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CHALLENGES FACING ONLINE TEACHING AND LEARNING IN AFRICAN HIGHER EDUCATION INSTITUTIONS: EMPIRICAL REVIEW

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Abstract:
Increasing demand for higher education coupled with globalization has led to the adoption of online teaching and learning to cope with the growing number of students. Even though online teaching and learning have advantages, some challenges bedevil its smooth implementation. The purpose of this article was to present a literature review of the challenges that higher education institutions in Africa face concerning online teaching and learning. The method that was employed in the review was the scoping review method. Empirical studies from 25 African countries published between 2000 and 2023 were assembled and reviewed. In all, 65 studies were reviewed in terms of three themes namely: 1) level of readiness/preparedness for online teaching and learning 2) access and participation in online teaching and learning, and 3) effectiveness of online teaching and learning. The results suggest that most of the challenges confronting online teaching and learning in African higher education institutions include inadequate

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preparation/readiness to adopt an online mode of teaching and learning. Issues of lack of readiness include inadequate ICT infrastructure, low levels of ICT literacy among students and teachers, weak pedagogical skills of teachers, and weak institutional policy framework to drive online teaching and learning. The results further revealed that access and participation of students in online teaching and learning in most parts of Africa are poor due to poor internet connectivity, lack of electricity, lack of access devices such as laptops and smartphones as well as higher cost of data. The review additionally revealed issues of effectiveness such as limited collaboration and interaction among participants in the e-teaching and learning, inability to engage in practical work such as laboratory practical and some mathematical computations. Other issues discovered include poor pedagogical skills of teachers. These challenges must be addressed to enable African higher education institutions catch up with the rest of the world in the adoption and utilization of ICT in teaching and learning.

Keywords: online teaching, higher education, challenges, ICT

1. Introduction

Advancement in digital technology has revolutionised teaching and learning in educational institutions. Studies conducted in Ghana by Akomea, Kuupille, and Asenso (2020) revealed that students who used digital tools performed noticeably better than those who did not, demonstrating the effectiveness of these platforms in facilitating learning. In other African nations like Kenya (Kibuku, Ochieng & Wausi, 2020; Quiros & De Villers, 2016), South Africa (Maphalala & Adejun, 2021), and Nigeria (Ajadi, Salawu & Adeoye, 2008), educators are increasingly using digital tools to improve their teaching methods. Online learning platforms are likely to see an even greater uptake in the years to come given the rapid expansion of technology and internet access across the continent. The success of online teaching and learning however depends on team effort. It also entails the deployment of sufficient resources, including dependable internet connectivity, digital devices, and access to pertinent platforms and software (Kibuku et al., 2020). In order to ensure that both teachers and students have the skills necessary to participate in online learning effectively, training and capacity building are also essential. Additionally, regular evaluation and monitoring of the online learning process can help pinpoint areas that require improvement and guarantee that the learning objectives are met. Further, the importance of collaboration among all stakeholders in ensuring a holistic approach to digital education in African Higher Education Institutions cannot be overstated (Kibuku et al., 2020).

Despite the prospects of online teaching and learning in Africa Higher Education Institutions, there appear to be some challenges impeding its smooth rollout. Available research evidence (Kibuku et al., 2020) indicates that online teaching and learning in African higher education institutions encounter a variety of difficulties that leave many stakeholders disappointed when they don't live up to expectations. Wright, Dhanarajan,

and Reju (2020) revealed that the majority of e-learning programs in developing nations either completely or partially fail, failing to fulfil their purposes. Kibuku et al. (2020) found that 85.6% of e-tutors reported feeling unmotivated to carry out their online learning duties, while 90.8% of e-learners expressed dissatisfaction with how online learning was delivered. These restrictions appear to have contributed to the sluggish adoption of e-teaching and learning in African higher education institutions (Nyerere, 2016).

This study aimed to identify the major issues impeding the successful adoption of online teaching and learning in African higher education institutions. What is the current situation (challenges) of online teaching and learning in the context of African higher education? How can Africa turn the current situation (challenges) into prospects? By analyzing the current situation, this study seeks to inform debate on how best African higher education institutions can take advantage of globalization and the 21st-century information technologies revolution to efficiently implement online teaching and learning. Most importantly, the study seeks to inform stakeholders and decision-makers of what situation (challenges) exists within educational institutions as they relate to the implementation of online teaching and learning.

1.1 Purpose of the Study

The purpose of this study was to examine the current challenges facing the implementation of online teaching and learning in African higher education institutions.

1.2 Research Questions

1) What challenges do higher education institutions in Africa face concerning their readiness/preparedness to implement online teaching and learning?
2) What is the accessibility and participatory challenge facing online teaching and learning in African higher education institutions?
3) How effective is online teaching and learning in Africa higher education institutions?

2. Literature Review

2.1 Theoretical Framework

The study is based on the Technology Acceptance Model (Davis, Bagozzi & Warshaw, 1989). According to the Technology Acceptance Model (TAM), perceived utility and perceived ease of use are the two criteria that influence whether a technological system will be adopted by its potential users. This model's emphasis on the perceptions of the potential user is its defining characteristic. That is to say, even while a technological product's inventor may think the product is practical and user-friendly, its potential consumers won't accept it until they have similar opinions (Rossmann, 2021). This model implies that online teaching and learning adoption and utilization in African higher

education institutions is dependent on its potential benefits as well as how easier it is to adopt it.

Whereas the benefits of digital teaching and learning in higher education institutions are well documented (Asomah, Agyei & Assamah, 2022; Asomah et al., 2022; Sarpong, et al., 2022; Agormedah et al., 2022; Akomea et al., 2022; Addae et al., 2021; Bayene, Mekonnen & Mamo, 2022, Agolodom, Mbaba, Okpaleke, Okenkwu, Alazigha & Orevaoghene, 2023), the degree of easiness to adopt such a technology in Africa higher education context is not well investigated. The ease with which online teaching and learning can be adopted seems to be influenced by external factors such as the readiness of stakeholders to adopt it, the extent of access and participation of teachers and learners as well as the effectiveness and efficiency of online teaching and learning. Electronic learning, like any other technology, thrives on long-term sustainability and the intention of users to utilize it continuously (Shang, 2019; Rahmat, 2013; Terzis, Economides, 2013). Continuous Use Intention is a vital measure of user loyalty and is critical to the development and use of electronic platforms (Bhattacherjee, 2001). A better knowledge of the elements and challenges that influence the adoption and utilization of digital teaching and learning within the African higher education context is required. Thus, this study seeks to unearth the challenges that confront African higher education institutions bid to adopt and use the e-teaching and learning mode.

3. Material and Methods

The research approach used in this study was the qualitative research approach (i.e. content analysis of documents through literature review). This approach enabled the researcher to thoroughly scrutinize past related literature and documents relevant to the topic which is not possible in quantitative research. Consequently, the scoping review method was used to collect the data. The adoption was made to have a wide-ranging and thorough strategy for examining the literature that swiftly connects the major variables and key phrases driving the review to the important sources of the literature. To identify the key themes or structures resonating throughout the body of literature available, the review used content analysis to compare and integrate data from prior research (Kibuku et al., 2020). According to Stepanyan, Littlejohn, and Margaryan (2013), the scoping review helps analyze trends in a contemporary field such as online teaching and learning where ideas are still developing. The review was guided by research questions in line with the recommendations of Arksey and O'Malley (2005) who contend that researchers need to identify and formulate research questions, identify relevant studies in line with the purpose of study, study selection, data collection, summary and synthesis of results and consultation. The research questions on page 4 guided the search.

The researcher reviewed empirical studies related to online teaching and learning in African higher education institutions. Two electronic databases – Educational Resources Information Center (ERIC) and Google Scholar – were searched with the keywords presented in Table 1 combined with the Boolean operator, "AND". The search

was undertaken between the 30th of January, 2023, and the 25th of March 2023 to identify research that was conducted on online teaching and learning in higher education institutions. The duration defined for the search was January 2000 to February 2023. The first search (ERIC) yielded 77 articles, and the second (Google) showed 98 articles. The intention was not necessarily to lamp the findings together but rather to establish a trend concerning the challenges of online teaching and learning in African higher education institutions.

The ERIC articles were reviewed, with special emphasis paid to the relevance of the topics, methodology, and conclusions; this approach decreased the number of articles to 47. After going through all of the publications, 5 were judged to be irrelevant: some dealt with online teaching generally but did delve into higher education context, while others evaluated available infrastructure to support online teaching in universities. Furthermore, 2 items could not be found. As a result, the number of ERIC articles that were eligible has decreased to 40. Applying the same procedure for 98 articles obtained from Google Scholar. Only 25 articles were found to be relevant and meet the criteria after duplicate articles were removed from those obtained from ERIC.

3.2 Inclusion and Exclusion Criteria

The criteria that were used in selecting the articles included;

1) The study must have been about online teaching and learning;
2) The study focus must have been higher education institution context;
3) The study setting must have been Africa;
4) The period of the study must have been between 2000 and 2023;
5) The study's participants had to be students, teachers, administrators, or other school staff.

A total of 65 research articles were identified to be relevant and were further evaluated for content analysis. The review followed the steps of the scoping review approach as stipulated by Arksey and O'Malley (2005) and summarised the results of every step as shown in Table 1.

Table 1: The scoping review process

Activity	**Outcome**
1. Identify research questions	1. What challenges do higher education institutions in Africa face concerning their readiness/preparedness to implement online teaching and learning? 2. What are the accessibility and participatory challenges facing online teaching and learning in African higher education institutions? 3. Do African higher education institutions face challenges concerning the effectiveness of online teaching and learning?
2. Find relevant terms by identifying key phrases and using them.	The key terms that were used for the primary search materials are as follows: 1. Online teaching and learning threats and opportunities

	2. Online teaching and learning limitations and successes 3. Online teaching and learning advantages and disadvantages 4. Weaknesses of online teaching and learning 5. Online learning challenges in African higher education 6. Access and participatory challenges of online learning 7. Online teaching and learning effectiveness. Depending on the outcome of the initial search, a secondary search was conducted, with the following findings: 1. Online teaching and learning challenges in African higher education 2. Access and participation in Online teaching and learning in African higher education 3. African higher education institutions' Readiness for online teaching and Learning 4. Effectiveness and efficiency issues of online teaching and learning in African higher education institutions. 5. Infrastructure issues facing higher education online teaching and learning.
3. Select the related studies	1. 98 research papers were obtained from google scholar 2. 77 research papers were obtained from ERIC.
4. Screening	After screening the following number of research works were found relevant: 1. 25 relevant research papers from google scholar 2. 40 relevant research papers from ERIC.
5. Extracting the major themes and constructs	The major themes that were running through the available literature include: 1. Issues of preparation and readiness for e-teaching and learning 2. Issues of access and participation in e-teaching and learning. 3. Issues of effectiveness and efficiency in e-teaching and learning.
6. Integrate summarise and report findings	To create the narrative report that is given in this paper, the study summarized and incorporated the findings from step five.

4. Results and Discussion

This section of the research presents and discusses the results that emanated from the review process. The results alongside the discussion are presented according to the research questions that were set to guide the study.

4.1 Challenges Concerning African Higher Education Institutions' Online Teaching and Learning Preparedness

Higher education institutions' preparedness for online teaching and learning may be categorized into four. They include the digital readiness of the institutions, the digital competence and readiness of instructors, the digital readiness of learners, and the

existence of institutional policy guidelines. In this study, institutional preparedness is determined by the availability of computers, ICT rooms, smartphones, internet access, and other tools and gadgets including learning management platforms and software systems. Knowledge of pedagogy, ICT literacy, access to computers and cellphones, and the degree of support and encouragement provided by university administration all play a role in teachers' readiness. The level of students' preparation is determined by their ICT skills, their access to computers and cellphones at home and school, their possession of devices, and several other factors. Thus, the first research question sought to determine whether university authorities, students, and lecturers were ready to engage in online teaching and learning.

4.1.1 E-readiness of Institutions

Concerning the digital or e-readiness of the institutions, the findings revealed that ICT infrastructure, tools and equipment were inadequate to promote online teaching and learning in most higher education institutions in Ghana (Asomah, Agyei & Assamah, 2022; Otoo-Arthur 2021; Sarpong, et al., 2022; Agormedah et al., 2022; Akomea et al., 2022; Adarkwah, 2020; Addae et al., 2021), Egypt (Hafez & El-din, 2019), in Ethiopia (Bayene, Mekonnen & Mamo, 2022), Nigeria, (Agolodom, Mbaba, Okpaleke, Okenkwu, Alazigha & Orevaoghene, 2023), Kenya (Anberbir, 2015; Makokha & Mutisya, 2016) South Africa (Maphalala & Adigun, 2021) Tanzania (Innocent & Masue, 2020) and Zimbabwe (Chireme & Kaseke, 2021). Inadequate provision of these ICT infrastructure, tools, and equipment means that African higher education institutions are ill-prepared to fully embrace online teaching and learning. This challenge has significant implications for effective e-teaching and learning. For instance, the challenge forces lecturers to use the conventional face-to-face teaching style (Du Plessis and Webb 2012; Spelman and Marongwe 2018; Youssef and Mohammed 2016). Also, it encourages lecturer-centered teaching strategies, which hinder students' ability to think independently, be creative, and flourish. It is also not good for the production of high-caliber academic work and challenging for the lecturer to be fully engaged in research and community participation. Additionally, it limits access and participation, particularly in online teaching and learning. Furthermore, inadequate ICTs at an institution of learning hinder the progression from traditional methods of learning to online learning. Based on the negative implications of the infrastructure deficits, African higher education institutions need to double efforts in ensuring that these gaps are filled up, especially in this 21st century where online teaching and learning is taking center stage.

4.1.2 Digital Competence of and Students

Another issue related to the readiness of African higher education institutions to embrace online teaching has to do with the digital competencies of teachers and students. The researcher specifically sought to find out whether lecturers and students had enough ICT literacy skills, tools, and equipment to engage in online teaching and learning. The

findings revealed that in most higher education institutions in Africa, students and teachers were ill-prepared to embrace online teaching and learning.

In a study to investigate uptake, barriers, and determinants of e-learning among university students in selected low-income countries in Sub-Saharan Africa amidst the COVID-19 disruption. Simeon, Babatunde, Abiodun, Olu, and Emem (2022) found that students lacked adequate training and orientation on the use of online tools for learning. Again, Manu and Owusu-Ansah (2020) undertook a study to investigate ICT literacy among first-year students in some public universities in West Africa. Data about participants' gender, age, ownership of pen drives, ownership of smartphones, time spent on the phone, and interest in using computers were acquired using a self-designed online questionnaire. The authors reported among other things that:

> "*The findings revealed an overall mean rating of less than 4.0, which is interpreted as respondents' competence in ICT applications. However, on a closer examination of the findings, participants' expressed inability to manipulate essential physical computer components gives credence to difficulties they experience with these applications*." (p. 13)

In Ghana, studies by Agormedah, Henaku, Ayite and Ansah (2020) and Akomea, Pantah, Kuupille and Asenso (2022) found a lack of formal orientation and training for both teachers and students. In South Africa, Maphalala & Adigun (2021) identified inadequate technological assistance and training for e-teaching and learning as a major challenge facing education students and teachers. In Tanzania, Innocent & Masue (2020) identified inadequate ICT skills among students and teachers as a limitation to a full rollout of online teaching and learning while Muchemula (2021) found that students in Zimbabwe were unprepared for online learning due to the saddening nature in which it was rolled out.

The readiness of the faculty and the factors impacting the usage of e-learning platforms at a College of Medicine and Health Sciences were evaluated in Rwanda by Nyiringango et al. (2022). They discovered that the main driver of e-learning use was a personal interest in technology use (93.3%), while the main deterrent was worry over students' access (77.1%). In addition, Ezinwa (2020) reports that lecturers expressed an inability to incorporate e-learning into their current job and even a lack of time to do so in the study examined the opinions of academic staff at the University of Ibadan regarding the preparedness of stakeholders of e-learning in Nigeria Further assessment of students' e-readiness by lecturers revealed that the lecturers were unsure of whether the students truly understood what e-learning was and had the necessary IT and web skills to support e-learning. The lecturers' perceptions of the readiness of Nigerian universities to embrace e-learning were not significantly influenced by student readiness or human resource readiness. However, the preparedness of Nigerian universities was significantly influenced by factors such as public/societal readiness, financial readiness, training readiness, ICT-equipment readiness, and readiness of e-learning materials/contents.

4.1.3 Institutional Policy Framework

The lack of an institutional policy framework is another issue that impedes the smooth rollout of online teaching and learning in most higher education institutions in Africa. Anberbir (2015) surveyed to determine the level of usage of online teaching and learning in some selected institutions of higher learning in Ethiopia. The survey's results showed that the use of online learning in higher education was still in its infancy and that the biggest problem in most institutions was the absence of an online learning policy and staff understanding of online learning. In Kenya, Makokha and Mutisya (2016) investigated the status of online learning in public universities. The findings revealed that the majority of universities lacked senate-approved online learning policies to guide the structured implementation of online teaching and learning. Weak institutional framework has also been reported in Ghana (Yidana, 2016; Otoo-Arthur et al., 2021) South Africa (Maphalala & Adigun (2021), and Zimbabwe (Muchemula, 2021).

Since the effective implementation of e-teaching and learning solely depends on teachers, students, and institutional readiness to implement it, African higher education institutions in the light of the identified challenges need to double their efforts to resolve them. We are now in the digital age and most services are now delivered digitally. African higher education cannot be an exception especially when the internationalization of higher education provision is taking center stage globally. An effective institutional policy framework is needed to secure the readiness of institutions, students, and teachers for the effective delivery of online teaching and learning.

4.2 Challenges Concerning Access and Participation in Online Teaching and Learning

Access and participation in online teaching and learning was another challenge that emerge during the review process. Results of the literature review specifically revealed that most students could not access online teaching and learning due to some stated challenges.

A study conducted by Sarpong, Dwomoh, Boakye, and Ofosua-Adjei, (2022) to investigate online teaching and learning in Ghana revealed that 197 (9.85%) of the sample were unable to completely participate in online teaching and learning owing to obstacles such as a lack of access devices, intermittent online connectivity, and an inability to afford the cost of internet data. The research also revealed that almost 90.1% of students were unhappy with e-learning and its related problems. Again, a survey by Sarpong (2020) and the Centre for Social Science Research (CSSR) of the Kumasi Technical University found that 93% of university students in their final year desired to return to the face-to-face system because of issues that had been previously raised by the student association and were confirmed. These difficulties are not specific to the educational system in Ghana.

In Ethiopia, Bayene, Mekonnen & Mamo (2022) explored the state of access and participation in online learning in Ethiopian higher education. The results of the study suggest that in addition to financial constraints that prevented access to computers and the internet, problems encountered with shared access facilities, such as inadequate

computers in computer rooms and weak internet connections denied a significant number of students access to online teaching and learning. Respondents' background (i.e., rural, semi-urban, and urban), users' ICT devices, and history of ICT education further influence their access and participation. Another problem identified about access was content accessibility. According to the report, the only attempts made to meet students with disabilities required to provide content in Braille and give students with visual impairments access to audio recording equipment. However, there was a lack of understanding of accessibility and accessibility standards. In South Africa, Queiros and de Villiers (2016) investigated online learning in a South African Higher Education Institution. The study revealed low levels of computer/internet access at home, which limited access and participation of students particularly students from disadvantaged homes. Barriers such as access to devices and equipment were also reported to have limited both student's and teachers' access and participation in online teaching and learning in Kenya (Kibuku, Ochieng & Wausi, 2020) in Tanzania (Kisanga & Ireson (2015) and in Uganda (Buire, Bagarrukayo & Muyinda, 2020). In the same vein, Mphahlele, Seeletso Muleya, and Simui (2021) investigated the access and participation of students in online teaching and learning in higher education institutions in Southern Africa. The results suggest significant disparities in access and participation in high-quality technologies and severe educational inequities between rural and urban children. The gap between rural and urban students in terms of access and participation was wider.

The access and participation challenge has significant implications for the continued use of digital tools for teaching and learning. This is because it is only when students and teachers fully access and participate in online teaching and learning that learning outcomes may be realized. So long as access and participatory challenges persist, a significant number of students may be cut off and this may affect the effective delivery of digital teaching and learning in African higher education institutions.

4.3 Challenges Concerning the Effectiveness of Online Teaching and Learning

Teaching is not an end in itself. It is a means to an end which is learning. The study sought to determine the extent of the effectiveness of online teaching in bringing about learning. Results of the analysis suggest that when judged on its merit, it is effective in that it enhances, self-directed and independent learning and hence improves students' autonomy (Quainoo & Pasawano, 2022; Aweso, Awinbugri Boadu Nsakwa & Nyarko-Nkrumah (2020). In comparison with the face-to-face mode of teaching and learning, it was found to be less effective because, student-student interaction, student-teacher interaction, and the use of the right pedagogy to teach were limited (Adarkwah, 2020; Darkwa & Samuel Antwi 2021). Students also performed better academically in classroom learning than in online learning (Darkwa & Samuel Antwi, 2021). Limited internet connectivity was found to have limited the participation of students in online teaching and learning (Sarpong, et al., 2022). Adarkwah (2020) undertook a study on the effectiveness of online teaching and learning in Ghana's higher education institutions and found that:

> "*Most of the 10 students interviewed indicated that online learning is the best alternative approach to teaching and learning during this pandemic. However, because of its spontaneous nature, and not an approach to education carefully thought by my school leaders and the government, they felt that online learning was not effective as they hoped. On social interaction, an ample amount of the students felt the lack of student-student interaction and teacher-student interaction negatively affected the effectiveness of the course*." (pp.16)

Thus student-student and teacher-student interaction which freely happens during face-to-face teaching seems to be limited in online teaching. The author quoted one of the respondents as saying that:

> "*Oh ok, I think this online learning is not that effective. Let me take campus for example, on campus you go for lectures, you meet the lecturer, you will have this interaction, like face-to-face, that makes you comprehend what the lecturer is putting across, and aside from that you even have the teaching assistants who are willing to help you understand or if you have any difficulty, they can address that issue*."

In a similar vein, Darkwa and Antwi (2021) examined the efficiency and academic outcomes of classroom instruction versus online instruction. The effectiveness of the course was evaluated using the course material, instructional strategies, interaction and assessment, feedback, and evaluation. Students' assessments were utilized to evaluate their performance, and a questionnaire was used to gather information on efficacy. The data were assessed using a paired-sample t-test included in the Statistical Package for Social Sciences version 26. Classroom learning was found to be more effective than Internet learning. Furthermore, students performed better academically in classroom learning than in online learning, though the difference was not statistically significant. In the same vein, Edwin and Nana Yaw (2016) in a study to determine the effectiveness of distance education in Ghana found classroom teaching and learning to be more effective among distance education studies.

Aweso, et al. (2020) explored nuggets and nuances of e-learning in tertiary education for stakeholder engagement in Ghana. The findings confirmed several strong relationships between e-learning and final-year student involvement in Ghana's tertiary institutions. Students who took a large number of online courses were more likely to engage in quantitative reasoning than their peers. Nonetheless, as compared to their more conventional classroom peers, they were less likely to engage in collaborative learning, student-faculty contacts, and dialogues with diverse groups. Students who took more online courses reported less exposure to good teaching approaches and worse interaction quality. The link between these engagement measures and the number of classes completed online implies that an online environment may enhance some forms of involvement while discouraging others.

Mensah, et al. (2021) investigated e-learning interactivity among Ghanaian tertiary students. All of the E-learning interaction categories—student-teacher, student-content, student-system, and student-student—were discovered to be connected to course effectiveness, students' self-directed learning abilities, and students' learning behaviors. Student-system interaction, student-student interaction, and student-teacher interaction, on the other hand, were the best predictors of course effectiveness, independent learning skills, and learning behavior, respectively. The efficacy of courses, students' ability to learn independently, and students' learning behavior were all significantly impacted by the interplay between different types of E-learning interactivity, according to the research.

Makokha & Mutisya (2016) assessed the status of e-learning in public universities in Kenya. Data were collected using questionnaires administered to both students and lecturers randomly sampled from seven public universities. Questionnaire responses were triangulated with interviews from key informants and focus group discussions (FGDs). Data were analyzed qualitatively and through the use of descriptive statistics. The findings indicate that most of the online uploaded modules (87%) were simply lecture notes and were not interactive enough. In a related development, Kibuku, Ochieng, and Wausi (2020) investigated digital learning difficulties faced by Universities in Kenya through empirical review. They found a lack of collaboration among the e-Learning participants as a challenge militating against the effectiveness of e-teaching and learning.

Nsengimana, Bazimaziki, Nyirahabimana, and Mushimiyimana (2021) investigated online learning during the COVID-19 pandemic in Rwanda. The study found that despite learners' willingness to play their part in online learning, challenges of learning mathematics and science such as the absence of practical activities, inadequate support for structured exercises, few open resources, and inadequate access to online resources impeded the effectiveness of the online mode.

Nhatuve (2021) examined how well online education worked in Zimbabwe during the Covid-19 outbreak. 202 students completed an online questionnaire as part of the study's quantitative methodology. Data were examined using graphs to show how students perceived the usefulness and difficulties of online teaching and learning. The study discovered that the electronic teaching and learning methods used to lessen the effects of the Covid-19 Pandemic were ineffective. A large percentage of students (63% and 14%) said the entire procedure was disappointing since they were unable to learn. Students also disclosed that several issues, such as ineffective teaching methods and challenges in establishing and sustaining beneficial interactions between lecturers and students, contributed to their failure. The process of learning was tedious. The clarity of examinations and assignments was poor, and lecturers struggled to provide meaningful feedback. In a similar vein, Olagbaju and Ayedun (2021) investigated how face-to-face and online instruction were considered to affect learning at Gambian institutions. The findings demonstrated that face-to-face teaching increased students' motivation and attitude toward learning more than face-to-screen instruction did.

It can be seen from the results that the effectiveness of online teaching depends on student-student interaction, student-teacher interaction, collaboration, the use of the right teaching strategies, and internet accessibility. Authorities in higher education should organize orientation workshops on the use of online teaching and learning. Such workshops should include the best teaching methods to adopt to enhance student-student interaction, teacher-student interaction, and collaborative learning. This will go a long way to enhance the learning outcomes of students.

5. Conclusion

This study sought to identify challenges bedeviling the smooth implementation of online teaching in Africa higher education institutions. The study concludes that Inadequate technological infrastructure, a lack of suitable hardware and software resources, and restricted access to dependable internet connectivity are the technological obstacles. These issues obstruct the flawless delivery of online education and necessitate spending money on enhancing digital infrastructure and supplying essential technological assistance.

The infrastructure issues concern the availability and accessibility of physical facilities, which are necessary for online teaching and learning and include computer laboratories and a dependable electrical supply. The access and efficiency of online education efforts are restricted by inadequate infrastructure, which obstructs both student and educator engagement. Adapting instructional design and teaching methods to the internet environment is a pedagogical difficulty. Faculty members need assistance with lesson preparation, learning management system usage, and online pedagogy. In order to maintain the standard of education, it is also necessary to find solutions to the challenges associated with maintaining student connection and engagement in virtual classrooms.

Socio-cultural issues include elements such as socioeconomic gaps, cultural norms, and digital literacy skills that may affect how well students and teachers can participate in online learning. Assuring fair access to online education requires bridging the digital gap, fostering digital literacy, and removing social and cultural barriers. Policy frameworks, funding restrictions, and administrative support are all examples of institutional obstacles. For the successful implementation of online teaching and learning activities, it is crucial to create clear policies and norms, allot sufficient resources, and establish a supportive administrative environment. Collaboration from a range of stakeholders, including educational institutions, governmental organisations, technology providers, and foreign partners, is necessary to overcome these obstacles. Infrastructure development, capacity building, faculty development, student support services, and policy reforms should be the main focuses of strategies.

5.1 Implications for Practice

African higher education institutions must increase internet connectivity, offer dependable power, and guarantee that both students and faculty have access to the necessary technological equipment. To overcome infrastructure gaps, this entails working with governmental organisations, telecom firms, and other stakeholders.

Institutions must prioritise faculty and staff training and capacity-building programmes to improve their digital skills and capabilities. This involves instruction in the use of educational technologies, instructional design, multimedia production, and online teaching platforms. It is important to offer faculty members opportunities for ongoing professional development so they may stay current on new pedagogical theories and technological developments.

It is essential to guarantee equity and access in online education. Institutions need to close the digital gap by helping students who might not have access to the internet, modern technology, or online learning materials. For students with minimal means, this may entail setting up computer laboratories, offering loaner equipment, providing subsidised internet access, and developing flexible learning options.

There must be a change in pedagogical methods for online instruction. Institutions ought to assist academic staff in modifying their teaching strategies to fit the online learning environment. This entails encouraging interactive and interesting online learning activities, creating tests that gauge higher-order thinking abilities, and encouraging collaborative learning through online tools. Institutions can help with this shift by offering materials, instruction, and pedagogical assistance.

Institutions should create and implement quality control procedures especially for online learning. This entails creating precise criteria and standards for online courses, carrying out routine course evaluations, giving faculty feedback, and making sure that learning outcomes are in line with programme objectives. Institutions should set up effective student support programmes that are tailored to the special requirements of online learners. This can include online academic advice, online library resources, virtual counselling services, and technological help to handle any problems that students might run into while engaging in online learning.

Institutions can share resources, knowledge, and best practices for online teaching and learning through collaborative efforts both within and outside of Africa. Partnerships with business, non-governmental organisations, and academic institutions can also help address the issues and increase access to resources and technology.

5.2 Theoretical Implications

From the TAM, perceived usefulness is a key determinant of technology acceptance. It implies that African higher education institutions can positively influence the acceptance and adoption of online learning platforms if they can show the value of online teaching and learning technologies, such as improved access to educational resources, flexibility in learning schedules, and enhanced collaboration. TAM emphasises the significance of perceived usability in fostering technology adoption. Therefore, difficulties with online

teaching and learning, including a lack of adequate technological infrastructure, a lack of digital literacy among teachers and students, and sophisticated user interfaces, may affect how simple users perceive these platforms to be. Institutions can address these issues by creating user-friendly online learning environments and offering users training and help to improve their digital literacy.

Facilitating circumstances are listed in TAM as a factor affecting technology acceptance. Theoretical implication suggests that infrastructure, internet connectivity, technological device accessibility, and technical support issues may have an impact on the enabling environment for online teaching and learning at African higher education institutions. The supporting conditions for the successful implementation of online learning can be improved by addressing these issues through investments in infrastructure development, providing appropriate resources, and guaranteeing technical support. TAM acknowledges social influence as a component that can influence people's acceptance of technology. Theoretical implications imply that views and attitudes of stakeholders, such as teachers, students, and administrators, have a significant impact on how well online teaching and learning is received. Technology acceptance can be aided by addressing concerns, offering instruction and help, and fostering a supportive environment that emphasises the advantages of online learning.

Conflict of Interest Statement

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Appendix A: Some major findings of the scoping review of literature on e-teaching and learning challenges

Author	Country	Issues of readiness	Issues of participation/access	Issues of effectiveness
Asamah Agyei & Assamah (2022)	Ghana			Lack of systematic efforts at teachers' and institutional levels
Agormedah, Henaku, Ayite & Ansah (2020)	Ghana	Lack of formal orientation and training perceived lack of constant access to internet connectivity and financial unpreparedness		
Sarpong, Dwomoh, Boakye, Ofosua-Agyei (2020)	Ghana	Lack of access devices, unreliable internet connectivity inability to afford the cost of internet data.	Some students could not effectively participate	
Akomea, Pantah, Kuupille & Asenso (2022)	Ghana	Unprepared due to lack of training, limited internet connection, and a lack of funds to purchase computers and cell phones.		
Addae, Amponsah & Gborti (2021)	Ghana		Higher data cost limited access	Unregulated social media affected the effectiveness
Adarkwah (2020)	Ghana			However, because of its spontaneous nature, and not an approach to education carefully thought by my school leaders and the government, they felt that online learning was not effective as they hoped. Social interaction. An ample amount of the students felt the lack of student-

				student interaction and teacher-student interaction negatively affected the effectiveness of the course.
Aweso, et al. (2020)	Ghana			Nonetheless, as compared to their more conventional classroom peers, they were less likely to engage in collaborative learning, student-faculty contacts, and dialogues with diverse groups. Students who took more online courses reported less exposure to good teaching approaches and worse interaction quality
Hafez & El-din (2019)	Egypt	Exhaustion, internet problems, technical issues, and anxiety		
Bayene, Mekonnen & Mamo (2022)	Ethiopia	Financial constraints, internet problems, and a limited number of PCs.	Lack of access to rural dwellers and students with disabilities. Students with disabilities were limited to the production of content in Braille form and the provision of audio and recording tools	
Anberbir (2015)	Ethiopia	Lack of E-learning Policy		
Makokha & Mutisya (2016)	Kenya	Lack of senate approved e-learning policy		Not interactive enough. Only modules uploaded with little room for interaction.
Kibuku, Ochieng & Wausi (2020)	Kenya	Lack of adequate e-learning policies, lack of ICT infrastructure, lack		Lack of collaboration among e-learning participants

		of technical and pedagogical competencies and training for e-learners, lack of an e-learning theory to underpin the e-learning practices, budgetary constraints, and sustainability issues.		
Agolodom, Mbaba, Okpaleke, Okenkwu, Alazigha & Orevaoghene (2023)	Nigeria	Financial constraints, internet access, lack of technical know-how.		Poor communication with lecturers
Olutola (2015)	Nigeria	Internet connectivity		
Nsengimana, Bazimaziki, Nyirahabimana & Mushimiyimana (2021)	Rwanda		Lack of access to online teaching and learning resources	Absence of practical activities, and inadequate support for structured exercises. English proficiency, insufficient collaboration among students and with facilitators.
Maphalala & Adigun (2021)	South Africa	Technical support and training for e-learning, Information communication technology infrastructure, internet accessibility; uptake of e-learning and user learning management system, content development for e-learning, and evaluation of teaching effectiveness using e-learning.		

Kisanga & Ireson (2015)	Tanzania	Poor infrastructure, financial constraints, inadequate support, lack of e-learning, knowledge, and teachers' resistance.		
Innocent & Masue (2020)	Tanzania	Lack of skills among users, and insufficient ICT infrastructure.		Poor attitude
Buire, Bagarrukayo and Muyinda (2020)	Uganda	Internet connectivity, power supply, and teachers' lack of required skills for designing online courses even in universities where infrastructure was not a problem.		
Chireme and Kaseke (2021)	Zimbabwe	Infrastructure as a challenge		
Muchemula (2021)	Zimbabwe	Unpreparedness on the part of students and lecturers due to the sudden manner in which it was rolled out. Limited accessibility to the internet, limited mobile networks, unreliable electricity supply, lack of appropriate technological gadgets, and lack of technical know-how.		
Lakssoumi, Alaoui, & Lakssoumi (2022)	Morocco.	Connectivity issues and reduced interaction with peers and professors		
Mouaziz, Byad, Srouuwi, Biadi & Moumni (2022)				The majority of the students were not satisfied as it was difficult for them to interact due to

				connectivity problems. Students were also confused and unmotivated to learn.
Sangwa, Manirakiza and Muta (2021)	Rwanda			Students lacked trust in the system and this affected their interest and level of participation.
Nyiringango et al (2022)	Rwanda	Lack of access to students		
Oagbaju and Oyedun (2021)	Gambia			Face to face contributed to students' interest more than face to screen.
Keita, Koita, Niamabele and Tambora (2021)	Mali	Lack of policy guidelines		
Moakofhi, Lateane, Phri, Pholele, and Sebalatiheng (2017)	Botswana	Poor infrastructure, Inadequate IT support, lack of e-learning policy, and lack of university management support		
Yambi (2020)	Angola	Poor internet connectivity, lack of policy framework		
Gunda and Rickets (2006)	Central African Republic	Infrastructure Barriers and weak institutional policy framework		
Martins, Tinga, Manjale and Sitoe (2021)	Mozambique			65% of respondents believed that the quality of the teaching and learning process has decreased and 80% had unsatisfactory experiences that their adaptations to the process.
Sawaneh and Sesay (2022)	Sierra Leone	Lack of ICT infrastructure, leadership, training instructors, and learners. Poor		

		pedagogy and technological factors		
Mphahlele, Seletso, and Muleya (2021)	Southern Africa (South Africa, Botswana, and Zambia		Poor access and participation of students as there were significant disparities in terms of ICT Infrastructure	
Schurgers, Stam, Band, and Labib (2009)	Zambia	Internet connectivity, inadequate computers, and infrastructure		
Alehawail, Yahia, Alrshah	Libya	Lack of knowledge about ICT and E-learning, ICT infrastructure, and lack of financial support.		