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Exploring Trainers Readiness for Asynchronous Learning in Technical and Vocational Education and Training (TVET) institutions, Kenya.

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Abstract: The COVID-19 pandemic significantly disrupted traditional face-to-face learning, compelling Technical and Vocational Education and Training (TVET) institutions globally to adapt swiftly. In Kenya, TVET institutions initially turned to synchronous online learning platforms like Zoom and Google Meet to ensure educational continuity. However, the synchronous model exposed notable limitations, especially in practical skills training, prompting a further shift to asynchronous learning which offers greater flexibility, autonomy and access. Despite these benefits, the shift to asynchronous learning faced challenges, including inadequate digital infrastructure and limited trainer readiness. This study examined the readiness of trainers in Kenyan TVET institutions to effectively deliver asynchronous learning. A mixed-methods research design was utilized, combining quantitative and qualitative approaches to gather data from trainers, principals, and institutional observations. The findings revealed that while digital infrastructure and tools for asynchronous delivery were available, they were often insufficient. Additionally, many trainers lack the necessary competencies for effective asynchronous delivery. The study concludes that although the transition to asynchronous learning is promising, significant investments in digital infrastructure and continuous professional development for trainers are crucial to ensure the effectiveness and quality of education in Kenyan TVET institutions. The study recommends that to effectively implement online delivery, trainers need enhanced training programs focusing on advanced digital skills and innovative online teaching methods, equitable distribution of digital resources, and continuous support through training, peer mentoring, and robust feedback mechanisms.

Key Terms - Asynchronous delivery methods, Covid-19, Digital skills, National TVET institutions, Trainers' readiness, Pedagogy

1. INTRODUCTION

The COVID-19 pandemic brought about an unprecedented disruption to traditional face-to-face learning across the globe, forcing educational institutions to adapt quickly. TVET (Technical and Vocational Education and Training) institutions, which rely heavily on hands-on, practical instruction, faced unique challenges during this transition. Initially, TVET institutions globally shifted towards synchronous (real-time) online learning to maintain continuity in education. Platforms like Zoom, Microsoft Teams, and Google Meet were widely adopted, allowing instructors to deliver lectures and facilitate discussions in live online sessions (UNESCO, 2021). Trainers also used various digital modes, such as WhatsApp and emails, to share learning resources with trainees. However, the synchronous learning model quickly revealed its limitations, particularly for TVET programs that focus on practical skills training. The challenge of replicating hands-on components in a live, online format became evident, and additional issues such as time zone differences, unstable internet connections, and the need for flexible learning schedules emerged (ILO, 2022). As a result, many institutions began exploring asynchronous learning models, which allowed students to access course materials, complete assignments, and engage in discussions at their own pace, place, and time.

The move toward asynchronous learning offered greater flexibility, particularly for students facing challenges such as poor internet connectivity, limited access to devices, or conflicting responsibilities (World Bank, 2021). TVET institutions began investing in digital simulations, virtual labs, and online resource libraries to facilitate practical lessons asynchronously. While these tools helped mitigate some of the challenges, they also highlighted disparities in digital literacy and access to technology, particularly in developing countries (ILO, 2022).

In Africa, the initial transition to synchronous learning was fraught with difficulties due to the continent's digital divide. While some institutions in more urbanized and better-connected regions managed to adopt synchronous learning methods, many others struggled with unreliable internet access, high data costs, and a limited availability of digital devices (Awuor, 2021). These challenges were particularly pronounced in rural areas, where the infrastructure for online learning was often lacking. In response, some TVET institutions resorted to alternative methods such as radio and television broadcasts to deliver educational content in real-time (UNESCO-UNEVOC, 2021). However, these methods had limited effectiveness for practical skills training, which is essential for TVET education.

As the pandemic persisted, African TVET institutions gradually shifted towards asynchronous learning. This approach offered greater flexibility, allowing students to access learning materials at their convenience and mitigating challenges related to poor

internet connectivity and high data costs (African Union, 2022). However, this transition required significant investments in digital infrastructure and capacity building, which many institutions lacked. Consequently, disparities in learning outcomes between students in urban and rural areas became more pronounced (Awuor, 2021).

In Sub-Saharan Africa, the transition to synchronous learning was uneven. For example, South Africa, which had relatively better ICT infrastructure, managed a quicker transition to synchronous classes by leveraging platforms like Microsoft Teams and Zoom to continue delivering lectures real-time (Department of Higher Education and Training, South Africa, 2021). However, in many other parts of the region, particularly in rural areas, the transition to synchronous learning faced significant challenges. Frequent disruptions due to power outages, poor internet connectivity, and high data costs made synchronous learning difficult to sustain (World Bank, 2021). As a result, many TVET institutions in Sub-Saharan Africa eventually shifted towards asynchronous learning models. This transition allowed students to download learning materials during off-peak hours when data costs were lower and to engage with course content at their own pace (Kariuki & Mwangi, 2021).

In East Africa, the transition to synchronous learning in TVET institutions was marked by similar challenges. In Kenya, for instance, there was a rapid adoption of synchronous learning methods, supported by partnerships between the government and telecom companies that provided subsidized data bundles to students (Ministry of Education, Kenya, 2021). Institutions like the Kenya School of TVET (KSTVET) utilized platforms such as Google Classroom and Zoom to ensure that learning continued. However, as the limitations of synchronous learning became apparent, many TVET institutions in East Africa shifted to asynchronous learning. This shift was driven by the need to provide flexible learning options that could accommodate students with varying levels of access to technology and the internet connectivity (Odhiambo, 2022).

In Kenya, TVET institutions such as KSTVET and Rift Valley Institute of Science and Technology (RVIST) also responded to the closure of learning institutions due to covid 19 by adopting synchronous mode of delivery. With time, they also transitioned to asynchronous methods by developing and distributing digital learning materials, including recorded lectures, e-books, and interactive simulations, which students could access at their own time. These efforts were supported by government initiatives aimed at enhancing online learning by making learning more accessible and flexible (Ministry of Education, Kenya, 2021). While these measures helped to sustain education during the pandemic, the transition also highlighted the need to invest in trainers' pedagogical competencies for asynchronous mode of delivery. The lack of trainer readiness impeded effective asynchronous delivery which in turn compromises the quality of training and ultimately, the quality of Education.

1.1 Statement of The Problem

Despite the rapid adoption of online learning during the COVID-19 pandemic, the initial reliance on synchronous learning revealed significant limitations. These included restricted trainee autonomy and flexibility, which hindered effective training. Consequently, many TVET institutions transitioned to asynchronous learning. However, this shift was further complicated by the lack of readiness among TVET trainers to deliver this new approach, ultimately affecting the quality of education. Additionally, there is limited information on the readiness of trainers in Kenyan TVET institutions to implement asynchronous learning effectively. This study addresses this critical gap by examining the readiness of trainers and the availability of digital infrastructure and tools for asynchronous training delivery in selected TVET institutions in Kenya.

1.2 Study Objectives

This study aims to explore the following objectives:

1.To identify the types of digital infrastructure and tools available for asynchronous learning in TVET institutions in Kenyan.

2. To explore trainer readiness for asynchronous learning in TVET Institutions in Kenyan

1.3 Study Justification.

Assessing the readiness of trainers and the availability of digital infrastructure for asynchronous learning in Kenyan TVET institutions is significant, given the shift from synchronous learning models that occurred during the COVID-19 pandemic. Asynchronous learning offers greater flexibility and inclusivity but requires trainers to have new digital competencies and institutions to have robust digital tools and infrastructure. However, there is limited information on how prepared trainers are for this mode of delivery and whether the necessary digital resources are in place. Understanding these factors is crucial for enhancing the quality of TVET education, bridging the digital divide, promoting equitable access, and informing targeted capacity-building and policy interventions to support effective asynchronous learning in TVET institutions in Kenya.

3.RESEARCH METHODOLOGY

3.1 Research Design

The study used a mixed-Methods research design which combined both quantitative and qualitative research methodologies to provide a comprehensive understanding of the research problem. This design allowed for the collection of both descriptive and qualitative information, which represent well-rounded views from respondents. Hennink, Hutter, and Bailey (2020), posit that qualitative research draws conclusions on the data collected through interpretation of that data, and connecting various data established from respondent narratives to establish emerging themes. The study sought to assess the transition from traditional, classroom-based learning to asynchronous learning in Technical and Vocational Education and Training (TVET) institutions in Kenya with a focus on trainer readiness for asynchronous learning in TVET institutions in Kenya. The quantitative Component was used to measure the level of readiness among trainers and to identify types of digital infrastructure and tools available for asynchronous learning in TVET

3.2 Population and Sample

The population for this study was drawn from 5 TVET institutions that had implemented online learning. It comprised 530 respondents (478 trainers, 47 Heads of ODeL departments and 5 Principles of sampled institutions) Yamane simplified formula was used to calculate the study sample of 265 (218 trainers, 42 Heads of ODeL departments and 5 Principles).

3.3 Data and Sources of Data

For this study, secondary data was collected through document analysis of reports from journals, research findings, other academic publications and websites. Data on trainer readiness was collected through questionnaires while addition data was

collected from principals of the sampled institutions through face-to-face interviews in order to corroborate data collected using other tools. Further data was collected through observation of types of digital infrastructure and tools available in the sampled institutions for asynchronous delivery. observation method was used to allow for collection of real time, naturally occurring data providing insights that other methods may miss, as well as triangulate data from self-reports which may sometimes be exaggerated.

3.4 Theoretical framework

The dependent variable of this study in the effective delivery of asynchronous learning while the independent variables are trainer readiness and availability of digital infrastructure and tools required. The effectiveness of asynchronous learning in Kenyan TVET institutions is influenced by the readiness of trainers and the availability of digital infrastructure. Trainers need to possess adequate digital competencies to effectively deliver content using asynchronous format, and institutions must have sufficient digital tools and infrastructure in place. Thus, the independent variables directly influence the quality and success of asynchronous learning.

3.5 Statistical tools and econometric models

This section elaborates the proper statistical/econometric/financial models which are being used to forward the study from data towards inferences. The detail of methodology is given as follows.

3.5.1 Descriptive Statistics

Quantitative data was edited and completed by checking for consistency. The data was then analyzed using Excel programs as well as IBM SPSS Version 26 for Windows and Excel programs Descriptive statistics was used to find the percentages and the frequencies of the data of all the variables of the study. This was then presented in form of tables. pie charts and graphs.

3.5.2 Qualitative data

To analyze the qualitative data on trainer readiness, the researcher transcribed, categorized, and organized data collected from interviewers, identifying emerging themes and theories before presenting it in form of narratives. Below are some of the respondents' statements that were quoted verbatim:

4. RESULTS AND DISCUSSION

4.1 Types of Digital infrastructure and tools to support asynchronous learning in TVET institutions in Kenya

The study sought to explore the Readiness of the trainers in the sampled TVET institutions for asynchronous learning in TVET institutions in Kenya.

Objective 1.

The first objective of the study was to identify the types of digital infrastructure and tools available for asynchronous learning in TVET Institutions in Kenyan. The researcher used Interviews and Questionnaires to collect data from respondents on digital infrastructure and tools available and used for synchronous delivery in sampled TVET institutions. Majority of the respondents (61%) disagreed that the available digital infrastructure and tools in sampled TVET institutions in Kenya are adequate for asynchronous delivery. However, (29%) of respondents agreed that there is at least a substantial number of digital infrastructure and tools available for use for synchronous delivery.

On the other hand, (10%) of respondents were not sure about the types of digital infrastructure and tools available for use for synchronous delivery.

Table 1.

The Table represents the data from respondents on the types of digital tools and infrastructure and tools used for synchronous delivery in sampled TVET institutions in Kenya.

Respondents	Frequency	Percentage
Disagreed	155	61%
Agreed	75	29%
Not sure	25	10%
Total	**255**	**100**

Objective 1.

Figure 1 and 2 represent the data from respondents on the types of digital tools and infrastructure and tools used for asynchronous training delivery in sampled TVET institutions in Kenya

Figure 1.

Adequacy of digital infrastructure and tools in selected TVET institutions:

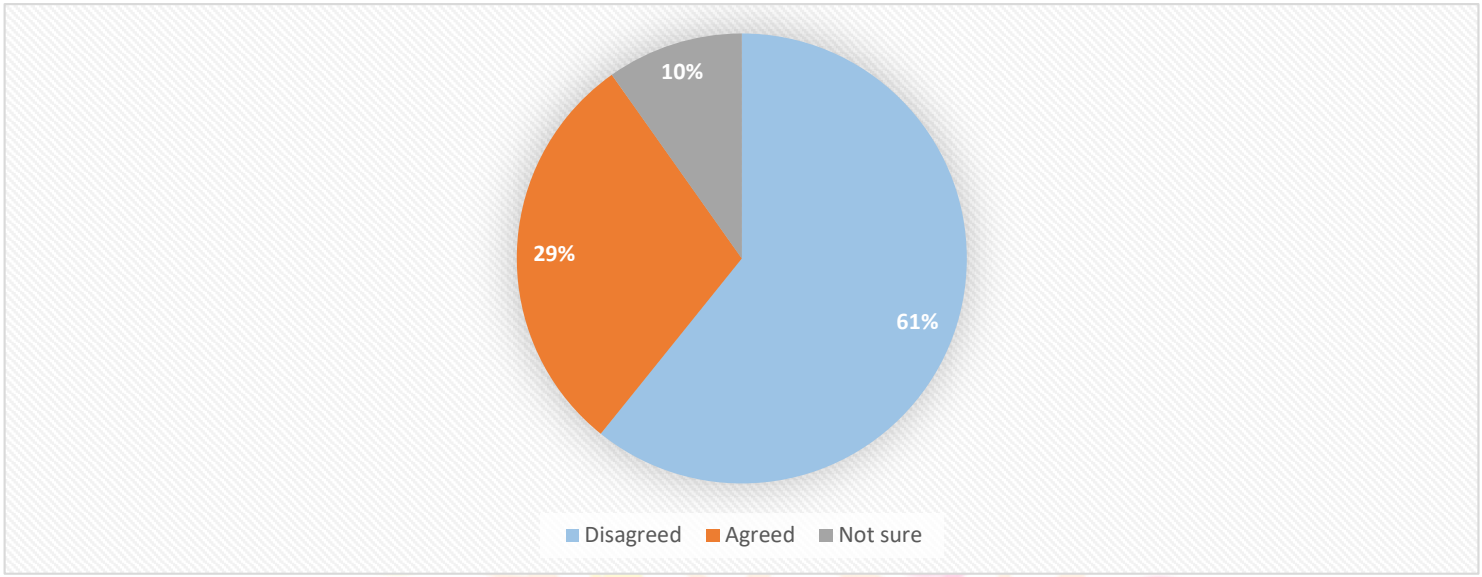
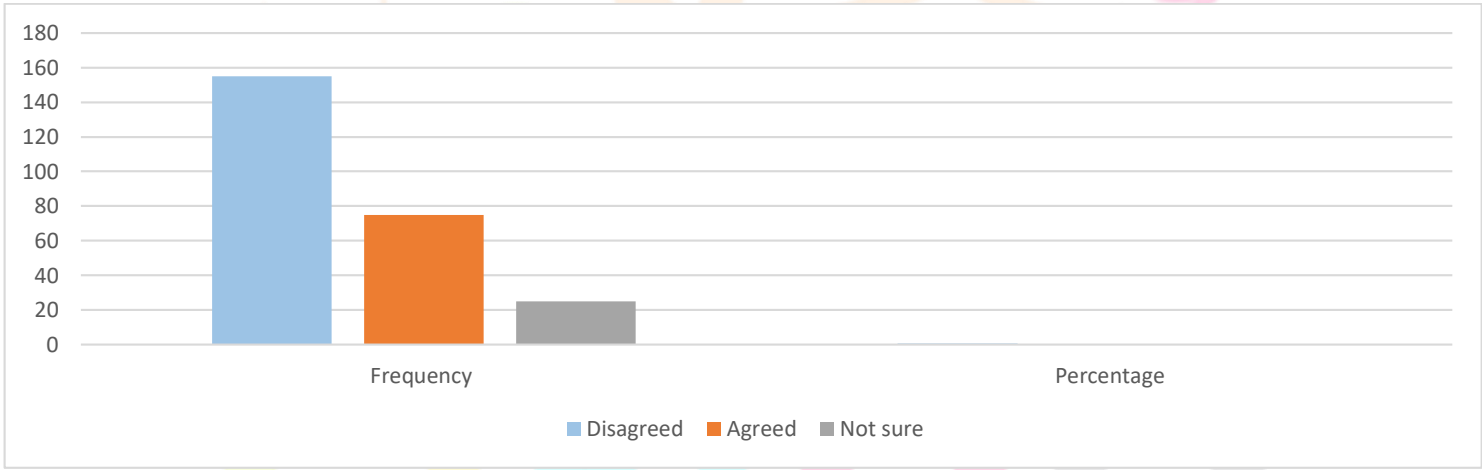


Figure 2

Adequacy of digital infrastructure and tools in selected TVET institutions:



Further information was obtained using observations within the institutions to ascertain the types of digital infrastructure and tools available for use for asynchronous delivery in sampled TVET institutions. Data collected through observations was also used to triangulate the data obtained from other data collection tools. The following data was collected from the sampled institutions using the observation schedule.

Table 2. Represents types of digital infrastructure available in sampled TVET institutions in Kenya.

Type of infrastructure	**Available infrastructure**
Digital infrastructure	1. Internet Connectivity 2. Learning Management Systems (LMS) 3. Computer Labs and ICT Facilities 4. Smart Classrooms 5. Digital Content and Resources 6. Digital Learning Materials 7. ICT Support Services 9. Mobile Learning Solutions 10.Remote Teaching Platforms, web conferencing platforms or video conferencing platforms.

Data obtained from the observation schedule indicated that that the sampled TVET institutions had basic digital infrastructure that enabled them to implement asynchronous delivery in the institutions, as they continue to adapt to the demands of modern methods of training. However, despite these developments, majority of the institutions reported to suffer from unreliable internet

connectivity, inadequate ICT infrastructure, and inadequate trainer capacity in digital literacy and online pedagogies which are critical asynchronous mode of delivery.

Table 3. Represents types of digital tools available in sampled TVET institutions in Kenya.

Type of Tools	Available Tools
Digital tools	1. Desktop Computers and Laptops 2. Tablets and Smartphones 3. Interactive Whiteboards and Smartboards 4. Projectors 5. Cameras 6. Webcams and Microphones 7. Headsets and Speakers 8. Servers and Network Devices 9. Digital Cameras and Camcorders 10. Interactive Tablets for Trainers

The information collected through the observation schedule concurred with the information collected through questionnaires and the interview schedules, confirming that there was a substantial number of digital tools available in sampled TVET institutions. These devices are instrumental in the implementation of synchronous learning, allowing for more interactive and engaging learning experience. However, despite the availability of these devices, more than 50% of the respondents admitted that they still experienced challenges as most of the digital devices were either substandard or obsolete. Further, there were challenges related to poor maintenance and inadequate or lack of capacity of trainers on the use of the devices.

4.2 Objective 2:

The second objective of the study was to establish the level of readiness among TVET trainers to deliver asynchronous methods in sampled TVET institutions in Kenya.

To ensure effective asynchronous delivery, it is essential to adopt appropriate active learning pedagogies tailored for online environments. The researcher collected data from trainers through interviews and questionnaires to assess their readiness to implement asynchronous training methods. Sampled respondents interviewed had mixed reactions on their level of readiness for delivery of asynchronous mode. The findings revealed that a majority (67%) of the trainers lacked the necessary competencies for effective asynchronous delivery, largely due to insufficient prior training on these methods. However, 25% of the respondents felt they were adequately prepared for this new mode of delivery, while 8% remained undecided about their level of Readiness. Data obtained is presented in the table below:

Table 4 representing data on the readiness of trainers for asynchronous delivery methods in sampled TVET institutions in Kenya.

Level of readiness	Frequency	Percentage
NO	145	56%
YES	70	27%
NOT SURE	40	17%
Total	**255**	**100**

Figure 3 and 4 represent the data from respondents on the readiness of TVET trainers for asynchronous training delivery in sampled TVET institutions in Kenya.

Figure 3

Trainer readiness

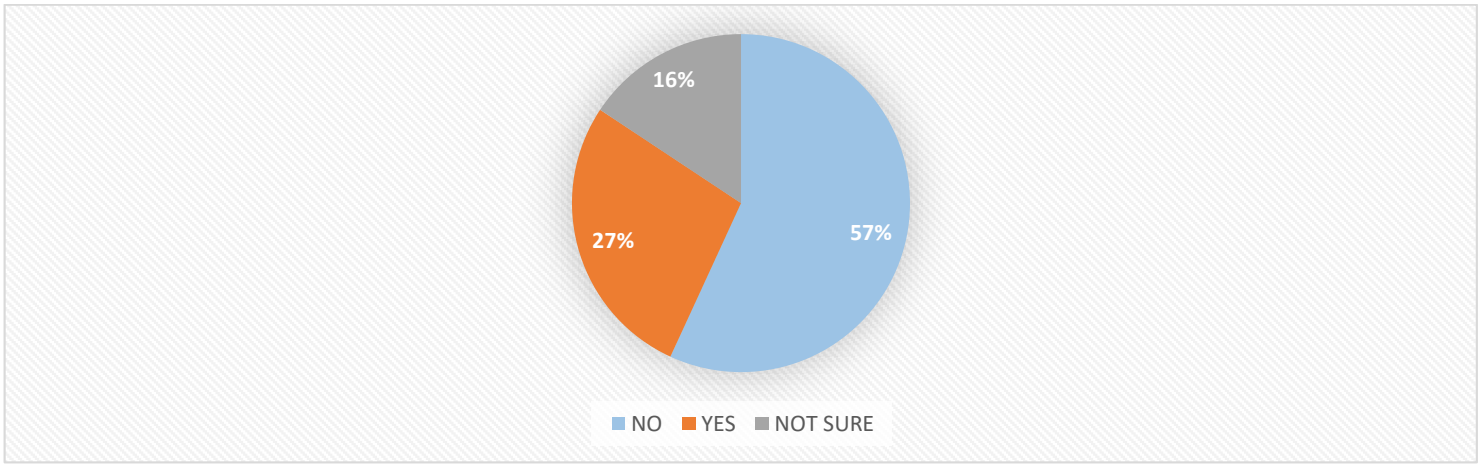
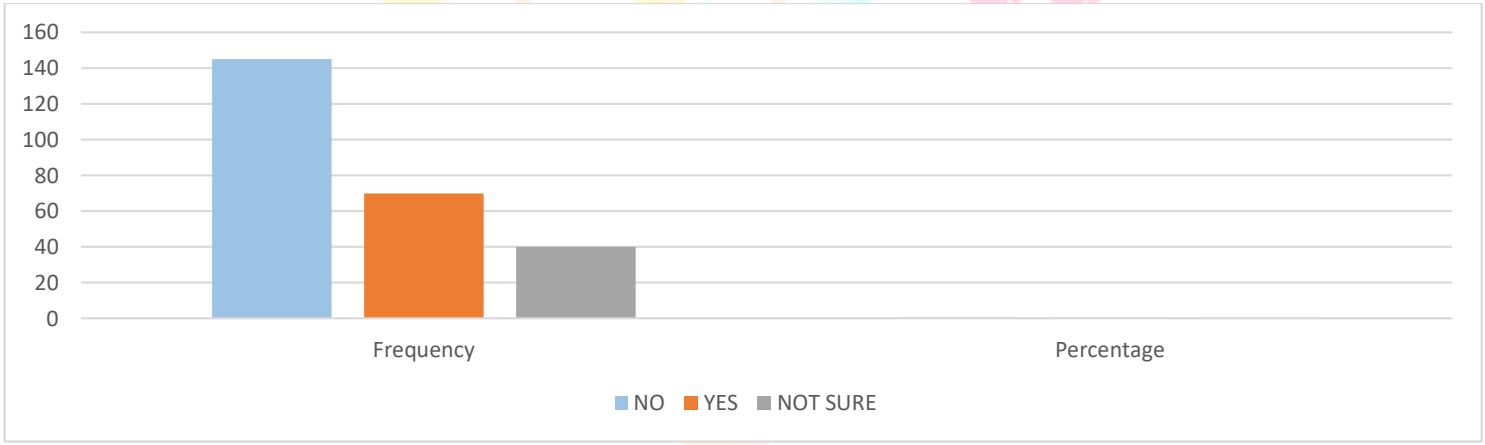


Figure 4
Trainer readiness



3.4.2 Qualitative data

Qualitative data on trainer readiness was transcribed, categorized, and organized into emerging themes and theories before presenting it in form of narratives as follows:

Respondent 1 said, "Currently, I am scheduled to handle a class synchronously though sometimes I feel inadequate as my competencies are limited. Although we were inducted prior to commencement, it is not enough. A lot of the times I call the technician to assist me before I can address the trainees needs".

Respondent 2 shared, "Despite trying my level best, it's not easy. Developing interactive online content is incredibly time-consuming and tedious, and it was particularly challenging because I lacked many of the necessary skills and the time given was too short." The interviewee however emphasized the importance of all trainers being equipped with these essential skills.

Respondent 3, however gave the following positive response " "Although it's my first time teaching an asynchronous class, I feel incredibly excited and liberated, especially since I don't have to come to school every day. I've been using YouTube tutorials for areas where I need help, but overall, I feel comfortable managing the class." He also noted that instead of complaining, trainers should take the initiative to upskill themselves in asynchronous teaching methods to deliver their lessons effectively.

Respondent 4 said "Respondent 4 further commented, "I wasn't asked if I wanted to teach an asynchronous class. I'm not even sure what is expected of me, but I have to teach, so I'm doing my best. As for my readiness, I don't know what to say. This is further compounded by lack of basic Digital tools that are critical in asynchronous training delivery"

Respondent 5. "I'm lucky because I studied computer science in college, which makes it easier for me to understand and teach an asynchronous class. In fact, my colleagues often rely on my support to deliver their lessons. I really prefer this mode of training because it allows me to showcase my skills and offers me a lot of flexibility since I can teach from anywhere and at any time."

Findings from Principals interview on trainer readiness for asynchronous training delivery:

Principals responded to the level of trainer's Readiness by noting that generally, trainers had shown a commendable level of enthusiasm and adaptability towards asynchronous training delivery. They noted that a good number of the trainers had embraced online delivery and were eager to integrate it into their teaching methods.

In addition, they also acknowledged that while a significant number of trainers possessed basic digital skills, there was a noticeable gap in the much-needed advanced digital competencies required for effective asynchronous teaching, necessitating continuous professional development in this area. They agreed that availability of digital resources and infrastructure varied across institutions, with some trainers having access to the necessary tools and platforms, while others faced challenges accessing these resources.
The principals further noted with appreciation that trainers were gradually shifting from traditional teaching methods to the more innovative, student-centered approaches. However, they concurred that there was still need for more training on designing and delivering engaging asynchronous content.
They also agreed that for effective delivery of asynchronous delivery, support from the administration was critical in facilitating this transition. This could be in form of regular training workshops, encouraging peer support groups, as well as access to online resources.
From these responses, it's evident that the Readiness of sampled trainers for asynchronous methods varied. Some trainers are well-prepared, while others are somewhat prepared but optimistic that with more practice, they can improve their skills in delivering asynchronous training. They all agreed that it was necessary for all trainers to possess digital skills and adapt to online pedagogies that are crucial for effective online learning. However, there are also those who lack enthusiasm and find online delivery overwhelming due to the significant effort required, particularly in designing quality interactive online programs.
Additionally, some trainers expressed that with more support and resources, they would be in a better position to manage the transition to asynchronous training delivery. They emphasized the need for continuous professional development as well as peer, technical and management support in order to enhance their confidence and effectiveness in delivering asynchronous training.
For those who felt inadequate, they cited the lack of necessary resources as a significant hindrance to the effective implementation of online learning. This aligns with findings by GOK (2020), which highlighted those limited resources for infrastructure development, faculty training, and course development impede the full realization of online learning potential in TVET institutions.
Additionally, some sampled trainers reported experiencing challenges such as LMS downtime, unstable internet connectivity, and inadequate digital skills, making self-paced online delivery challenging.
These challenges underscore the need for increased investment in digital infrastructure and comprehensive training programs to equip trainers with the skills required for effective online teaching. Addressing these issues could significantly enhance the quality and accessibility of online education, ensuring that all trainers are better prepared and more confident in delivering asynchronous lessons.

CONCLUSION:

The readiness of trainers for asynchronous training in TVET institutions is promising but requires ongoing efforts to address the existing gaps. With the right support and resources, trainers can effectively transition to and excel in asynchronous teaching.
Recommendations:
The following are the recommendations for the study:
Judging from the trainers' state of readiness, there is need for enhanced Training Programs for trainers of online delivery for effective implementation. This can be in form of training targeting advanced digital skills and innovative teaching methodologies.
It is also recommended that institutions should ensure equitable distribution of digital resources and infrastructure to be used for asynchronous delivery.
In addition, continuous support through workshops, peer mentoring, and access to online resources has to be maintained and robust feedback mechanisms be continuously assessed and trainers needs addressed.

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