



Digital Learning Platforms in Teacher Education: Tutors' Experiences, Usage and Constraints to Digital Pedagogical Transformation in Tanzania

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Abstract

Digital learning platforms are increasingly important for strengthening teaching, assessment, communication and professional development in teacher education. However, limited evidence exists on tutors' actual experiences with these platforms and constraints faced in their use in Tanzanian Teachers' Colleges. In response, this study sought to establish tutors' previous exposure to digital learning platforms, their usage practices and the factors constraining effective utilisation. A sequential explanatory mixed-methods design was employed. Quantitative data was collected through an online questionnaire administered to 614 tutors from 50 government and private Teachers' Colleges across 21 regions. Qualitative data was obtained from 82 participants, comprising tutors, college principals, academic officers and ICT officers, through interviews and Focus Group Discussions. Quantitative data was analyzed using frequencies and percentages while qualitative data was analyzed thematically and integrated into the interpretation. Tutors reported previous experience with Moodle, Google Classroom, Blackboard and Microsoft Teams. However, these platforms were mainly used for communication, sharing learning materials and managing assignments rather than for collaborative learning, formative assessment, continuous feedback and learner-progress monitoring. Poor internet connectivity, high internet costs, unstable electricity supply and limited digital skills constrained effective utilization. The study recommends investment in reliable and affordable connectivity, stable electricity, continuous professional development, institutional ICT support and integrated, mobile-friendly, low-bandwidth and offline-capable digital learning platforms.

Keywords: Digital Learning, Digital Platforms, Digital Transformation, Teacher Education; Digital Pedagogy; Educational Technology.

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Introduction

The use of digital learning platforms has changed the way teaching and learning are organized in higher and teacher education institutions (UNESCO, 2023; Martin et al., 2022). These platforms play an important role in supporting blended learning, online teaching and learning, communication, instructional resource management, assessment and tracking of learners (Organization for Economic Co-operation and Development, 2023; Al-Fraihat et al., 2020). In addition, these platforms are used not only to upload learning resources but also to

organize learning activities, monitor learners' progress, facilitate interaction and manage assessments. The effectiveness of digital learning platforms depends not only on system quality, information quality, technical support and user satisfaction, as demonstrated by Al-Fraihat et al. (2020), but also on broader educational factors. UNESCO (2023) extends this perspective by emphasizing the importance of pedagogical relevance, institutional capacity, equitable access and teacher competence. Collectively, these insights suggest that the value of digital learning platforms

lies not merely in their technical capabilities but in how effectively they are integrated into pedagogical practices to support meaningful teaching and learning.

In Europe, North America, Asia and Australia, higher education institutions (including teacher education institutions) use digital platforms, such as Google Classroom, Moodle, Canvas, Blackboard and Microsoft Teams to facilitate flexible learning, pedagogical innovation, communication and teacher professional development (Almaiah et al., 2020; Martin et al., 2022). However, these platforms vary in their organization and features, but typically include content delivery, interaction, collaborative learning, assessment, feedback and tracking of learner participation. In recent years, their adoption was accelerated during the COVID-19 pandemic, which influenced institutions to move quickly towards mainly remote and blended program delivery (Adedoyin & Soykan, 2023; Bond et al., 2021). The literature, however, suggests that a fast-track approach to pedagogical transformation was not necessarily a successful one. While some focused on supporting interaction, self-directed learning and collaborative construction of knowledge, others mostly maintained traditional approaches to schooling in digitally mediated spaces without reimagining pedagogy (Bond et al., 2021; Martin et al., 2022). The difference shows that simply having a platform available is not enough; rather, it depends on the digital competence of the teacher, the design of teaching and learning, institutional supports and the fit of the technology for the education context.

In the African context, the use of digital platforms has grown steadily following increased investments in digital education and the expansion of internet connectivity across educational institutions (Adarkwah, 2021; EdTech Hub, 2024). Digital platforms are increasingly being adopted as tools to support blended learning, online instruction, collaboration and professional development in countries like South Africa, Kenya, Nigeria, Ghana and Rwanda (Adarkwah, 2021; Czerniewicz et al., 2020; Mtebe & Raphael, 2018). This shift has occurred because education is undergoing a transformation towards technology-aided learning, making the integration of technology in teaching and learning part and parcel of teachers' daily routine. Ndibalema (2025) reported that while institutional adoption of digital learning platforms in many high-income countries typically occurs within

well-resourced environments, adoption in Africa often takes place under conditions of limited infrastructure, unequal access to technology, and constrained financial resources.

Across many rural African contexts, the sustainable implementation of ICTs continues to be constrained by persistent barriers, including unreliable electricity supply, high internet data costs, limited connectivity, inadequate ICT infrastructure, insufficient technical support, and low levels of teachers' digital competence. These challenges not only hinder the effective integration of digital technologies into teaching and learning but also exacerbate educational inequalities. For instance, Adarkwah (2021) argues that while online learning offers significant opportunities to ensure educational continuity and flexibility, it can also marginalize learners and educators who lack access to appropriate digital devices, affordable internet connectivity or conducive learning environments.

Likewise, Czerniewicz et al. (2020) reported that the widespread adoption of distance learning in South Africa brought the social and institutional inequities to the fore, rather than removing them. In contrast, Mtebe and Raphael (2018) found that sustained institutional investment, leadership commitment, staff development and technical support can help technology-enabled learning to be more effective even in resource-constrained environments. Collectively, these studies demonstrate that digital learning platforms in Africa is constrained by interconnected infrastructural, institutional and pedagogical conditions rather than technological limitation alone.

In Tanzania, the Education and Training Policy (2014, 2023 Edition) and the 2023 Curriculum emphasize the integration of digital technologies into teaching and learning as a strategy for enhancing educational quality, relevance, and competency development (Ministry of Education, Science and Technology, 2023). Similarly, the National Digital Education Strategy (2024/25–2029/30) identifies digital technologies as key enablers of effective teaching, learning, assessment, educational administration and teachers' professional development.

These reforms reflect a shift in the role of technology from being an optional instructional tool to becoming an integral component of efforts to improve the quality and effectiveness of the education system. Additionally, the Tanzania Institute of Education (TIE) has established a

Learning Management System (LMS) for Teacher Continuous Professional Development to support the ongoing professional learning of primary school teachers (Tanzania Institute of Education, 2024). This initiative illustrates how a digital platform can be integrated into a national education program to disseminate professional learning resources, deliver continuous professional development and provide structured learning opportunities for teachers.

However, comparable systems have not been widely implemented in teachers' colleges, despite their mandate to equip prospective teachers with the digital competencies required by the current curriculum reforms. Although several studies have examined the adoption of digital learning in Tanzanian higher education institutions, most were conducted before the recent curriculum reforms and therefore provide limited evidence on the current state of digital learning platform implementation in teachers' colleges. Mtebe and Raisamo (2014) studied factors that influence students' intention to use mobile learning while Mtebe and Raphael (2018) documented achievements, challenges and opportunities of technology-enhanced learning. These studies demonstrate that perceived usefulness, user readiness, institutional investment, infrastructure and technical support are important factors in technology usage. However, these studies have focused predominantly on universities, university lecturers and well-established higher education systems. In contrast, pre-service teacher education institutions operate under different conditions, including variations in infrastructure, staffing, program organization, pedagogical expectations, residential arrangements and supervision of teaching practice. Consequently, it remains unclear whether findings from university settings can be directly generalized to teacher education institutions without examining the experiences and perspectives of tutors working within these contexts.

Consequently, an important empirical gap remains. Although international studies have demonstrated the potential of digital platforms to support flexible learning, communication, collaboration, assessment, and learner progress monitoring, evidence from African contexts indicates that their effective implementation continues to be constrained by infrastructural, economic, pedagogical and institutional challenges (Al-Fraihat

et al., 2020; Bond et al., 2021; UNESCO, 2023; Unwin et al., 2020).

The available literature in Tanzania has added valuable knowledge on the use of technology in universities, while the empirical studies have been given to little attention to teachers' colleges and the experience of tutors on actual use of digital learning platforms (Mtebe & Raisamo, 2014; Mtebe & Raphael, 2018). Furthermore, most previous studies have examined digital learning platforms from isolated perspectives, such as technology adoption or pedagogical use, without providing a comprehensive understanding of how key factors, including prior experience, usage patterns, infrastructure, technical capacity and institutional conditions, interact to influence their implementation. Addressing this gap is essential because efforts to scale up digital learning platforms without a clear understanding of tutors' practices and working contexts are likely to result in low adoption, limited pedagogical integration, underutilization of platform functionalities and poor long-term sustainability. This study, therefore, sought to generate context-specific evidence about tutors' experiences of digital platforms usage to inform the future improvement of their use for teacher education colleges across Tanzania.

Literature Review

This section reviews the literature on digital learning platforms, with particular emphasis on tutors' experiences and usage patterns as well as the infrastructural, technological and institutional factors that influence their effective utilization in teachers' colleges. The review progresses from global to regional and local contexts to provide a comprehensive understanding of the existing evidence and identify gaps that inform the current study.

Tutors' Experiences and Usage Patterns

Digital learning platforms are widely used in higher education and teacher education for communication, content sharing, learner tracking, online assessment and collaborative learning (Al-Fraihat et al., 2020; Bond et al., 2021). The role of digital learning systems in teacher education has changed considerably from simple repositories of learning materials to comprehensive digital ecosystems that facilitate interactive teaching and learning. Recent studies show that teacher colleges increasingly utilize digital platforms to facilitate reflective practice, blended learning, competency-

based assessment, peer collaboration and data-informed decision-making (Martin et al., 2022; Organisation for Economic Co-operation and Development, 2023).

Although the literature consistently reports increasing adoption of digital learning platforms in teacher education, the extent and nature of their use vary considerably across contexts (Viberg et al., 2022). Studies conducted in Europe and North America document the use of digital learning platforms to support interactive pedagogies, learning analytics, online assessment and collaborative knowledge construction (Ifenthaler & Yau, 2020). In contrast, evidence from many developing countries indicates that teachers tend to use these platforms primarily for administrative and content management purposes, such as sharing learning materials, posting announcements and collecting assignments (Hizam et al., 2021). Al-Fraihat et al (2020) and Ansong et al (2022) reported that digital platform use remains concentrated on administrative and content-management functions, such as distributing notes, uploading assignments and sharing announcements. Hence, it is crucial to understand how college tutors employ digital platforms in teacher education training in order to determine if the technology is used simply to deliver content or if it is used to support pedagogical practice.

Studies from South Africa, Rwanda, Kenya and Ghana show a growing use of digital platforms in universities and colleges, specifically following the COVID-19 pandemic (Tella et al., 2023; Ng'ambi et al., 2020). Educators commonly use digital platforms for communicating with students, allocating course materials and managing assignments while advanced platform functions such as automated assessments, learning analytics and collaborative learning spaces remain underutilized (Mtebe & Raphael, 2018; Ng'ambi et al., 2020; Tella et al., 2023). Studies in Rwanda and South Africa indicate that as the institutions invest in educational technology, there is growing integration of digital learning in teaching and assessment activities (Ndayambaje, 2024). On the other hand, other studies conducted in East Africa report that teachers still use WhatsApp, Telegram and email because these are more accessible and require lower technological demands than formal Learning Management Systems (Mtebe et al., 2021; Omodan & Ige, 2021). These results indicate that access to technology is not enough to achieve successful

digital learning adoption. Institutional readiness, technical support and professional development opportunities play comparable roles in influencing the engagement of educators with the digital learning systems.

The Government of Tanzania has intensified efforts to promote the use of digital learning platforms within the education sector. Recent education reforms have emphasized the integration of digital technologies into teaching and learning while the implementation of a Learning Management System (LMS) through the Teacher Continuous Professional Development (TCPD) framework has institutionalized the use of digital platforms to support teachers' ongoing professional learning (Ministry of Education, Science and Technology, 2023; Tanzania Institute of Education, 2024).

Nevertheless, research suggests that the use of digital learning within teachers' colleges remains relatively limited and fragmented (Mtebe & Raphael, 2018). Tutors continue to depend on informal digital tools, such as Google Drive, WhatsApp and email, for sharing learning resources and communication. This signifies that while digital readiness is gradually improving, significant opportunities remain for strengthening the adoption of structured digital platforms in teacher education institutions (Ministry of Education, Science and Technology, 2023; Tanzania Institute of Education, 2024). Furthermore, Mtebe and Raisamo (2014) found that many educators use digital learning platforms primarily to share learning materials, with limited use of their broader pedagogical functionalities due to inadequate digital competencies and infrastructural constraints. Moreover, research on digital learning technologies in Tanzania has focused predominantly on universities, leaving teachers' colleges relatively underexplored despite their pivotal role in preparing future teachers (Mtebe & Raphael, 2018). Consequently, there is limited empirical evidence on tutors' experiences with digital learning platforms and how these experiences influence their effective utilization in teacher education institutions.

Factors Affecting Digital Platforms Usage

Across the world, the use of digital learning platforms continues to face various challenges despite substantial technological improvements (Almaiah et al., 2020). Researchers indicate that resistance to organizational change, inadequate

technical support, insufficient digital competencies and concerns regarding data security remain major challenges to effective use of the digital learning system (Scherer et al., 2021; Almaiah et al., 2020). Furthermore, educators regularly report difficulties in integrating digital technologies during teaching due to increased workload and limited time for professional learning. These limitations indicate that the successful use of a digital learning system requires not only technological investment but also sustained technical support and continuous professional training. Poor internet connectivity remains one of the most persistent factors hindering online learning adoption across Africa (Unwin et al., 2020).

Although researchers generally agree that technological barriers influence the adoption of digital learning platforms, the literature offers differing perspectives on the factors that most strongly determine their successful implementation. Some studies emphasize technological infrastructure and reliable internet connectivity as the primary drivers of adoption (Dhawan, 2020) whereas others argue that institutional leadership, organizational culture and professional support mechanisms are equally, if not more, critical to the effective utilization and sustained integration of digital learning platforms (Howard et al., 2021). These differing perspectives suggest that digital learning implementation challenges are multidimensional rather than purely technological. Therefore, addressing infrastructure constraints alone may not guarantee successful adoption if users lack confidence, motivation and institutional support.

Across sub-Saharan Africa, infrastructural problems continue to limit equitable access to digital learning opportunities (World Bank, 2022). Studies conducted in Kenya, South Africa and Nigeria indicate that insufficient ICT facilities, limited technical personnel, unstable electricity supply and high internet costs significantly limit the utilization of digital learning systems in teacher education institutions (Mncube & Minty, 2025; Tella et al., 2023). Consequently, educators often rely on low-cost and mobile-based communication apps rather than fully using digital platforms. These findings point out the need for systems that can work effectively in low-resource regions through offline and mobile-first designs. Poor institutional ICT infrastructure, high internet costs, unstable

electricity supply and inadequate technical support significantly limit the system's effectiveness. Comparative evidence from developing countries further demonstrates that infrastructure challenges interact with broader socio-economic realities. For example, studies conducted in Ethiopia and Uganda found that high internet costs and unreliable electricity significantly constrained educators' participation in online learning environments (Mtebe et al., 2022; Tadesse & Muluye, 2020). Similar findings have been reported by Adedoyin and Soykan (2023), where internet affordability and limited access to digital devices continue to hinder educational technology integration despite growing policy commitments toward digital transformation. These findings suggest that effective adoption strategies should address both technological infrastructure and issues of affordability and accessibility.

In Tanzania, infrastructure-related limitations remain substantial barriers to digital transformation in teacher education (Mtebe & Raisamo, 2014). Although national policies steadily facilitate digital education, disparities exist in electricity reliability, internet availability and access to digital tools, specifically in rural institutions (Mtebe & Raphael, 2018). Recent national initiatives have emphasized offline learning solutions, zero-rating internet accessibility and continuous professional learning for educators, including tutors (Tanzania Institute of Education, 2024). These initiatives are particularly significant because teachers' colleges are responsible for preparing prospective teachers who can effectively integrate digital pedagogies in classroom practice. Therefore, digital learning implementation strategies must be aligned with local realities to ensure equitable access and long-term sustainability (Ministry of Education, Science and Technology, 2023; Tanzania Institute of Education, 2024).

According to Almaiah et al. (2020), insufficient professional training and low confidence in using digital technologies reduce educators' willingness to fully utilize digital platform features, such as online discussion forums, assessment and automated grading systems. Similar findings have been reported in East African teacher education institutions, where tutors often rely on informal apps, such as WhatsApp, due to the complexity of formal digital learning platforms and limited support mechanisms. The literature, therefore, demonstrates that effective use of a digital learning

system requires not only technological infrastructure but also regular professional training, mobile compatibility, institutional support and context-sensitive design capable of operating in low-resource environments.

Methodology

The section presents the research design, population and sampling procedures, instruments, validity and reliability measures, data analysis procedures and ethical considerations.

Design

This study used a sequential explanatory mixed methods design in which quantitative data was first collected and analyzed and later qualitative data was collected to explain and elaborate the quantitative data. The design allowed the researcher to reflect on general trends in terms of tutors' experiences and constraints in the use of the digital learning platforms and provided detailed and context-specific explanations of the contextual factors that affect the use of digital platforms in teacher education.

Population and Sampling

The targeted population of this study was 1,400 tutors working in government and private Teachers' Colleges across Tanzania. In the quantitative phase, a census approach was adopted by inviting all the tutors to participate. While participation was voluntary, only 614 tutors who completed the online questionnaire constituted the final quantitative sample. Furthermore, purposive sampling was used to select 82 participants, comprising 53 tutors, 10 college principals, 10 academic officers, and 9 ICT officers from 10 Teachers' Colleges. Each of the five educational zones was represented by one Teachers' College, selected based on Teachers' Colleges. Each of the five educational zones was represented by one Teachers' College, selected based. A purposive sampling method was deemed appropriate as it allowed the study to gain in-depth information relevant for the improvement of digital learning platforms.

Instruments

A structured questionnaire, semi-structured interviews and Focus Group Discussions (FGD) were used to gather data. The questionnaire was administered to tutors online, using KoboToolbox; collected data related to tutors' previous exposure to digital learning platforms, usage and challenges

facing them in using the platforms. Semi-structured interviews were conducted with ICT officers, academic tutors and college principals while FGDs comprised a group of five to six tutors in each college, chosen based on their teaching experience, willingness to participate and ability to provide rich insights on the use of digital platforms in teaching and learning. Methodological triangulation was achieved by collecting complementary quantitative and qualitative evidence through questionnaires, interviews and FGDs.

Validity and Reliability

For the quantitative part, validity was established through expert review by involving specialists in educational technology and research methodology, who examined the questionnaire for clarity, relevance and alignment with the study objectives. Their comments were incorporated to improve the wording, sequencing and coverage. Reliability in the quantitative component was ensured through pilot testing of the questionnaire with a few tutors. On the qualitative component, credibility was ensured through data triangulation of interviews, focus group discussions and the questionnaire. Dependability was ensured by using consistent interview and focus group discussion guides. Confirmability was achieved through systematic documentation of data collection and analysis, while transferability was supported by providing sufficient descriptions of the study context and participants.

Data Analysis

Quantitative data was first downloaded from KoboToolbox, checked for completeness, cleaned and organized according to guiding research questions. For research question one, responses were coded and analyzed using frequencies and percentages. The platforms were then ranked according to the number of tutors reporting previous exposure and use in each platform. Data from interviews and FGDs were analyzed using a thematic approach through repeated reading of the transcripts, generation of initial codes, grouping related codes into categories, developing and reviewing the themes and interpreting the themes in relation to the research questions.

For research question two, questionnaire responses concerning infrastructural, technological and institutional constraints were coded, counted and analyzed using frequencies and percentages. The constraints were then ranked from the most to the least frequently reported. Relevant interview and

FGD responses were transcribed, coded and categorized into themes such as internet connectivity, internet costs, electricity supply, digital skills and institutional support. Lastly, the results of the quantitative and qualitative data were triangulated to obtain a holistic perspective on tutors' previous exposure and barriers to digital learning platform use during interpretation.

Ethical Considerations

Ethical principles were observed throughout the study. Permission to conduct the study was granted by the Tanzania Institute of Education (TIE), and all participating Teachers' Colleges were officially informed by letter issued by TIE before data collection. Participation was voluntary and informed consent was received from all participants. To protect respondents' privacy, no personal identifiers, such as names, were included in the findings. Interview and focus group participants were assigned identification codes instead of names and results were presented in an aggregated manner to ensure confidentiality and anonymity so that individual respondents and colleges could not be identified. The participants were also made

aware that they have the right to withdraw at any moment during the study without any consequences.

Findings and Discussion

This section presents and discusses findings according to research questions. Quantitative and qualitative evidence are integrated to examine tutors' previous exposure to and usage of digital learning platforms and the principal factors constraining effective utilization.

Research Question 1: How do tutors utilize digital learning platforms in teaching and learning?

To address this research question, tutors were asked about their previous exposure to digital learning platforms and how they used them in teaching and learning activities. Table 1 presents tutors' previous exposure to different digital learning platforms. Qualitative findings provide deeper insights into how these platforms were used in practice and how the tutors experienced their integration into teaching and learning.

Table 1: Tutors' Previous Exposure to Digital Learning Platforms (N = 614)

Digital Learning Platform	Frequency	Percentage
Moodle	316	51.4
Google Classroom	278	45.3
Blackboard	195	31.8
Microsoft Teams	105	17.1

In Table 1, respondents could select more than one platform; therefore, the percentages do not total 100%. In response, Table 1 indicates tutors' previous exposure to commonly used digital learning platforms. Moodle was the platform with the highest previous exposure (51.4%), followed by Google Classroom (45.3%), Blackboard (31.8%) and Microsoft Teams (17.1%). These findings indicate tutors' familiarity with different digital learning platforms. To better understand tutors' experiences beyond their previous exposure to digital platforms, interview and FGD participants were asked to explain how these platforms were used during teaching and learning. Although WhatsApp was not classified as a formal learning management system in the survey table, it emerged prominently in the qualitative data as the digital tool most commonly used for routine communication and sharing learning materials. One participant explained, "Most of the time we rely on WhatsApp because every student has access to it. It is easier to send and

receive notes, announcements and assignments, compared to other separate systems." Another participant stated, "We need one system that brings together lecture notes, assignments, discussions, and grades because we currently use different applications for different activities."

The integrated findings demonstrate that tutors possessed foundational familiarity with digital learning platforms; however, their experience is characterized more by administrative and communication functions than by pedagogically rich teaching practices. Although many tutors had previously used Moodle, Google Classroom and Blackboard, qualitative findings revealed that these platforms were mainly used for distributing notes, communicating with students and collecting assignments rather than facilitating collaborative learning, learner assessment or continuous feedback.

This phenomenon aligns with the one noted by Bond et al. (2021) that digital platforms in higher education are often used first for communication and content distribution and later for more complex interactive functions. Likewise, Martin et al. (2022) concluded that digital learning can support collaborative, continuous feedback, assessment management and tracking the progress of the learners, but many teachers do not utilize a substantial proportion of the available functions. This finding is further consistent with qualitative evidence, showing that tutors continued to depend heavily on WhatsApp because it is familiar, affordable and accessible to both tutors and students. This suggests that previous exposure to digital platforms does not necessarily translate into effective digital pedagogy. The findings also corroborate those of Mtebe and Raphael (2018), who found that in Tanzania, digital learning platforms are used predominantly as repositories for learning materials rather than as tools for active and collaborative learning.

These findings indicate that previous exposure to digital learning platforms should not be equated with competence in digital pedagogy. Even so, such experience remains valuable because, as proposed by the Technology Acceptance Model (Davis, 1989), familiarity with a system increases perceived ease of use and minimizes resistance to its adoption. Hence, the use of digital platforms in Teachers' Colleges must gradually complement and support tutors' practices and offer them professional development that will help them transform from simple communication and content sharing to online assessment, collaborative discussion, feedback, microteaching and monitoring of the students' progress.

The results also indicate that tutors' reliance on WhatsApp and their appreciation of platforms that are simple, integrated and mobile-friendly illustrate the technology and infrastructure constraints within the teacher education environment. Similar evidence has been documented in Ghana and South Africa, where reliance on mobile communication applications is due to their familiarity, low cost and ease of availability compared to formal institutional platforms (Ng'ambi et al., 2020; Tella et al., 2023). Unwin et al. (2020) also reported that in various African countries, teachers often use both formal learning and mobile/social media as a consequence

of poor connectivity and limited devices with high data costs.

The findings are in agreement with literature in this study, where affordability, accessibility and infrastructure are considered as shaping digital practices in resource-constrained environments in Africa, in addition to pedagogical preferences. This finding corresponds with Mtebe et al. (2021), who reported that higher education institutions in Tanzania frequently combine formal Learning Management Systems with informal communication tools because the latter are more accessible and easier to use under constrained infrastructural conditions. Similarly, Omodan and Ige (2021) observed that educators increasingly rely on widely available social media applications to sustain communication and collaborative learning when institutional digital platforms are either unavailable or underutilized. This study extends these findings by demonstrating that tutors continue to depend on WhatsApp not only because of its accessibility but also because it supports routine instructional communication in contexts where comprehensive institutional platforms remain insufficiently developed.

The use of multiple applications may lead to fragmented teaching and administration processes, which is evident in a tutors' request for a single system that brings together the notes, assignments, discussion and marks. The findings agree with the conclusions of Scherer et al. (2021), who stated that technologies that are perceived as useful, manageable and related to daily professional work can be adopted more easily.

Research Question 2: What factors constrain effective utilization of digital learning platforms among tutors in teachers' colleges?

To identify the barriers facing effective utilisation of digital learning platforms, tutors were asked to explain challenges experienced during teaching and learning processes. Quantitative findings are presented first, followed by qualitative support, explaining how these barriers affect tutors' day-to-day practices. In Table 2, respondents could identify more than one platform; therefore, the percentages do not total 100%.

Table 2: Factors Constraining the Utilization of Digital Learning Platforms (N = 614)

Constraint	Frequency	Percentage
Poor internet connectivity	449	73.1
High internet costs	354	57.7
Unstable electricity supply	282	45.9
Limited digital skills	278	45.3

Table 2 shows the most frequently reported barriers affecting tutors' utilisation of digital learning platforms as poor internet connectivity (73.1%), followed by high internet costs (57.7%), unstable electricity supply (45.9%) and limited digital skills (45.3%). These findings indicate that digital platform utilisation is constrained by multiple interconnected barriers rather than by a single technological challenge.

Qualitative findings revealed that unreliable internet connectivity, high internet costs, frequent electricity interruptions and limited digital competencies were the principal challenges identified as hindering effective utilization of digital learning platforms. One tutor, for instance, explained: "Sometimes we fail to access online materials because purchasing internet bundles every day becomes expensive for both tutors and students." Similarly, an ICT officer reported, "The system will only succeed if it can operate offline because network availability differs greatly across colleges, especially those located in rural areas." Furthermore, one of the College Principals reported, "Most tutors are willing to use digital platforms but unreliable internet and limited institutional ICT support discourage consistent use across teaching activities."

Taken together, the quantitative and qualitative findings demonstrate that the barriers facing digital learning platform utilisation extend beyond technological infrastructure. Tutors' experiences show that poor connectivity, high internet costs, unstable electricity supply and limited digital competence interact to reduce consistent and meaningful use of digital learning platforms. Consequently, successful implementation depends upon simultaneous investment in infrastructure, institutional support and users' digital capacity. The integrated findings show that effective utilisation of digital learning platforms depends upon a combination of technological, institutional and human factors rather than infrastructure alone. Similarly, previous research found that implementation of digital learning systems is linked with four key enablers: availability of reliable

infrastructure, affordable internet connection, technical support and users' digital competence (Almaiah et al., 2020; OECD, 2023).

The findings in this study resonate with the experience in Africa and Tanzania, particularly, where adoption of digital learning is shaped by infrastructural inequities and institutional support readiness. Poor internet connectivity, unstable electricity supply, inadequate ICT infrastructure and high data costs have all been documented as key challenges in digital learning implementation in Ghana, South Africa, Kenya, and Nigeria (Adarkwah, 2021; Ng'ambi et al., 2020; Tella et al., 2023). Likewise, Mncube and Minty (2025) found that inadequate ICT infrastructure, inconsistent maintenance and limited institutional investment continue to constrain sustainable technology implementation in South African educational institutions.

Conclusion and Recommendations

This section presents the conclusions and the corresponding recommendations of the study.

Conclusions

Based on the findings, it is concluded that sustainable integration of digital learning platforms in teacher education requires strengthening tutors' pedagogical capacity alongside the provision of enabling environments characterized by reliable digital infrastructure, affordable connectivity, continuous professional development and strong institutional support. These conditions are essential for achieving meaningful and sustainable digital transformation in Teachers' Colleges.

Recommendations

Based on the study conclusions, teachers' colleges should continue promoting continuous professional development to strengthen tutors' pedagogical use of digital learning platforms beyond communication and content sharing. Furthermore, the Ministry responsible for Education and other education stakeholders should invest in reliable internet connectivity, affordable data access, stable

electricity supply and offline-capable digital learning platforms to support sustainable implementation.

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