic Characteristics of Trainers**

The facilitators (trainers) were very informative in this study. The demographic information gathered from them included their gender, highest educational qualification, current position at the institution, teaching experience, and program where one was teaching. The outcomes are displayed in Tables 4.3 and 4.4. One glaring point to note from the demographic data is the population ratio of men to women that is 1:3. This points to a worrying low uptake by men in the department of applied sciences.

**Table 4. 3*****Demographic Characteristics of Trainers***

	Description	Frequency	Percent
Name of TVET Institution	Kabete National Polytechnic	11	33.3
	Nyeri National Polytechnic	10	30.3
	Meru National Polytechnic	12	36.4
	Total	33	100.0
	Male	13	39.4
	Female	20	60.6
Education qualification	PhD	2	6.1
	Master's degree	8	24.2
	Bachelor's degree	13	39.4
	Higher National Diploma	3	9.1
	Diploma	7	21.2
	Certificate	0	0
	Total	33	100.0
Current position at the institution	Full time trainer	30	90.9
	Part-Time	3	9.1
	Total	33	100.0
Length of service in teaching	Less than 5 years	6	18.2
	6 - 10 years	13	39.4
	11 - 15 years	4	12.1
	16 years and above	10	30.3
	Total	33	100.0

The results in Table 4.3 shows that Meru National Polytechnic had most trainers in the department of applied sciences, that is, 12(36.4%) followed by Nyeri National Polytechnic 10(30.3%), and then Kabete National Polytechnic at 11(33.3%). Regarding their gender, the results indicate that, female trainers were more than male counterparts, that is, 20(60.6%) and 13(39.4%) respectively. The gender disparity among trainers could be

attributed to the nature of program offered in the institution. The presented findings disagree with the results of Ngugi and Muthima (2017) which presented the existence of great disparity on female tutors other than male in engineering courses at TVET institutions in Kenya. Ngugi and Muthima explained that, the female gap in at TVET institutions was as a result of social, cultural, institutional and curricula related factors. Comparably, Matenda (2020) also noted domination of male gender among TVETS institutions in South Africa.

Another characteristic sought from trainers was about their highest educational qualification. The findings show that most trainers, 13(39.4%) had undergraduate bachelor's degree, 8(24.2%) master's degree, 7(21.2%) diploma; 3(9.3%) national diploma, while 2 (6.1%) had doctorate degree. This shows that most trainers were qualified. The trainers' qualifications reflect their expertise and competence in delivering the desired Odel teaching information investigated in this study. These findings justify the census report carried out in 2019 by the TVET authority on the competencies and qualification of TVET trainers. The survey reported that, TVET institutions are dominated by teaching staff who have higher diploma qualifications (TVET Authority, 2019). Apart from that, trainers were advancing their qualifications as evidenced by the availability of PhD, masters and undergraduate graduates (TVET Authority, 2019). Moreover, the findings provided similar information as the one of Langat et al. (2022) who established that, Trainers in national polytechnics have fairly sufficient qualifications since the minimum requirements set was craft certificate qualification. When asked to indicate their position in the TVET, 30(90.9%) of trainers said they were full time, while 3(9.1%) were part-timers. With most

staff being full time trainers, they were expected to show commitment in implementing online distance teaching and learning.

In terms of years of teaching experience, the researcher established that most trainers 13(39.4%) had worked between 6 and 10 years; 10(30.3%) had from 16 years and above. It is also clear that 6(18.2%) had less than 5 years of teaching, while 4 (12.1%) between 11 and 15 years. The results show that an overwhelming majority of trainers, 27(81.8%) had from 6 years and above of teaching experience; hence were better placed to providing information regarding implementation of online distance teaching and learning in TVET institutions. Apparently, the outcomes are in support with the observations of Kiplangat (2021) who reported that most trainers in TVETs have work experience of five years and above. In Malaysia, Abdullah et al. (2022) also recognized the impact of adequate working experience in determining trainer's ability to tackle different situations in the teaching professions. Langat et al. (2022) also commented that, working experience was a prerequisite for TVET trainer's ability to have knowledge, skills and expertise for handling a variety of issues in course of carrying out their mandate.

The study was further interested to establish the course that trainers were handling. Table 4.4 show how trainers were distributed across various courses offered in the department of applied sciences at national TVET institutions.

**Table 4. 4**

***Programs taught by Trainers in the Department of applied sciences at national TVET institutions***

Programs taught by trainers	Frequency	Percent
Analytical Chemistry	3	9%
Applied Biology	6	18%
Entrepreneurship	2	6%
Engineering Mathematics	1	3%
Environmental Science	1	3%
Fashion Design	1	3%
Food Technology	4	12%
Cosmetology	4	12%
Medical Laboratory Technology	2	6%
Office Management	3	9%
Petroleum Geoscience Technology	2	6%
Science laboratory Technician	4	12%
Total	33	100.0

The results show that most national TVET institutions were offering applied biology and hence many trainers were attached to the program. Other programs that had from 3 trainers and above were analytical chemistry, food technology, Cosmetology, office management, and science laboratory technician. The distribution of lecturers in other courses indicates that some of them were engaged to handle common/ general courses. Odanga et al. (2021) also noted that, National TVET institutions in Kenya offer a variety of courses to support multi-skilled development of future workforce. This was also evident in the results of Ngugi and Muthima (2017).

#### **4.4.2 Demographic Characteristics of Trainees**

In this study, the demographic characteristics of trainees included their age and gender.

Results are presented in Table 4.5.

**Table 4. 5*****Demographic Characteristics of Trainees***

<b>Characteristics</b>	<b>Frequency</b>	<b>Percent</b>
Below 18 years	2	1.2
19-24 years	149	90.9
25-30 years	7	7.9
Total	164	100.0
Male	59	36.0
Female	105	64.0
Total	164	100.0

The findings in Table 4.5 show that most 149(90.9%) second year ODeL students pursuing diplomas in applied sciences at national TVET institutions in Kenya aged between 19 and 24 years. Those between 25 and 30 years of age were 7(7.9%). The result shows that most TVET trainees are young and hence require to be empowered with appropriate technical training and education that would enable them to be productive in growing the economy of their nation. In agreement, Kiplangat (2021) found that students enrolled in TVET institutions in West Pokot and Trans-Nzoia counties aged between 18-35 years.

The results additionally indicate that there was a higher representation of female students compared to male students in national TVET institutions in Kenya. The female students were almost two third, 105 (64%), while the male students were 59 (36%). This shows glaring gender imbalance in the enrollment of students in the applied sciences department across national TVET institutions in Kenya. The results were attributed to the nature of the courses offered in the department.

The gender imbalance in enrollment, with a significantly higher representation of female students in national TVET institutions in Kenya, can have several future implications, both



positive and negative. If this gender imbalance persists, it may result in an imbalance in the workforce in applied sciences fields in Kenya. With more female students enrolling in these programs, there is the potential for a future workforce that is predominantly female in these sectors. This could have implications for workplace dynamics, leadership roles, and gender diversity in industries related to applied sciences. On the positive side, the higher representation of female students in applied sciences programs could contribute to greater gender diversity in STEM (Science, Technology, Engineering, and Mathematics) fields in Kenya. This may lead to increased perspectives, ideas, and innovations, as diverse teams often bring different viewpoints to problem-solving and research.

The gender imbalance highlights the need for proactive policies and initiatives to address gender disparities in TVET enrollment. It may serve as a catalyst for educational institutions and policymakers to develop strategies to encourage more male students to pursue applied sciences programs, thereby promoting gender equity in education. The gender imbalance may also impact career opportunities and earning potential for graduates. It's essential to ensure that all students, regardless of gender, have equal access to educational and career opportunities, and that gender does not become a barrier to pursuing certain professions or industries.

Over time, a more balanced enrollment in TVET institutions can contribute to changing societal perceptions and stereotypes about gender roles in education and careers. This shift in mindset may encourage more students to choose fields of study based on their interests and abilities rather than traditional gender norms.

In conclusion, while the gender imbalance in TVET enrollment may raise concerns, it also presents an opportunity to address gender disparities, promote diversity in STEM fields, and reshape societal perceptions about gender roles in education and careers. To harness the positive implications and mitigate potential challenges, it is essential for educational institutions and policymakers to take proactive measures to ensure equal access and opportunities for all trainees, regardless of gender. But the question remains.

#### **4.4.3 Demographic Characteristics of HODs and Principals**

The background information collected from principals and Heads of Departments (HODs) primarily focused on gender and years of professional experience. The researcher noted that out of the three principals, two were female and one was a male. As for the HODs, there were two male gender and one female. The gender information from principals and HODs did not indicate biasness, but had a demonstrated a fair representation. The results indicated that TVETs had complied with gender inclusivity among the principals as recommended by the TVETA Act and the Constitution of Kenya (TVET Act, 2019; Constitution of Kenya, 2013). Ngugi and Muthima (2017) however noted dominance of gender parity among TVET institutions in Kenya.

Regarding working experience, one HoD indicated to have been in that position between 1 and 3 years. Two principals and one HOD said that had between 7 and 10 years of work experience in the current position, while one principal and one HOD had more than 10 years' experience. The experience of principals and HODs was regarded adequate, and hence the incumbent were knowledgeable and resourceful in this study.

#### **4.5 Availability of ICT Infrastructure for Implementing ODEL Curriculum**

This first objective of this study aimed to determine the availability of information communication technology infrastructure in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya. Data was obtained from trainers, trainees, HODs and principals. In presenting and discussing the results, the study adopted the concurrent nested research design of mixed methods. Therefore, the information gathered from trainers and trainees through use of questionnaires was predominant. However, the information provided by these two main categories of respondents was not adequate in covering all aspects investigated in this study. Therefore, qualitative information gathered from HODs and principal as well as the additional information noted from document analysis, provided critical supplementary facts and evidences which further helped the researcher to explain aspects of phenomena investigated in this study. The essential supplementary information from qualitative data was therefore embedded / nested to complement the quantitative data. The findings from trainees are presented first followed by results from trainers, and then the findings from HODs and principals. The information from document analysis is integrated in appropriate sections and areas where it is best suited in the discussion.

To assess this variable, both trainees and trainers were requested to express their agreement level with each statement presented to them using a five-point Likert scale; where, (1) stood for Strong Disagree, (2) is Disagree, Moderately Agree was (3); Agree = (4) and Strongly Agree was (5). The study inquired about the adequacy of computers /laptops and their maintenance; adequacy of digital learning laboratories, availability of backup power

supply, connection to the electricity grid, sufficient internet, availability of Wifi hotspot, online digital programs, and video conferencing facilities.

The descriptive findings against each of these items were interpreted based on the mean values and standard deviation. Mean is a statistical measure that represents the central tendency and provides an indication of the most representative value within a set of values. In this study, the mean value was utilized to determine the level of agreement for each item. The mean values ranged from 1 to 5, where 1 indicated the lowest mean and 5 represented the highest mean. On the other hand, the standard deviation measures the extent to which the distribution deviates from the mean value. The summation of responses also helped to have a general opinion regarding each variable. During discussion of results, the frequencies for agree and strongly agree responses were summed up to indicate ‘agreement’ to the item, while, disagree and strongly disagree constituted ‘disagreement’ response. The collected responses from both trainees and trainers were condensed and displayed in Table 4.6 and 4.7, respectively.

**Table 4. 6*****Trainees' descriptive results on availability of ICT infrastructure***

Trainees' availability of information communication technology infrastructure (N = 164)	SD	D	MA	A	SA	Mean	Std. Dev.
• This institution has adequate computers for all trainees	23(14%)	6(3.7%)	21(12.8%)	50(30.5%)	64(39%)	3.77	1.373
• All trainees have computers / laptops at their disposal all the time	21(12.8%)	28(17.1%)	12(7.3%)	49(29.9%)	54(32.9%)	3.53	1.425
• All trainees have computers that are well maintained	4(2.4%)	22(13.4%)	26(15.9%)	58(35.4%)	54(32.9%)	3.83	1.106
• Digital learning laboratories are adequate for all trainees	13(7.9%)	11(6.7%)	21(12.8%)	56(34.1%)	63(38.4%)	3.88	1.220
• This institution has a backup power supply in case there is power outage (generator or solar or both)	11(6.7%)	7(4.3%)	10(6.1%)	29(17.7%)	107(65.2%)	4.30	1.185
• This institution is connected to the electricity grid	4(2.4%)	20(12.2%)	11(6.7%)	23(14.0%)	106(64.6%)	4.26	1.166
• Internet, Wifi hotspot is available all the time	12(7.3%)	13(7.9%)	35(21.3%)	34(20.7%)	70(42.7%)	3.84	1.264
• Institution has relevant online digital programs for trainees	4(2.4%)	18(11%)	42(25.6%)	67(40.9%)	33(20.1%)	3.65	1.001
• Video and audio conferencing facilities are available	17(10.4%)	26(15.9%)	17(10.4%)	49(29.9%)	55(33.5%)	3.60	1.364

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

Table 4.6 presents trainees' responses on the availability of information communication technology (ICT) infrastructure in their institution. The KMO measure of sampling adequacy for this set of data is 0.696, indicating a moderately good fit and suggesting that the data adequately represents the target population.

Overall, the trainees' perceptions indicate positive views regarding the availability of ICT infrastructure. The majority of trainees agree or strongly agree with the statements presented (mean is above 3.5). Specifically, a significant proportion of trainees 64(39%) strongly agree; and 50(30.5%) agreed that their institution has adequate computers for all trainees, with a mean of 3.77 and a standard deviation of 1.373. Similarly, a considerable number of trainees 54(32.9%) strongly agreed, and 49(29.9%) agreed that all trainees have computers/laptops at their disposal all the time, with a mean of 3.53 and a standard deviation of 1.425.

Trainees also expressed positive opinions regarding the maintenance of computers, with 54(32.9%) strongly agreeing and 49(29.9%) agreeing that all trainees have computers that are well maintained. The mean for this statement is 3.83, and the standard deviation is 1.106. Additionally, the availability of digital learning laboratories is perceived positively, with 38.4% of trainees strongly agreeing and a mean of 3.88 (Std. Dev. = 1.220). This indicates a good level of preparedness of ICT equipment for supporting online distance curriculum implementation in national technical and vocational education institutions.

Regarding infrastructure support, a majority of trainees 107 (65.2%) strongly agreed that their institution had a backup power supply in case of a power outage. Furthermore, most trainees 106(64.6%) strongly agreed that the institution is connected to the electricity grid.

The mean for both statements is relatively high, with 4.30 (Std. Dev. = 1.185) and 4.26 (Std. Dev. = 1.166), respectively.

In terms of internet connectivity, a significant proportion of trainees (42.7%) strongly agree that internet and Wi-Fi hotspot are available all the time, resulting in a mean of 3.84 (Std. Dev. = 1.264). The presence of relevant online digital programs for trainees was perceived positively, with 40.9% of trainees agreeing with a mean of 3.65 (Std. Dev. = 1.001).

Lastly, trainees expressed a moderate agreement on the availability of video and audio-conferencing facilities, with a mean of 3.60 (Std. Dev. = 1.364).

Overall, the findings suggest that trainees generally perceive the availability of ICT infrastructure positively in their institution. Their responses also indicate considerable level of preparedness considering most ICT facilities were rated as available. The study findings were against those reported by Langat et al. (2021) who noted that the status of implementing ODEL learning among TVET institutions in Kenya was poor among Kenyan TVET institutions. The lack of preparedness was due to lack of adequate ICT infrastructure such as computers, internet, wifi and ICT laboratories.

On the same note, Katam and Otieno (2021) also reported negative perceptions towards adoption of ICT infrastructure among Kenyan TVETS. This was evidenced by inadequacy of technological infrastructure, negative attitudes towards ICT technologies and limited ICT funding. Furthermore, the significant level of preparedness observed aligns with the adopted Simonson's equivalency theory, which suggests that information communication technology not only facilitates effective teaching and learning but also enhances the quality of distance education by replicating the traditional learning environment. With the presence

of ICT infrastructure in TVET institutions, electronic learning systems can be employed to promote interactive discussions, question and answer sessions, timely feedback, and online practical instructions as needed. This can ultimately enhance the overall learning experience for both trainers and trainees. However, it is important to consider the statements where disagreement or lower agreement is observed to address any potential gaps that may hinder the implementation of online distance curriculum in national TVET institutions.



**Table 4. 7*****Trainers' descriptive results on availability of ICT infrastructure***

Trainers' responses on availability of ICT infrastructure (N = 33)	SD	D	MA	A	SA	Mean	Std.
• The institution is connected to the national electric power grid	1(3%)	0	0	10(30.3%)	22(66.7%)	4.5	.792
• The institution has adequate Computers	2(6.1%)	4(12.1%)	14(42.4%)	9(27.3%)	4(12.1%)	3.2	1.039
• Trainers have computers that are well maintained	6(18.2%)	9(27.3%)	8(24.2%)	5(15.2%)	5(15.2%)	2.8	1.334
• Digital learning laboratories are adequate	4(12.1%)	5(15.2%)	20(60.6%)	3(9.1%)	1(3%)	2.7	.902
• Digital library is available	5(15.2%)	3(9.1%)	9(27.3%)	7(21.2%)	9(27.3%)	2.9	1.331
• Fast internet, Wifi and data bundles internet available	5(15.2%)	3(9.1%)	9(27.3%)	7(21.2%)	9(27.3%)	3.3	1.388
• Video conferencing and Audio conferencing facilities	3(9.1%)	9(27.3%)	14(42.4%)	5(15.2%)	2(6.1%)	2.8	1.014

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

The KMO measure of sampling adequacy for this dataset is determined to be 0.696, indicating a moderately good fit and suggesting that the data adequately represents the population. Table 4.7 indicates varied opinions among trainers regarding the availability of ICT infrastructure. While a significant majority of trainers (66.7%) strongly agree that the institution is connected to the national electric power grid, there are only a few trainers (3%) who expressed a strong disagreement with this statement (mean = 4.58; SD = 0.792).

In terms of the availability of computers/laptops/smartphones for trainers, opinions are more diverse. A considerable proportion of trainers (42.4%) moderately agree that the institution has adequate devices for trainers. However, there are trainers who expressed disagreement or strong disagreement with this statement (mean = 3.27; SD = 1.039) suggesting a moderate level of agreement among trainers. Trainers also exhibited mixed opinions regarding the maintenance of computers. A notable proportion of trainers (27.3%) expressed strong disagreement with the statement that all trainers have well-maintained computers (mean = 2.82; SD = 1.334).

Regarding digital learning facilities, trainers expressed varying perceptions of their adequacy. A majority (60.6%) moderately agreed that the digital learning laboratories are adequate for online distance learning. However, there are trainers who disagreed or strongly disagreed. The mean for this statement is 2.76, suggesting a moderate level of agreement (Std. Dev. = 0.902). Opinions are also divided when it comes to the availability of a digital library, fast internet, Wi-Fi, and data bundles. The mean values for these statements are 2.91 and 3.36, indicating a moderate level of agreement among trainers (Std. Dev. = 1.331 and 1.388, respectively). Lastly, trainers express mixed opinions regarding the availability of video conferencing and audio-conferencing facilities. While a significant

proportion of trainers (42.4%) agree, there are trainers who disagree or strongly disagree. The mean for this statement is 2.82, suggesting a moderate level of agreement (Std. Dev. = 1.014).

Overall, the findings from trainers' responses on the availability of ICT infrastructure indicate diverse opinions and a lack of consensus on various aspects. While there is agreement regarding the institution's connection to the national electric power grid, other aspects such as device availability, maintenance, and specific facilities exhibit mixed perceptions with mean values showing moderate agreement. The results collaborate with the observations of Katam and Otieno (2021) who noted that, the adoption of ODEL faced obstacles not only due to the lack of sufficient ICT technologies but also due to negative attitudes of lecturers, resistance to change, inadequate ICT skills, insufficient funding for infrastructure development, untrained instructors, poor maintenance of existing devices, and limited support. The mixed perceptions on the availability, maintenance and adequacy of specific facilities discourage the assumption of the Simonson's equivalency theory that, traditional learning is equivalent to virtual when the required resources for stabilizing the environment are provided for. Addressing these concerns and improving the availability and maintenance of ICT infrastructure could enhance the trainers' experiences and facilitate effective teaching and learning practices.

#### **4.5.1 Comparison and Discussion of Results from Trainers and Trainees on Availability of ICT Infrastructure**

The descriptive results from trainers and trainees exhibited several aspects on availability of ICT infrastructure in readiness to implement curriculum through ODEL in National

TVET Institutions. When comparing the findings from the trainers' and trainees' responses on the availability of ICT infrastructure, diverse opinions and areas of agreement and disagreement emerged. Notably, both trainers and trainees generally agree that the institution is connected to the national electric power grid, with a majority strongly agreeing with this statement. This can be attributed to the fundamental requirement of power connectivity for utilizing ICT infrastructure. Similarly, both groups expressed positive opinions about the availability of internet and Wi-Fi, indicating a perception of reliable connectivity within the institution. The findings were in agreement with the Communications Authority of Kenya (2019) report which underscored substantial growth in student population utilizing and having access to internet services from a variety of devices in Kenyan institutions. However, these was not the case in the presentation of Ngwacho (2021) who reported that, there was high unequal accessibility of internet connectivity among students in tertiary institutions of learning.

However, differing views surfaced when it comes to the availability of computers, laptops, and smartphones for trainers. While a significant proportion of trainers moderately agree with this statement, trainees' responses indicate a higher level of agreement. This contrast might stem from trainers' different expectations or requirements for their work compared to trainees. Furthermore, opinions diverge on the maintenance of computers. Trainers expressed stronger disagreement, suggesting that they are more aware of maintenance issues or face more challenges with computer upkeep than trainees. In contrast, trainees perceive computer maintenance more positively, possibly due to differing perspectives or less exposure to maintenance-related concerns. Tom et al. (2016) presented findings that are in agreement with the suggestions of trainers in TVETs underscoring that, ICT

equipment from prior investments is not used due to the high cost of supplies, the inability to maintain ICT equipment, and the fact that few people are familiar with how to use the infrastructure. If students find computers in the lab are working they may not bother with the details on whether they are maintained, but teachers have the details.

The adequacy of digital learning facilities for online distance learning also elicited mixed perceptions. While a majority of trainers moderately agree, trainees express a more positive perception. This difference might arise from varying expectations or experiences with the digital learning facilities. Most learners utilize smart phones for online distance learning; hence their responses on adequacy of digital learning facilities may not necessarily be accurate. However, most trainers may require to use institutional facilities to facilitate an online class, hence their adequacy matters to a great extent. Similarly, trainers and trainees hold diverse opinions on the availability of specific facilities such as a digital library, fast internet, Wi-Fi, data bundles, video conferencing, and audio-conferencing. The study noted moderate levels of agreement among trainees and trainers. This indicates opportunities for TVET institutes to strengthen digital library, speed of internet, Wi-Fi, video conferencing, and audio-conferencing facilities varying personal experiences, needs, or awareness of the availability and quality of these facilities. The influence of adequacy of ICT infrastructure in the education sector has been recognized by many scholars such as Ghavifekr and Yulin (2021), Tom et al. (2016), Ngwacho (2021) and Masrom et al. (2022) as improving trainee's enrolment, academic performance, enhancing learning experience and cutting infrastructural development costs. The aforementioned studies recommended investment in funding, investing, equipping and developing ICT infrastructure to facilitate ODEL learning. Furthermore, the findings support the adopted Bruner's constructivist and

Simonson's equivalency theories in the study in the fact that, both theories appreciate the role of ICT infrastructure as a connector between the learner and the facilitator. In order to have adequate interactivity, guidance, learner participation and equivalency adequate, quality, and available and usability ICT services and resources need to be put in place; which revolves around strengthening TVET institutes ICT infrastructure.

#### **4.5.2 Findings and discussion based on results from Principals and HODs on availability of ICT infrastructure and Document analysis guide**

The study had an in-depth interview with the principals and HOD. The first question sought to respondents was to give a thought on what should be done on ICT infrastructure to support curriculum implementation for online distance teaching and learning. The responses provided by principals pointed out several key actions. A critical analysis of the responses showed that principals and HODs emphasized the need for government to prioritize distance learning and provide sufficient software and hardware infrastructure in the institutions. This aligns with the strategy mentioned in the distance learning instructional content policy on ODeL which was noted during document analysis. The ICT Infrastructure goal is to set minimum standards for ICT infrastructure requirements and providing necessary ICT infrastructure at the National ODeL center.

The HODs particularly urged administrators of national TVET institute to initiate skill training and development programs for staff, organizing regular workshops and seminars for trainees and trainers; implement online learning policies, and allocate money for supporting online programs. Karani and Waiganjo (2022) also noted that, TVET institutions suffered from limited ICT competencies and infrastructure preparedness for

supporting virtual learning. Karani and Waiganjo (2022) emphasized on the need for TVET managers to allocate funds to acquire basic ICT infrastructure and also train both trainers and trainees in order to adopt ODeL learning. During document analysis it was also noted that one of the strategies by the National ICT policy was equipping staff and learners with requisite LMS skills, developing ODeL Center National LMS policies, and increasing the provision of appropriate physical facilities for TVET ODeL institutions. Similarly, in Malaysia Yeap et al. (2021) suggested the development of staff capacities, knowledge and skills and also purchase of required infrastructure as remedial for enhancing TVET teaching and learning. In support of the same was Mukuni (2019) who aired out that, ministry of education intervention through procuring required digital infrastructure is a key aspect for eradicating the disillusionment in adopting distance learning and teaching.

Furthermore, the principals suggested recognizing trainers' efforts in supporting online studies, providing technical staff support, and supporting the ODEL (Open, Distance, and e-Learning) directors in all institutions. The importance of improving connectivity in trainees' residential areas and supporting trainers and trainees in the purchase of laptops and data bundles featured prominently in the responses gathered from both principals and HODs.

Comparing these suggestions with the responses provided by trainers and trainees, we can see some areas of agreement. Generally, the respondents acknowledged the need to increase the number of laptops for trainers and implement an ODEL centre in the TVET institutions. In agreement, Mukuni (2019) stressed that, successful implementation of distance learning and teaching requires the availability of hardware, software, internet,

skills, competencies and management support. These findings also concur with the adopted Simonson's equivalency theory which underpin that the traditional teaching should not be different from the e-learning experiences. To bridge this gap, infrastructure in terms of hardware, software and competence support need to come in in order to ensure equivalency in instructional delivery irrespective of the distance gap. These suggestions align with the focus on providing sufficient hardware resources and establishing dedicated centres for online learning.

In order to improve ICT infrastructure for online distance teaching and learning effectively, it would be beneficial to consider the suggestions from both principals and HODs. By combining the broader perspectives and strategic insights of the principals with the department-specific expertise and knowledge from the HODs, institutions can develop a comprehensive plan that addresses infrastructural gaps, ensures policy implementation, provides necessary resources and training, and supports connectivity for both trainers and trainees. Collaboration and communication between these stakeholders will be vital in implementing effective strategies to enhance the ICT infrastructure for online learning in national TVET institutions in Kenya. The same has been noted in the studies conducted by Pangen and Karki (2021), Hassan et al. (2021), Karani and Waiganjo (2022) and Yeap et al. (2021). These studies recommend the scaling up of ICT infrastructure, increase access and availability of technologies, improve internet connectivity and also implementing ICT related policies and reforms in order to secure successful development and acquisition of necessary resources.



#### **4.6 Availability of ICT User Training and Skills Development Support ODEL**

The second objective of this study aimed to investigate the presence of training and support for ICT users, focusing on the readiness to implement curriculum through online distance teaching and learning in Kenya's National TVET institutions. Data was obtained from trainers, trainees, HODs and principals. In presenting and discussing the results, the study adopted the concurrent nested research design of mixed methods. Therefore, the information gathered from trainers and trainees through use of questionnaires was predominant. However, the information provided by these two main categories of respondents was not adequate in covering all aspects investigated in this study. Therefore, qualitative information gathered from HODs and principal as well as the additional information noted from document analysis, provided critical supplementary facts and evidences which further helped the researcher to explain aspects of phenomena investigated in this study. The essential supplementary information from qualitative data was therefore embedded / nested to complement the quantitative data. The findings from trainees are presented first followed by results from trainers, and then the findings from HODs and principals. The information from document analysis is integrated in appropriate sections and areas where it is best suited in the discussion.

In measuring this variable, the trainees and trainers were asked to indicate the level of their agreement with each statements posed to them on a five-point Likert scale where, (1) stood for Strong Disagree, (2) is Disagree, Moderately Agree was (3); Agree = (4) and Strongly Agree was (5). The study inquired about the training on how to operate ICT equipment, ICT technical support is provided all the time, regular training, whether they access and utilize materials on the LMS, regular refresher courses and individual training.

The descriptive findings against each of these items were interpreted based on the mean values and standard deviation. The summation of responses also helped to have a general opinion regarding each variable. During discussion of results, the frequencies for agree and strongly agree responses were summed up to indicate ‘agreement’ to the item, while, disagree and strongly disagree constituted ‘disagreement’ response. The responses received from trainees and trainers were summarized and presented in Table 4.8 and 4.9.

**Table 4. 8*****Trainees descriptive results on availability of ICT user training and skills development support***

Trainees' statements on availability of ICT user training and skills development support (N = 164)	SD	D	N	A	SA	Mean	Std.
• Trainees are trained to operate ICT equipment	9(5.5%)	7(4.3%)	20(12.2%)	38(23.2%)	90(54.9%)	4.18	1.145
• Trainees are provided with ICT technical support all the time	9(5.5%)	22(13.4%)	27(16.5%)	37(22.6%)	69(42.1%)	3.82	1.263
• Trainees are trained on how to use ICT equipment regularly	13(7.9%)	22(13.4%)	5(3%)	72(43.9%)	52(31.79%)	3.78	1.249
• I can access and utilize learning materials on the LMS	9(5.5%)	26(15.9%)	36(22%)	47(28.7%)	46(28%)	3.58	1.208
• Trainees have regular refresher courses on open and distance	17(10.4%)	31(18.9%)	35(21.3%)	53(32.3%)	28(17.1%)	3.27	1.244
• I get individualized training on open and distance learning	18(11%)	21(12.8%)	47(28.7%)	54(32.9%)	24(14.6%)	3.27	1.190
Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .668							

The KMO measure of sampling adequacy, which was calculated to assess the suitability of the sample, yielded a value of .668, indicating a moderate level of adequacy for the

analysis. The findings presented in Table 4.8 indicate various levels of agreement or disagreement among the trainees study participants. For instance, a significant majority of trainees, 90 (54.9%), strongly agreed that they are trained to operate ICT equipment, with an overall mean score of 4.18 and a standard deviation of 1.145. This suggests that the trainees generally felt confident in their ability to use ICT equipment effectively.

Similarly, the trainees expressed positive sentiments regarding the provision of ICT technical support, with 69 (42.1%) strongly agreeing that they receive support all the time. However, there were also some trainees who disagreed or strongly disagreed with this statement, indicating potential areas for improvement (mean = 3.82; SD = 1.263).

Regarding regular training on how to use ICT equipment, 72 (43.9%) trainees agreed, while 52 (31.79%) strongly agreed. The mean score for this statement was 3.78, with a standard deviation of 1.249. In terms of accessing and utilizing learning materials on the Learning Management System (LMS), there was a relatively balanced distribution of responses. From the findings, 47(28.7%) agreed while 46(28%) of trainees strongly agreed that they can access and utilize learning materials on the LMS (mean = 3.58; SD = 1.208). When it comes to regular refresher courses on open and distance learning, 53 (32.3%) trainees agreed, while 28 (17.1%) strongly agreed. The mean score for this statement was 3.27, with a standard deviation of 1.244.

Finally, in terms of individualized training on open and distance learning, 54 (32.9%) trainees agreed, while 24 (14.6%) strongly agreed. The mean score for this statement was 3.27, with a standard deviation of 1.190. From the results, it can be observed that trainees generally agree that they receive training to operate ICT equipment and have access to ICT technical support. However, there is a relatively lower level of agreement regarding regular

training on how to use ICT equipment and accessing learning materials on the learning management system (LMS). The availability of regular refresher courses on open and distance learning and individualized training on open and distance learning also received mixed responses. Trainer and trainee capacity building was also noted by Muchanji (2017) as a key enabler in service support and the adoption of open distance teaching and learning in Nairobi. Therefore, Muchanji noted that the development of training programmes to update tutors and students on technological knowhow. Apart from Muchanji, Itasanmi et al. (2020) also noticed similar trends of little user training support at institutions in Nigeria. Concerning the adopted theories, the results are supporting the Bruner's constructivist learning theory which requires trainees to use prior knowledge or experiences to form the basis for new knowledge and understanding in course dialogue. This requires trainers to change their roles of being instructors to become facilitators which demand them to have up to-date knowledge and skills in utilizing the technological platforms. This also appreciates the observed findings which underpinned the need for technical sharpening to enable trainees and trainers to make good use of the available technological infrastructure.

The results above mean that national TVETs had made notable effort in training learners to operate ICT equipment, but had done poorly in training learners on how to use ICT equipment and accessing learning materials on the learning management system (LMS). Having ICT skills is not equivalent to knowing how to use ICT equipment and accessing learning materials on the learning management system (LMS). Therefore, national TVETs had to make effort in training its trainees on how to utilize LMS. Indeed, online teaching and learning largely takes place in learning management system and therefore trainees ought to be trained for gainful utilization. Muchangi (2017) also classified that having the

required infrastructure is one thing and utilizing them another thing. The study stressed the need to impact trainers and trainees with required technical and hands on skills to operate, utilize and access information materials using the learning management systems. Another study which agrees with the current findings was done by Igberaharha (2021). Appreciated the need for empowerment of stakeholders through seminars, programs and regular professional manpower development to enhance quality teaching and learning in Nigerian TVETs. The findings were moreover, in support with the adopted theories which appreciated the role of knowledge development and ICT resources in ensuring smooth teaching and learning between instructors and trainees virtual platforms in TVETs.

These findings suggest potential areas for improvement in the provision of ICT user training and skills development support in national TVET institutions. Efforts could be made to enhance regular training sessions on ICT equipment and ensure better access to learning materials on the LMS. Additionally, providing more opportunities for refresher courses and individualized training in open and distance learning may further enhance the trainees' learning experiences. Addressing these areas of concern would contribute to enhancing the overall quality and effectiveness of the training program. Specific areas for professional development were also noted by Igberaharha (2021) who reported that professional manpower should focus on the utility of ICT infrastructure, operation of equipment, accessibility of learning sites, download ability of learning materials. Similarly, Idjawe (2020) explained that the in-effective utilization of instructional resources and materials could be improved by training both students and staff on available resources to support quality teaching among tertiary institutions.

**Table 4. 9*****Trainers' descriptive results on availability of ICT user training and skills development support***

Trainers' availability of ICT user training and skills development support (N = 33)	SD	D	MA	A	SA	Mean	Std.
• I have regular workshops and seminars on how to deliver online classes.	3(9.1%)	12(36.4%)	12(36.4%)	5(15.2%)	1(3%)	2.67	.957
• I can upload and download learning materials on the LMS	1(3%)	8(24.2%)	9(27.3%)	12(36.4%)	3(9.1%)	3.24	1.032
• I can set, mark and grade examinations online	4(12.1%)	9(27.3%)	7(21.2%)	10(15.2%)	3(9.1%)	2.97	1.212
• I can teach practical's online	5(15.2%)	17(51.5%)	2(6.1%)	7(21.2%)	2(6.1%)	2.52	1.176
• I am competent in preparing content /modules for online distance learning	4(12.1%)	6(18.2%)	5(15.2%)	14(42.4%)	4(12.1%)	3.24	1.251
• The institution has a budget for staff to advance in their careers in digital technology or in-service.	10(30.3%)	8(24.2%)	7(21.2%)	7(21.2%)	1(3%)	2.42	1.226
• The trainers have adequate content and pedagogy skills training in online teaching.	1(3%)	14(42.4%)	5(15.2%)	11(33.3%)	2(6.1%)	2.97	1.075
• Trainees have regular refresher courses	7(21.2%)	13(39.4%)	5(15.2%)	7(21.2%)	1(3%)	2.45	1.148

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

Table 4.9 presents the findings on trainers' availability of ICT user training and skills development support. Looking at the results, it can be observed that trainers have varying levels of proficiency in different aspects of online teaching and digital technology. The statement with the highest mean score was "I can upload and download learning materials on the LMS" (mean = 3.24; SD = 1.032), indicating that trainers generally feel competent in managing learning materials on the learning management system.

However, the statement with the lowest mean score was "I can teach practical online" (mean = 2.52; SD = 1.176), suggesting that trainers were relatively less confident in conducting practical sessions in an online setting. Additionally, the results indicate that trainers expressed a moderate level of agreement regarding their competence in preparing content/modules for online distance learning (mean = 3.24; SD = 1.251) and in setting, marking, and grading examinations online (mean = 2.97; SD = 1.212).

The findings are pointing out trainers' inadequate proficiencies in using learning management system. The findings therefore reveal training gaps among trainers on using LMS. For example, the statement, "the trainers have adequate content and pedagogy skills training in online teaching" received a moderate mean score (mean = 2.97; SD = 1.075), suggesting a need for additional training and support in this area. Similarly, the statement, "the institution has a budget for staff to advance in their careers in digital technology or in-service" received a relatively low mean score (mean = 2.42; SD = 1.226), indicating that budgetary constraints may be hindering trainers' professional development in digital technology. Regarding the noted trainers' proficiencies, almost similar observations were noted by Naiker and Makigato (2018) who explained that; teachers could not be presumed to have acquired the necessary pedagogical knowledge to guide their teaching practice,



especially the technological expertise necessary to incorporate technology into their pedagogy from the basic teacher training institutes. Naiker and Makigato (2018) also considered the need for TVET trainers to have a comprehensive retraining package in course of offering their teaching services. This package was reported to require support from the principals and managers through offering financial allocation to cater for regular professional development.

Overall, the results highlight the varying levels of trainers' proficiency in different aspects of online teaching and the need for further training, and support to enhance their skills. The findings suggest potential areas for improvement, such as providing more training opportunities, allocating budgets for professional development, and addressing specific challenges related to conducting practical sessions online. The need to allocate enough budgets as a strategy for ensuring regular ICT proficiency development among TVET stakeholders was reported by Adhiambo (2015) to constitute a long-term plan for effecting professional development. In support, also, was Muchangi (2017) who illustrated that, trainers in institutions needed to embrace training in order to develop their personal characteristics which influenced open and distance learning and teaching. These were; quality of the instructor, quality of teaching and learning, technological knowhow and quality of the teaching styles. These presented findings strengthen up the observations articulated in the Bruner's constructivist learning theory which opined that the adoption of technology in online and virtual learning tends to change the role of class instructors to that of facilitators and guidance provider hence a need for instructors to have more knowledge compared to the trainees. This underscores the influence of professional development in impacting trainer's knowhow.

#### **4.6.1 Comparison and Discussion of Results from Trainers and Trainees on Availability of ICT User Training and Skills Development.**

The descriptive results from trainers and trainees exhibited several aspects on availability of ICT user training and skills development support for implementing ODEL curriculum. Trainees generally agree that they receive training to operate ICT equipment and have access to ICT technical support, which aligns with trainers' positive sentiments regarding their competence in using ICT. These agreements indicate a level of confidence and satisfaction with the training program and support provided.

From the results, it is clear that both trainees and trainers indicated to be less competent in using learning management systems, where, trainers reported a lower level of confidence in teaching practical online. They in addition expressed a moderate level of agreement regarding their competence in preparing content/modules for online distance learning and in setting, marking, and grading examinations online. Trainers on their parts pointed out limitation in using LMS. This indicates weak capacity building programs on the LMS in national TVET institutions. The findings were against the observations obtained by Choomnoom (2022) who noted that, in Thailand, TVET trainers had regular capacity building platforms which rendered them relevant in online teaching and learning.

Notably, the need for additional training and support is evident in the lower mean score for the statement concerning trainers' content and pedagogy skills training in online teaching. Similarly, the lower mean score for the statement about the institution's budget for staff professional development in digital technology suggests that financial constraints may limit trainers' opportunities for advancing their skills in this domain. Notably, in Zambia, similar constraints were experienced among the teaching staff employed in national

polytechnics (Konayyuma, 2019). Specifically, Konayyuma found that open distance and flexible learning in Zambia was threatened by the presence of skills gaps, mismatching policy gaps on capacity building, limited online pedagogical practices and lack of a supportive funding model of professional development. The study suggested the development of a strategic responsive model for equipping teaching professionals with required technical and technological pedagogical skills. Yet in another study, Oliver et al. (2021) lamented on similar challenges relating to poor pedagogical skills. Oliver's research findings in Zimbabwe revealed that tutors in training colleges lacked the necessary training in managing teaching in ODEL. They also faced challenges in designing online instructional strategies and developing curriculum that catered to the specific needs of learners. Based on these findings, this study recommends that the university should introduce capacity building programs in ODEL to enhance the skills and competencies of staff members.

When the trainers were asked in an open-ended question on what should be done to improve trainers' skills development programs to support online teaching at their institution. They emphasized on the need for them to be trained on preparation of online modules for all courses in applied sciences, and be provided with refresher courses and workshops to improve in pedagogy skills. Trainers further said that addressing budgetary constraints and allocating resources for trainers' professional development in digital technology can contribute to enhancing their overall skills and confidence in various aspects of online teaching. The trainees in an open-ended question on what should be done to improve their skills revealed that it is crucial to provide targeted training and support for trainees in using ICT equipment and accessing learning materials on the LMS. They went

ahead and said that regular training sessions can be enhanced to cater to the specific needs and expectations of trainees. Similar results were also reported by Oliver et al. (2021) that, both teachers and trainees lacked profound capacity building programs with respect to the online and distance learning programs introduced by their colleges in Zambia. Oliver et al. stressed on the need for implementation of a training and skills development policy to cater for students and lecturers needs.

Overall, these findings highlight the importance of continuous training and support for both trainees and trainers to improve their ICT skills, and ensure effective utilization of digital technology in teaching and learning practices. The impact of continuous professional development in technical, technological, online management systems utilization and virtual interactions has also been recommended by many researchers such as Oliver et al. (2021), Konayyuma, (2019), Choomnoom (2022), Adhiambo (2015), Naikera (2018) and Idjawe (2020).

#### **4.6.2 Findings and discussion based on results from Principals and HODs on availability of ICT User Training and skills development and Document analysis guide.**

During an in-depth interview, both the principals and HODs were asked questions regarding the availability of ICT user training and skills development. Both principals and HODs agree on the importance of providing technical skills support and training on specific tools and technologies like video conferencing and learning management systems. During document analysis, some correspondence was noted in one of the strategies of the ODeL training manuals and schedules policies, which emphasized on developing a centralized system for the development of online-learning materials and reskilling of trainers. They

also recognize the need for capacity building workshops to enhance the ICT skills of trainers and trainees. These findings are consistent with the results from trainees and trainers. Both the principals and HODs acknowledged the significance of improving infrastructure, including hardware, and internet connectivity. However, there were differences in their perspectives. HODs highlight the need for trainers to develop pedagogical approaches and integrate digital tools into teaching practices, as well as the importance of technical support to address issues that arise. During the document analysis, it was also noted that in the ODeL training manuals and schedules policies, revising the TVET programs' curriculum, pedagogy, learning materials, and assessments to make them fit for ODeL education was one of the strategies.

Moreover, the responses from principals focused more on policy implementation, funding, and recognition of trainers' efforts. Principals 03 noted, *“to improve ICT skills development, a comprehensive approach was a necessity*. This principal, went ahead and pointed solutions that included, *“providing detailed training on specific tools and pedagogical approaches, ensuring sufficient infrastructure and connectivity, offering continuous professional development programs, and addressing funding and time planning challenges”*. The findings moreover, pointed out on the need for collaboration between principals and HODs, along with effective change management strategies, will be crucial to enhancing ICT skills development for online distance teaching and learning in TVET institutions in Kenya. Agreeably, Ismael et al. (2019) acknowledged the role of senior manager's intervention in ensuring effective competency management and development such as collaboration, student, workshop and classroom management and reporting management are effected in virtual learning. Similarly, Musonye et al. (2021)

acknowledged the role of managerial support as a great support for ensuring necessary resources are brought on board for effective teaching and learning in TVETs.

#### **4.7 Availability of Appropriate ODeL Instructional Materials**

The third objective of this study was about finding out the availability of appropriate online distance teaching and learning instructional materials in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya. Data was obtained from trainers, trainees, HODs and principals. In presenting and discussing the results, the study adopted the concurrent nested research design of mixed methods. Therefore, the information gathered from trainers and trainees through use of questionnaires was predominant. However, the information provided by these two main categories of respondents was not adequate in covering all aspects investigated in this study. Therefore, qualitative information gathered from HODs and principal as well as the additional information noted from document analysis, provided critical supplementary facts and evidences which further helped the researcher to explain aspects of phenomena investigated in this study. The essential supplementary information from qualitative data was therefore embedded / nested to complement the quantitative data. The findings from trainees are presented first followed by results from trainers, and then the findings from HODs and principals. The information from document analysis is integrated in appropriate sections and areas where it is best suited in the discussion.

In measuring this variable, the trainees and trainers were asked to indicate the level of their agreement with each statements posed to them on a five-point Likert scale where, (1) stood for Strong Disagree, (2) is Disagree, Moderately Agree was (3); Agree = (4) and Strongly

Agree was (5). The study inquired about the existence of online materials that are professionally developed, availability of online practical manuals and guides, availability of content manuals, assignments are well shared out with trainees, distribution of attachment trainee manuals, adequate digital reference materials and ease of access of online materials while outside the institution

The descriptive findings against each of these items were interpreted based on the mean values and standard deviation. The summation of responses also helped to have a general opinion regarding each variable. During discussion of results, the frequencies for agree and strongly agree responses were summed up to indicate 'agreement' to the item, while, disagree and strongly disagree constituted 'disagreement' response. The responses received from trainees and trainers were summarized and presented in Table 4.10 and 4.11.

**Table 4. 10*****Trainees' descriptive results on availability of appropriate online distance teaching and learning instructional materials***

Trainees' statements availability of appropriate online distance teaching and learning instructional materials (N = 164)	SD	D	N	A	SA	Mean	Std.
• This institution has online learning materials that are professionally developed and written	13(7.9%)	24(14.6%)	23(14%)	60(36.6%)	44(26.8%)	3.60	1.247
• Online practical manuals and guides are available for trainees	13(7.9%)	38(23.2%)	25(15.2%)	49(29.9%)	39(23.8%)	3.38	1.289
• Subject content manuals are available online all the time.	6(3.7%)	33(20.1%)	46(28%)	38(23.2%)	41(25%)	3.46	1.174
• Assignments are well set out and shared with trainees through the digital platform in good time	1(0.6%)	25(15.2%)	22(13.4%)	35(21.3%)	81(49.4%)	4.04	1.140
• Attachment/internship trainee manuals are distributed online as required all the time.	11(6.7%)	21(12.8%)	20(12.2%)	45(27.4%)	67(40.9%)	3.83	1.276
• Adequate digital reference materials are available in the library	7(4.3%)	15(9.1%)	10(6.1%)	43(26.2%)	89(54.3%)	4.17	1.154
• I am able to access online e-resources when outside the institution	8(4.9%)	25(15.2%)	22(13.4%)	53(32.3%)	56(34.1%)	3.76	1.214

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .677



The findings presented in Table 4.10 shed light on the availability and adequacy of online distance teaching and learning instructional materials for trainees. It is evident that the institution's online learning materials are perceived positively by trainees. For the statement "This institution has online learning materials that are professionally developed and written," 60 trainees (36.6%) agreed, while 44 trainees (26.8%) strongly agreed, indicating a favourable mean of 3.60 with a standard deviation of 1.247. This suggests that a considerable proportion of trainees perceived the online learning materials to be of high quality.

Similarly, the availability of online practical manuals and guides is also perceived positively. While 38 trainees (23.2%) agreed and 39 trainees (23.8%) strongly agreed, indicating a mean of 3.38 and a standard deviation of 1.289. The availability of subject content manuals online at all times was moderately agreed upon by trainees, with 46 trainees (28%) agreeing and 41 trainees (25%) strongly agreeing, resulting in a mean of 3.46 and a standard deviation of 1.174. The prompt sharing of assignments through the digital platform received a highly positive response from trainees. A substantial number of trainees, 81 (49.4%), strongly agreed that assignments were well set out and shared in a timely manner, reflecting a high mean of 4.04 and a standard deviation of 1.140. This indicates that trainees appreciate the efficiency of assignment distribution through the digital platform. An online learner requires to access and download manuals and assignment from LMS without which they may feel unsupported.

In terms of attachment/internship trainee manuals, trainees also expressed a positive perception. A total of 45 trainees (27.4%) agreed, and 67 trainees (40.9%) strongly agreed

that the manuals were distributed online as required at all times, resulting in a mean of 3.83 and a standard deviation of 1.276.

Regarding digital reference materials in the library, trainees demonstrated a high level of satisfaction. An overwhelming majority, 89 trainees (54.3%), strongly agreed that adequate digital reference materials were available, contributing to a high mean of 4.17 and a standard deviation of 1.154. Lastly, trainees' ability to access online e-resources when outside the institution was moderately agreed upon. A total of 53 trainees (32.3%) agreed, and 56 trainees (34.1%) strongly agreed, resulting in a mean of 3.76 and a standard deviation of 1.214. The herein present a fair availability and access of e-resources provided by the library. These findings were against the revealed situation in western Kenya where Odanga et al. (2021) reported that, the TVET institutions experienced deplorable challenges on the availability, adequacy, industry support and quality of information materials provided in the schools. However, Abumador (2020) found that, the library was a good supporting system for enabling learners to have access to available e-books, e-journals and other forms of information materials which support remote learning.

Overall, the results indicate that trainees perceive the availability of appropriate online distance teaching and learning instructional materials positively. There was some evidence for institution's provision of professionally developed online learning materials, practical manuals, subject content manuals, assignments, attachment/internship trainee manuals, digital reference materials, and access to online e-resources. These findings suggest that the institution has made efforts to ensure the availability and accessibility of online materials, contributing to a meaningful learning for trainees.

These findings were in agreement with the presentation of Abumandour (2020) and who opined that, effective virtual teaching and learning success requires the availability of information resources that are available virtually. Similarly, Pujar and Kamat (2009) informed that, accessibility to e-resources and other information services among institutions was key in harnessing the preparedness to implement distance and online teaching and learning. A sense of e-readiness was also reported by Chung et al. (2020) who noted that in Malaysia, students expressed a lot of readiness to adopt online teaching and training by possessing adequate skills and knowledge on resources retrieval, technical skills, ICT skills and the availability of accessible information resources motivated their readiness. The findings were moreover, supporting the Bruner's constructivist learning theory of education philosophy which informed that, learners require a conducive environment with relevant resources in form of trainers, technology and information resources so they may seek, find, synthesize and share their knowledge with others. Noting that in online learning; learners build new knowledge through accessing, selecting, organizing and interpreting information and data from various sources and assessing the quality learning materials, the availability of accessible e-resources stay relevant in informing the preparedness for adopting e-learning in TVET institutions.

**Table 4. 11*****Trainers' descriptive results on availability of appropriate online distance teaching and learning instructional materials***

Trainers' statements availability of appropriate online distance teaching and learning instructional materials (N = 33)	SD	D	MA	A	SA	Mean	Std.
1. This institution has online learning materials that are professionally developed and written.	3(9.1%)	7(21.2%)	9(27.3%)	11(33.3%)	3(9.1%)	3.12	1.139
2. All trainers have computers / laptops at their disposal all the time	2(6.1%)	13(39.4%)	7(21.2%)	9(27.3%)	2(6.1%)	2.88	1.083
3. This institution has a backup power supply in case there is power outage(generator or solar or both)	0	0	3(9.1%)	14(42.4%)	16(48.5%)	4.39	.659
4. Online practical manuals and guides are available for trainees and trainers	2(6.1%)	15(45.5%)	10(30.3%)	4(12.1%)	2(6.1%)	2.67	.990
5. Online teaching guides are available to all trainees	6(18.2%)	9(27.3%)	11(33.3%)	6(18.2%)	1(3%)	2.61	1.088
6. Subject content manuals are available online all the time.	6(18.2%)		10(30.3%)	8(24.2%)	1(3%)	2.70	1.132
7. Assignments are well set out and shared with the trainee through the digital platform in good time	2(6.1%)	8(24.2%)	13(39.4%)	9(27.3%)	1(3%)	2.58	1.001
8. Attachment trainee manuals are distributed online as required	2(6.1%)	8(24.2%)	13(39.4%)	9(27.3%)	1(3%)	2.97	.951
9. Training modules are available via the portal	6(18.2%)	4(12.1%)	9(27.3%)	8(24.2%)	6(18.2%)	3.12	1.364

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which assesses the overall adequacy of the data for factor analysis, was found to be 0.696. This suggests that the data collected for this construct was adequate for analysis. Table 4.11 provide insights into the trainers' statements regarding various aspects of online learning at the institution.

In terms of professionally developed and written online learning materials, 33 (100%) trainers responded to the statement. Among them, 11 (33.3%) agreed, 9 (27.3%) moderately agreed, and 7 (21.2%) disagreed, resulting in a mean score of 3.12 and a standard deviation of 1.139. This indicates that a significant number of trainers perceive the online learning materials to be professionally developed and written, although there is some disagreement among trainers. The discrepancies was not from TVET institute to another.

Regarding the availability of computers/laptops for trainers, 13 (39.4%) trainers agreed, 9 (27.3%) moderately agreed, and 7 (21.2%) disagreed, with a mean score of 2.88 and a standard deviation of 1.083. This suggests that a considerable proportion of trainers have computers/laptops at their disposal, but there was some disagreement on this aspect. Again the aspect seemed to differ from one TVET to the other.

The presence of a backup power supply in case of power outages, such as a generator or solar power, was affirmed by 14 (42.4%) trainers, while 16 (48.5%) strongly agreed, resulting in a high mean score of 4.39 and a low standard deviation of 0.659. This indicates that the institution has a reliable backup power supply, which is perceived positively by trainers. The reliable backup power supply ensure provision on services to the online learner is not interrupted. These findings were in line with Muchanji (2017) findings who argued that the availability of power supply and reliable, adequate internet connectivity

played a key role in ensuring effective implementation of open distance teaching and learning in Nairobi County. In Rift Valley Technical Training Institute, Rotich et al. (2016) present mixed reactions on the connectivity and continuous accessibility, usability and availability of adequate internet and power supply. Rotich et al. explained that both staff and students lamented on the undependability of the connectivity and supply to be dismal, which hindered virtual teaching at other premises within the school compound. Nyongesa et al. (2022) moreover disagree with the presented findings through their observation that, western Kenya's TVET institutions suffered from unreliable and limited power supply.

For online practical manuals and guides, 15 (45.5%) trainers agreed, 10 (30.3%) moderately agreed, and 4 (12.1%) disagreed, with a mean score of 2.67 and a standard deviation of 0.990. This suggests that a significant number of trainers believe that online practical manuals and guides are available for both trainees and trainers. Regarding the availability of online teaching guides for trainees, 9 (27.3%) trainers moderately agreed, 11 (33.3%) agreed, and 6 (18.2%) disagreed, resulting in a mean score of 2.61 and a standard deviation of 1.088. This indicates some variation in the availability of online teaching guides for trainees, with a mixed perception among trainers, however, the highest majority trainers agreed.

Similarly, subject content manuals available online all the time received moderate agreement from 10 (30.3%) trainers, 8 (24.2%) moderately disagreed, and 6 (18.2%) disagreed, resulting in a mean score of 2.70 and a standard deviation of 1.132. This suggests that the availability of subject content manuals online is perceived differently among trainers. In terms of assignments being well set out and shared through the digital platform,

13 (39.4%) trainers agreed, 9 (27.3%) moderately agreed, and 8 (24.2%) disagreed, with a mean score of 2.58 and a standard deviation of 1.001. This indicates some variation in the perception of the quality of assignment distribution through the digital platform.

The distribution of attachment trainee manuals online as required received similar responses, with 13 (39.4%) trainers agreeing, 9 (27.3%) moderately agreeing, and 8 (24.2%) disagreeing, resulting in a mean score of 2.97 and a standard deviation of 0.951. This suggests that the distribution of attachment trainee manuals online is perceived positively by a significant number of trainers. Moreover, the availability of training modules via the portal received mixed responses, with 9 (27.3%) trainers agreeing, 8 (24.2%) moderately agreeing, and 6 (18.2%) disagreeing, resulting in a mean score of 3.12 and a standard deviation of 1.364. This indicates a varying perception of the availability of training modules via the portal.

Overall, the findings provide an understanding of the trainers' perspectives on the availability of appropriate online distance teaching and learning instructional materials. While there are positive perceptions regarding certain aspects, such as the presence of a backup power supply and the availability of practical manuals, there are also areas of disagreement, indicating the need for further improvements in those areas.

#### **4.7.1 Comparison and Discussion of Results from Trainers and Trainees on Availability of Appropriate online distance teaching and learning materials.**

The descriptive results from trainers and trainees were largely consistent on the availability of appropriate online distance teaching and learning materials. Trainees generally perceive the availability of online learning materials, practical manuals, subject content manuals,

assignment distribution, attachment/internship trainee manuals, digital reference materials, and access to online e-resources positively. These agreements suggest that trainees find the institution's online materials to be of high quality and appreciate their timely distribution. The positive perception of trainees can be attributed to the efforts made by the institution to develop professionally written online learning materials and provide comprehensive resources that enhance the e-learning experience. Additionally, the prompt sharing of assignments and the availability of digital reference materials contribute to a favourable perception among trainees. The contributions of enough information materials and sources were also attributed by Musonye et al. (2021) to influence effective teaching and learning at TVET institutions in western Kenya. Nyongesa et al. (2022) demonstrated that adequate infrastructure, information resources, power supply, internet connectivity, technological knowhow and ability to assess, download, create discussion and manage classes in the learning management systems were critical aspects for determining e-learning success among technical and vocational training institutions in Kenya. The findings further compare with the adopted theories which underpin the need for necessary resources such as technology, information resources, training and infrastructure for supporting online teaching and learning among technical and vocational training institutions.

In contrast, trainers' responses indicate some disagreement regarding certain aspects of online teaching and learning instructional materials. Trainers have varying perceptions regarding the professional development and quality of the online learning materials. This disparity indicates existence of gaps which requires addressed. The differences in perception could be due to variations in trainers' familiarity with the specific materials or the extent to which they are integrated into their teaching practices.



The availability of computers/laptops for trainers is another aspect where trainers show disagreement. This could be attributed to differences in resource allocation or access to equipment among trainers. When trainers were asked on what should be done to improve on availability of digital online teaching materials to support online teaching at their institution, they provided statements which emphasized on the need to increase the number of computers. One trainer said, *“Increase number of computers so that each trainers has their own computer at their disposal all the time.”*

However, the presence of a backup power supply, such as a generator or solar power, receives a highly positive response from trainers, indicating that the institution has taken measures to ensure uninterrupted power supply during online teaching and learning. This was against what Nyongesa et al. (2022) reported that, power supply, infrastructure, attitudes, internet connectivity and competencies were major issues which hindered e-learning readiness and preparedness in Kenyan TVET institutions.

Overall, the findings suggest that the institution has made efforts to provide appropriate online distance teaching and learning instructional materials. While trainees generally perceive the materials positively, trainers' responses indicate areas of disagreement and varying perceptions. This shows a fair level of preparedness of TVET institutions with regards to instructional materials. Addressing the areas professional development of trainers and ensuring the availability and accessibility of materials, can contribute to a more uniform and satisfactory experience for both trainees and trainers. Obwogo and Kwamboka (2016) however, discovered that although TVET institutions had the potential to invest and implement ODEL in teaching and learning, there was great laxity which was caused by limited funding, limited investment in ICT infrastructure and also lack of technological

knowhow. Stakeholders in the sector were called upon to work together towards realizing acquisition of infrastructure and trainers professional development. The findings of Kiaritha et al. (2022) as well stressed on the need to embrace trainee and trainer competency development as mechanisms to realize effective online teaching and training.

#### **4.7.2 Findings and discussion based on results from Principals and HODs on Appropriate online distance teaching and learning instruction materials and Document analysis guide.**

During the interview, the HODs and principals were asked to explain the status of preparedness of learning resources and the availability of online resources for online learning at their institutions. Their responses indicated that while some institutions have shown efforts to improve readiness for online studies, others are still facing challenges. The availability of professionally written learning materials, online practical manuals, online video clips, study guides, and digital libraries varies among the institutions. Some institutions have made progress in developing these resources, while others are still in the process of creating them. This aligns with the strategy of developing a centralized system for online learning materials from the Distance learning instructional content policy on ODEL, which can help address the inconsistency in availability of professionally written learning materials, online practical manuals, video clips, study guides, and digital libraries as noted from the document analysis. The support provided to trainers on content development for online distance courses includes regular training and workshops.

Similar reactions were also evident in the findings of Kiaritha et al. (2022) that, in developing countries, TVET institutions are yet to be stable and comply with the

requirements for online teaching and learning as evidenced by the numerous challenges facing the sector. Some of the hindrances to effective virtual learning are as a result of limited infrastructure, technology, technical and ICT knowhow and limited funding opportunities. Comparative results were also reported by Orji et al. (2020) who aired out that, in Nigeria, preparedness for ODE learning post COVID-19 pandemic was wanting. Orojri et al. opined that, TVET institutions were hindered from reaching effective e-learning due to inadequate infrastructure, lack of technical dedicated expert, low bandwidth and unstable internet, inadequate support services, inconsistent power supply and poor learning system management.

The principals and HODs had a consensus that revised curriculums should be developed to accommodate online teaching and learning. One of the HODs said *“revised curriculums to accommodate online teaching and learning would help support curriculum implementation.”* During document analysis it was noted that the Distance learning instructional content policy on ODEL also strategized the need to revise the curriculum and pedagogy for online distance education. Other themes noted from their responses was the need for adequate funding, provision of sufficient learning resources, establishment of a dedicated institution for creating online learning resources, and incentives for online teachers, such as promotions, are emphasized. Orji et al. (2020) also emphasized the need to allocate funds and also enacting perpetual funding policies and practices which will ensure the development of required infrastructure, computers, internet, power supply and information materials to achieve effectiveness in online training and learning. Other studies which acknowledge the contributions of funding and infrastructural development to enrich e-readiness and preparedness for effective virtual learning were those done by Kiaritha et

al. (2022), Yigzaw et al. (2019), Shakeel et al. (2023) and Adams et al. (2019). The strengthening of these incentives agree with the adopted theories which acknowledge that, effective instructional delivery through online platforms requires the availability of adequate technology, resources, facilities, infrastructure, competencies, skills, funding and trainers support

When comparing these results with the responses provided by principals, there are some similarities and differences. Both principals and HODs acknowledge the importance of preparedness in terms of infrastructure, training, and availability of learning resources. However, the principals' responses provide a more detailed assessment of the readiness status of specific institutions, highlighting variations in their preparedness. Additionally, the principals' responses shed light on the challenges faced by certain institutions, such as limited materials, lack of equipped laboratories, and insufficient documentation. One of the principals said, *“Most materials are at development process.”* These findings differ with Adams et al. (2019) which underpinned that, both students and trainers expressed a lot of readiness in adopting online learning as evidenced funding allocation, development of infrastructure and enrichment of stakeholders with knowledge on e-learning management systems in Malaysia. In agreement, in Philippines, Resurrection (2018) reported that the main challenge that hindered effective preparedness to e-learning was limited technological infrastructure. The dominance of these challenges depict limited preparedness, a factor which undermine the exploration and adoption of ODEL learning; this aspect betrays the Simonson’s equivalency theory supposition hence a call to address the observed hindrances.

The responses from HODs further noted a need for comprehensive approach to improving online learning resources and support for online curriculum implementation. This includes allocating separate funding for online resources, ensuring the availability of learning materials and digital libraries, and establishing a centralized institution for developing online learning resources. Other crucial initiatives noted from the responses from principals and HODs were about providing incentives to online teachers and promoting a culture of continuous training and professional development. Besides, collaborative efforts between TVET institutions, curriculum development agencies, and relevant stakeholders will be necessary to address the challenges, and ensure effective implementation of online distance teaching and learning in Kenya's national TVET institutions. Similar remedial mechanisms have been projected in the studies such as Resurrection (2018), Yulia (2017), Som et al. (2020) Yigzaw et al. (2019) and Shakeel et al. (2023).

#### **4.8 Availability of Stakeholders' Financial Support for Implementing ODEL**

This fourth objective of this study assessed the availability in financial support from various stake holders in readiness to implement online distance curriculum in National TVET institutions in Kenya. Data was obtained from trainers, trainees, HODs and principals. In presenting and discussing the results, the study adopted the concurrent nested research design of mixed methods. Therefore, the information gathered from trainers and trainees through use of questionnaires was predominant. However, the information provided by these two main category of respondents was not adequate in covering all aspects investigated in this study. Therefore, qualitative information gathered from HODs and principal as well as the additional information noted from document analysis, provided critical supplementary facts and evidences which further helped the researcher to explain

aspects of phenomena investigated in this study. The essential supplementary information from qualitative data was therefore embedded / nested to complement the quantitative data. The findings from trainees are presented first followed by results from trainers, and then the findings from HODs and principals. The information from document analysis is integrated in appropriate sections and areas where it is best suited in the discussion.

In measuring this variable, the trainees and trainers were asked to indicate the level of their agreement with each statements posed to them on a five-point Likert scale where, (1) stood for Strong Disagree, (2) is Disagree, Moderately Agree was (3); Agree = (4) and Strongly Agree was (5). The study inquired about the acquiring of smartphones by students, free Wi-Fi hotspot, internal budgetary to support digital learning, loans and HELB for buying laptops, subsidized data bundles and other financial scholarship

The descriptive findings against each of these items were interpreted based on the mean values and standard deviation. The summation of responses also helped to have a general opinion regarding each variable. During discussion of results, the frequencies for agree and strongly agree responses were summed up to indicate 'agreement' to the item, while, disagree and strongly disagree constituted 'disagreement' response. The responses received from trainees and trainers were summarized and presented in Table 4.12 and 4.13.

**Table 4. 12*****Trainees' descriptive results on availability in financial support from various stake holders***

Trainees' statements on availability of financial support from various stake holders (N = 164)	SD	D	N	A	SA	Mean	Std.
<ul style="list-style-type: none"> <li>Learners are assisted to acquire smartphones or laptops by the institution</li> <li>The institution offers free wifi hotspots and internet bundles to learners</li> <li>This institution has an internal budgetary allocations to support digital learners</li> <li>Students get loans to support their studies from HELB or counties for buying laptops and other ICT infrastructure required.</li> <li>There are subsidized data bundles for all learners</li> <li>Students get other financial scholarships via our institution</li> </ul>	35(21.3%)	76(46.3%)	19(11.6%)	19(11.6%)	15(9.1%)	2.41	1.207
	12(7.3%)	16(9.8%)	26(15.9%)	50(30.5%)	60(36.6%)	3.79	1.241
	5(3%)	27(16.5%)	54(32.9%)	33(20.1%)	45(27.4%)	3.52	1.148
	6(3.7%)	23(14%)	17(10.4%)	40(24.4%)	78(47.6%)	3.98	1.216
	19(11.6%)	43(26.2%)	39(23.8%)	39(23.8%)	24(14.6%)	3.04	1.248
	11(6.7%)	38(23.2%)	50(30.5%)	24(14.6%)	41(25%)	3.28	1.256
Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .726							

From the findings shown in Table 4.12, it can be observed that the availability of financial support for trainees from various stakeholders. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which assesses the overall adequacy of the data for factor analysis, was found to be 0.726. This suggests that the data collected for this study is moderately adequate for conducting factor analysis. Regarding the statement "Learners are assisted to acquire smartphones or laptops by the institution," the responses indicate that 76 (46.3%) trainees agreed, 35 (21.3%) disagreed, and 19 (11.6%) moderately disagreed, resulting in a mean score of 2.41 and a standard deviation of 1.207. This suggests that a significant number of trainees receive assistance from the institution to acquire smartphones or laptops, although there were a few trainees with dissenting opinion.

On the statement "The institution offers free wifi hotspots and internet bundles to learners," the findings reveal that 60 (36.6%) trainees strongly agreed, 50 (30.5%) agreed, and 26 (15.9%) moderately agreed, resulting in a high mean score of 3.79 and a standard deviation of 1.241. This indicates that the institution provides free wifi hotspots and internet bundles to a considerable number of trainees, which is perceived positively by the majority of trainees.

Regarding the availability of internal budgetary allocations to support digital learners, 54 (32.9%) trainees agreed, 33 (20.1%) moderately agreed, and 27 (16.5%) disagreed, resulting in a mean score of 3.52 and a standard deviation of 1.148. This suggests that the institutions had budgetary allocations in place to support digital learners, but there is some variation in the perception of trainees regarding this support.



The statement "Students get loans to support their studies from HELB or counties for buying laptops and other ICT infrastructure required" received a high level of agreement from 78 (47.6%) trainees, with 40 (24.4%) agreeing and 23 (14%) moderately agreeing. This resulted in a mean score of 3.98 and a standard deviation of 1.216. This indicates that a significant number of trainees receive loans from institutions like HELB or counties to support their studies and acquire necessary ICT infrastructure. In contrast, Akpokiniovo (2020) presented that, students in Somalia missed funding privileges such as bursaries from CDF and education loans as a result of weak and unstable administration which has not prioritized much on access to education by individuals. This made students enrolled in institutions of higher learning to experience severe financial challenges. Moreover, these findings compared very well with the requirements stipulated in the TVET act of 2019 that stipulates learners funding opportunities through education loans to support their academics at universities, colleges and TVET institutions. Such efforts channelled in the education sector reflect continued preparedness with respect to adopting blended and virtual learning management system in TVETS, a factor which qualifies the constructivist theory put forward by Bruner (1990) and the theory of equivalency put forward by Simonson (1995). This is in the essence that, constructivist and equivalency theories guide successful adoption of distance online education practices which encompasses continuous improvement of the practice through assuring adequacy of resources, facilities and infrastructure.

Regarding the availability of subsidized data bundles for all learners, 43 (26.2%) trainees agreed, 39 (23.8%) moderately agreed, and 19 (11.6%) disagreed, with a mean score of 3.04 and a standard deviation of 1.248. This suggests that there was moderate availability

of subsidized data bundles, but the perception among trainees varies probably across TVET national institutions. The presented findings are not in line with Obwoye and Kwamboka (2021) who established that, learning in TVET institutions in western Kenya is hindered by poor internet connectivity especially in the TVET classes leave alone the fact that some TVET institutions had internet connections. In Nairobi Teachers training colleges, Mwancha et al. (2021) discovered that Odell learning was in its infant stage and henceforth, TVETS experienced a lot of challenges one of them being inaccessibility of the learning management systems due to lack of internet and connectivity.

Lastly, the statement "Students get other financial scholarships via our institution" received varied responses where, 11(6.7%) of trainees strongly agreed; 38 (23.2%) agreed, 50 (30.5%) moderately agreed, and 65 (39.6%) disagreed, resulting in a mean score of 3.28 and a standard deviation of 1.256. This indicates that the availability of financial scholarships through the institution was moderate across national institutions.

The findings provide insights into the trainees' perceptions regarding the availability of financial support from various stakeholders. While there are positive perceptions regarding certain aspects, such as the provision of free wifi and internet bundles, loans from institutions, and financial scholarships, there were also areas of disagreement and variation in perception. This highlights the need for continued efforts to ensure adequate financial support for trainees in acquiring necessary digital infrastructure.

**Table 4. 13*****Trainers' descriptive results on availability in financial support from various stake holders***

Trainers' statements on availability of financial support from various stake holders (N = 33)	SD	D	MA	A	SA	Mean	Std.
1. The institution has a distinct budget for digital learning programs	4(12.1%)	3(9.1%)	22(66.7%)	3(9.1%)	1(3%)	2.82	.882
2. This institution has a budget for staff to advance in their careers in digital technology or in-service.	4(12.1%)	11(33.3%)	11(33.3%)	6(18.2%)	1(3%)	2.67	1.021
3. The institution has a budget for refresher courses in ICT	3(9.1%)	14(42.4%)	6(18.2%)	10(30.3%)	0	2.70	1.015
4. This institution has an internal financial support for digital trainers to purchase internet data or subsidized data bundles	7(21.2%)	14(42.4%)	8(24.2%)	3(9.1%)	1(3%)	2.30	1.015
5. The institution solicit funds outside the institution to support online learning	5(15.2%)	9(27.3%)	12(36.4%)	7(21.2%)	0	2.64	.994

Table 4.13 presents the trainers' statements on the availability of financial support from various stakeholders for digital learning programs in an institution.

Trainers were asked about the presence of a distinct budget for digital learning programs (Statement one). With a mean score of 2.82, the trainers moderately agreed that such a budget existed with standard deviation of 0.882 which shows that variation in their opinions were not significant. To ensure the successful implementation of digital learning initiatives, it is crucial for the institution to allocate a dedicated budget. This will enable the purchase of necessary resources, software licenses, and training materials to enhance the learning experience. As stated by Okumu and Bblaale (2018), allocating budget for virtual learning programs in TVETs can address significant limitations, including inadequate equipment quality, insufficiently trained staff, limited implementation of a competence-based education and training (CBET) curriculum, and inadequate supervision in TVET institutions.

Moving on to second statement, trainers were probed about the availability of a budget for staff advancement in digital technology or in-service. The mean score is 2.67, and a standard deviation of 1.021. This indicated a similar level of agreement as in first statement. To foster a culture of continuous learning and professional growth, it is essential for the institution to allocate funds specifically designated for staff to enhance their digital skills. This budget can support attending relevant workshops, conferences, and acquiring certifications to keep up with the ever-evolving digital landscape. In the same note, Nyongesa et al. (2021) established that adequate funding and financial planning was key in implementation of online teaching and learning in TVET institutions. These findings are moreover, agree with earlier arguments presented by the adopted theories which assure the

effectiveness of ODEL learning to heavily rely on the preparedness of technology, competencies, supportive environment, human resources and infrastructure.

The third statement focuses on whether the institution has a budget for refresher courses in ICT. Trainers' responses resulted in a mean score of 2.70 and a standard deviation of 1.015.

The fourth statement was about whether the institution provides internal financial support for digital trainers to purchase internet data or subsidized data bundles. The mean score is 2.30, and a standard deviation of 1.015, indicating a considerable level of disagreement.

Adequate internet connectivity is crucial for delivering digital training. Therefore, the institution is expected to consider providing internal financial support to trainers, enabling them to access reliable internet connections through subsidies or data bundles. This support will facilitate uninterrupted online interactions and enhance the overall digital learning experience. Mahdi and Wani (2021) also asserted the need to invest heavily in improving the accessibility of learning management systems by both students and trainees through adequate funding in Asia. These findings were also collaborating with Maina (2019) who established that self, HELP, CDF and institutional funding possessed significant influence in the learning experience of students in academic institutions.

Lastly, the fifth statement explored whether the institution solicits funds outside the institution to support online learning. The mean score is 2.64, representing a moderate level of agreement. To expand financial resources dedicated to online learning, it is essential for the institution to actively seek external funds. This can be achieved through collaborations with industry partners, grant applications, or establishing partnerships with funding agencies. By diversifying their funding sources, the institution can strengthen the support

available for online learning initiatives and improve the overall quality of digital education. This aspect was also featured in Maina 2019 study who established that, diverse sources of funds from donors, external sources, own-source revenue, internal sources, government, HELB loans and county government enabled schools to operate effectively leave alone the benefit of increased access to education by marginalized people. Maina argued that, diverse sources of funds for academic institutions enable them develop their infrastructure, train and develop their staff proficiencies and also strengthen ICT technologies. These factors contribute to effecting face to face and online learning. These findings also strengthen the role of the adopted theories in underpinning financial support role as a contributory factor to effective online teaching and learning.

The above findings highlight the importance of financial support in facilitating successful digital learning programs. To enhance the institution's digital capabilities, it is recommended to allocate a distinct budget for digital learning, provide resources for staff advancement in digital technology, offer budgetary provisions for refresher courses in ICT, support trainers in accessing reliable internet connectivity, and actively seek external funds for online learning. By prioritizing and investing in these areas, the institution can create a conducive environment for effective digital instruction and promote continuous improvement in digital learning practices. The same was also prioritized by Bhattarai et al (2021), Shrestha (2021), Maina (2019), Aryal (2020) and Chepkoech (2021) who reported that, stable supply of funds in TVET institutions was essential in enhancing effective face-to-face and blended or online teaching and learning.

#### **4.8.1 Comparison and Discussion of Results from Trainers and Trainees on Availability of financial support from stakeholders.**

The descriptive results from trainers and trainees exhibited several aspects on financial support from stakeholders. It was observed that there were both areas of agreement and disagreement regarding the availability of financial support for trainees and trainers in the context of online learning programs.

In Table 4.12, trainees generally agree that they receive assistance from the institution to acquire smartphones or laptops, indicating that there is some financial support available for them. However, there is also some disagreement among trainees, which may stem from variations in individual experiences or perceptions of the support provided in different TVET institutions.

Similarly, in Table 4.13, trainers moderately agree that there is a distinct budget for digital learning programs and staff advancement in digital technology. However, there is some variation in their opinions, indicating that there may be differing views on the adequacy or effectiveness of the allocated budgets. Obviously, there is funds scarcity in government institutions hence perpetual increase on the amount allocated is ideal. These findings agree with Mutua (2021) who argued that, the presence of a financial policy ensured good accountability, sustained allocation and disbursement of government funds on time to TVET institutions. Policies also existed to ensure compliance to set financial budgets. In terms of the provision of free wi-fi hotspots and internet bundles, both trainees and trainers agree that this support is available, suggesting that the national TVET institutions had taken appropriate preparatory measures to ensure access to internet connectivity for online

learning. In Obwoye and Kwamboka (2021) and Mwancha et al. (2021) studies, the stakeholders lamented of poor internet connectivity especially in the TVET classes. The studies stressed the need to allocate more funds to cater for suitable internet bandwidth which would ensure sustainable online teaching and learning. These findings also underscore the need for the adopted theories in determining the required resources, facilities and infrastructure to ensure preparedness and implementation of online teaching and learning.

Regarding the availability of internal budgetary allocations to support digital learners, trainees and trainers have different perspectives. Trainees generally agree that such allocations exist, indicating some level of financial support. However, trainers exhibit a higher level of agreement, suggesting that they perceive more extensive support from internal budgetary allocations. The trainees may not be fully familiar with internal processes such budgetary allocations and therefore, the responses from trainers were regarded more credible; meaning, national TVET institutions had considerable budgetary allocations to support digital learners.

Moreover, the availability of loans and financial scholarships for trainees received relatively high levels of agreement from both trainees and trainers. This agreement suggests that there are established mechanisms in place to provide financial assistance to support trainees' studies and acquisition of ICT infrastructure. The perception of availability and access to loans and scholarships is likely influenced by the actual availability of these resources and the extent to which trainees and trainers are informed about them. This was also noted by Maina (2019) who reported that, TVETS institutes have avenues for



obtaining government loans such as HELB, self-funds and CDF funds which enable them to clear their school fees and also for upkeep.

Regarding the availability of subsidized data bundles, there is some disagreement among trainees and trainers. Similarly, trainees and trainers had varying opinions on internal financial support for purchasing internet data or subsidized data bundles. This discrepancy may stem from differences in trainees' and trainers' awareness of the available support or variations in the implementation and accessibility of subsidized data bundles. This indicates a need for awareness promotion on available financial support mechanisms and systems for both trainers and trainees.

These findings are in line with those of Okello et al. (2021) who argued that the availability of clear financial policies in TVET institutions guided on important activities such as government allocation, internet budgetary, infrastructure development, professional development planning and technological support. Notably, Okello et al. noticed that TVET managers and principals in Uasin Gishu were aware of the diverse sources of funds generated from the schools to cater for various bills including internet subscriptions. These findings also acknowledge the ideologies of Simonson which identified that, the gap between physical and online learning may be bridge through adopting technological infrastructure and internet to have equal access to resources and the trainer as the ones learning face-to face do.

In terms of soliciting funds outside the institution to support online learning, there was moderate agreement among trainers, suggesting that they recognize the importance of seeking external funds. However, there was some variation in their perspectives, indicating

differing views on the institution's efforts in acquiring external financial support. Trainers may have different experiences or perceptions regarding the institution's success in securing external funding. Application for external funding and proper utilization of the same is critical in championing TVET development agenda; hence, measures are expected to be put in place for securing such funds. Ndei et al. (2019) also insisted on a need for institutions of higher learning to have alternative streams sources of revenue apart from the government allocation in order to effectively develop its infrastructure, offer quality and learning as well as adopt relevant technology for ensuring effective teaching and learning. In conjunction, South Africa TVETs also acknowledged that apart from the sources of funds, financial management, governance and accountability promoted innovativeness, development and growth of the institutions (Nundkumar & Subban, 2018).

#### **4.8.2 Findings and discussion based on results from Principals and HODs on availability of financial support**

During an in-depth interview, the principals and the HODs were asked how their institution finances the provision of digital learning. The HODs stated that their institution finances the provisioning of digital learning programs through various means. These include the annual subscription for online video conferencing applications, and the purchase of ICT tools such as microphones and laptops to support digital learning. However, the specific details of the annual budgetary allocation for online teaching and learning support were conspicuously missing in their responses. When comparing these results with the responses provided by principals, there is some alignment in terms of the sources of financing. One of the principals responded, *“From tuition and infrastructure funds which are provided by the government.”* This indicated that the funding of ICT infrastructures in national TVET

institutions was mainly from government capitation. Both HODs and principals mentioned public financing as a source of funding, with the government providing tuition and infrastructure funds. Additionally, the involvement of trainers in cost-sharing is acknowledged by the HODs.

To further support curriculum implementation for online distance teaching and learning at TVET institutions in Kenya, several suggestions are put forth. These include allocating a budget specifically for online teaching and learning, providing financial support to all TVET institutions for starting online programs, and facilitating capacity building for trainers. This suggestion for allocating a budget specifically for online teaching and learning, mentioned by the HODs, also supports the need for dedicated financial resources as emphasized in the institutional policy as noted from the document analysis.

The suggestions provided by the HODs and principals, such as subsidized data bundles for online learners, improving rural electrification, and establishing partnerships with industry and government agencies, align with the vision of the Vision 2030 policy on ODeL as noted during document analysis. This policy aims to strengthen institutional frameworks and promote stakeholder participation in TVET ODeL education. Besides, the HODs emphasized the importance of industry internships for trainees and encourage support from organizations like UNESCO.

In line with the observed findings, several different studies have independently suggested some of the mentioned interventions to ensure successful implementation of ODeL in TVET institutions. For example, Jafar et al. (2020) insistent on the need to enact professional competency framework as a mechanism for ensuring enrichment of

institutional stakeholders with skills, knowledge, competencies and qualifications in online training. Moreover, of Okello et al. (2021) explained the need for good financial policies for guiding infrastructural development, annual budgetary allocation, advancement of technology, maintenance and sustenance of teaching and learning. Others such as Maina (2019) and Langat et al. (2021) noted the need for preparedness through procuring adequate ICT infrastructure such as computers, internet, wifi and ICT laboratories and also sourcing for external sources of funds.

In nutshell, the suggestions provided by the HODs and the principals highlighted the need for dedicated financial resources to effectively implement online distance teaching and learning in TVET institutions. This includes investment in infrastructure, capacity building, and collaborative efforts with various stakeholders to ensure sustainable and inclusive digital education opportunities for students in Kenya.

#### **4.9 Curriculum Implementation through ODeL in National TVET Institutions**

The dependant variable is curriculum implementation in online distance teaching and learning in National TVET institutions in Kenya. Data was obtained from trainers, trainees, HODs and principals. In presenting and discussing the results, the study adopted the concurrent nested research design of mixed methods. Therefore, the information gathered from trainers and trainees through use of questionnaires was predominant. However, the information provided by these two main categories of respondents was not adequate in covering all aspects investigated in this study. Therefore, qualitative information gathered from HODs and principal as well as the additional information noted from document analysis, provided critical supplementary facts and evidences which further helped the

researcher to explain aspects of phenomena investigated in this study. The essential supplementary information from qualitative data was therefore embedded / nested to complement the quantitative data. The findings from trainees are presented first followed by results from trainers, and then the findings from HODs and principals. The information from document analysis is integrated in appropriate sections and areas where it is best suited in the discussion.

In measuring this variable, the trainees and trainers were asked to indicate the level of their agreement with each statements posed to them on a five-point Likert scale where, (1) stood for Strong Disagree, (2) is Disagree, Moderately Agree was (3); Agree = (4) and Strongly Agree was (5). The study inquired about the existence of online courses, measure supporting learning, research projects available, supervision during industrial attachment, online exams, measures to monitor implementation of online teaching, existence of a revised curricula, availability of hardware and software and capacity building programs.

The descriptive findings against each of these items were interpreted based on the mean values and standard deviation. The summation of responses also helped to have a general opinion regarding each variable. During discussion of results, the frequencies for agree and strongly agree responses were summed up to indicate 'agreement' to the item, while, disagree and strongly disagree constituted 'disagreement' response. The responses received from trainees and trainers were summarized and presented in Table 4.14 and 4.15.

**Table 4. 14**

*Trainees' descriptive results on implementation curriculum through online distance teaching and learning in National TVET institutions*

Trainees' statements on implementation curriculum through online distance teaching and learning in National TVET institutions (N = 164)	SD	D	MA	A	SA	Mean	Std.
• Our institution has some Odel courses	8(4.9%)	52(31.7%)	22(13.4%)	45(27.4%)	37(22.6%)	3.77	1.373
• There are measures for supporting Odel	9(5.5%)	36(22%)	56(34.1%)	31(18.9%)	32(19.5%)	3.53	1.425
• Research projects for online distance learners are supervised same as face to face students	5(3%)	22(13.4%)	55(33.5%)	39(23.8%)	43(26.2%)	3.83	1.106
• Odel learners are supervised during industrial attachment /internships same as the face to face	7(4.3%)	20(12.2%)	50(30.5%)	36(22%)	51(31.1%)	3.88	1.220
• We have online examinations for online distance learners	7(4.3%)	45(27.4%)	49(29.9%)	40(24.4%)	23(14%)	4.30	1.185
• There are quality assurance measures which help to monitor the implementation of Odel	6(3.7%)	24(14.6%)	44(26.8%)	54(32.9%)	36(22%)	4.26	1.166
• Respective curricula have been revised to enable online distance teaching and learning	6(3.7%)	21(12.8%)	65(39.6%)	40(24.4%)	32(19.5%)	3.84	1.264
• The available hardware and software have enabled implementation of Odel	5(3%)	23(14%)	58(35.4%)	40(24.4%)	38(23.2%)	3.65	1.001
• Trainees have been re-tooled through capacity building programs to be able to learn online	9(5.5%)	24(14.6%)	51(31.1%)	39(23.8%)	41(25%)	3.60	1.364

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

Table 4.14 presents the descriptive results of trainees' statements regarding the implementation of curriculum through online distance teaching and learning in National TVET institutions. Regarding the first statement, "Our institution has some online distance teaching and learning courses," a mean rating of 3.77 with a standard deviation of 1.373 were noted. This indicated that, on average, trainees have a moderately positive perception of the availability of online courses in their institution. On the second statement which read, "There are established measures for supporting online distance teaching and learning in our institution," the mean rating is 3.53 with a standard deviation of 1.425. This suggests that trainees have a somewhat mixed opinion regarding the level of support provided for online learning, with some variation in their responses.

Regarding the third statement, "Research projects for online distance learners are supervised same as face-to-face students," the mean rating is 3.83 with a standard deviation of 1.106. This indicates that trainees generally agreed that research projects for online learners receive comparable supervision to face-to-face students. The other statement was, "Online distance learners are supervised/evaluated during industrial attachment/internships same as the face-to-face," and recorded a mean rating of 3.88 with a standard deviation of 1.220. This suggests that trainees perceive similar levels of supervision and evaluation for online distance learners during industrial attachments or internships as compared to face-to-face students. The statement, "We have online examinations for online distance learners," received the highest mean rating of 4.30 with a standard deviation of 1.185. This indicates that trainees strongly agreed that their institution offered online examinations for distance learners, suggesting a high level of satisfaction in this aspect.

Another high level of agreement was noted on the sixth statement, "Our institution has established quality assurance measures which help to monitor the implementation of online distance teaching and learning," (mean = 4.26; SD = 1.166); "Respective curricula have been revised to enable online distance teaching and learning," (mean = 3.84; SD = 1.264). These suggest that trainees generally agree that quality assurance measures were in place in most national TVET institutions, and that there was a moderate level of curriculum revisions to facilitate online distance teaching and learning.

The other two statements that had a mean value above the medium were: "The available hardware and software have enabled the implementation of online distance teaching and learning," (mean = 3.65; SD = 1.001); and "Trainees have been re-tooled through capacity building programs to be able to learn online," (mean = 3.60; SD = 1.364). This indicates that trainees generally agreed that they had received some level of re-tooling through capacity building programs to support their online learning experience, and that there was a considerable effectiveness of the available hardware and software for online learning. Likewise to the reported findings, UNESCO (2022) also reported that effective adoption of online teaching and learning curriculum in TVETs institutes require adequate preparation through impacting trainers and trainees with digital skills, digital technological skills and also competencies on how to manage the learning management systems. Apart from that, Aryal (2020) explained that, trainers and trainees require being equipped with knowledge and skills on how to utilize, manage the available technological infrastructure to implement virtual learning.

In summary, the trainees' responses indicate a generally positive perception of the availability of online courses, supervision of research projects and industrial attachments,



online examinations, and the presence of quality assurance measures. However, there is room for improvement in terms of support measures for online learning, curriculum revisions, effectiveness of hardware and software, and capacity building programs. Katam and Otieno (2021) also gave suggestions on the need to maintain and acquire of ICT infrastructure through ICT funding policies in order to enhance the implementation of online distance teaching and learning in National TVET institutions. Moreover, Ngwacho (2021) reported that, accessibility of internet and technology among students in tertiary institutions of learning required to be strengthened through implementing appropriate best practices such as training and development and maintenance fund budgetary in order to ensure working ability of available computers, laptops and Wifi connectivity. The findings further support the observations of the Bruner's constructivist learning and Simonson's equivalency theories which acknowledge that, effective online learning require the learner to have prior knowledge and skills on how to access, interact and share knowledge and experiences through the available technologies. The Equivalency theory specifically supports the role of trainer's knowhow in facilitating effecting learning among trainees.

**Table 4. 15**

*Trainers' descriptive results on implementation curriculum through online distance teaching and learning in National TVET institutions*

Statements on implementation curriculum through online distance teaching and learning in National TVET institutions (N = 33)	SD	D	MA	A	SA	Mean	Std.
• Our institution has some Odel courses	1(3%)	5(15.2%)	14(42.4%)	7(21.2%)	6(18.2%)	3.36	1.055
• There are measures for supporting online Odel learning in our institution	3(9.1%)	4(12.1%)	11(33.3%)	10(30.3%)	5(15.2%)	3.30	1.159
• Research projects for online distance learners are supervised same as face to face students	5(15.2%)	9(27.3%)	9(27.3%)	8(24.2%)	2(6.1%)	2.79	1.166
• Odel learners are supervised during industrial attachment	3(9.1%)	8(24.2%)	11(33.3%)	9(27.3%)	2(6.1%)	2.97	1.075
• We have online examinations for Odel learners	4(12.1%)	10(30.3%)	7(21.2%)	9(27.3%)	3(9.1%)	2.91	1.208
• There are quality assurance measures which help to monitor the implementation of Odel	3(9.1%)	1(3%)	17(51.5%)	9(27.3%)	3(9.1%)	3.24	1.001
• Respective curricula have been revised to enable online distance teaching and learning	3(9.1%)	5(15.2%)	15(45.5%)	8(24.2%)	2(6.1%)	3.03	1.015
• Policy on curriculum implementation has been revised	2(6.1%)	4(12.1%)	17(51.5%)	9(27.3%)	1(3%)	3.09	.879
• The available hardware and software supports Odel	3(9.1%)	5(15.2%)	16(48.5%)	8(24.2%)	1(3%)	2.97	.951
• Teaching staff have been re-tooled through capacity building programs	4(12.1%)	7(21.2%)	13(39.4%)	6(18.2%)	3(9.1%)	2.91	1.128

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

Table 4.15 shows that there was some existence of online distance teaching and learning courses in the institutions. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of 0.696 suggests a reasonable sampling for the study. The mean score for this statement was 3.36, and a standard deviation of 1.055; indicating a fairly high level of agreement among the participants regarding the existence of online distance teaching and learning courses in their institution. Trainers further agreed that there are established measure for supporting online distance and teaching in their institution (mean = 3.30; SD = 1.159). Furthermore, there was a moderate level of agreement among the participants regarding the supervision of research projects (mean = 2.79; SD 1.166) and the supervision/evaluation of online distance learners during industrial attachment or internships (mean = 2.97; SD 1.075). The standard deviation scores for both statements was around the mean, hence suggesting, a relatively low variability in the responses.

There was also a moderate level of agreement among the participants regarding the establishment of quality assurance measures (mean = 3.24; SD 1.001), the revision of respective curricula (mean = 3.03; SD 1.015), and the revision of the policy on curriculum implementation (mean = 3.09; SD 0.879) to support online distance teaching and learning. The available hardware and software were perceived to enable the implementation of online distance teaching and learning (mean = 2.97; SD 0.951). Additionally, teaching staff were reported to have undergone re-tooling through capacity building programs (mean = 2.91; SD 1.128). These findings provide valuable insights for enhancing the implementation of online distance teaching and learning in National TVET institutions, guiding efforts to address gaps and improve the overall quality of curricula.

The findings highlight the importance of continuous improvement efforts in areas such as quality assurance, curriculum revision, policy development, technological infrastructure, and faculty development. These areas play a crucial role in ensuring the effective implementation and delivery of online distance teaching and learning in National TVET institutions. These results compare with those of Muchanji (2017) and Itasanmi et al. (2020) who identified regular training and skills development as a key enabler in service support and the adoption of open distance teaching and learning. Moreover, Nyongesa et al. (2022) agrees that adequate infrastructure, information resources, power supply, internet connectivity, technological knowhow and ability to assess, download, were critical aspects for determining e-learning success among technical and vocational training institutions in Kenya, hence need to implement comprehensive policies in addressing these aspects.

The results also suggest that, while progress has been made in certain aspects, there is still room for enhancement and refinement. Addressing these areas can lead to a more robust and supportive environment for online distance education, ultimately benefiting both learners and the institution as a whole.

#### **4.9.1 Comparison and Discussion of Results from Trainers and Trainees on Curriculum implementation.**

The descriptive results from trainers and trainees on curriculum implementation shed light on the trainees' and trainers' perceptions regarding the implementation of curriculum through online distance teaching and learning in National TVET institutions. While there are areas of agreement, there are also noticeable disagreements and variations in their perspectives. Trainees, who focus on the delivery of online courses, generally have a

positive perception of the availability of online courses in their institution, the supervision of research projects, and the evaluation during industrial attachments. They also strongly agree that their institution offers online examinations for distance learners, indicating a high level of satisfaction in this aspect. Positive attitudes and perceptions towards the implementation of online learning were also reported by Obwoye and Kwamboka (2016) who explained that online teaching and learning was an opportunity for cutting a lot of costs in developing nations. Despite this, the readiness to implement virtual teaching was lagged behind as presented by inability of learners who attended online classes being reluctant to undertake their online examinations. These indicated limited preparedness.

However, trainees have a somewhat mixed opinion regarding the support measures provided for online learning, the curriculum revisions, the effectiveness of hardware and software, and the capacity building programs. On the other hand, trainers, with their broader view encompassing various aspects, moderately agree that there are established measures for supporting online learning. They also perceive the supervision of research projects and industrial attachments for online learners to be on par with face-to-face students. Obwoye and Kwamboka (2016) also posed blames that the lack of readiness was hesitated by the lack of support systems such as funding, availability of infrastructure, hardware and software technologies for supporting online teaching and learning. Muchanji (2017) also presented results that agree with this one's which noted the need for support measures in place to achieve effective adoption of online teaching and training. Some of the noted efforts that were required indicated training, funding, acquisition of computers, internet connectivity and also developing infrastructure.

Trainers generally agree that quality assurance measures are in place, but there is room for improvement in terms of curriculum revisions, the effectiveness of hardware and software, and capacity building programs. The disparities in perceptions can be attributed to factors such as different roles and experiences, limited awareness, varying expectations, and communication gaps. To bridge these gaps and enhance the implementation of online distance teaching and learning, institutions are expected to improve communication channels, provide comprehensive information, involve trainees in decision-making processes, and prioritize staff development, curriculum revisions, and quality assurance measures. By addressing these factors, institutions can create a more cohesive and supportive learning environment for online distance learners. Existing studies such as Katam and Otieno (2021), Pangen and Karki (2021), Hassan et al. (2021), Karani and Waiganjo (2022) Yeap et al. (2021) and Langat et al. (2021) have also featured on important aspects such as technology, power connectivity, infrastructure development and curriculum revision to effectively implement online teaching and learning.

The above findings provide valuable insights for decision-makers and educational institutions seeking to enhance the implementation of online distance teaching and learning. By addressing the identified gaps and leveraging the strengths, institutions can create a more responsive, inclusive, and effective learning experience for online distance learners.

#### **4.9.2 Findings and discussion based on results from Principals and HODs on Curriculum implementation**

The HODs expressed during interviews that their institutions were prepared for implementing the curriculum for online distance teaching and learning. They mentioned that the necessary infrastructure, including LMS servers, trained staff, and internet connectivity, were in place. However, they did not provide specific details regarding the extent of online studies offered or the progress of online materials preparation.

Comparing these results with the responses provided by principals, there is a general consensus in terms of the status of preparedness. Both the HODs and principals mentioned the on-going preparation of online materials and the imparting of online skills to trainers and trainees. However, financial challenges are acknowledged by the HODs as a persistent issue. The HOD number two said, *“a few online teaching materials and practical manuals and guides have been developed and others are in the pipeline due to lack of enough funds.”* This indicates conservable effort was in place although the initiatives were curtailed by shortage of finances.

To improve curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya, the HODs suggested several measures. Their responses emphasized on the need for funding and equipping online studies in all TVET institutions, and ensuring the availability of professionally prepared learning and assessment materials that can be reused across the system. Quality assurance and standards should be prioritized, and efforts should be made to address equipment, connectivity, and digital literacy issues, which may require additional financing. During document analysis

it was also noted that the National ICT policy and the TVET standards and guidelines policy (2022) on ODeL emphasized the provision of necessary ICT infrastructure, developing a National Learning Management System (NLMS), and strengthening quality assurance and monitoring in TVET ODeL programs.

Additionally, capacity building for trainers should begin in teacher training colleges to ensure their proficiency in online teaching and learning. This suggestion aligns with the ODeL training manuals and schedules policies. These policies aim to support the digitization of TVET ODeL content and interactive online delivery to learners by focusing on reskilling trainers and integrating technology into TVET ODeL education delivery and pedagogy as noted during the document analysis.

The HODs stressed the importance of investing in equipment, connectivity, and digital literacy as enablers for the digitalization and expansion of TVET and skills systems, particularly to increase access for vulnerable learners. In agreement, Katam and Otieno (2021), Pangenji and Karki (2021), Hassan et al. (2021), Karani and Waiganjo (2022) Yeap et al. (2021) and Langat et al. (2021) studies have recommended some aspects including training, professional development, curriculum revision, funding and investment in technological infrastructure.

Overall, the HODs and principals recognized the need for ongoing efforts to enhance curriculum implementation for online distance teaching and learning. This included addressing financial challenges, ensuring the availability of high-quality learning resources, promoting capacity building for trainers, and investing in infrastructure and



digital literacy. By implementing these measures, national TVET institutions in Kenya can better support online education and expand access to learning opportunities for all students.

#### **4.10 TVET Policy Regarding Curriculum Implementation through ODEL**

This fifth objective of this study aimed to examine the extent to which TVET policy moderate the preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya. Data was obtained from trainers, trainees, HODs and principals. In presenting and discussing the results, the study adopted the concurrent nested research design of mixed methods. Therefore, the information gathered from trainers and trainees through use of questionnaires was predominant. However, the information provided by these two main categories of respondents was not adequate in covering all aspects investigated in this study. Therefore, qualitative information gathered from HODs and principal as well as the additional information noted from document analysis, provided critical supplementary facts and evidences which further helped the researcher to explain aspects of phenomena investigated in this study. The essential supplementary information from qualitative data was therefore embedded / nested to complement the quantitative data. The findings from trainees are presented first followed by results from trainers, and then the findings from HODs and principals. The information from document analysis is integrated in appropriate sections and areas where it is best suited in the discussion.

In measuring this variable, the trainees and trainers were asked to indicate the level of their agreement with each statements posed to them on a five-point Likert scale where, (1) stood for Strong Disagree, (2) is Disagree, Moderately Agree was (3); Agree = (4) and Strongly Agree was (5). The study inquired about the existence of a policy, adherence to the policy,

TVET ACT, master plan on online digital learning, learning conforming to National guidelines and standards and conforming to global environment practice.

The descriptive findings against each of these items were interpreted based on the mean values and standard deviation. The summation of responses also helped to have a general opinion regarding each variable. During discussion of results, the frequencies for agree and strongly agree responses were summed up to indicate 'agreement' to the item, while, disagree and strongly disagree constituted 'disagreement' response. The responses received from trainees and trainers were summarized and presented in Table 4.16 and 4.17.

**Table 4. 16*****Trainees' descriptive results on TVET policy***

Trainees' statements on TVET policy (N = 164)	SD	D	N	A	SA	Mean	Std.
• My institution has a policy to enhance online digital learning	1(0.6%)	24(14.6%)	31(18.9%)	57(34.8%)	51(31.1%)	3.81	1.054
• TVET policy regarding online digital learning are followed	7(4.3%)	31(18.9%)	33(20.1%)	56(34.1%)	37(22.6%)	3.52	1.159
• The TVET Act regarding online digital learning are followed	2(1.2%)	34(20.7%)	42(25.6%)	50(30.5%)	36(22%)	3.51	1.088
• Our institution has a master plan on online digital learning	5(3%)	40(24.4%)	41(25%)	43(26.2%)	35(21.3%)	3.38	1.159
• The distance learning and teaching offered at my institution conform to the National guidelines and standards	0	12(7.3%)	35(21.3%)	74(45.1%)	43(26.2%)	3.90	.874
• I feel the distance learning and teaching offered at my institution conforms to the global environment practice	6(3.7%)	23(14%)	39(23.8%)	74(45.1%)	22(13.4%)	3.51	1.012
Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .639							

The results show that Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.639, indicating that the data may have some limitations in adequately representing the population. Table 4.16 shows that trainees agreed that their institution has a policy to enhance online digital learning (Mean = 3.81, SD = 1.054): The majority of trainees (34.8%) agreed that their institution had a policy to enhance online digital learning. A small proportion (0.6%) disagreed, indicating a general consensus among the trainees. The trainers also moderately agreed on the compliance with the TVET policy regarding online digital learning (Mean = 3.52, SD = 1.159). While a significant proportion (34.1%) agreed, there were also notable proportions who disagreed and moderately agreed, suggesting a lack of consensus. Trainees expressed similar mixed opinions on whether the TVET Act regarding online digital learning is followed (Mean = 3.51, SD = 1.088). The standard deviation indicates a relatively low level of variability in the responses.

Trainees had diverse opinions on whether their institution had a master plan on online digital learning (Mean = 3.38, SD = 1.159). The statement, “distance learning and teaching offered at my institution conform to the National guidelines and standards: (Mean = 3.90, SD = 0.874) indicated majority of trainees (45.1%) agreed that the distance learning and teaching offered at their institution conforms to the National guidelines and standards. There were no trainees who disagreed, indicating a strong consensus on this statement. Trainees expressed however demonstrated mixed opinions on whether the distance learning and teaching offered at their institution conforms to the global environment practice (Mean = 3.51, SD = 1.012).

The findings above from the trainees' statements on TVET policy indicate mixed opinions and a lack of consensus on various aspects. While there is some agreement regarding the presence of a policy to enhance online digital learning and the conformity to national guidelines and standards, there is uncertainty regarding the implementation of TVET policy and the existence of a master plan on online digital learning. Further evaluation and clarification of these policies and practices may be necessary to address the concerns and improve the trainees' experiences in TVET institutions. These findings showed consensus with the provision of Langat et al. (2022) who articulated that, the existence of TVET standards in Kenya that direct online learning and teaching is one thing and the implementation of the same another. Langat et al. explained that, despite the existence of the policy, the sector progress with relation to curriculum teaching through online basis is hindered by technological, infrastructural, technical, competencies and availability of internet connectivity limitations.

**Table 4. 17*****Trainers' descriptive results on TVET policy***

Statements on TVET policy (N = 33)	SD	D	MA	A	SA	Mean	Std.
• The TVET policy framework that help to enhance online digital learning is fully implemented	2(6.1%)	5(15.2%)	12(36.4%)	12(36.4%)	2(6.1%)	3.21	.992
• Vision 2030 policy on role of TVET in enhancing online digital learning is fully implemented	1(3%)	6(18.2%)	12(36.4%)	12(36.4%)	2(6.1%)	3.24	.936
• The TVET Act policy articulate on TVET role in enhancing online digital learning is implemented	1(3%)	5(15.2%)	17(51.5%)	9(27.3%)	1(3%)	3.12	.820
• National master plan policy on TVET online digital learning in the institution is fully followed.	2(6.1%)	5(15.2%)	14(42.4%)	12(36.4%)	0	3.09	.879
• Sessional paper Number 10 of 2020 policy that supports online digital learning is implemented in this institution.	2(6.1%)	6(18.2%)	10(30.3%)	14(42.4%)	1(3%)	3.18	.983
• Global environment policy touches on role of TVET enhancing online digital learning and is implemented.	2(6.1%)	5(15.2%)	10(30.3%)	15(45.5%)	1(3%)	3.24	.969
• Society and culture role policy on TVET which is clear on role of enhancing online digital learning is implemented in this institution.	2(6.1%)	8(24.2%)	10(30.3%)	11(33.3%)	2(6.1%)	3.09	1.042

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy = .696

The results in Table 4.17 indicate that the implementation of TVET policy statements related to online digital learning varies among the respondents. The majority of lecturers agreed or moderately agreed that the TVET policy framework that helps enhance online digital learning is fully implemented, with 12(36.4%) agreeing and 12(36.4%) moderately agreeing (mean = 3.21; SD = 0.992). Similarly, the Vision 2030 policy on the role of TVET in enhancing online digital learning was considered to be fully implemented by 12(36.4%) trainers, while 6(18.2%) agreed and 2(6.1%) disagreed (mean = 3.24; SD = 0.936).

The TVET Act policy, which articulates the role of TVET in enhancing online digital learning, received mixed responses; where, 17(51.5%) respondents agreed, 5(15.2%) disagreed, and 1(3%) moderately agreed (mean = 3.12; SD = 0.820). The implementation of the National Master Plan policy on TVET online digital learning in the institution was seen positively with 14(42.4%) respondents agreeing, 5(15.2%) disagreeing, and no respondents indicating moderate agreement (mean = 3.09; SD = 0.879).

Regarding the Sessional Paper Number 10 of 2020 policy, which supports online digital learning, 14(42.4%) respondents agreed, 6(18.2%) disagreed, and 2(6.1%) moderately agreed (mean = 3.18; SD = 0.983). The global environment policy, which touches on the role of TVET in enhancing online digital learning, received positive responses, with 15(45.5%) agreeing and 5(15.2%) disagreeing (mean = 3.24; SD = 0.969). The Society and Culture role policy on TVET, which is clear on the role of enhancing online digital learning, also had mixed responses. 10(30.3%) respondents agreed, 8(24.2%) disagreed, and 2(6.1%) moderately agreed (mean = 3.09; SD = 1.042).

The above findings suggest that there is variation in the perception of lecturers regarding the implementation of TVET policies related to online digital learning. While some policies received more positive responses, others had mixed opinions or noticeable level of disagreement. This indicates a low level of compliance to the stated aspects of TVET policy. These results highlight the need for further evaluation and improvement in the implementation of TVET policies to ensure effective enhancement of online digital learning in the institution. In support, Ngwacho (2021) explained that the existence of TVET policy that incorporate the adoption of online learning lacks to articulate the required level of preparedness. Ngwacho established that both staff and learners are inadequately prepared on e-learning with respect to the developed standards and henceforth called a need for the policy to be revised by elaborating how funding, professional development, internet connectivity and sustainability of online teaching and learning will be achieved. Another research by Musonye et al. (2021) also stressed on the need to have strategy for ensuring availability, adequacy and usability of available facilitates, computers, infrastructure and services in TVET institutions.



#### **4.10.1 Comparison and Discussion of Results from Trainers and Trainees on TVET Policy**

The descriptive results from trainers and trainees on TVET policy reveal the trainees' and trainers' perceptions regarding the implementation of TVET policies related to online digital learning. The trainees generally agree that their institutions had a policy to enhance online digital learning and that the distance learning and teaching offered at their institution conforms to national guidelines and standards. However, there is a lack of consensus among trainees on the implementation of TVET policy, the existence of a master plan on online digital learning, and conformity to global environment practices. These mixed opinions and disagreements may stem from factors such as limited awareness of policies, varying interpretations of guidelines and standards, and differing experiences among the trainees. It may also indicate non-conformities in the implementation of this policy. These findings were not agreeing with the situation in Indonesia as presented by Paryono (2015). Paryono reported the existence of salient findings efforts put in the current policies and practices such as high level of awareness, existence of well trained teachers, implementation of teachers' professional standards and acquisition of required resources and facilities to steer teaching and learning among technical and vocational institutions.

Similarly, the trainers expressed diverse views on the implementation of TVET policies. While there is agreement or moderate agreement regarding the full implementation of the TVET policy framework and the Vision 2030 policy, there is mixed feedback on the TVET Act policy and the National Master Plan policy. These disparities in opinions could be attributed to factors such as varying levels of familiarity with policies, differing perceptions of policy effectiveness, and individual experiences within the institution. These results

reflect a need to create awareness among TVET stakeholders in order to achieve consensus and familiarity of the status of the implementation of the policies. In Nigeria, Akanbi (2017) presented similar mixed reactions regarding the adoption of policies and frameworks in implementing online teaching and learning. Akanbi recommended a need to create awareness to the school stakeholders through training, seminars, conferences and workshops regarding the available policies which bound and guide implementation of online teaching and learning.

The discrepancies in perceptions between trainees and lecturers, as well as within the lecturer group, may arise from differences in roles, responsibilities, and perspectives. Trainees primarily focus on their learning experiences, while lecturers have a broader understanding of policy implementation and institutional dynamics. Moreover, limited communication and understanding between trainees and lecturers about policy implementation can contribute to the variations in their perceptions.

To address these discrepancies and enhance the implementation of TVET policies, it is crucial to improve communication channels and promote a shared understanding of policies among all stakeholders. Regular dialogues, training sessions, and workshops can help clarify policies, provide guidance on implementation, and address any concerns or misconceptions. Additionally, involving both trainees and lecturers in decision-making processes and policy reviews can foster a sense of ownership and alignment towards common goals. By working together, institutions can ensure a more cohesive and effective implementation of TVET policies for online digital learning, leading to improved educational experiences for trainees and lecturers alike. Similar avenues for creating policy

awareness such as seminars, workshops, conferences and trainings were noted by Ankabi (2017) in Nigeria. In the same note, Kibata (2013) notifies that the factors which prevented instructors from utilizing online chat boxes, discussion rooms and tutorials was lack of knowhow and exposure in workshops, conferences and seminars. Kibata called upon the TVET principals to chip in through availing required resources and training to create awareness.

#### **4.10.2 Findings and discussion based on results from Principals and HODs on TVET policy.**

The interview response from the Head of Department to the question on how the TVET policy framework affects the implementation of open and distance online learning at their institution, several aspects were highlighted. Firstly, the TVET policy had not been fully absorbed and implemented by most TVET institutions' management. One of the HODs clarified, *“The TVET policy has not been fully absorbed and implemented by the management of TVET institutions.”*

Additionally, the policy does not emphasize online studies and does not direct on allocating separate funds for online learning. Another HOD said, *“The TVET policy neither stresses the need for online studies nor separate funds for online studies as an entity.”* This indicates gap in the TVET policy as it is currently constituted. However as noted during the document analysis the National ODeL policy and the institutional policy on distance learning instructional content for ODeL aim to strengthen institutional frameworks for effective leadership and management of TVET ODeL education, emphasize quality assurance, and support the digitization of TVET ODeL content. The two policies also aim to provide necessary ICT infrastructure, enhance the integration and utilization of ICT, and

support the development of online-learning materials and the reskilling of trainers for TVET ODeL education delivery. This clearly shows that both the National ODeL policy and the institutional policy on distance learning instructional content for ODeL unlike the TVET policy emphasizes on online studies. Many institutions are currently focusing on recruiting trainees and developing necessary infrastructure, such as classrooms and laboratories to comply with the policy's objective of accommodating more students. Furthermore, it is stated that the majority of TVET institutions have only recently realized the importance of online learning and are taking small steps in that direction. This explains that TVET institutions are on their way to meeting the required in order to effectively implement online and distance learning. Similar observations have been postulated by Langat et al. (2021), Kiplangat (2021) and Karani and Waiganjo (2022) that despite the existence of the infrastructural and technological challenges, TVETS are aware of the importance and benefits of investing in online teaching and henceforth, efforts towards the same are being channelled through embracing policies, training and trainers professional enrichment on how to deliver instructions online.

When comparing these results with the responses provided by principals regarding the policy framework enabling online distance teaching and learning, some critical areas were identified. The TVET policy framework as stated by the principals, aims to revitalize the TVET sector, enhance access to education, and promote partnerships with industry. It aligns with the vision of Vision 2030, which emphasizes the need for skilled graduates to drive economic aspirations. However, the response from the Head of Department highlights the gaps in policy implementation and awareness among stakeholders. It suggests that the policy needs to be better understood by the management and trainers, and

calls for more funds and incentives to support online studies. The importance of recognizing the quality of online exams and providing regular quality assurance measures is also stressed. It is evident that there is a need for greater alignment between policy objectives and their implementation on the ground. These findings agree with the reports of Karani and Waiganjo (2022) who opined that, effective implementation of policies for online learning requires the adoption of the idea by the stakeholders. In doing so, this could clear numerous perceptions and attitudes. Karani and Waiganjo called for stakeholder involvement at each stage of decision-making in order to promote acceptance and incorporation of learners and trainers needs with respect to implementing online teaching and learning among TVETs.

In terms of recommendations for improving the TVET policy to support curriculum implementation for online distance teaching and learning, several suggestions are made. These included enlightening management and trainers on the ICT issues in the policy and online studies components; breaking down the policy into easily understandable sections, organizing workshops and seminars, allocating funds specifically for online studies, and incorporating incentives for trainers who perform well in online classes. Regular quality assurance measures and standards enforcement are also proposed, along with recognizing the quality of online exams on par with face-to-face exams. These recommendations aim to bridge the gap between policy formulation and effective implementation, ensuring that online distance teaching and learning can be successfully integrated into TVET institutions.

Overall, it is clear that there are challenges in implementing the TVET policy framework related to online distance teaching and learning. One significant challenge mentioned was

the lack of familiarity among management, trainers, and trainees with the TVET policy. Despite this, the principals' responses emphasized the policy's potential to drive the TVET sector's revitalization, and enhance access to education, aligning with national development goals. However, the response from the Head of Department reveals the gaps in policy awareness, funding, and infrastructure development that hinder effective implementation.

The suggested recommendations seek to address these challenges and create a supportive policy environment for curriculum implementation in online distance teaching and learning within the TVET sector. By recognizing the importance of stakeholder involvement and addressing financial, infrastructural, and capacity-building needs, the TVET policy can better support the advancement of online learning in TVET institutions. These findings as well agree with the reiterations opined in the construvist and equivalency theories, that effective online and virtual teaching requires preparedness of the target stakeholders with the required skills, competencies, attitudes, resources, facilities and infrastructure. To ensure bringing of the gap between physical and online tastes, these requirements need to be put in place.

#### **4.11 Testing Moderation effect of TVET Policy**

The study aimed to examine the preparedness of online distance curriculum implementation in national TVET institutions in Kenya. Having established the state of affairs, the study went on to test research question number five which was about determining the extent to which TVET policies moderate preparedness and curriculum implementation of online education in TVET institutions in Kenya. To investigate this inquiry, the study aimed to employ moderated multiple linear regression analysis. As a result, diagnostic tests were conducted to verify whether the data met the assumptions of

linear regression analysis. The outcomes pertaining to testing the assumptions of linear regression are provided in the subsequent section.

#### **4.11.1 Diagnostic tests on preparedness and curriculum implementation of online teaching and learning in TVET institutions**

The five conditions of linear regression were ascertained accordingly. The first condition to be checked was normality of the data; that is, determine if the data were derived from a target population that exhibited a normal distribution. Other conditions checked were linearity of the output variable and predictor variables, auto-correlation of items of predictor variables, heteroscedasticity problem and violation of multicollinearity condition (Gravetter et al., 2020; Waithima, 2020). The sections that follows provide results of the tests of each of these assumptions. In this study variables were coded where  $X_1$  = availability of information communication technology infrastructure;  $X_2$  = availability of ICT user training and skills development support;  $X_3$  = availability of appropriate online distance teaching and learning instructional materials;  $X_4$  = availability in financial support from various stake holders;  $M$  = TVET policy (moderator) and  $Y$  = online distance curriculum implementation in national technical and vocational education institutions (dependent variable).

##### **4.11.1.1 The Normality Test**

The study used P-value of Shapiro-Wilk statistic in checking normality. This was because the target population was small. The normality condition was also ascertained by checking histograms, especially based on the dependent variable. The Shapiro-Wilk test statistics are shown in Table 4.18.

**Table 4. 18**

*Shapiro-Wilk Test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on both trainees and trainers data*

Variables	Shapiro-Wilk Trainees data			Shapiro-Wilk Trainers data		
	Statistic	df	Sig.	Statistic	df	Sig.
X1	.988	164	.168	.958	33	.224
X2	.991	164	.364	.964	33	.343
X3	.995	164	.802	.975	33	.640
X4	.995	164	.863	.940	33	.066
M	.993	164	.566	.962	33	.290
Y	.993	164	.581	.981	33	.812

\*. This is a lower bound of the true significance.

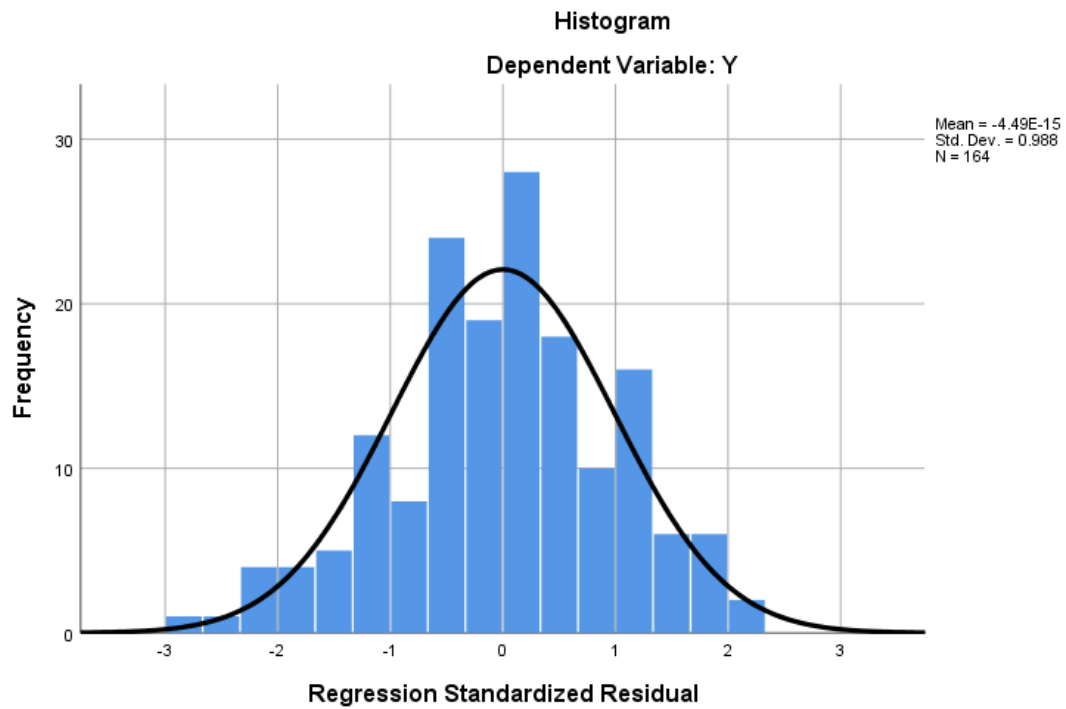
a. Lilliefors Significance Correction

The findings in Table 4.18 show Shapiro-Wilk P-values for each variable are insignificant;  $X_1 = .168$ ;  $X_2 = .364$ ;  $X_3 = .802$ ;  $X_4 = .863$ ;  $M = .566$  and  $Y = .581$  for trainees' data; while for data from trainers, the P-values were:  $X_1 = .224$ ;  $X_2 = .343$ ;  $X_3 = .640$ ;  $X_4 = .066$ ;  $M = .290$  and  $Y = .812$ . The results show that the data exhibited conformity with normality condition was derived from a normally distributed target population (Waithima, 2020). The skewness was also confirmed by checking histograms based on Y (online distance curriculum implementation in national technical and vocational education institutions) as depicted in Figures 4.1 and 4.2.



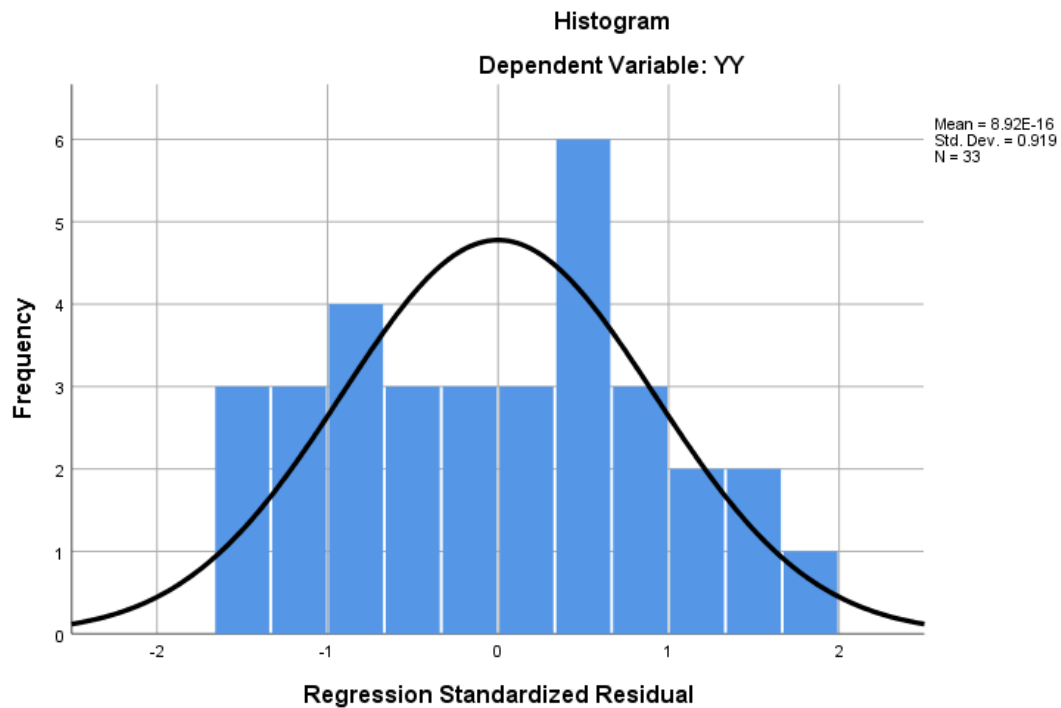
**Figure 4. 1**

*Histograms: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainees' data*



**Figure 4. 2**

*Histograms: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainers' data*



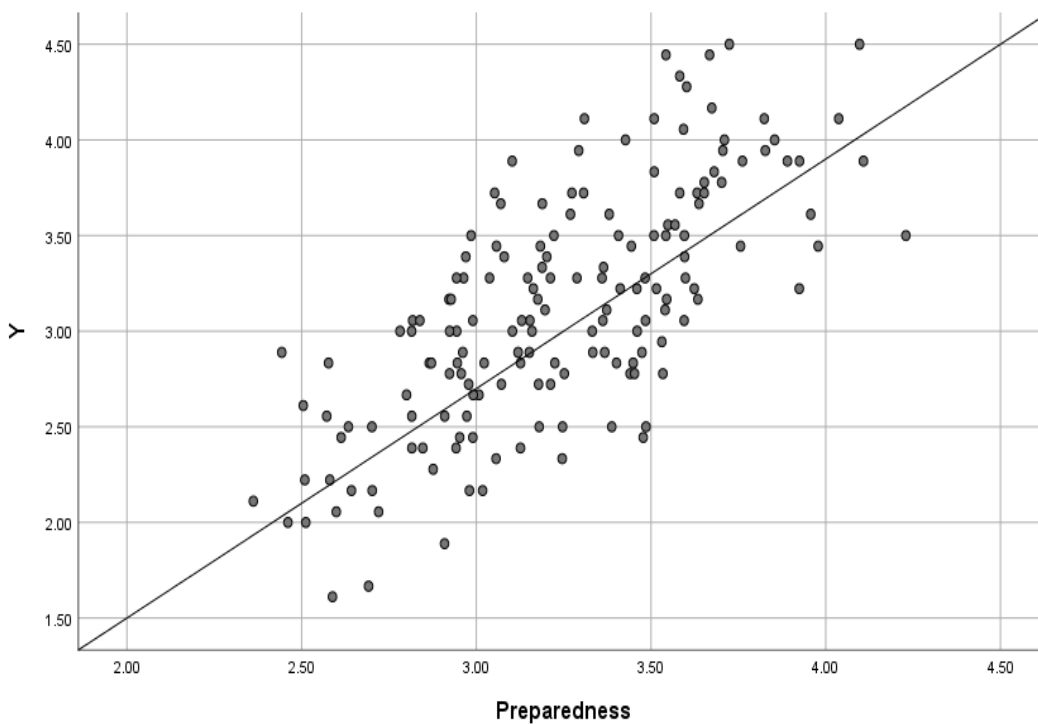
According to Figures 4.1 and 4.2, data exhibit a fair distribution of data of trainees and then followed by those from trainers. The trainers' respondents were fewer in numbers and the resulting normal curve is therefore less spread as compared to the one from trainees. However, the skewness and flatness of the curve is minimal; hence, the normal distribution status is noted.

#### 4.11.1.2 The Linearity Test

The linearity of the data between preparedness and curriculum implementation of online teaching and learning in TVET institutions was checked by generating a scatter plot and the same is presented in Figure 4.3.

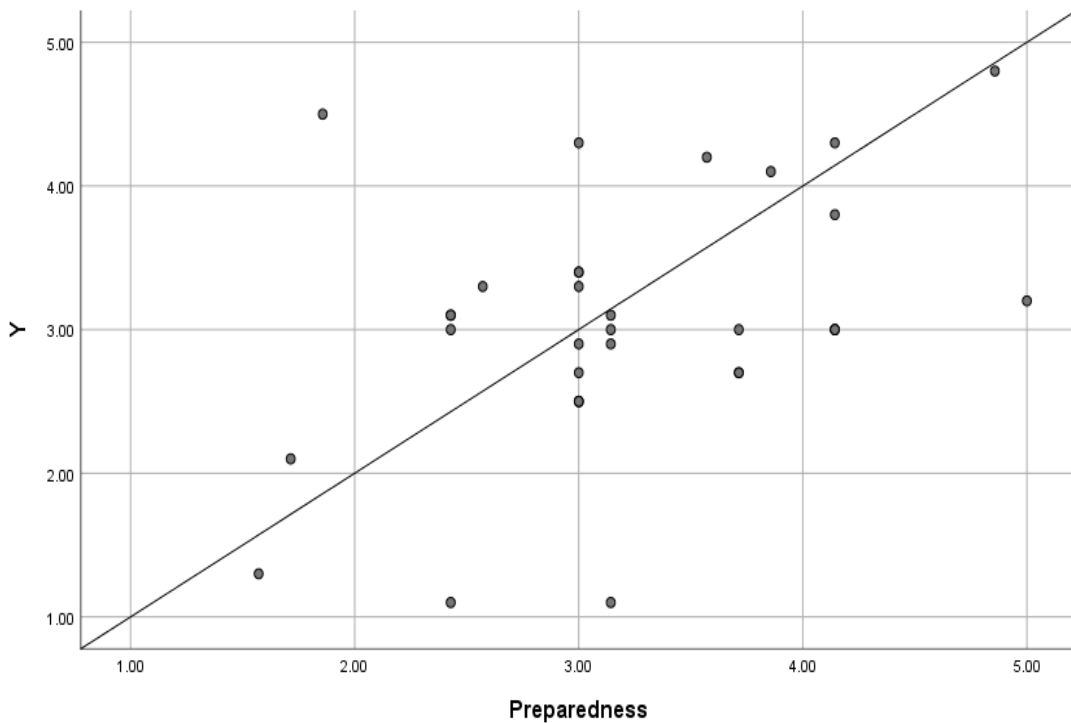
**Figure 4. 3**

*Linearity Test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainees' data*



**Figure 4. 4**

*Linearity Test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainers' data*



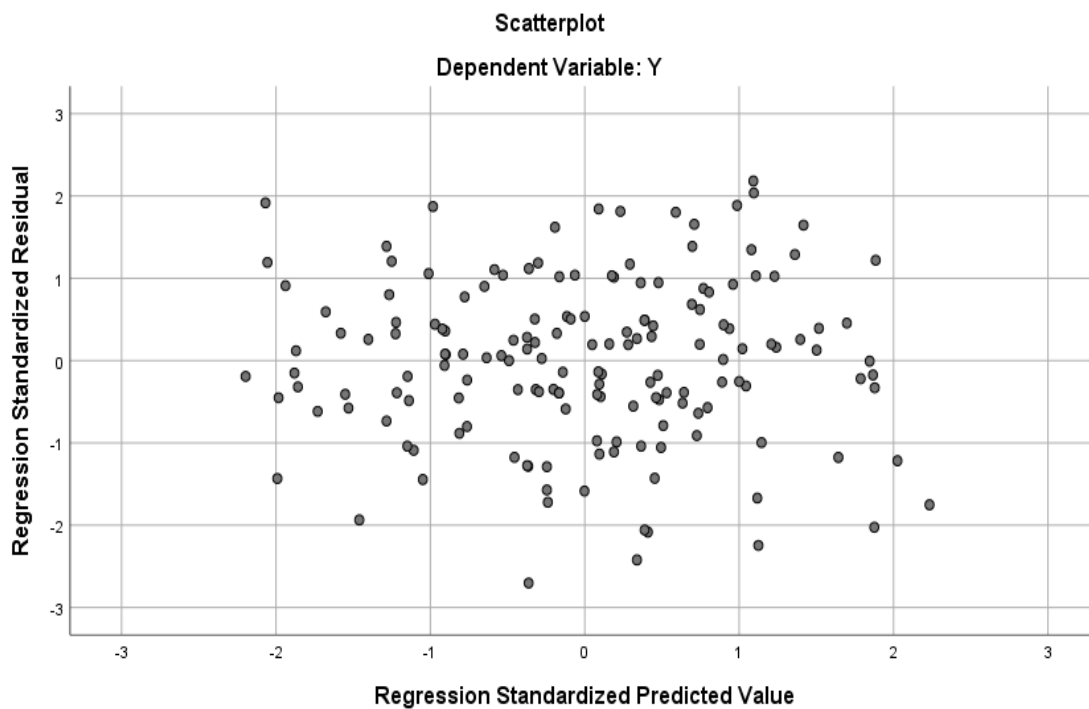
The convergence of data points in Figures 4.3 and 4.4 is clearly observed to be along the line of best fit. The scatter graph from trainees' data (Figures 4.3) are showing high convergence as compared to the data from trainers (Figures 4.4). However, in both cases, the findings show that the deviation of data points from linearity is insignificant; and therefore, the study observes that there is linearity between preparedness and curriculum implementation of online teaching and learning in TVET institutions.

#### 4.11.1.3 The Heteroscedasticity Test

To assess the presence of a heteroscedasticity problem in the data, a scatter graph was constructed utilizing standardized predicted residuals and standardized residuals. The dispersion of data points on the graph aided in identifying the existence of heteroscedasticity. The results can be observed in Figures 4.5 and 4.6.

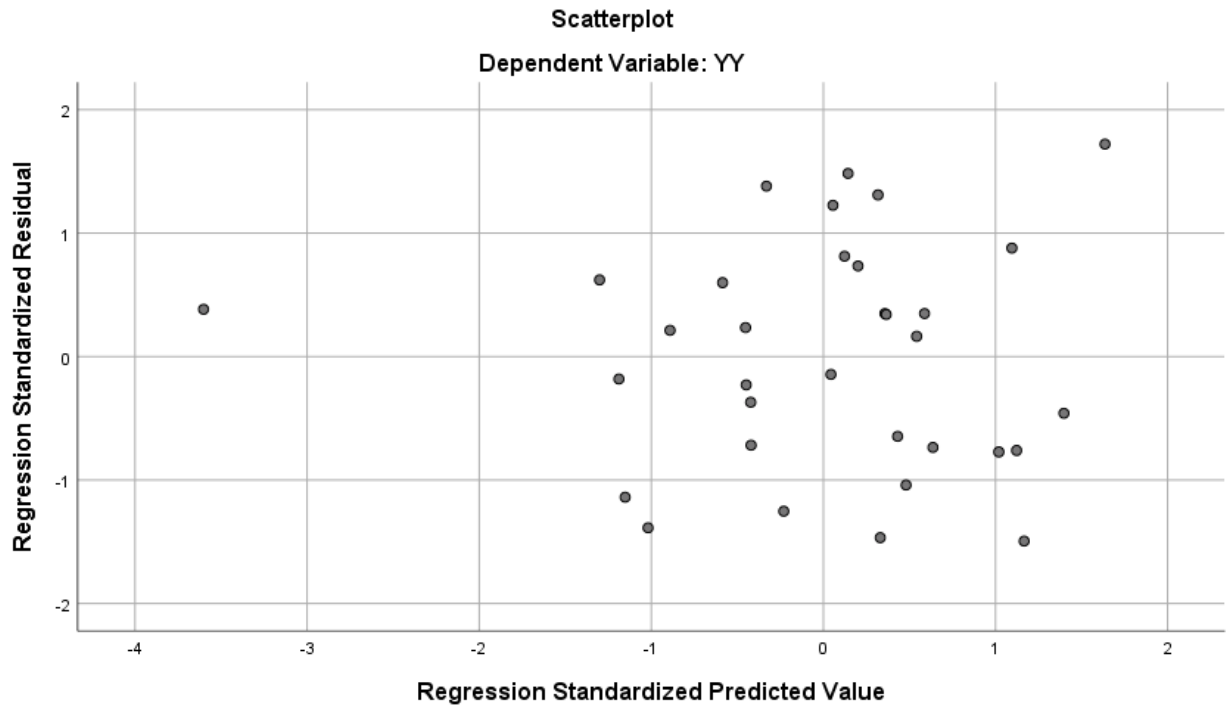
**Figure 4. 4**

***Heteroscedasticity test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainees' data***



**Figure 4. 5**

*Heteroscedasticity test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainers' data*



The scatter graph from both trainees (Figure 4.5) and trainers' data (Figure 4.6) show scatter points that are largely defused, hence failing to form an established pattern along the rectangular graph. The scatter points in the two figures are showing that they are not forming any definite pattern. Consequently, the data in both cases do not show a violation of heteroscedasticity.

#### 4.11.1.4 The Autocorrelation Test

In determining whether items and aspects of independent variables were correlated (autocorrelation condition), the Durbin-Watson statistics were computed using SPSS. The results are in Table 4.19.

**Table 4. 19**

*The Autocorrelation Test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainers' data*

Variables	Durbin-Watson – Trainees data	Durbin-Watson – Trainers data
X1	1.654	2.213
X2	1.781	2.137
X3	1.643	2.186
X4	2.141	1.902

The results on the test of autocorrelation show that the Durbin-Watson values are around one for each variable based on both trainees and trainers' data. Durbin-Watson value is usually around two and is expected not to be less than 0.8 (Taylor, 2023). The findings mean that the autocorrelation condition was not violated.

#### 4.11.1.5 The Multicollinearity Test

The compliance of data to the multicollinearity condition before conducting a multiple linear regression was also checked by computing the Variance Inflation Factor (VIF) values of the independent variables (availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders. The findings are in Table 4.20.

**Table 4. 20**

***Multicollinearity Test: Preparedness and curriculum implementation of online teaching and learning in TVET institutions based on trainers' data***

Variable	VIF - Trainees data	VIF - Trainers data
X1	1.846	2.270
X2	2.742	3.163
X3	2.605	3.820
X4	1.803	1.835

The findings in Table 4.20 show VIF for each variable are above one and below five;  $X_1 = 1.846$ ;  $X_2 = 2.742$ ;  $X_3 = 2.605$ ; and  $X_4 = 1.803$  for trainees' data; while for data from trainers, the VIF are:  $X_1 = 2.270$ ;  $X_2 = 3.163$ ;  $X_3 = 3.820$ ; and  $X_4 = 1.835$ . The VIF is expected to be between 1 and 5, and should not exceed 10 (Grande, 2015). In the connection, the findings show that the data had no multicollinearity problem.

The above results on diagnostic tests showed non violations of the five assumptions of linear regression. Therefore, the study adopted parametric test, in the case, a moderated multivariate linear regression analysis to examine the extent to which TVET policies moderate preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya.

#### **4.11.2 Results on Moderation Effect of TVET Policies**

The fifth research question reads, to what extent does TVET policies moderate preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya? In testing this research question, a moderated Multiple Linear Regression (MMR) was conducted. The output of a moderated multiple linear regressions



show three most essential tables; that is, the model summary, model validity and coefficient. Each table show three models which are numbered as model 1, model 2, and model 3. The first model consist the independent variables only, the second model contain all the independent variables and TVET policy; while, the third model contains all the independent variables and TVET policy, plus the interaction terms which is a product of the moderator and the independent variables. Actually, the third model help to determine the moderation effect by checking the R square change statistics from the model summary table. The ANOVA results table provides information on whether the model is valid. The regression weights of each variable in MMR are shown in the coefficient table; however, in this table, the coefficient table was not generated because the moderation effect of TVET policy was lacking. The study used the following MMR model.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_jZ_j + \beta_{ij}X_iZ_j + \varepsilon$$

The above model is in three levels;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon \dots\dots\dots (i)$$

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_zZ_j + \varepsilon\dots\dots\dots (ii)$$

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_jZ_j + \beta_{ij}X_iZ_j + \varepsilon\dots\dots\dots (iii)$$

Where:

Y is the online distance curriculum implementation in national technical and vocational education institutions

$\beta_0$  is the constant value,

$\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  are the coefficients of availability of information communication technology infrastructure, availability of ICT user training and skills development support,

availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders.

$X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$  are availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders.

$Z_j$  is the TVET policy

$B_j$  is the coefficient of the TVET policy as a predictor

$X_i Z_j$  is the interaction term between variable  $X_i$  ( $i = 1, 2, 3, \& 4$ ) and TVET policy

$B_{ij}$  is the coefficient of the interaction term.

$\varepsilon$  is the error term.

With regard to the first model, the availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders were first regressed on online distance curriculum implementation in national technical and vocational education institutions ( $Y$ ) in a multivariate model. For the second model, the TVET policy ( $Z_j$ ) is added to help in checking a change in R-square statistics. The interaction terms ( $X_i * Z_j$ ) is then introduced in the third model. This helps determine whether there is moderation. The results are shown in Tables 4.21, 4.22, and 4.23. The first presentation is on model validity in Tables 4.21.

#### 4.11.2.1 Moderation Effect of TVET Policies based on data from Trainees

The test on moderation effect of TVET policies was done based on data gathered from trainees and trainers consecutively. Presentation of results starts with moderation effect of TVET policies based on data from trainees.

**Table 4. 21**

*ANOVA: Moderation effect of TVET policies based on data from trainees*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.072	4	9.268	60.176	.000 <sup>b</sup>
	Residual	24.488	159	.154		
	Total	61.560	163			
2	Regression	38.872	5	7.774	54.142	.000 <sup>c</sup>
	Residual	22.688	158	.144		
	Total	61.560	163			
3	Regression	38.873	6	6.479	44.835	.000 <sup>d</sup>
	Residual	22.687	157	.145		
	Total	61.560	163			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X1, X2, X3

c. Predictors: (Constant), X4, X1, X2, X3, M

d. Predictors: (Constant), X4, X1, X2, X3, M, Interaction terms

From the findings in Table 4.21,  $F_{(4, 159)} = 60.176$ ,  $P < .000$ . This indicates that the first model is valid; meaning, the presumed relationship is truly exist and is not due to chance, hence the model can be used in data interpretation. In the second model, TVET policy is added to model one as predictor; which resulted to F statistics,  $F_{(5, 158)} = 54.142$ ,  $P < .000$ . This indicates that the second model is also valid. This meant that TVET policy is a key a predictor on the preparedness of online distance curriculum implementation in national technical and vocational education institutions. The interaction term ( $X_i * Z_j$ ) is introduced

in the third model resulting to F statistics,  $F(6, 157) = 44.835$ ,  $P < .000$ . The results show the third model is also valid. On overall, the ANOVA results in Table 4.14 show that the availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders, plus TVET policy are all vital constructs in determining the preparedness of online distance curriculum implementation in national technical and vocational education institutions. The extent of moderation is demonstrated in model three where, R-square change statistics are observed as shown in Table 4.22.

**Table 4. 22**

***Model summary: Moderation effect of TVET policies based on data from trainees***

Mode	R	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
				R Square Change	F Change	df1	df2	Sig. F Change	
1	.776 <sup>a</sup>	.602	.592	.39245	.602	60.176	4	159	.000
2	.795 <sup>b</sup>	.631	.620	.37894	.029	12.539	1	158	.001
3	.795 <sup>c</sup>	.631	.617	.38014	.000	.006	1	157	.939

a. Predictors: (Constant), X4, X1, X2, X3

b. Predictors: (Constant), X4, X1, X2, X3, M

c. Predictors: (Constant), X4, X1, X2, X3, M, Interaction\_terms

d. Dependent Variable: Y

The impact of input variables on the variation in online distance curriculum implementation in national technical and vocational education institutions is demonstrated through the R-square change statistics. The results in Table 4.22 display the R-square change statistics, indicating the extent to which the observed variation can be explained by adding the interaction term. The summary results for Model One reveal that the four predictor variables (availability of information communication technology infrastructure,

availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability of financial support) account for 60.2% of the total variation in online distance curriculum implementation in these institutions ( $R^2 = .602$ ;  $p = .000$ ).

Upon adding the TVET policy in Model Two, the R-square value improved by 2.9% ( $\Delta R^2 = .029$ ,  $p = .001$ ), indicating a slight enhancement to the model. The significance of Model Two ( $p < 0.05$ ) indicates that the addition of TVET policy remains statistically significant in the online distance curriculum implementation in these institutions.

In Model Three, the interaction term involving the interplay of TVET policy and the components of preparedness for online distance curriculum implementation was introduced. The results showed no change in the R-square value ( $\Delta R^2 = 0.000$ ,  $p = .939$ ), rendering Model Three insignificant. Therefore, it can be concluded that TVET policy does not moderate the relationship between preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya. While TVET policy is recognized as a critical factor in curriculum implementation, it does not act as a moderating variable in the hypothesized relationship.

Based on this conclusion, the study interpreted the regression weights for Model One and Model Two. Another study conducted by Papier (2021) established a relationship between policy implementation and the adoption of competence-based online teaching and learning, which resulted in improved competencies, professional training, and academic achievement. However, this study did not emphasize the moderating role of TVET policy in the preparedness and curriculum implementation of online education in TVET institutions in Kenya. Refer to Table 4.23 for the regression coefficient results.

**Table 4. 23*****Regression weights: Moderation effect of TVET policies based on data from trainees***

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.674	.266		2.538	.012
	X1	.041	.160	.028	.256	.798
	X2	.315	.110	.237	2.858	.005
	X3	1.045	.187	.717	5.580	.000
	X4	.375	.088	.287	4.270	.000
2	(Constant)	.233	.285		.819	.414
	X1	.082	.155	.056	.529	.597
	X2	.580	.130	.436	4.457	.000
	X3	1.123	.182	.771	6.164	.000
	X4	.697	.124	.534	5.605	.000
	M	.305	.086	.275	3.541	.001
3	(Constant)	-.345	1.479		-.234	.816
	X1	.089	.176	.061	.502	.616
	X2	.570	.182	.428	3.138	.002
	X3	1.134	.229	.778	4.943	.000
	X4	.706	.166	.540	4.241	.000
	M	.272	.432	.246	.630	.530
	Interaction_terms	-.003	.033	-.043	-.077	.939

a. Dependent Variable: Y

From the results in Table 4.23, the regression weights for model one is shown, where only X1 (availability of information communication technology infrastructure) cease to be significant ( $P > 0.05$ ). All the other three predictors X<sub>2</sub> (availability of ICT user training and skills development support); X<sub>3</sub> (availability of appropriate online distance teaching and learning instructional materials); X<sub>4</sub> (availability in financial support from various stake holders) remained statistically significant ( $P < 0.05$ ) in each case.

This means that when all the predictor variables are considered together in one model towards curriculum implementation of online teaching and learning in TVET institutions in Kenya, the availability of information communication technology infrastructure become less important though still required. The aspects of preparedness that remained significant are availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders. The following research model one was hence generated.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon \dots\dots\dots (i)$$

$$Y = .674 + .041X_1 + .315X_2 + 1.045X_3 + .375X_4 + \varepsilon$$

Regarding regression weights in the second model, when the TVET policy was added as predictor in model two, again, the three predictors  $X_2$  (availability of ICT user training and skills development support);  $X_3$  (availability of appropriate online distance teaching and learning instructional materials);  $X_4$  (availability in financial support from various stake holders) remained statistically significant ( $P < 0.05$ ) for each variable. In addition, TVET policy was also statistically significant in the model ( $P < 0.05$ ). This means that the availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, availability in financial support from various stake holders, and TVET policy were jointly significant in impacting curriculum implementation of online teaching and learning in TVET institutions in Kenya. In this case, TVET policy proved to be a significant predictor. The following research model two was hence generated.

#### 4.11.2.2 Moderation Effect of TVET Policies based on data from Trainers

From a triangulation perspective, the moderation effect of TVET policies was also conducted based on data from trainers. The results are presented and discussed in below.

The first Table 4.24 show ANOVA results.

**Table 4. 24**

***ANOVA: Moderation effect of TVET policies based on data from trainers***

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.528	4	3.882	12.008	.000 <sup>b</sup>
	Residual	9.052	28	.323		
	Total	24.581	32			
2	Regression	16.138	5	3.228	10.323	.000 <sup>c</sup>
	Residual	8.442	27	.313		
	Total	24.581	32			
3	Regression	16.444	6	2.741	8.757	.000 <sup>d</sup>
	Residual	8.137	26	.313		
	Total	24.581	32			

a. Dependent Variable: Y

b. Predictors: (Constant), X4, X1, X2, X3

c. Predictors: (Constant), X4, X1, X2, X3, X5\_M

d. Predictors: (Constant), X4, X1, X2, X3, X5\_M, Interactions

From the findings in Table 4.24,  $F(4, 28) = 12.008$ ,  $P < .000$ . This indicates that the first model is valid; meaning, the presumed relationship is truly exist and is not due to chance, hence the model can be used in data interpretation. In the second model, TVET policy is added to model one as predictor; which resulted to F statistics,  $F(5, 27) = 10.323$ ,  $P < .000$ . This indicates that the second model is also valid. This meant that TVET policy is a key a predictor on the preparedness of online distance curriculum implementation in national technical and vocational education institutions. The interaction term ( $X_i * Z_j$ ) is introduced



in the third model resulting to F statistics,  $F(6, 26) = 8.757, P < .000$ . The results show the third model is also valid. On overall, the ANOVA results in Table 4.14 show that the availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders, plus TVET policy are all vital constructs in determining the preparedness of online distance curriculum implementation in national technical and vocational education institutions. The extent of moderation is demonstrated in model three where, R-square change statistics are observed as shown in Table 4.25.

**Table 4. 25**

***Model summary: Moderation effect of TVET policies based on data from trainers***

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.795 <sup>a</sup>	.632	.579	.56859	.632	12.008	4	28	.000
2	.810 <sup>b</sup>	.657	.593	.55917	.025	1.951	1	27	.174
3	.818 <sup>c</sup>	.669	.593	.55942	.012	.976	1	26	.332

a. Predictors: (Constant), X4, X1, X2, X3

b. Predictors: (Constant), X4, X1, X2, X3, X5\_M

c. Predictors: (Constant), X4, X1, X2, X3, X5\_M, Interactions

d. Dependent Variable: Y

The impact of input variables on the variation in online distance curriculum implementation in national technical and vocational education institutions is demonstrated by the R-square change statistics. The results in Table 4.25 indicate the R-square change statistics, reflecting the observed variation that can be explained by adding the interaction term. The summary results for Model One reveal that all four predictor variables

(availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability of financial support) account for 63.2% of the total variation in online distance curriculum implementation in national technical and vocational education institutions ( $R^2 = .632$ ;  $p = 0.000$ ).

Upon adding the TVET policy in Model Two, the R-square value improved by 2.5% ( $\Delta R^2 = .025$ ,  $p = .174$ ), indicating a slight enhancement to the model. However, the p-value exceeding 0.05 renders Model two statistically insignificant. Consequently, when TVET policy was included, the resulting Model Two became insignificant in the context of online distance curriculum implementation in these institutions. In other words, according to the trainers, TVET policy was not a significant predictor.

In Model Three, the interaction term involving the interplay of TVET policy and the components of preparedness for online distance curriculum implementation was introduced. The results showed a slight change in the R-square value, with an increase of 1.2% ( $\Delta R^2 = .012$ ,  $p = .332$ ). Model Three remained insignificant. These findings led to the conclusion that TVET policy does not moderate the relationship between preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya. This implies that while TVET policy is a critical factor in the implementation of online teaching and learning curriculum in these institutions, it does not act as a moderating variable in the hypothesized relationship.

Based on this conclusion, the study interpreted the regression weights for Model One and Model Two. Although there were limited studies discussing the moderating role of TVET policy in the relationship between preparedness and the implementation of online teaching and learning, the significance of TVET policies cannot be overlooked. Studies by Ankabi (2017), Brand (2021), and Langat et al. (2022) acknowledge the contribution of policies in TVET institutions, such as informing training and professional development. Refer to Table 4.26 for the regression coefficient results.

**Table 4. 26*****Regression weights: Moderation effect of TVET policies based on data from trainers***

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.699	.442		1.582	.125
	X1	.025	.184	.024	.137	.892
	X2	.405	.217	.381	1.869	.072
	X3	.534	.239	.501	2.236	.033
	X4	.752	.174	.673	4.329	.000
2	(Constant)	.587	.441		1.331	.194
	X1	.058	.183	.054	.318	.753
	X2	.370	.214	.349	-1.727	.096
	X3	.425	.247	.399	1.719	.097
	X4	.580	.211	.519	2.753	.010
	X5_M	.283	.203	.278	1.397	.174
3	(Constant)	1.871	1.373		1.363	.185
	X1	-.175	.218	-.164	-.803	.429
	X2	-.618	.330	-.582	-1.872	.072
	X3	.331	.265	.311	1.251	.222
	X4	.540	.215	.483	2.515	.018
	X5_M	-.149	.482	-.146	-.308	.760
	Interactions	.040	.040	.785	.988	.332

a. Dependent Variable: Y

From the results in Table 4.26, the regression weights for model one are shown, where only X1 (availability of information communication technology infrastructure) cease to be significant ( $P > 0.05$ ). All the other three predictors X<sub>2</sub> (availability of ICT user training and skills development support); X<sub>3</sub> (availability of appropriate online distance teaching and learning instructional materials); X<sub>4</sub> (availability in financial support from various stake holders) remained statistically significant ( $P < 0.05$ ) in each case. The findings were consistent with those noted from trainees' data.

This means that when all the predictor variables are considered together in one model towards curriculum implementation of online teaching and learning in TVET institutions in Kenya, the availability of information communication technology infrastructure become less important though still required. The aspects of preparedness that remained significant are availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders. The following research model one was hence generated.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon \dots\dots\dots (i)$$

$$Y = .699+ .025X_1 + .405X_2 + .534X_3 + .752X_4 + \varepsilon$$

Regarding regression weights in the second model, when the TVET policy was added as predictor in trainers' model two, again, the three predictors  $X_2$  (availability of ICT user training and skills development support);  $X_3$  (availability of appropriate online distance teaching and learning instructional materials);  $X_4$  (availability in financial support from various stake holders) remained statistically significant ( $P < 0.05$ ) for each variable. The same was observed from trainees' data. However, TVET policy was statistically insignificant in the model ( $P > 0.05$ ). This means that the availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, availability in financial support from various stake holders, were jointly significant in impacting curriculum implementation of online teaching and learning in TVET institutions in Kenya. In this case, TVET policy was insignificant

predictor. Considering that there was no moderation effect of TVET policy, the study there did not interpret the regression weights for model two and three.

#### **4.11.3 Comparison and Discussion of Results on Moderation Effects of TVET Policy**

The results on moderation effects of TVET policy based on data from both trainees and trainers agreed that TVET policy does not moderate the preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya. There is also a general consensus that availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders were all jointly and statistically significant in the preparation of curriculum implementation of online teaching and learning in TVET institutions in Kenya. Both data from trainees and trainers indicated over 60% impact on the dependent variable. These findings support the observations demonstrated in the results of Kim (2020) and Guma et al. (2013) who noted that communication technology tools made learning interactive, lively, less interfered with environmental aspects, cut costs of physical infrastructure to attend face to face learning. The studies commented on a need to strengthen the utilization of ICT in education through budgeting and fund allocation to ensure acquisition of technological resources and training trainers and trainees.

From the results on moderation effects of TVET policy based on data from both trainees and trainers, it is clear that curriculum implementation of online teaching and learning in TVET institutions in Kenya requires adequate availability of information communication

technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders. However, the most significant component are availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stake holders. This means that with increased scenarios where learners are increasing owning smart mobile phones, the issue of availability of information communication technology infrastructure becomes less important. Probably the issue of outsourcing ICT infrastructure will increasing become a reality hence TVET institutions should focus more on ICT user support training and skills development, avail appropriate online distance teaching and learning instructional materials, and presence of financial support from various stakeholders.

Similar observations were also noted in the results of Guma et al. (2013) and Lawrence and Tar (2018) who argued that, ICT infrastructure availability and then usability were the major basics for ensuring preparedness in the adoption of online teaching and learning among TVET institutions. Other studies by Muchangi (2017) and Itasanmi et al. (2020) also noticed the implication of investing in trainers and trainees training support at institutions in Nigeria. Apart from that, the above results acknowledge the recommendations of Bruner's constructivist learning theory which requires trainees to use prior knowledge or experiences to form the basis for new knowledge and understanding in course dialogue. In this case, self-reliance of learners in knowledge acquisition based on earlier experiences relies on the skills, competencies and abilities to access, utilize the

available technology and also interact with the instructors and other learners who meet virtually.

Another key observation that has stood out from the above results is that TVET policy is an essential ingredient in determining the preparedness of online distance curriculum implementation in national technical and vocational education institutions, but it is not a moderator. This implies that TVET institutions can develop their own internal policy and guideline regarding online distance curriculum implementation in national technical and vocational education institutions by concentrating availability of information communication technology infrastructure, availability of ICT user training and skills development support, availability of appropriate online distance teaching and learning instructional materials, and availability in financial support from various stakeholders. Doing so cannot be intervened by TVET policy. However, the TVET policy is critical probably in providing broad guidelines but, it does not necessarily determine interplay of the above variables.

Other past studies findings which acknowledge the contributions of TVET policies in implementing curriculum for online teaching and learning were presented in support, Ngwacho (2021) Kiplangat (2021) and Karani and Waiganjo (2022) explained that TVET policies were key in influencing allocation of funds for infrastructural and technological development and for conducting trainers professional enrichment. Therefore, policies are critical in providing adequate guidance with respect to TVET preparedness to implement curriculum for teaching and learning among institutions in Kenya. The role of TVET policy in implementing online curriculums for teaching and learning was not featured in the adopted theories. The Equivalency theory may be improved to incorporate the contribution



of policies and frameworks in influencing infrastructure, competency development, and fund allocation in preparedness to implement curriculum for online teaching and learning among TVETs in Kenya.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter captures the entire study by providing summary on the findings derived from chapter four, conclusions and giving recommendations. The study was set out to to examine the preparedness of online distance curriculum implementation in national technical and vocational education institutions in Kenya. This purpose was achieved through investigating aspects of online distance learning that included: ICT infrastructure, ICT user training, appropriate online distance materials, financial support and curriculum implementation. The study further investigated the moderating role of TVET policy regarding curriculum implementation of online teaching and learning. The study utilized constructivist theory and theory of equivalency in explaining the phenomenon. It utilized concurrent triangulation research design of mixed methods approach. Data were collected from 203 respondents comprising of 3 principals, 3 HODs, 33 trainers, and 164 trainees. Data were gathered by means of questionnaires for trainers and trainees and interview schedules for HODs and principals. Descriptive statistics and inferential analysis were employed on quantitative data while thematic analysis was applied on qualitative data.

#### **5.2 Summary of Findings**

The findings were summarized based on the main constructs of the study. Firstly, a summary was provided on the response rate, indicating the percentage of participants who completed the study. Next, the reliability of the data for the main variables which is

followed by background information of the respondents which entailed their demographic details and other relevant characteristics. Finally, a summary was presented based on the variables investigated in the study, highlighting the key findings and outcomes related to each variable.

### **5.2.1 Summary on Response Rates**

The study involved three national TVETs where a total of 164 students (79% response rate) responded to the questionnaires. For the trainers attached to this department, the study received responses from 33, 88.6% response rate.

### **5.2.2 Summary on Background Information of Respondents**

Concerning principals and HODs, there was a fair representation; out of the three principals, two were female and one was a male. There were two male HODs and one female HOD. On aspect of the highest education qualification, the study noted 44 (64.7%) principals had undergraduate degree, and that majority, 45(66.2%) had worked in the current station between 1 and 5 years. Regarding working experience, one HoD indicated to have been in that position between 1 and 3 years. Two principals and one HOD said that had between 7 and 10 years of work experience in the current position, while one principal and one HOD had more than 10 years' experience. The experience of principals and HODs was regarded adequate in providing reliable information on all constructs of the study.

The female trainers were more than male counterparts, that is, 20(60.6%) and 13(39.4%) respectively. The trainers were well educated. Most trainers, 13(39.4%) had undergraduate bachelor's degree, 8(24.2) master's degree, 7(21.2%) diploma; 3(9.1.3%) national diploma, while 2 (6.1%) had doctorate degree. The results indicated most trainers 13(39.4%) had

worked between 6 and 10 years; 10(30.3%) had from 16 years and above. It is also clear that 6(18.2%) had less than 5 years of teaching, while 4(12.1%) between 11 and 15 years. On trainees, there was a higher representation of female students as compared to males. The female students were almost two third, 105 (64%), while the male students were 59 (36%). The study noted that most students 149(90.9%) were aged between 19-24, 7(7.9%) between 25-30 and 2(1.2%) 18 and below

### **5.2.3 Curriculum Implementation through Online Distance Teaching and Learning in National TVET Institutions**

Curriculum implementation through online distance teaching and learning in national TVET institutions is the centre of discussion in this study considering it was the dependent variable. The study noted seven factors that were deemed key at the preparatory stage. These factors included adequate ICT infrastructure, availability of ICT user training, teaching materials, financial support and TVET policy. However, curriculum implementation through online distance teaching and learning in national TVET institutions was facing several challenges which were attributed to limited access to hardware and software, lack of enough capacity building for trainers and lack of sufficient support and supervision.

### **5.2.4 Availability of ICT Infrastructure**

The first objective was set out to determine the availability of information communication technology infrastructure in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya. The study's findings noted that many TVETs institutions had established presence of adequate computers, laptops, and digital learning materials. In addition the institutions are connected to the national

electric power grid, and hence a reliable power supply. However, the availability of a digital library, fast internet, Wi-Fi, and video and audio-conferencing facilities were wanting in many institutions. Improving connectivity, infrastructure support, and maintenance were necessary to facilitate effective online teaching and learning practices. Suggestions for improvement highlighted the importance of government support, training programs, policy implementation, and provision of resources to enhance the ICT infrastructure in National TVET institutions. By considering the perspectives of all stakeholders and implementing comprehensive strategies, these institutions can overcome the challenges and strengthen their ICT infrastructure in National TVET institutions.

#### **5.2.5 Availability of ICT User Training and Skills Development**

This was the second objective which aimed to examine the availability of ICT user training and skills development support in readiness to implement curriculum through online distance teaching and learning in National TVET institutions in Kenya. The results of the study indicate that trainees had received training on operating ICT equipment, utilizing learning materials on the LMS, and got ICT technical support; while, trainers said they had received training on uploading and downloading learning materials on the LMS, and preparing content /modules for online distance learning. Nevertheless, there was a need for improvement in areas such as training on how to use ICT equipment, accessing learning materials on the learning management system (LMS), and conducting practical sessions online considering a substantial respondents were indicated moderate response. The results indicate noticeable gaps in ICT user training and skills development support. Financial constraints and limited budgets for staff professional development in digital technology may pose obstacles. It is important to focus on policy implementation, infrastructure

improvement, and collaboration among stakeholders to address these challenges. The study emphasizes the importance of continuous training, support, and effective change management strategies for enhancing ICT skills development in National TVET institutions.

#### **5.2.6 Availability of Appropriate Online Distance Teaching and Learning Instructional Materials**

The third objective aimed to assess the availability of suitable online distance teaching and learning instructional materials in preparation for the implementation of curriculum through online distance teaching and learning in National TVET institutions in Kenya. The study's findings indicated that participants held a generally positive perception of the online distance teaching and learning instructional materials within the institution, although their rating was moderately favorable

This indicated moderate level of preparation. The professionally developed and written online learning materials were noted, along with the availability of practical manuals and guides. The prompt sharing of assignments and distribution of trainee manuals online were also appreciated. While respondents reported moderately adequate reference materials in the library, there was a room for improvement in terms of accessibility of online resources outside the institution. Overall, the findings highlight the institution's efforts to provide meaningful online learning experiences, while also suggesting areas for further enhancement.

### **5.2.7 Availability of Financial Support from Stakeholders**

The fourth objective was about assessing the availability of financial support from various stake holders in readiness to implement online distance curriculum in National TVET institutions in Kenya. The outcomes of this study revealed that institutions had provided assistance in obtaining smartphones or laptops; free wifi hotspots and internet bundles are available; loans and financial scholarships are offered. However, there is a lack of allocation of internal budgets for digital learners, and in providing subsidized data bundles. There are also no clear provisions for seeking external funds. Suggestions were made to address these gaps, including the need for dedicated financial resources, capacity building, partnerships, and industry internships to effectively implement online distance teaching and learning in TVET institutions.

### **5.2.8 TVET Policy**

The study further determined the extent to which TVET policy moderate the preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya. The results noted that the lack of consensus among participants suggests a potential gap in policy development and implementation. The absence of a key master plan for online digital learning and the inconsistent adherence to the global environmental practices point to potential areas where policies may be lacking or not effectively implemented. It is possible that there were variations in policy implementation across different national TVET institutions or regions, resulting in inconsistencies and disparities in curriculum development.

### **5.2.9 Overall Summary**

The aim of the study was to investigate the level of preparedness for implementing online distance curriculum in national TVET institutions in Kenya. Additionally, it examined the moderating effect of TVET policy on the implementation of curriculum in online teaching and learning within these institutions. The results of multiple linear regression analysis indicate that all four aspects of curriculum implementation, namely the availability of ICT infrastructure, ICT user training, appropriate online learning materials, and financial support, as well as TVET policy, significantly influence the implementation of curriculum in online distance teaching and learning in national technical and vocational education institutions in Kenya (P value is less than 0.05).

However, when considering the regression weights table, it is evident that while all four predictor variables collectively have a significant impact in a combined model, the most influential factors are the availability of ICT user training and skills development support, the availability of appropriate online distance teaching and learning materials, and the availability of financial support from various stakeholders (P value is less than 0.05). Furthermore, the study found that TVET policy does play a moderating role in the relationship between the preparatory variables and the implementation of curriculum in online teaching and learning (R-square change = .012; and P-value = .332) which is greater than 0.05, it is insignificant.

### **5.3 Conclusions**

Preparedness to implement curriculum in online distance teaching and learning is crucial in every TVET institution. It requires a concerted effort of all stakeholders. The study highlighted the preparedness of online distance curriculum implementation in national



technical and vocational education institutions in Kenya. The effectiveness of curriculum implementation was characterized by availability of ICT infrastructure, ICT user training, appropriate teaching materials and financial support. Other crucial aspects needed are knowledgeable and skilled actors. It was clear that there was limited access to hardware and software; insufficient capacity building for trainers, and inadequate support and supervision from stakeholders. The conclusion made regarding each objective is stipulated below.

### **5.3.1 Availability of ICT infrastructure**

Regarding the first objective, the study noted that availability of ICT infrastructure was a crucial aspects of preparing to implement online teaching and learning curriculum in national TVETs. The study noted while many TVET institutions in Kenya have made progress in terms of hardware availability and reliable power supply, there is an indispensable need for improving connectivity, infrastructure support, and maintenance. The study noted that government support, training programs, policy implementation, and provision of resources are crucial factors in enhancing the ICT infrastructure in National TVET institutions.

### **5.3.2 Availability of ICT User Training and Skills Development**

ICT user training was found to be an essential preparatory aspects to effective curriculum implementation of online teaching and learning in national TVETs. The study revealed a need for improvement in ICT user training and skills development in National TVET institutions in Kenya. Financial constraints, limited budgets, and specific training needs pose challenges in this area. Policy implementation, infrastructure improvement,

collaboration among stakeholders, and the provision of continuous training and support are crucial for addressing these challenges and enhancing ICT skills development. Effective change management strategies should also be employed to support the transition to online distance teaching and learning.

### **5.3.3 Availability of Appropriate Online Distance Teaching and Learning Instructional Materials**

Online distance teaching and learning materials was crucial towards implementing online teaching and learning curriculum in national TVETs. The findings highlighted the institution's commitment to providing meaningful online learning experiences while also identifying areas for improvement. The study indicates a moderate preparation of the online distance teaching and learning instructional materials at national TVET institutions. The availability of well-developed materials, practical manuals, prompt sharing of assignments, and distribution of trainee manuals are at moderate level and were appreciated by trainees and trainers. However, there is room for improvement in terms of accessibility to online resources outside the institution.

### **5.3.4 Availability of Financial Support from Stakeholders**

Concerning objective four, financial support from stakeholders was conclusively critical in curriculum implementation of online teaching and learning in national TVETs. Nevertheless, there were low levels of financial support for both trainees and trainers in national TVETs which deprived most TVETs lacked adequate internal budget allocation for digital learners and provision of subsidized data bundles. The financial support provided was only in obtaining devices, Wi-Fi, and internet access. Regardless of low

financial support from all the stakeholders, the variable was weighty preparatory element in curriculum implementation of online teaching and learning in national TVETs in Kenya.

#### **5.3.5 TVET Policy**

TVET policy was found as not having a moderating role on the preparedness and curriculum implementation of online teaching and learning in TVET institutions in Kenya. This was mainly because effective curriculum implementation was dependent on user training, availability of appropriate materials and financial support this was greatly influenced by the stakeholder's management. As such, the study noted that TVET policy is a critical predictor variable in the curriculum implementation of online teaching and learning in TVET institutions in Kenya; but does not moderate the hypothesized relationship.

#### **5.4 Recommendations**

The study deduced some recommendations based on the findings, and further described the implication of the results on theories, policies and practices. The recommendations provided here in this sub-section are organized according to the objective of the study.

##### **5.4.1 Recommendations on Availability of ICT Infrastructure**

Government support plays a crucial role in facilitating the development and enhancement of ICT infrastructure. Thus, the study recommends that government should allocate sufficient funds and resources specifically for ICT infrastructure, for example on hardware, software, and connectivity to support curriculum effective implementation of online teaching and learning in TVET institutions in Kenya.

#### **5.4.2 Recommendations on Availability of ICT User Training and Skills Development**

The need to prioritize and enhance ICT user training for both facilitators and trainees was essential in curriculum implementation of online distance teaching and learning. However, the training acquired was reported to be low. Therefore, the study recommends, TVET institutions to develop comprehensive and on-going training programs whereby they can equip their both trainees and trainers with the necessary skills and competencies to effectively utilize online platforms and digital resources. This will improve the quality of curriculum implementation and ensure a successful transition to online learning.

The study further recommends that TVET institutions to foster collaboration among stakeholders, including government agencies, industry partners, and relevant organizations. By sharing best practices, expertise, and resources, stakeholders can collectively contribute to the development, and delivery of effective training initiatives. Collaboration enables the creation of a supportive ecosystem that addresses the specific training needs of TVET facilitators and students; and the same would ultimately promote the successful integration of ICT with online teaching and learning process.

#### **5.4.3 Recommendations on Appropriate Online Distance Teaching and Learning Instructional Materials**

The importance of appropriate online distance teaching and learning materials in curriculum implementation of online teaching and learning in national TVET institutions noted the need to enhance accessibility to online resources beyond the institution's confines. By establishing partnerships with online libraries, content providers, and open educational resource platforms, TVET institutions can ensure students have access to a

wide range of relevant and up-to-date online learning materials. Furthermore, utilizing learning management systems can enable remote access to resources, hence promoting flexible and inclusive learning.

Moreover, the continuous development of instructional materials is crucial. Thus, the study recommends, regular reviewing and updating of online instructional materials. TVET institutions should further ensure the relevance on online instructional materials by aligning them with the curriculum, and by incorporating the emerging trends and by embracing industry-specific content. Interactive and engaging materials with multimedia elements and real-world applications will enhance student engagement and understanding; hence they should be incorporated. By focusing on these recommendations, TVET institutions can create an accessible and dynamic online learning environment, providing students with valuable learning experiences.

#### **5.4.4 Recommendations on Availability of Financial Support from Stakeholders**

As evidenced in the study, the level of financial support was insufficient considering that internal budgets, specifically for digital learners and subsidized data bundles were not sufficient. This points the need to increase financial support from stakeholders. Adequate financial resources are essential for investing in quality online teaching and learning resources; ensuring equitable access, and improving educational outcomes. The study further recommends that TVET institutions should engage in advocacy efforts to raise awareness about the importance of financial support for online learning. Collaborating with industry partners, educational associations, and government departments, and institutions can emphasize the positive impact of investing in digital learning resources, and play a role

in encouraging stakeholders to allocate more resources. Engaging alumni networks can be an effective way to secure financial support for educational initiatives too. TVET institutions have been advised to establish alumni fundraising campaigns, create scholarship programs, or seek alumni contributions to support the implementation of online distance curriculum though this would require the initiatives of the Principal and the board of management.

#### **5.4.5 Recommendations on Curriculum Implementation through Online Distance Teaching and Learning in National TVET Institutions**

The results indicates the need to enforce good policies, adequate funding and supervisions in TVET institutions which would enhance effective curriculum implementation. Strengthening support and supervision mechanisms is crucial. Therefore, TVET institutions should establish support teams to address technical issues, assign mentors or instructional coaches to guide trainers, and conduct regular supervision and feedback sessions. In providing comprehensive support and supervision, the national TVET institutions should enhance trainers' capacity, improve the quality of online teaching, and address challenges that arise during the implementation process.

#### **5.4.6 Recommendations on TVET Policy**

TVET policy is a critical predictor construct in the curriculum implementation of online teaching and learning in TVET institutions in Kenya. Developing comprehensive and consistent policies is crucial. Therefore, TVET institutions and TVETA and other relevant educational authorities from the Ministry of Education should establish clear guidelines and standards specifically addressing online distance curriculum implementation. These

policies should cover aspects such as ICT infrastructure availability, ICT user training, instructional materials, and financial support. By creating well-defined policies, institutions can ensure a standardized approach to curriculum implementation; hence, fostering a supportive environment for online teaching and learning.

Lastly, TVET institutions should ensure regular policy reviews, evaluation, and feedback mechanisms are established to ensure effective implementation and adherence. By closely monitoring policy implementation, institutions can identify areas for improvement, address disparities, and promote consistency in curriculum development and delivery. Robust policy implementation and monitoring mechanisms will help ensure that policies are effectively put into practice, leading to improved outcomes in curriculum implementation of online teaching and learning in TVET institutions.

### **5.5 Implications of the Findings on Theories, Practices and Policies**

The findings of the study concluded that the preparedness of an institution had positive and substantial influence on curriculum implementation of online teaching and learning in TVET institutions in Kenya. These findings support the argument drawn from constructivist theory and the theory of equivalency that provides a theoretical foundation for understanding and guiding preparation approaches. The constructivist theory emphasizes active learning, knowledge construction, and learner-centred environments, while the equivalency theory focuses on the idea that distance education should produce equivalent outcomes to traditional education. These theories support the use of online learning tools and technologies to facilitate interactive and meaningful learning experiences. The findings from the studies reviewed in chapter two are also in line with the

findings reported in this study; where, both support the argument that the preparedness of an institution influence online curriculum implementation in TVET institutions in Kenya.

Based on these findings, there are implications for policies and practices related to the curriculum implementation of online distance teaching and learning in TVET institutions. TVET institutions and TVETA, KICD and Ministry of Education should establish clear guidelines and standards specifically addressing online distance curriculum implementation. These policies should cover aspects such as the availability of ICT infrastructure, training for users, access to instructional materials, and financial support. Such comprehensive policies, enable the authorities to ensure that national TVET institutions embrace a standardized approach to curriculum implementation, and fathom a supportive environment for online teaching and learning.

Regular policy reviews, evaluation, and feedback mechanisms are also suggested to ensure effective implementation and adherence to the policies. This implies the need for national TVET institutions to monitor and evaluate the implementation of policies, identify areas for improvement, address disparities, and promote consistency in curriculum development and delivery.

## **5.6 Recommendations for further Studies**

Considering the findings which have underscored the prevalence of deficiencies in curriculum implementation and also the preparedness of TVET institutions, the study suggest the following recommendations for further studies:



The study observed that ICT user training and skills development played a significant role in the implementation of online distance teaching and learning curriculum. However, the specific drawback for ICT user training was financial constraints and limited budgets. Hence, a future study could delve into the specific financial aspects, such as the allocation of funds, budgeting processes, and financial management strategies within national TVET institutions. Such future research could provide insights into the financial barriers that hinder effective ICT training and identify potential solutions.

The study highlighted the importance of support and supervision in enhancing curriculum implementation. Future research could explore the specific support and supervision mechanisms that should be employed in national TVET institutions during the implementation of online distance teaching and learning. The study could assess the effectiveness of these mechanisms in addressing technical issues, providing guidance to trainers, and ensuring quality teaching practices. Additionally, the research could investigate the best practices in establishing and sustaining support teams, mentorship programs, and come up with supervision frameworks or models.

The study emphasized the need to enhance curriculum implementation of online teaching and learning in TVET institutions in Kenya through various strategies. A future study could assess the long-term impact of these interventions on the overall quality of education in national TVET institutions. This research could investigate outcomes such as improved student performance, increased employability of graduates, and the relevance of the curriculum to industry needs. By examining the long-term effects, policymakers and educators can identify successful approaches and make informed decisions regarding the

allocation of resources, and the design of future online curriculum implementation initiatives.

This study noted variations in policy implementation across different national TVET institutions or regions, resulting in inconsistencies and disparities in curriculum development. This highlights the need for further research and a more comprehensive investigation to assess the specific policies in place and their effectiveness in promoting TVET integration in curriculum implementation of online teaching and learning in TVET institutions in Kenya.

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## **APPENDICES**

### **Appendix I: Consent Form**

**KENYA METHODIST UNIVERSITY  
SCHOOL OF EDUCATION AND SOCIAL SCIENCES**

**P.O BOX 267-60200**

**MERU**

#### **PARTICIPANT INFORMATION AND CONSENT DOCUMENT**

Dear Respondent,

Thank you for your willingness to participate in this research. If for any reason, at any time, you wish to drop out of the research, you may do so without having to give an explanation. The research aims at getting information that will be used by relevant stakeholders in making decisions on enhancing online teaching and learning in national technical and vocational education and training institutions in Kenya. The Information obtained through this research is purely for academic purposes only and will be used as such.

The information you provide shall be treated with utmost confidentiality and shall not be used for any other purposes other than for this study's purposes. Under no circumstances will your name appear in this research.

If you have any questions about this research, you are free to contact

(Flora Ngera: Flora.mutwiri@kemu.ac.ke. Cellphone number +254 720735009)

Supervisor, Department of Education and Social Sciences. Kenya Methodist University

Thank you for your time and cooperation

Rose Mbuthu Munene

[Rose.munene@kemu.ac.ke](mailto:Rose.munene@kemu.ac.ke)

I agree to participate in this research. Signature-----date-----

## Appendix II: Questionnaire for ODeL Trainees from Department of Applied

### Sciences

The purpose of this questionnaire is to find out the level of preparedness in curriculum implementation through online distance teaching and learning in National TVET institutions in Kenya. Please answer all the questions to the best of your knowledge. The information which you will provide will be treated with utmost confidentiality and will only be used for the purpose of this study and not any other purpose.

Do not write your name or any other details in this questionnaire that may reveal your identity.

### **SECTION A: Background Information**

Please tick (✓) where appropriate to provide the needed information on the spaces provided.

1. Name of your Institution.....
2. Age:  
Below 18 years [ ]    19-24 years [ ]    25-30 years [ ]    31-40 years [ ]  
Above 41 [ ]
3. Gender: Male [ ] Female [ ]

### **SECTION B Available ICT hardware Infrastructure for online and learning in the institution (Hardware and software)**

4. Please indicate your level of agreement or disagreement to the following statements regarding the availability of ICT online learning Infrastructure for online learning in your institution.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on availability of ICT learning Infrastructure for online learning	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	This institution has adequate computers for all trainees	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	All trainees have computers / laptops at their disposal all the time	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

c)	All trainees have computers that are well maintained	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	Digital learning laboratories are adequate for all trainees	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	This institution has a backup power supply in case there is power outage (generator or solar or both)	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	This institution is connected to the electricity grid	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	Internet, wifi hotspot is available all the time	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
h)	Institution has relevant online digital programs for trainees	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
i)	Video and audio conferencing facilities are available	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

5. What is the name given to the learning management system that is in use at your institution

[ 1 ] Moodle

[ 1 ] Canvas

[ 1 ] Blackboard

[ 1 ] Our institution does not have a learning management system

[ 1 ] Any other, kindly specify\_\_\_\_\_

6. What ICT infrastructure do you use for learning practical lessons in your department apart from Internet, wifi hotspot?

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7. What are the major challenges facing the ICT Infrastructure for supporting online learning at your institution?

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## SECTION C: ONLINE TRAINEE'S SKILLS DEVELOPMENT AND SUPPORT SERVICES

8. Please indicate your level of agreement or disagreement to the following statements regarding skills development support services.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on skills development support services	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	Trainees are trained to operate ICT equipment	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	Trainees are provided with ICT technical support all the time	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	Trainees are trained on how to use ICT equipment regularly	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	I can access and utilize learning materials on the LMS	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	Trainees have regular refresher courses on open and distance learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	I get individualized training on open and distance learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

9. Suggest what should be done to improve on trainees' skills development programs to embrace online learning at your institution?

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**SECTION D: AVAILABILITY OF APPROPRIATE ONLINE DISTANCE  
LEARNING INSTRUCTIONAL MATERIALS (LEARNING RESOURCES)**

Please indicate your level of agreement or disagreement to the following statements regarding availability of digital online teaching materials.

10. Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D)

	Statements on availability of digital online teaching materials	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	This institution has online learning materials that are professionally developed and written	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	Online practical manuals and guides are available for trainees	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	Subject content manuals are available online all the time.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	Assignments are well set out and shared with trainees through the digital platform in good time	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	Attachment/internship trainee manuals are distributed online as required all the time.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	Adequate digital reference materials are available in the library	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	I am able to access online e-resources when outside the institution	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

## SECTION E. PROVISION OF FINANCIAL SUPPORT SERVICES

11. Please indicate your level of agreement or disagreement to the following statements regarding financial support services.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on financial support services	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	Learners are assisted to acquire smartphones or laptops by the institution	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	The institution offers free wifi hotspots and internet bundles to learners	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	This institution has an internal budgetary allocations to support digital learners	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	Students get loans to support their studies from HELB or counties for buying laptops and other ICT infrastructure required.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	There are subsidized data bundles for all learners	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	Students get other financial scholarships via our institution	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

## SECTION F: TVET POLICY & CURRICULUM IMPLEMENTATION

12. Please indicate your level of agreement or disagreement to the following statements regarding the implementation of each of these policies in your institution.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on implementation of policies in the institution	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	My institution has a policy to enhance online digital learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

b)	TVET policy regarding online digital learning are followed	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	The TVET Act regarding online digital learning are followed	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	Our institution has a master plan on online digital learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	The distance learning and teaching offered at my institution conform to the National guidelines and standards	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	I feel the distance learning and teaching offered at my institution conforms to the global environment practice	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

## SECTION G: CURRICULUM IMPLEMENTATION OF ONLINE DISTANCE TEACHING AND LEARNING

13. Please indicate your level of agreement or disagreement to the following statements regarding curriculum implementation of online distance teaching and learning in your institution.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on curriculum implementation on online distance teaching and learning	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	Our institution has some online distance teaching and learning courses	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	There are established measures for supporting online distance teaching and learning in our institution	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	Research projects for online distance learners are supervised same as face to face students	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

d)	Online distance learners are supervised/evaluated during industrial attachment /internships same as the face to face	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	We have online examinations for online distance learners	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	Our institution has established quality assurance measures which help to monitor the implementation of online distance teaching and learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	Respective curricula have been revised to enable online distance teaching and learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
h)	The available hardware and software have enabled implementation of online distance teaching and learning have	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
i)	Trainees have been re-tooled through capacity building programs to be able to learn online	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

14. Suggest what should be done to improve curriculum implementation for online distance teaching and learning at your institution?

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### Appendix III: Questionnaire for the Trainers

The purpose of this questionnaire is to find out the level of preparedness in curriculum implementation through online distance teaching and learning in National TVET institutions in Kenya.

Please answer all the questions to the best of your knowledge and do note that the information which you will provide shall be treated with utmost confidentiality and will only be used for the purpose of this study and not any other purpose.

Do not write your name or any other details in this questionnaire that may reveal your identity.

#### SECTION A: BACKGROUND INFORMATION

Tick (v) where appropriate to provide the needed information in the spaces provides.

1. Name of your institution-----
2. Age:      Below 30 years [ ],    31-40 [ ],    41-50 [ ],    51-60 [ ].
3. Gender:      Male [ ]      Female [ ]
4. What is your current position at the institution? Fulltime trainer [ ]      Part-Time [ ]
5. Highest academic qualification      [ ] PhD      [ ] Master's degree      [ ] Bachelor's degree  
[ ] Higher National Diploma      [ ] Diploma      [ ] Certificate
6. Length of service in teaching  
Less than 5 years [ ]      6 - 10 years [ ]      11 - 15 years [ ]      16 years and above [ ]
7. Which course do you teach? -----  
-----

## SECTION B: Available ICT Hardware Infrastructure for Distance Teaching and Learning

8. Please indicate your level of agreement or disagreement to the following statements regarding ICT facilities in your institution which are used in online distance teaching and learning.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on ICT Infrastructure	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	The institution is connected to the national electric power grid	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	The institution has adequate Computers/laptops/smartphones For all trainers	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	All trainers have computers that are well maintained	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	Digital learning laboratories are adequate for the number of trainees for online distance learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	Digital Library is available for all	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	Fast internet, Wifi and data bundles internet available	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	Video conferencing and Audio conferencing facilities available	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

9. What is the name given to the learning management system that is in use at your institution

[ 1 ] Moodle

[ 1 ] Canvas

[ 1 ] Blackboard

[ 1 ] Our institution does not have a learning management system

[ 1 ] Any other, kindly specify\_\_\_\_\_

10. What ICT infrastructure do you use for teaching practical lessons in your department apart from Internet, wifi hotspot?

-----  
-----

11. What are the major challenges facing the ICT Infrastructure for supporting online teaching at your institution?

-----  
-----

### SECTION C: Institutional trainer support services (Skills development)

12. Please indicate your level of agreement or disagreement to the following statements regarding skills development programs

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on skills development programs	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	I have regular workshops and seminars on how to deliver online classes.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	I can upload and download learning materials on the LMS	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	I can set, mark and grade examinations online	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	I can teach practical's online	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	I am competent in preparing content /modules for online distance learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	The institution has a budget for staff to advance in their careers in digital technology or in-service.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	The trainers have adequate content and	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

	pedagogy skills training in online teaching.					
h)	Trainees have regular refresher courses	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

13. Suggest what should be done to improve on trainers' skills development programs to support online teaching at your institution?

-----  
-----

#### **SECTION D: AVAILABILITY OF APPROPRIATE ONLINE DISTANCE TEACHING AND LEARNING INSTRUCTIONAL MATERIALS (LEARNING RESOURCES)**

14. Please indicate your level of agreement or disagreement to the following statements regarding availability of digital online teaching materials

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) = 1

	Statements on availability of digital online teaching materials	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	This institution has online learning materials that are professionally developed and written.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	All trainers have computers / laptops at their disposal all the time	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	This institution has a backup power supply in case there is power outage(generator or solar or both)	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	Online practical manuals and guides are available for trainees and trainers	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	Online teaching guides are available to all trainees	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	Subject content manuals are available online all the time.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]



g)	Assignments are well set out and shared with the trainee through the digital platform in good time	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
h)	Attachment trainee manuals are distributed online as required	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
i)	Training modules are available via the portal	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

15. Suggest what should be done to improve on availability of digital online teaching materials to support online teaching at your institution?

-----  
-----

## SECTION E. PROVISION OF FINANCIAL SUPPORT SERVICES

16. Please indicate your level of agreement or disagreement to the following statements regarding financial support services.

Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on financial support services	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	The institution has a distinct budget for digital learning programs	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	This institution has a budget for staff to advance in their careers in digital technology or in-service.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	The institution has a budget for refresher courses in ICT	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	This institution has an internal financial support for digital trainers to purchase internet data or subsidized data bundles	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

e)	The institution solicit funds outside the institution to support online learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
----	--	-------	-------	-------	-------	-------

17. Suggest what should be done on financial support services to improve curriculum implementation for online distance teaching and learning at your institution?

-----  
-----

## SECTION F: TVET POLICY & CURRICULUM IMPLEMENTATION

18. Please indicate your level of agreement or disagreement to the following statements regarding the implementation of each of these policies in your institution.

Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on implementation of policies in the institution	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	The TVET policy framework that help to enhance online digital learning is fully implemented	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	Vision 2030 policy on role of TVET in enhancing online digital learning is fully implemented	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	The TVET Act policy articulate on TVET role in enhancing online digital learning is implemented	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
d)	National master plan policy on TVET online digital learning in the institution is fully followed.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	Sessional paper Number 10 of 2020 policy that supports online digital	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

	learning is implemented in this institution.					
f)	Global environment policy touches on role of TVET enhancing online digital learning and is implemented.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	Society and culture role policy on TVET which is clear on role of enhancing online digital learning is implemented in this institution.	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

19. Suggest what should be done on TVET policy to improve curriculum implementation for online distance teaching and learning at your institution?

-----

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## SECTION G: CURRICULUM IMPLEMENTATION OF ONLINE DISTANCE TEACHING AND LEARNING

20. Please indicate your level of agreement or disagreement to the following statements regarding curriculum implementation of online distance teaching and learning in your institution.

Rating: Strongly Agree (S.A) =5, Agree (A) =4, Neutral (N) =3, Disagree (D) =2 and Strongly Disagree (S.D) =1

	Statements on curriculum implementation on online distance teaching and learning	Strongly Agree (S.A) =5	Agree (A) =4	Neutral (N) =3	Disagree(D) =2	Strongly Disagree (S.D) =1
a)	Our institution has some online distance teaching and learning courses	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
b)	There are established measures for supporting online distance teaching and learning in our institution	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
c)	Research projects for online distance learners	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

	are supervised same as face to face students					
d)	Online distance learners are supervised/evaluated during industrial attachment /internships same as the face to face	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
e)	We have online examinations for online distance learners	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
f)	Our institution has established quality assurance measures which help to monitor the implementation of online distance teaching and learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
g)	Respective curricula have been revised to enable online distance teaching and learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
h)	Policy on curriculum implementation has been revised to support online distance teaching and learning	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
i)	The available hardware and software have enabled implementation of online distance teaching and learning have	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]
j)	Teaching staff have been re-tooled through capacity building programs to be able to teach online distance teaching and learning courses	[ 5 ]	[ 4 ]	[ 3 ]	[ 2 ]	[ 1 ]

21. Suggest what should be done to improve curriculum implementation for online distance teaching and learning at your institution?

---

---

## Appendix IV: Interview Guide for HODs

Gender: Male [ ] Female [ ]

Position in the institution .....

### SECTION A: AVAILABILITY OF ICT INFRASTRUCTURE

1) How many computers are available for the trainers for teaching purposes  
None [ ]      1-5 [ ]      6-10 [ ]      11-15 [ ]      16 and above [ ]

2) Are the computers connected to the internet?  
Yes [ ]      No [ ]

3) How many computer are connected to the internet points in the department.  
None [ ]      1-5 [ ]      6-10 [ ]      1-15 [ ]      16 and above [ ]

4) What other ICT infrastructures are available in your institution for supporting online distance teaching and learning?

-----  
-----

5) Have you integrated use of ICT in online distance learning in the entire applied science programs offered?

.....

Please explain.....  
(Probe on the programs offered through ODL using ICT).

### SECTION B: ONLINE ICT TRAINING AND SKILLS DEVELOPMENT SUPPORT

6) Explain what has been done on each of the following support ICT skills development at your institution

a) ICT / help desk to support trainees?

Explain

-----  
Workshops for preparing online practical manuals

Explain.....

.....

-----  
-----

The training of trainers on exam setting, marking and grading examinations

Explain-----  
-----

b) Other support services given to trainers and trainees  
Explain.....  
.....

7) Provide your personal comments/ opinion on offering of the following courses through online distance teaching and learning.

a) Applied biology.....

b) Certificate In Science Laboratory Technology  
.....

c) Diploma In Analytical Chemistry  
.....

d) Certificate In Beauty Therapy & Hairdressing  
.....  
.....

e) Diploma In Beauty Therapy & Hairdressing  
.....  
-----

f) Diploma In Environmental Science & Technology  
.....

8) In your opinion, do you think the use of Online teaching and learning can produce quality graduates?

Yes [    ]

No [    ]

Explain -----

**SECTION C: AVAILABILITY OF APPROPRIATE ONLINE DISTANCE TEACHING AND LEARNING INSTRUCTIONAL MATERIALS (LEARNING RESOURCES)**

9) Provide your comments on availability of each of the following learning resources.

a) Available of practical manuals through online portal.

.....

b) Available of learners' study guides on the learning portal.

.....

c) Providing online examinations through the online platform.

.....

d) Availability of attachment trainee manuals through online portal.

.....

10) Suggest what should be done to improve on availability of digital online teaching materials to support online teaching at your institution?

-----

**SECTION D: INSTITUTIONAL FINANCIAL SUPPORT SERVICES ON USE OF ONLINE DISTANCE LEARNING**

11) Provide your comments on the financial support that your institution provide towards supporting learning

-----

12) Suggest what should be done on financial support services to improve curriculum implementation for online distance teaching and learning at your institution?

-----

**SECTION E. TVET Policy & Curriculum Implementation**

13) Explain how TVET policy framework affect the implementation of open and distance online learning at your institution

-----

14) Suggest what should be done on TVET policy to improve curriculum implementation for online distance teaching and learning at your institution?

-----



**SECTION F: CURRICULUM IMPLEMENTATION OF ONLINE DISTANCE TEACHING AND LEARNING**

15) Explain the status of preparedness of your department in implementing curriculum of online distance teaching and learning

-----

16) Suggest what should be done to improve curriculum implementation for online distance teaching and learning at your institution?

-----

## Appendix V: Interview Guide for Principals

1. Gender:      Male [   ]      Female [   ]
2. How long have you held your current position as the Head of National TVET (tick)  
1- 3 years      4- 6 years      7 -10 years      more  
than 10 years

### SECTION A: AVAILABILITY OF ICT INFRASTRUCTURE

3. Does your institution offer some courses through online digital learning mode  
Yes [   ]    No [   ]

Explain the status of the same

-----

4. Which learning management system is used in this institution for online teaching and learning?

.....

5. Describe the nature of ICT infrastructure that are available to support online digital learning at your institution

-----

6. What percentage of computers is available for trainers to use in online distance learning?

Below 25% [   ]    26-50% [   ]    51-75% [   ]    over 76% [   ]

7. What percentage of your staff is trained in online distance teaching?

Below 10% [   ]    10-25 % [   ]    26- 50% [   ]    51-75% [   ]    above  
76% [   ]

8. How would you describe the internet speed at your institution?

i) [   ] Extremely fast [150mbps]

ii) [   ] Fast    [100mbps]

iii) [   ] Satisfactory [80mbps]

iv) [   ] Slow    [50mbps]

v) [   ] Extremely slow [below 50mbps]

vi) [   ] Any other, specify, \_\_\_\_\_

9. Have you integrated use of ICT in distance learning in the entire applied science programs offered?

.....  
Please explain.....

(Probe on the programs offered through ODL using ICT).

10. Suggest what should be done to improve ICT infrastructure to support curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya?

-----

## **SECTION B: ONLINE ICT TRAINING AND SKILLS DEVELOPMENT SUPPORT SERVICES**

11. Describe the nature and the kind of ICT technical skills support you provide to trainees to support online distance learning at your institution

-----

12. Describe the nature and the kind of ICT technical skills support you provide to trainers to support the implementation of curriculum of online distance teaching and learning at your institution

-----

Provide your comments regarding capacity building workshops for trainers and trainees at your institution

-----

13. Identify the areas that are covered during the capacity building workshops for trainers and trainees at your institution

-----

14. Suggest what should be done to improve ICT skills development for learners and trainers to support curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya?

-----

**Section C: Institutional support on online distance teaching and learning (materials preparation support).**

15. Explain the status of preparedness of learning resources to support the implementation of curriculum of online distance teaching and learning at your institution

-----

Provide your comments regarding the online availability of the following resources for online learning at your institution

- a. Professionally written learning materials

-----

Online practical manuals

-----

- b. Online videos clips and study guides

-----

Digital Library

-----

16. Describe the nature of support you provide to trainers on content development for online distance courses.

-----

17. Suggest what should be done on online learning resources to support curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya?

-----

#### **SECTION D: INSTITUTIONAL FINANCIAL SUPPORT SERVICES ON USE OF ONLINE DISTANCE LEARNING**

18. Describe how your institution finance the provisioning of digital learning programs?

-----

19. Explain the annual budgetary allocation for online teaching and learning support at your institution

-----

Suggest what should be done regarding financial resources to support curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya?

-----

#### **SECTION E: SECTION E. TVET POLICY & CURRICULUM IMPLEMENTATION**

20. Describe the policy framework that has enabled your institution to provide online distance teaching and learning

-----

21. How does the following policy framework enhance online distance learning in your institution?

- TVET policy framework enhance online distance learning in your institution?

.....

Vision 2030-----

National master plan-----

Session paper 2006-----

Monitoring and evaluation systems. -----

Adequate trainer/trainee guidance policy-----

22. Suggest what should be done TVET policy to support curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya?

-----

### **SECTION G: CURRICULUM IMPLEMENTATION OF ONLINE DISTANCE TEACHING AND LEARNING**

23. Explain the status of preparedness of your institution in implementing curriculum of online distance teaching and learning

-----

24. Suggest what should be done to improve curriculum implementation for online distance teaching and learning at national TVET institutions in Kenya?

-----

## Appendix VI: Document Analysis Guide

Policies on online distance teaching and learning.

To what extent do the following policy documents support integration of online distance teaching and learning in your institution?

-----

Are they implemented?

-----

Explanation will be provided on each of the following documents.

### **National policies on online distance teaching and learning.**

- a) ICT policy (National)-----
- b) ODeL policy (National)-----

### **Institutional policy**

- a) Distance learning instructional content policy
- b) ODeL training manuals and schedules policies
- c) TVET standards and guidelines policy (2022)
- d) Vision 2030

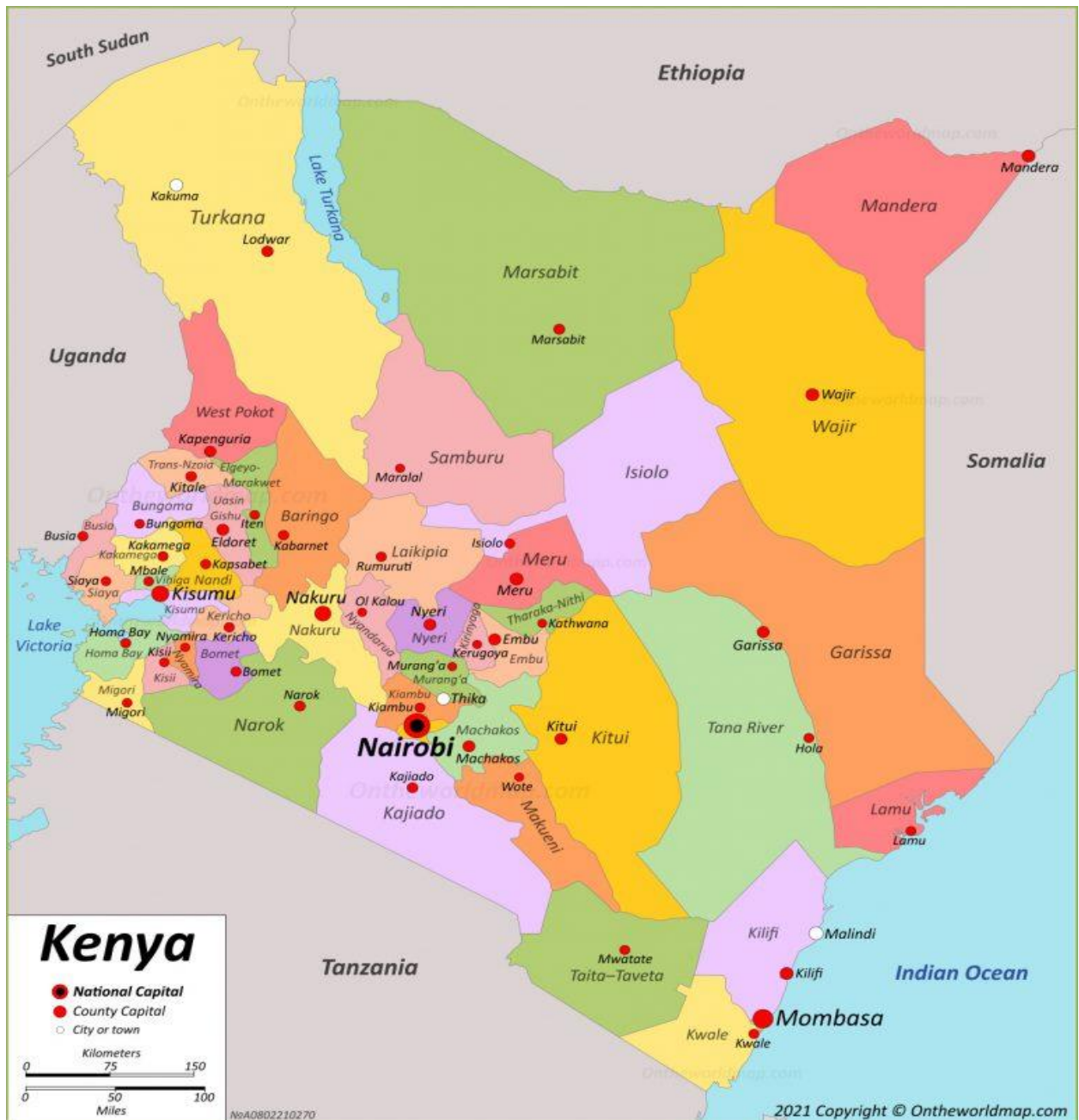
**Appendix VII: National public TVET institutions in Kenya that make the target population**

<b>No.</b>	<b>Name of TVET</b>	<b>County In Kenya</b>	<b>Trainees population</b>	<b>Trainers</b>	<b>Total</b>
1	Kabete	Kiambu	13800	200	14000
2	Meru	Meru	8000	225	8225
3	Kisii	Kisii	3000	180	3180
4	Kisumu	Kisumu	3318	200	3518
5	Nyeri	Nyeri	13500	200	13700
6	Kenya Coast	Mombasa	7500	150	7650
7	Sigalagala	Kakamega	12500	1100	13600
8	Kitale	Kitale	4900	270	5170
9	North eastern	Garissa	650	120	770
10	Eldoret	Uasin Gishu	12800	280	13080
total	10	-	79968	2925	82893

Source: ODeL Coordinators, 2022



## Appendix VIII: A Map of Kenya Showing Location of the Study



Source: Geo Current Map

The Map of Kenya showing 47 Counties. The study was conducted in Kiambu ,Nyeri and

Meru County where The three TVET institutions are located.

## **Appendix IX: Introductory Letter**

Kenya Methodist University

Department of Education

P.O. Box 267 – 60200

Meru.

Phone 0725867602

Dear Participant,

### **RE: LETTER OF INTRODUCTION**

I am a PhD student pursuing Educational Leadership and Management program at Kenya Methodist University. I am conducting a research as a requirement in partial fulfillment of the degree program. The research topic is; ‘Preparedness in curriculum implementation through online and distance teaching and learning in TVET institutions in Kenya’.

I humbly request for your participation in this research by volunteering answers to the questionnaires and taking part in the interviews as requested. Kindly answer all the questions in all the parts of the questionnaire. The information you will give will be treated with utmost confidentiality and used solely for the purpose of this research. Do not write your name or any other details in this questionnaire that may reveal our identity

Your participation in this research will greatly be appreciated.

Thank you in advance.

Yours faithfully,



Rose M. Munene

I agree to participate in this research. signature-----

## **Appendix X: Consent form**

KENYA METHODIST UNIVERSITY

SCHOOL OF EDUCATION AND SOCIAL SCIENCES

P.O BOX 267-60200

MERU

### **PARTICIPANT INFORMATION AND CONSENT DOCUMENT**

Dear Respondent,

Thank you for your willingness to participate in this research. If for any reason, at any time, you wish to drop out of the research, you may do so without having to give an explanation. The research aims at getting information that will be used by relevant stakeholders in making decisions on enhancing online teaching and learning in national technical and vocational education and training institutions in Kenya. The Information obtained through this research is purely for academic purposes only and will be used as such.

The information you provide shall be treated with utmost confidentiality and shall not be used for any other purposes other than for this study's purposes. Under no circumstances will your name appear in this research.

If you have any questions about this research, you are free to contact

(Flora Ngera: Flora.mutwiri@kemu.ac.ke. Cellphone number +254 720735009)

Supervisor, Department of Education and Social Sciences. Kenya Methodist University

Thank you for your time and cooperation

Rose Mbuthu Munene

Rose.munene@kemu.ac.ke

**I agree to participate in this research. Signature-----date-----**

## Appendix XI: Ethical Clearance Letter



### KENYA METHODIST UNIVERSITY

P. O. BOX 267 MERU - 60200, KENYA  
TEL: 254-064-30301/31229/30367/31171

FAX: 254-64-30162  
EMAIL: [INFO@KEMU.AC.KE](mailto:INFO@KEMU.AC.KE)

February 1, 2023

KeMU/ISERC/EDU/02/2023

ROSE MBUTHU MUNENE  
EDU-4-0382-1/2020

Dear Rose,

**SUBJECT: PREPAREDNESS IN CURRICULUM IMPLEMENTATION THROUGH ONLINE DISTANCE TEACHING AND LEARNING IN NATIONAL AND VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN KENYA**

This is to inform you that Kenya Methodist University Scientific Ethics and Review Committee has reviewed and approved your research proposal. Your application approval number is KeMU/ISERC/EDU/02/2023. The approval period is 1<sup>st</sup> February, 2023 – 1<sup>st</sup> February 2024

This approval is subject to compliance with the following requirements:-

- I. Only approved documents including (Informed consents, study instruments, MTA) will be used.
- II. All changes including (amendments, deviations, and violations) are submitted for review and approval by Kenya Methodist University Scientific Ethics and Review committee.
- III. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KeMU SERC within 72 hours of notification.
- IV. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KeMU SERC within 72 hours.

- V. Clearance for export of biological specimens must be obtained from relevant institutions.
- VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU SERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.







## THE NYERI NATIONAL POLYTECHNIC

P.O. BOX 465-10100 – NYERI, KENYA  
ALONG MUMBI ROAD  
TELEPHONE: +254724477942 FAX: +254 061-2032852  
E-mail: [info@thenyeripoly.ac.ke](mailto:info@thenyeripoly.ac.ke) Website: [www.thenyeripoly.ac.ke](http://www.thenyeripoly.ac.ke)



THE NYERI NATIONAL  
POLYTECHNIC

9<sup>th</sup> January, 2023

The HOD  
Applied Sciences

**ROSE MBUTHU MUNENE – ADM NO. EDU-4-0382-1/2020**

The person named above is a student at the Kenya Methodist University undertaking a PHD programme at the said institution. She intends to collect data for educational purposes. The research is based on “**Preparedness of Curriculum Implementation through Online Distance Learning in National Technical Institutions in Kenya**” from the month of January to February at the Applied Sciences Department and therefore, you are requested to accord her the assistance she deserves.

We wish her all the best.

Yours sincerely

Ann Mwangi  
Chief Principal

cc. Rose Mbuthu Munene



## THE MERU NATIONAL POLYTECHNIC

P.O. BOX 111-60200, MERU  
Tel: 0769 369 680 | 0768 096 667 | 0741 053 260  
Email: merunationalpolytechnic@gmail.com | merunationalpolytechnic@yahoo.com  
info@merunationalpolytechnic.ac.ke  
Website: [www.merunationalpolytechnic.ac.ke](http://www.merunationalpolytechnic.ac.ke)



THE MERU NATIONAL  
POLYTECHNIC  
Bridging the knowledge gap

4<sup>th</sup> January, 2023

### TO WHOM IT MAY CONCERN

Rose Mbuthu Muncio of Kenya Methodist University ADM NO: EDU-4-0382-1/2020 has been allowed to collect data for research purposes from January to February, 2023 from the Department of Applied Sciences in The Meru National Polytechnic.

Kindly give the researcher all the support to carry out the exercise successfully.

Thank you.

Yours faithfully

For

Mutembei Kigige

Chief Principal



KENYA  
VISION 2030



KNEC ACCREDITED



Please quote our reference number when replying.

## Appendix XII: Introduction Letter



### KENYA METHODIST UNIVERSITY

P. O. Box 267 Meru - 60200, Kenya  
Tel: 254-064-30301/31229/30367/31171

Fax: 254-64-30162  
Email: [deanrd@kemu.ac.ke](mailto:deanrd@kemu.ac.ke)

#### DIRECTORATE OF POSTGRADUATE STUDIES

December 13, 2022  
Commission Secretary,  
National Commission for Science, Technology and Innovation  
P.O. BOX 30623-00100  
**NAIROBI**  
Dear Sir/Madam

**RE: ROSE MBUTHU MUNENE – (REG. NO. EDU-4-0382-1/2020)**

This is to confirm that the above named is a bona fide student of Kenya Methodist University, in the School of Education and Social Sciences, Department of Education undertaking a Doctors' Degree in Education, Leadership and Education Management . She is conducting research on: "Preparedness In Curriculum Implementation Through Online Distance Teaching And Learning In National Technical And Vocational Education and Training Institutions In Kenya."

We confirm that her research proposal has been presented and approved by the University.

In this regard, we are requesting your office to issue a research license to enable her collect data

Any assistance accorded to her will be appreciated.





Thank you.

  
Dr. John Muchiri (PhD)  
Director, Postgraduate Studies

Cc: Dean SESS  
CoD, Education  
Postgraduate Co-ordinator-SESS  
Student Supervisors



## Appendix XIII: NACOSTI Research License

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<p>Ref No: 835199</p>	<p>Date of Issue: 21/February/2023</p>
<p align="center"><b>RESEARCH LICENSE</b></p>	
	
<p><b>This is to Certify that Ms. Rose Muthu Muthu of Kenya Methodist University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu, Meru on the topic: PREPAREDNESS IN CURRICULUM IMPLEMENTATION THROUGH ONLINE DISTANCE TEACHING AND LEARNING IN NATIONAL TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN KENYA for the period ending:</b></p>	
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