Received: October 31, 2025
Revised: November 26, 2025
Accepted: November 27, 2026
Published: August 27, 2026

Elicit Journal of Education Studies
eISSN:3121-8474
pISSN:3093-0472

https://elicitpublisher.com

EMPIRICAL PAPER

Toward Inclusive Digital Education in Abuja, Nigeria: A Qualitative Study of Adoption Barriers and System-Level Reforms in K–12 Schools

Sunday Temitope Toba[1], Raphael Ngigi Wanjiku[2], Oluchi Jessica Nwosu[3]

Affiliations

[1]Department of Information Technology, Miva University, Nigeria
[2]Department of Technology and AI, Nexford University, Nigeria
[3]Department of Jurisprudence and International Law, University of Lagos, Nigeria

ORCID Identifiers

Sunday Temitope Toba
0009-0008-4133-5719

Raphael Ngigi Wanjiku
0000-0003-1030-2021

Oluchi Jessica Nwosu
0009-0006-1163-0798

DOI

10.65820/ejes-6vol2-issue2-2026

Abstract

Purpose: Despite significant global advancements in EdTech that have revolutionised teaching and learning approaches, the adoption of these innovations among schools in Nigeria, particularly Abuja, remains constrained. Factors such as poor digital infrastructure, high data cost, unreliable electricity supply, digital incompetence, socio - economic disparities, and inconsistent school policies towards e-learning integration have collectively hindered progress. This study examines the use of digital learning tools in K–12 schools in Abuja, highlighting the need for digitised teaching to remain globally competitive.

Methods: This research adopted a qualitative research design based on open-ended methods to determine the impact of digital learning tools on K-12 learning in Abuja. N=20 of the purposively chosen teachers, administrators, and education officers will be interviewed in 30-45 minutes on Zoom or face-to-face. Thematic analysis using the Braun and Clarke (2006) model was carried out on the data generated.

Results: This paper established that to promote the digitisation of education in Abuja, systemic change is required. This will bridge the gap between K-12 learners in the state and address the limitations within the state.

Novelty and Contribution: Improving K-12 learning in Abuja will foster a more adaptable and future-oriented educational system in Nigeria.

Social and Practical Implications: Pragmatically, digital integration will enhance teaching and learning, digital literacy, and curriculum delivery in these schools. Socially, adopting digital tools for teaching and learning will promote inclusive education such that all children, regardless of socio-economic status, will have access to quality education, in fulfillment of SDG 4.

Keywords: Digital learning; E-learning; K–12 education; Teacher Training; Student Engagement

*Corresponding author
E-mail address: temi.s.toba@gmail.com

How to cite this article:

Toba, S. T., Wanjiku, R. N., & Nwosu, O. J. (2026). Toward Inclusive Digital Education in Abuja, Nigeria: A Qualitative Study of Adoption Barriers and System-Level Reforms in K-12 Schools. *Elicit Journal of Education Studies*, 2(2), 74-89. https://doi.org/10.65820/ejes-6vol2-issue2-2026

1 Introduction

Despite being a key instrument for national development, the education system in Nigeria has been characterised by persistent instability and underperformance (Vlasov, 2021; Gyuse et al., 2024). The educational system of the country is plagued by an overwhelming number of problems, including poor infrastructure (Olusola et al., 2024), indiscipline, bad governance, politicisation of education (Aina, 2017), brain drain, unavailability of teaching and learning resources, and constant strikes, although it is one of the largest economies in Africa (Hazzan, 2024). These issues are evident in Abuja, the country's capital, albeit cushioned to some extent by recent government investments in policy reforms and school renovations. The image is, however, ironic: a city that stands as an embodiment of growth, but remains trapped in structural malfunction that is symptomatic of the wider educational crisis in Nigeria.

In recent times, it has become increasingly evident that a silent revolution is unfolding in the way knowledge is disseminated globally and within the Nigerian education system. The education environment has undergone a global shift due to the proliferation of digital learning technologies, which provide students with unlimited access to information beyond the physical classroom, foster personalised learning, and encourage collaborative learning experiences (Rafiq et al., 2024). In Nigeria, lessons learned on digital learning systems like Udemy, Tuteria, Afrilearn, and Khan Academy are already being incorporated into classrooms, which proves the idea of education in terms of enhancing the educational quality and increasing access to children. Although the incorporation of digital tools in learning is beginning to assume a positive perspective in Abuja, student's experiences reveal that there are some limitations. Evidence indicates that the majority of schools outside the rural-urban sphere face significant challenges, including poor internet connectivity, power outages, and insufficient training of teachers to effectively utilise digital tools (Hazzan, 2024).

While it is evident that digital learning tools hold the potential to transform K-12 learning in Abuja, its effectiveness is dependent on not just the availability of platforms or necessary devices but the right planning, inclusive policies, and the capacity to ensure that technology is only an enhancer of human connection, which is the very heart of teaching. Despite existing research highlighting the general challenges that hinder the effectiveness of digital learning, much of this work is concentrated on the experiences of students in Nigeria as a whole, particularly in urban settings without analysing the systemic inefficiencies that exist in rural settings (Nigerian basic schools). The gap, therefore, lies in understanding how Abuja's socio-economic realities, the unique realities of the elite (private) schools and underfunded public schools, shape the effectiveness of digital learning initiatives. This paper aims to address this gap by addressing not just the technological tools but also the cultural, social, infrastructural, and policy environments that determine the success.

Guided by this purpose, this paper is anchored on the following research questions:

i. What systemic inadequacies within Abuja's K-12 education system impede the adoption and effectiveness of digital learning tools among teachers and students?
ii. How do teachers perceive and interact with these tools?
iii. How can existing global EdTech platforms be tailored to Nigeria's local context to improve learning outcomes?
iv. What policy and practice recommendations can close the gap between current digital learning initiatives and long-term educational improvement in Abuja?

2 Literature Review

2.1 The Adoption of E-Learning in Sub-Saharan Africa

Sub-Saharan Africa has witnessed a rise in the adoption of e-learning platforms, yet the trajectory of its use remains uneven (Kotoua et al., 2015; Trines, 2018). While some studies record success stories on this adoption (Maune, 2023; Mutale, 2025), others highlight the challenges still at play. For instance, since the adoption of e-learning platforms, Sarpong (2023) and Mutale (2025) have revealed in their studies that countries like Ghana and other developing countries have faced challenges that ranged from onboarding ICT infrastructure, poor internet capacity, inadequate teacher training, lack of technical support, and insufficient ICT resources. In rural areas, there are even more compounded issues with electricity and the internet connectivity (Aung and Khaing, 2016; Patel et al., 2018). Another study by Yidana et al. (2023) indicated through evidence from about twenty-five African countries that low levels of ICT training, poor pedagogical skills, and weak institutional policy framework are responsible for the lack of

effectiveness of digital learning platforms across the continent. Additionally, the study by Mukabagorora et al. (2023) found that despite that policies supporting the adoption of e-learning platforms have increased, its adoption is still impeded by limited budget, low teacher training, and particularly weak infrastructure to accommodate advanced technological devices. These issues are consistent with the challenges faced in Nigeria since the digitisation of education in the country

Despite this obvious reality, Jibrin et al. (2024) claim that some promising cases exist. For instance, Vincent et al. (2024) revealed that 75% of Makerere University students in Uganda preferred online learning due to its flexibility and accessibility. Furthermore, Oats et al. (2019) found that students in Botswana demonstrate a higher willingness to adopt mobile devices for learning due to their perceived value and portability. These successes are viable proof that under the right conditions, digital learning can replace conventional schooling, especially in urban and rural areas. The onset of the covid-19 pandemic amplified the use of digital platform for learning and although it generated much benefits, the limitations were significant. While the urban communities maintained continued access to education through these devices, their rural counterparts remained largely marginalised, thereby highlighting the systemic inequalities that permeate the broader education landscape (Legg-Jack, 2021). These experiences are proof that enhancing e-learning in Africa, and especially Nigeria is possible but relies heavily on infrastructure and the right policy.

2.2 Nigeria: Educational Technology Adoption and Policy Frameworks

In Nigeria, various platforms promote K-12 learning; some of which include Tuteria Limited, ULesson, Edukoya, PrepClass, 9IJA KIDS, Elevate, Unicaf, and the National Open University (NOUN) among others. Foremost among these platforms is uLesson, with over 2 million live session attendances, 5 million downloads, and 14 million lessons watched within its first four years of operation. Due to the budding nature of this industry, recent statistics reveals that e-learning will reach $7.05 million by the end of 2027. The Tuteria app has also received more than 500 tutor applications and has served over 50,000 learners as of 2021.

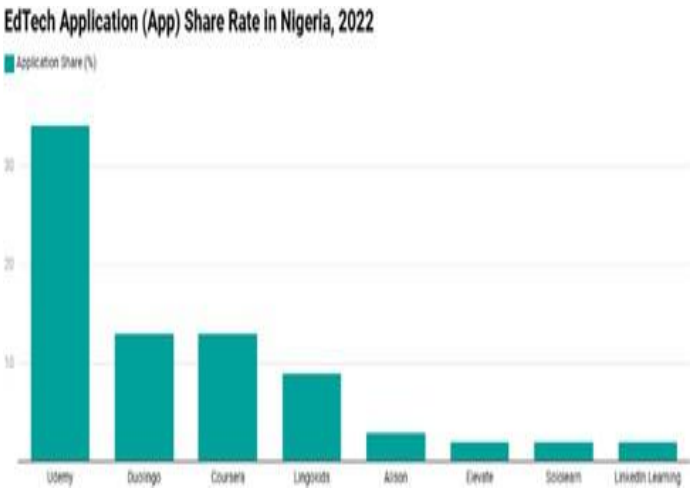

Figure 1 Edtech Application Share Rate in Nigeria, 2022

(Source: Statista Market Insights)

While there is the availability of digital learning apps in Nigeria, the illustration in Figure (1) depicts the imbalance in the distribution of digital learning adoption in Nigeria, with the Udemy platform capturing more learners than the rest of the platforms. By implication, despite Abuja's structural advantages as the nation's capital (Eze & Nwande, 2022), the dominance of Udemy suggests that a significant majority of K-12 schools within the territory rely primarily on a single Edtech platform, which may not be fully tailored to the diverse curriculum structure of all schools.

Evidence from existing literature suggests that the accessibility of e-learning platforms is largely facilitated by Nigeria's favourable policies such as the National Digital Economy Policy and Strategy (NDEPS) and various national initiatives to foster digitisation (Olorundare et al., 2022; Chinedu, 2022). Earlier policies, such as the National Policy on Education

(NPE), the Nigerian National Policy for Information Technology (NNPIT), the Nigerian National Policy for Information Technology (NNPIT), the National Information and Communication Technology Policy (NICTP), and the National Policy on ICT in Education (NPCITE) were directed at integrating digital tools in teaching and curriculum delivery (Bello & Ajao, 2024).

However, evidence suggests that despite the vastness of these policies, there were inconsistencies and wide variations in their implementation. These challenges associated with digital integration were as prevalent in private schools as they were in public basic schools. The most pressing issues included: unequal access to affordable technology between the two student demographics, unreliable power supply, limited internet connectivity, shortage of skilled instructors, high cost of digital devices, outdated curricula, corruption and unethical practices (Chinedu, 2022; Bello & Ajao, 2024). In a bid to enhance the use of digital platforms despite structural constraints, more recent policies like the Digital Framework for Technology Integration in Education and the National Policy on Information and Communication Technologies (ICT) was developed to provide adequate guidance on the expectations of all stakeholders in the process of ICT integration in education and to manage the specific needs of the Nigerian basic school system such as teacher training, community participation, and policy alignment (DailyTrust, 2023).

2.3 Challenges Affecting Digital Learning

Scholarly discourse underscores a range of challenges affecting the advancement of digital learning in Nigeria, and specifically within Abuja. One significant challenge identified is the deficiency in digital literacy skills among teachers (Chama & Subaveerapandiyan, 2023; Agarry et al., 2024). Studies about e-learning in Nigeria show that a large number of teachers in Nigeria lack experience with digital tools (Fernando & Jain, 2022). This is due to factors such as insufficient training and outdated digital infrastructure. Despite the assertion by Farooq and Nauman (2023) that awareness of these tools exists, the competence required to design lesson plans, utilise communication media, plan digital lesson notes, and engage students online remains a primary challenge faced by these teachers. Regardless of these challenges, the surge in digital educational requirement has consequently necessitated that teachers become more invested in tech education to overcome the constraints of conventional education. Government initiatives targeted at providing training and enhancing the digital skills for students is another effective option.

Another major challenge is the inadequate infrastructure in the Nigerian system (lack of electricity and poor internet accessibility). Mbaleki et al. (2023) found that in South Africa, a lot of students scramble to use technology due to the epileptic nature of power supply. The universities have had to resort to power supply rationing which the authors refer to as load shedding. Another study done in a Delta state university revealed that the e-library is only powered for two hours during working hours, leaving the remaining hours of work unproductive for both teachers and students. In Abuja, revealed that internet and electricity connectivity is relatively better in urban areas than many rural areas. Despite the technological advancements in the educational sector, instability in electricity supply and poor internet connectivity remain significant barriers to the efficacy of teaching and learning. The study by Imhanyehor (2022) affirms that in most Nigerian basic schools, the shortage of digital tools, slow internet, and the lack of electricity significantly affects access to e-learning platforms.

Resistance to change is another challenge identified in the literature (Al-Takhayneh et al., 2022). According to Amdur (2022), the illiterates of the 21st century are not those who cannot read nor write but those who cannot learn, relearn, and unlearn. In alignment with Toffler's assertion, Amdur (2022) posits that literacy is not defined by basic reading and writing, but by the ability to learn, unlearn, and relearn in an evolving digital landscape. This, regrettably, is the reality of many teachers in Nigerian schools. It is such that even when infrastructure and the right policy support exist, institutional, psychological, and cultural factors play a major role in igniting resistance among these teachers. Al-Takhayneh et al. (2022) contend that this resistance typically stems from the perception that accepting digital innovation conflicts with their belief structure or their preference for traditional teaching methods. Moreover, Farooq and Nauman (2023) claim that some teachers have low trust in the effectiveness of these digital tools when compared to their own competence level. The perception is usually that their competence is superior to the effectiveness of the digital tools. In Nigeria, especially Abuja, it was reported that as soon as the challenges of the Covid pandemic waned, many schools, through the influence of the teachers, were quick to revert to conventional teaching methods. The resultant effect of this was that the momentum for e-learning significantly diminished. Similarly, a study conducted in

Imo identified the lack of digital skills and access to the right resources as primary factors contributing to teacher resistance toward digital platform integration (Ikwuka et al., 2024).

Ultimately, the high cost of digital devices is another significant challenge that affects their adoption among teachers and learners in Nigerian schools (Akpan et al., 2025). The cost of installing and using digital devices appears in various forms, ranging from the initial setup of devices to the cost of internet data. For many middle- and low-income families, the financial burden of acquiring digital devices and maintaining internet connectivity limits consistent access to digital platforms. Abdulmajeed et al. (2020) concluded that the parents' socio-economic background influenced the education of their children. This means that unemployment and low-income households negatively impact lifestyles and put a strain on the ability to afford digital devices and other learning resources. The argument of the authors was in line with another interesting article that states that income and social class is logarithmically associated with the surface area of the brain (Noble et al., 2015). Therefore, socioeconomic inequality affects cognitive development. This reality is proof that the existing learning and accessibility divide between the private and public-school systems has been initiated by the use of digital platforms.

3 Methodology

3.1 Research Design

This study adopts an open-ended qualitative design to explore how digital learning tools are shaping K–12 education in Abuja. The qualitative approach is ideal for understanding lived experiences and uncovering complex issues that cannot be quantified (Creswell & Poth, 2018). Since the study focuses on teachers' and students' perceptions, their daily realities, and the contextual challenges of using digital learning platforms, qualitative inquiry provides the flexibility to capture opinions, emotions, and explanations in natural settings. The aim is not to generalise findings but to generate in-depth insights into how technology, infrastructure, and policy interact within Abuja's education system (Nowell et al., 2017).

3.2 Sampling and Participants

The study population consists of teachers, school administrators, and education policy officers in the selected public and private schools within Abuja. Purposive sampling was appropriate because the research required participants with direct experience using digital learning tools. Random sampling would include individuals with no exposure to the phenomenon, which would weaken insight (Bryman, 2018). Therefore, a purposive sampling strategy was employed to select participants with direct experience in utilising digital learning tools, ensuring informed professional perspectives. This was done with the aim of having a heterogeneous sample of the difference in school type, socioeconomic background, and digital access. The study's target population comprised a total of 20 respondents, including 10 from private schools, 8 from public schools, and 2 education officers in the Federal Capital Territory (FCT) Education Board. This combination will guarantee the inclusion of both well-prepared and under-prepared schools in the debate (Palinkas et al., 2015). Twenty participants were selected because qualitative studies reach saturation with 12–30 interviews when participants share similar experiences (Guest et al., 2020). The sample size was adequate to capture variation across school types while still allowing deep engagement with each participant.

3.3 Data Collection

The collection of data was done using semi-structured open-ended interviews. The interviews took between 30 and 45 minutes and were performed online through Zoom or Google Meet (or as a real-life meeting). The four primary areas that were covered by the interview questions were (1) the experiences of using digital learning tools that teachers had, (2) the challenges and opportunities of digital adoption, (3) the perceptions that teachers have about student engagement and outcomes, and (4) how school policies and training can support the use of technology. Open-ended questions enabled participants to articulate their perspectives without constraints, offering context-specific insight that closed-ended questions might have overlooked (Braun and Clarke, 2021). The interviews were tape recorded at the consent of the participants and subsequently transcribed verbatim to be analysed.

3.4 Data Analysis

The data that were transcribed was analysed through thematic analysis in accordance with the six-step model suggested by Braun and Clarke (2006). It was done through familiarisation with the data, making initial codes, finding themes, revising and naming themes, and issuing the final report. The data were coded and structured with the help of NVivo software. Themes were created inductively, whereby patterns would come out naturally as the participants respond. The key themes that will be anticipated are the competence of the teacher, the infrastructure difficulties, the policy congruence, and the digital disparity. Such an analytical method will guarantee results anchored in the opinion of the participants and analytical rigour (Nowell et al., 2017).

3.5 Ethical Considerations

The study received ethical approval from the Nexford University Research Ethics Committee. All participants provided informed consent and were assured of confidentiality throughout the process. Pseudonyms were assigned during reporting to protect identities. Data were stored securely and used only for academic purposes. Participants were informed of their unrestricted right to withdraw at any stage without consequences, which strengthened trust and upheld core principles of qualitative research rigour (Lincoln and Guba, 1985).

4 Results Presentation

4.1 Analysis

This analysis employed Braun and Clarke's thematic approach to examine open-ended responses from teachers and learners in Abuja's primary and secondary schools. The goal was to understand how digital tools are utilised, what works well, and what problems make adoption difficult.

Demographic Analysis

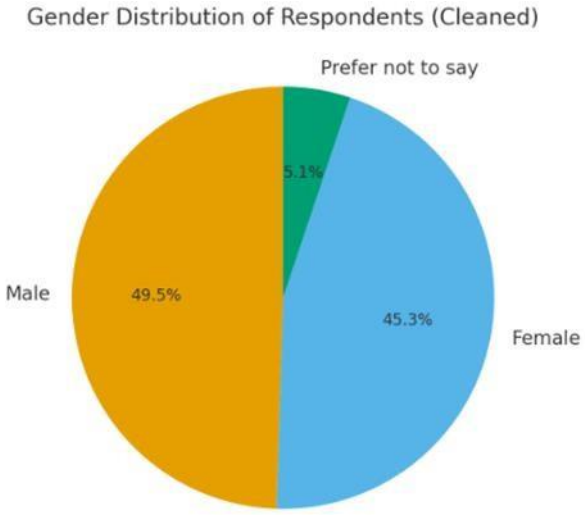

Figure 2 Gender Distribution of Respondents

The survey shows that 50.5% of participants identified as male, 46.3% as female, and 3.2% preferred not to say. This near balance between male and female respondents reflects diverse participation across the sample, ensuring that gender perspectives were well represented in the study's findings and analysis.

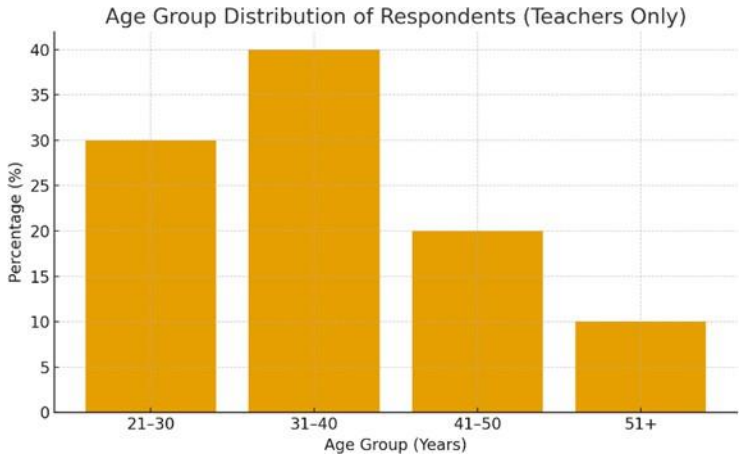

Figure 3 Age Group Distribution of Respondents

Most respondents were between 31 and 40 years (40 percent), representing mid-career teachers with extensive classroom experience. Younger teachers aged 21 to 30 years accounted for 30 percent, indicating substantial participation from early-career educators who typically report higher digital adaptability. Teachers aged 41 to 50 years formed 20 percent of the sample, while those 51 years and above represented 10 percent and described greater difficulty adapting to digital tools.

Table 1 Summary of Themes from Thematic Analysis

Theme	Core Ideas	Practical Implications / Insights
Accessibility and Infrastructure	- Internet access and data cost are major barriers. - Power outages disrupt classes. - Many students rely on smartphones; few own laptops. - Unequal access between public and private schools.	- Provide free or subsidised data for students and teachers. - Invest in school Wi-Fi, solar backups, and device-sharing schemes. - Prioritise equitable digital access across schools.
Teacher Digital Competence and Pedagogy	- Some teachers use technology effectively with videos and live sessions. - Many just upload notes with little interaction. - Limited ICT training for teachers. - Some prefer traditional boards due to a lack of skills or power issues.	- Provide continuous ICT and e-pedagogy training. - Encourage multimedia teaching (videos, quizzes). - Support teachers with stable internet and tech support.
Student Engagement and Motivation	- Learners enjoy interactive lessons and quizzes. - Boredom occurs when lessons are text-heavy. - Students want gamification and rewards (badges, points). - Motivation is social—participation from peers matters.	- Add gamified elements and social learning spaces. - Use competition and reward systems. - Make content visually engaging to sustain interest.
Content Quality and Personalisation	- Content is often clear but lacks depth and interactivity. - Students want richer explanations and varied formats.	- Combine text with multimedia and practice tools. - Introduce adaptive learning paths.

	- Desire for personalisation based on hobbies, learning style, or pace. - Teachers see need for adaptive tools.	- Include localised and interest-based materials.
5. Policy Gaps and Equity Issues	- No consistent school policy for e-learning integration. - Many schools ban phones or restrict platform use. - Teachers self-fund internet/data. - Digital divide between public/private learners.	- Create national/school-level e-learning policies. - Provide funding and data support for teachers. - Design inclusion programs for low-income learners.

4.2 Findings

Theme 1: Accessibility and Infrastructure

A significant majority of respondents prioritised access. Students and teachers agreed that poor internet and unstable electricity are the biggest barriers to digital learning. One student mentioned using e-learning platforms at home as "difficult because you have to buy data", while another noted that it only works "when there is a strong network signal." These comments reflect the reality that data in Nigeria is expensive, and many families cannot afford to stay connected for long hours. Teachers face the same issue. One teacher admitted that they need "a good network for the teachers" before lessons can run smoothly. Another described trying to prepare digital lessons only to lose power halfway through. Several respondents shared that even when schools have computers, frequent power cuts make it impossible to use them consistently. Most learners stated that they rely on smartphones rather than laptops or tablets. While mobile phones help bridge the gap, they also have limits. Some students complained that certain apps were "not compatible with my device," or that they had to borrow their parents' phones, which means they could not access learning tools whenever they wanted. Despite these barriers, a few learners from private schools or well-connected homes explained that they could log in daily without problems, describing the process as "conveniently easy." This difference between students with access and those without shows how digital learning can deepen inequality if infrastructure gaps persist.

Theme 2: Teacher Digital Competence and Pedagogy

The data revealed that access to technology does not automatically mean it is well utilised. Many students identified teachers who simply upload notes and leave them to read on their own. As one student puts it, "our teacher just posts too many notes." Others noted that teachers assign online work without clear instructions, which makes learning stressful rather than interactive. From the teachers' side, some admitted they find digital platforms hard to use or time-consuming. One teacher confessed that they still prefer using "the chalkboard" because "it doesn't require electricity." This shows not only a comfort with traditional methods but also a lack of training on how to use modern tools effectively. Still, there were positive examples. A few students praised teachers who used live classes and short videos, describing them as "very interactive" and "easy to follow." Teachers who use multimedia seem to keep students' attention longer. But such examples were rare—most participants indicated that teachers need more training. Both students and teachers believe that professional development is necessary. Teachers want structured workshops and technical support. Students suggested that their teachers learn how to make lessons "fun, visual, and not just reading." As one teacher survey question asked, "What features are most important when using educational technology platforms?"—the most common answers were interactivity, simplicity, and ease of navigation.

Theme 3: Student Engagement and Motivation

Students desire that learning be engaging, not coercive. Across the learner surveys, many admitted that they stay engaged only when lessons include games, quizzes, or visible progress tracking. One learner explained that what they enjoy most are "assessments, quizzes, and games at the end of each session." Another mentioned that they participate more when "everybody's involved," meaning classmates and teachers contribute together. But many others said online learning feels dull. One student described the platform as "just work", saying nothing about it was fun. This shows that

motivation drops when digital platforms are not designed for engagement. Learners suggested improvements such as "more games, videos, and colourful visuals." When asked what motivates them to keep using a platform, many said they liked rewards or recognition. Several mentioned that digital badges or scores make them want to complete more lessons. A few even joked that being rewarded with free data would motivate them more. These simple comments carry an important point: gamification—like badges, points, or progress meters—can make learning feel rewarding instead of stressful. Teachers supported this idea too. They noted that when students compete in online quizzes or group discussions, participation improves. A teacher mentioned that "students pay more attention when there are interactive activities."

Theme 4: Content Quality and Personalization

Students' opinions on content quality were mixed. Many said the materials were helpful and easy to understand. One learner shared that their platform provided "past exam questions and explanations that help me understand better." Others liked that the lessons were short and clear. These responses show that students value simplicity and relevance. However, several complained that the content "doesn't go in-depth" or feels repetitive. Some found it boring because it was mostly text with little video or interactivity. Others maintained they prefer more context-based examples or practical demonstrations. This echoes a point made by one of the students, who stresses that e-learning must offer "bite-sized, easy-to-understand, and engaging content" tailored to students' needs. Personalization also came up repeatedly. Many learners said they wanted content that fits their learning style or hobbies. Some wanted subjects linked to their interests, like art, music, or coding. One student wrote that platforms should "let us choose what we want to learn more about." When asked about personalisation features, most learners said it was "very important" but "not effective right now." This means current systems are too rigid—they treat every student the same. Learners suggested that platforms should allow them to learn at their own pace or choose the difficulty level of activities. Teachers agreed, saying that digital platforms should offer different modes for different learners. For instance, some students prefer visuals while others like reading or hands-on practice.

Theme 5: Policy Gaps and Equity Issues

The last theme deals with the bigger picture—school and government policies. Many students and teachers perceive that there is no structured policy guiding how digital learning should be implemented in schools. One student said their school "doesn't allow phones," so they can only access e-learning tools at home. Another noted, "We only use the platform during holidays." These rules, though intended to reduce distractions, ultimately limit how often technology is utilised for learning. Teachers also observed that their schools seldom allocate funding or professional training for e-learning. Some rely on personal resources to buy data or devices. A teacher explained that there is "no support for internet use" and that they pay for their own connections. Without institutional support, digital learning depends on individuals' volition. The surveys indicated that private schools generally possess better infrastructure and more motivated staff, while public schools face the most significant challenge. Learners from wealthier families have smartphones, internet access, and sometimes tutors to guide them, but those from low-income backgrounds depend entirely on school resources. This creates a digital divide even within the same city. One practical suggestion from both groups was to make school ICT facilities available after hours, especially for students without home internet. Another idea was for telecom companies to partner with schools to offer cheaper educational data plans.

5 Discussion

This study reveals that online learning materials are revolutionising the Abuja learning landscape, but there are still numerous factors that influence its efficacy. Student and teacher data align with e-learning literature in Nigeria and the Sub-Saharan region. Consistent with previous research, infrastructure, educator proficiency, and policy facilitation influence digital learning outcomes in the area. Abuja encounters the same issues as Ghana, Uganda, and Zimbabwe: poor internet connectivity, high gadget prices, inadequate teacher training, and an ineffective institutional framework. This phenomenon is not peculiar to Nigeria alone; comparable challenges persist throughout the entire continent. Nigeria has challenges and aspirations for development.

The findings of Abuja are reflective of what the others (Trines, 2018; Sarpong, 2023) have indicated as the disproportionate distribution of e-learning implementation in Sub-Saharan Africa. Students and teachers in the survey discussed networks that were not reliable, expensive data, and inaccessible devices, which the literature also continues to mention. These issues are the largest obstacles of equal digital education. Indicatively, a study by Patel et al. (2018) concluded that rural-based schools in South Africa had significant issues with connexion, which was virtually the same scenario as is the case with teachers in Abuja at the moment. Some schools completely rely on mobile phones as there are no working computer labs and Wi-Fi networks. This reliance on mobile devices resembles other studies that were conducted by Oats et al. (2019), where many learners in Africa resort to mobile learning due to its convenience and flexibility. Nevertheless, mobile phone learning has its limitations—small screens, small data, incompatibility, which students of Abuja likewise lamented. It substantiates the idea that mobile access has enhanced inclusion but it has not addressed the structural issues on the ground.

One of the similarities between the current results and the previous literature is the contribution of infrastructure in determining success. Mukabagorora et al. (2023) and Efenedo and Edegbo (2023) observed that despite the existence of e-learning policies, lack of proper infrastructure particularly electricity and internet have remained a limiting factor to its effectiveness. These frustrations were experienced by the participants in Abuja. Educators mentioned a potential for compromised classroom management or being unable to utilise projectors due to inconsistent power supply. Students claimed that their devices would frequently run out of charge before they could complete tasks. This is what Mbaleki et al. (2023) termed as power rationing which has become an ordinary phenomenon in African schools. The results thus support the perception that the survival of technology-based education is not possible in the absence of consistent infrastructure. To enhance digital learning in Abuja, prioritising electricity, internet investment and affordable data services is essential.

A secondary theme emerging from the research concerns the skills and attitudes of teachers. Majority of the teachers in Abuja find it difficult to employ digital tools regardless of their access. The problem is the same and recurrently mentioned in scholarly literature. According to Chama and Subaveerapandiyan (2023), the absence of digital literacy among teachers is still one of the main issues in Africa. Similarly, Fernando and Jain (2022) defined digital illiteracy as one of the most harmful hurdles to online learning. These studies validate the self-reported challenges of teachers in Abuja, who indicate the lack of sufficient training to plan, structure, and execute lessons via digital platforms. The findings suggest that teachers possess the willingness to evolve but they have not been trained adequately to embrace technology. The same tendency was found by Farooq and Nauman (2023), who reported that the level of awareness of digital tools was high in Pakistan, but the level of competence was low. This analogy can be used to understand why despite teachers in Abuja attempting to utilise e-learning platforms, they simply post the text notes or homework rather than engage the students in interactive learning. Insufficient digital skills in teaching restrict the possibility of e-learning and influence the experience of online learning amongst students.

According to the results, the students also appreciate teachers who employ interactive style in their lesson, which supports the idea by Mutale et al. (2025) that effective e-learning relies not only on the use of technology by teachers but also on how they use it. Students are more engaged when they are organised through live sessions, videos shown by teachers, and games. This aligns with the observation by Jibrin et al. (2024) that students in properly-designed online spaces report higher satisfaction and improved academic performance. Conversely, in the event that teachers are not digitally confident, students lose interest. It is therefore obvious that the teachers must be continuously trained. Both Chinedu (2022) and Bello and Ajao (2024) emphasised that the education policies in Nigeria must be aimed at addressing the issue of equipping teachers with ICT infrastructure as well as capacity to make effective use of the latter. The results of Abuja indicate that this is yet to take place on the necessary magnitude.

This further aligns with the current discourse on the engagement and motivation of students. Abuja students indicated that they prefer learning in the form of games, quizzes, and interacting activities, which is also what Maune (2023) found out in Zimbabwean universities, where students learn better when they are not just an audience, but participants. Engagement requirement is also related to the importance of perceived usefulness and enjoyment in the adoption of technology as found by Oats et al. (2019). Students lose focus when the site is overly textual or repetitive as a number of the respondents in this research asserted. This emphasises the issue that Sarpong (2023) identified in Ghana, where students no longer had much interest since the digital material was not varied and interactive. In both, the inability to make learning enjoyable undermines the motivation, and constrains the benefits of e-learning. Digital learning can thus

be made more appealing to the Nigerian students through the use of gamification, social participation and recognition systems.

The researchers also discovered that a significant number of students in Abuja desire individualised learning experiences. They would like to curate their subject, regulate their learning pace and engage with contents that appeal to them. The personalisation recommendation also reflects the recommendation given by Mukubagorora et al. (2022), who noted that individualised learning plans are likely to address the shortcoming of a traditional classroom, which is the one-size-fits-all approach. The desire to personalise among students in Abuja is an indication of the change towards self-directed learning, and this would greatly enhance the results should such change be backed by improved technology and versatile platforms. Nonetheless, according to the literature, adaptive learning characteristics demand powerful technical infrastructures and stable data analytics, which many Nigerian platforms are still facing a backlog (Agarry et al., 2024).

Another thematic area where the results align with earlier findings is the quality of the content. The content of most students in Abuja was seen as something that is not too difficult but at times too superficial or repetitive. Such complaints were also voiced by Imhanyehor (2021), who noted that in Nigeria, primary schools tend to utilise the digital materials which are not well developed and updated. The outcome is that the students read materials that are not profound or pertinent. Even with the availability of large learning e-learning systems such as ULesson and Tuteera, this problem continues to exist as these systems have gone a step further to enhance accessibility. Consistent with the current body of knowledge, the market of e-learning is expanding fast in Nigeria, yet the quality assurance is not very stable (Olorundare et al., 2022). To illustrate, although ULesson has several million downloads and lessons, not everyone is using the same resources equally due to the difference in content design and teacher support depending on the location and income level. This supports the necessity to have tougher content curation and quality control policies.

One of the most effective links that exist between the current findings and the established body of knowledge is socioeconomic inequality. The cost of devices and internet connectivity was noted repeatedly as a barrier by students and teachers. This corroborates the findings of Akpan et al. (2025) who revealed that the affordability of the digital devices and the affordability of the internet subscriptions ensure that many Nigerian families cannot afford regular access to the internet. Abdulmajeed et al. (2020) also associated this with the socioeconomic background, as children born in low-income households are less likely to utilise online learning materials. This digital divide is still highly apparent as it was found in Abuja. Students are able to log in on a daily basis in private schools using personal devices, and in public schools, some of the students are forced to borrow phones with their families. This is similar to what Legg-Jack (2021) reported when the COVID-19 pandemic struck and urban students were able to resume their learning online while the rural students were left behind. The gap is not just in economic terms but also in geographic terms as the city centres have more connectivity than the rural districts, and thus the gap is further increased.

Furthermore, the study identifies resistance to change among teachers. There are teachers who are more comfortable using chalkboard than the computer and want to use the traditional way of teaching. The described attitude is consistent with the perspectives of Al-Takhayneh et al. (2022), who outlined how psychological resistance usually occurs because of the fear of losing control or becoming incompetent in an online classroom. Farooq and Nauman (2023) also came across a similar observation that teachers do overestimate their ability to teach traditionally compared to the possibilities provided by technology. This resistance is manifested in Abuja as unwillingness to adopt e-learning following the COVID-19 pandemic. As soon as schools were physically opened again, many educators and school leaders rushed to face-to-face education, undermining the digital education business. This result is comparable to the one provided by Ikwuka et al. (2024), who discovered that in Imo State, Nigeria, low digital skills and inadequate access to resources are factors that directly impact the reluctance of teachers to implement new systems. To overcome this attitude, it is necessary not only to train the teachers but to provide them with institutional support and recognition of those who are ready to adopt digital innovation.

A further point of convergence between the current discourse and previous findings is policy inconsistency. Nigeria has come up with various frameworks, the National Policy on ICT in Education, the Digital Economy Policy, and most recently the National Policy on Information and Communication Technologies but as Bello and Ajao (2024) and Chinedu (2022) pointed, all these policies have remained poorly enforced. This was affirmed by the respondents in Abuja who said that schools do not have the support, finances, or direction to implement such policies in their day-to-day activities. Indicatively, some schools prohibit use of phones, whereas others do not have an e-learning policy. The absence of

policies is not the problem but the lack of structured implementaton. Similar policy gap is also found to be associated with corruption and ineffective accountability systems in the works by Olorundare et al. (2022) and Okeke (2023), which further postpones the gains of digitisation. The current results concur that these policies will not affect the classroom experience significantly until the implementation is made stronger.

Another contribution to the body of knowledge is the fact that digital learning could be successful, however, some peculiarities should be taken into account. Online learning offers flexibility and accessibility; therefore, students are willing to adopt online learning as Jibrin et al. (2024) and Vincent et al. (2024) demonstrate that the intention to online learning occurs when there are proper infrastructure, teaching assistance, and affordability. This was also observed in Abuja where students who had good internet connectivity and support by teachers had more positive experiences than those who did not. These similarities with other African realities confirm the fact that it is not the problem of culture but of structure. Both teachers and students are constrained by structural deficiency that fail to provide necessary infrastructure and support for proper digital transition.

6 Conclusions

In conclusion, this study has established that digital learning in Abuja is limited by structural issues in the nation as regards digital infrastructure, pedagogy, capacity, and governance. Based on the findings from the participants selected for this study, it is evidenced that insufficient digital infrastructure and unreliable internet connectivity are the major obstacles to the adoption of digital tools for learning and teaching. The lack of digital competence among teachers is also a significant limitation affecting the successful incorporation of digital tools in classroom teaching, as most teachers tend to use them rarely. Additionally, the inability to personalise these digital tools to suit the learning needs of respective students affects student engagement and desire to learn through digital tools. Lastly, the unequal distribution of access between school types and policy loopholes indicate the lack of coordinated systems to normalise the integration of digital learning tools within the FCT. These identified limitations point to the need for Abuja to adopt a more inclusive, deliberate and strategic approach to digital learning.

6.1 Recommendations

Based on the findings highlighted in the conclusive statements, the study makes the following recommendations:

Enhance Digital Infrastructure and Connectivity

The education board in FCT Abuja should prioritise investing in trusted internet connection platforms and digital learning equipment to be used in both the public and private schools in the state. This investment should also include convincing Edtech firms and Telecom services to collaborate with the Nigerian government to provide subsidised broadband and device implementation.

Improve Pedagogy and Teacher Digital Competence.

School administrations are encouraged to introduce compulsory professional development courses that will assist teachers in acquiring the requisite skills of digital education, platform management, and content development supported by technology. It is pertinent that training is made practical and incorporated into day-to-day learning and instruction.

Develop and Implement Policies and Standards for Digital Learning

To enhance digitisation of education in K-12 Abuja schools, an integrated digital learning tool is required to help direct the integration of the curriculum, choice of platforms, expectations of teachers, privacy of data, and protection of students. The inequalities affiliated with digital technological access among socio-economic groups should also be addressed in this policy.

Improve Student Interaction with Localised and Interactive Content on digital platforms.

This study recommends that the creation of interactive and curriculum-oriented materials on digital platforms should be tailored to suit K-12 learning requirements. Motivation of students to encourage learning can be enhanced with the help of gamification and simulation materials that are suited to the culture and social structure of the society.

Encourage Equity in Access Programs.

The government should provide specialised interventions such as data plan subsidies, free learning centres, digital device sharing programs, and usable digital tools. These interventions should promote inclusivity and equity by ensuring unbiased access to programs that support digital learning.

6.2 Limitations and Future Research Directions

This study has a significant number of methodological and contextual limitations, which are deducible from the results of the study. The study relies on self-reported information acquired from students and teachers in Abuja. This might result in response bias, especially because the study was done in an atmosphere where both teachers and students feared challenging the school authority and the government policy. Additionally, the sample data was gathered strictly from teachers, school administrators, and education policy officers in selected public and private schools within Abuja schools. This implies that the views and findings from the selected group might not reflect the views of other teachers and students within the six Area Councils in Abuja, particularly in rural areas where digital limitations are more extreme. Further, the study was focused on subjective digital learning experiences and did not include objective technological infrastructure quality tests, device audits, or bandwidth testing that would have improved the findings of the study. The duration of the study was also relatively short, and this did not allow the researcher to record relevant changes that occurred over time. Lastly, the research did not capture the exact socio-economic gap in Abuja households that affect the availability of digital devices, electricity supply, and parental digital know-how.

These limitations imply that studies that require larger samples are expected to learn more about digital learning preparedness among learners and teachers in the Abuja K-12 school system. Future research should focus on identifying sustainable strategies for incorporating EdTech in K-12 schools, particularly in areas like Abuja where traditional face-to-face approaches are still prevalent. Future studies need to examine the impacts of digital infrastructure, teacher competence, and socio-economic inequalities on technology adoption and learning outcomes.

Acknowledgement

The authors wish to express their sincere gratitude to all the teachers, school administrators, and education officers in Abuja who participated in this study. We also acknowledge the Federal Capital Territory (FCT) Education Board for facilitating access to the selected schools. Special thanks to the students who generously shared their experiences and insights on digital learning platforms.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data availability statement

The qualitative data generated during this study, including interview transcripts, are not publicly available due to ethical considerations and participant confidentiality agreements. However, anonymised data summaries may be available from the corresponding author upon reasonable request and with appropriate ethical approval.

Conflict of Interest

The authors declare no conflict of interest. The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Declaration of Use of Generative AI

Following Elicit Publishing Limited's commitment to research integrity and ethical publishing, the author(s) declare that generative AI tools were utilised strictly for editorial purposes; specifically for grammar improvement and formatting consistency. No AI-generated content influenced the study's methodology, analysis, or findings. Full accountability for the accuracy and scholarly integrity of this work rests with the author(s).

References

Abdulmajeed, K., Joyner, D., & McManus, C. (2020). Challenges of Online Learning in Nigeria. 20, 417-420. https://doi.org/10.1145/3386527.3405953

Agarry, R., Babalola, M., & Jacob, P. (2024). Teachers' Perception of Digital Literacy Skills as a Tool for 21st Century Teaching in Nigeria. University of Dar es Salaam Library Journal, 19(1), 57-69. https://doi.org/10.4314/udslj.v19i1.5

Aina, J. (2017). The lack of good governance in Nigeria and its impact on functional science education. International Journal of Development and Sustainability, 6, 1036-1047. https://www.researchgate.net/publication/320410435_The_lack_of_good_governance_in_Nigeria_and_its_impact_on_functional_science_education

Akpan, A., Atabang, A., & Udofia, S. (2025). Online Learning Platforms and Bridging of Digital Knowledge Gap among Postgraduate Students in Akwa Ibom State. International Journal Of Education Framework (Ijefa), 5(1), 43-56. https://www.researchgate.net/publication/394362897_Online_Learning_Platforms_and_Bridging_of_Digital_Knowledge_Gap_among_Postgraduate_Students_in_Akwa_Ibom_State

Al-Takhayneh, S.K., Karaki, W., Hasan, R.A., Chang, B.L., Shaikh, J.M., & Kanwal, W. (2022). Teachers' psychological resistance to digital innovation in jordanian entrepreneurship and business schools: Moderation of teachers' psychology and attitude toward educational technologies. Front Psychology, 13(1), 1-15. https://doi.org/10.3389/fpsyg.2022.1004078

Aung, T., & Khaing, S. (2016). Challenges of Implementing e-Learning in Developing Countries: A Review. Advances in Intelligent Systems and Computing, 388, 405-411. 10.1007/978-3-319 23207-2_41

Bello, O., & Ajao, A. (2024). Digital Literacy and Skills Development in Nigeria: Policies, Barriers and Recommendations. Journal of African Innovation & Advanced Studies (JAIAS), 5(2), 133-150. https://www.researchgate.net/publication/383860373_Digital_Literacy_and_Skills_Development_in_Nigeria_Policies_Barriers_and_Recommendations

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021). To saturate or not to saturate? Qualitative Research in Sport, Exercise and Health, 13(2), 201–216. https://doi.org/10.1080/2159676X.2020.1770931

Chama, A., & Subaveerapandiyan, A. (2023). Digital Literacy Skills of Teachers: A Study on ICT Use and Purposes. Qeios, 28, 1-28. https://doi.org/10.32388/7VMIK7

Chinedu, O. (2022). Digitalization Driven Public Service And Service Delivery: The Nigeria's Experience. Journal of Public Administration, Finance and Law, 10(22), 1-8. https://doi.org/10.47743/jopafl-2021-22-05

Creswell, J. W., & Poth, C. N. (2018). Qualitative inquiry and research design: Choosing among five approaches (4th ed.). SAGE.

Efenedo, G., & Edegbo, W. (2023). Internet connectivity and power outages in university electronic libraries in Nigeria. Journal of ICT Development, Applications and Research, 5(2), 83-89. https://doi.org/10.47524/jictdar.v5i2.84

Eze, J., & Nwande, M. (2022). Abuja, the federal capital of Nigeria: reflections on city making and urban displacement policy. Journal of Advance Multidiscplinary Research, 1(2), 17-23. https://www.synstojournals.com/multi

Farooq, M., & Nauman, S. (2023). Teachers' Perceptions and Experiences of using Digital Technology in Undergraduate Classrooms in Pakistan. Journal of Social Sciences and Media Studies, 7(1), 54-62. https://doi.org/10.58921/jossams.07.01.0252

Fernando, J.G., & Jain, S.K. (2022). Digital Illiteracy of Teachers and its Impact in Online Learning. Technoarete Transactions on Application of Information and Communication (ICT) in Education, 1(3), 1-6. https://technoaretepublication.org/information-communication-technology/article/digital-illiteracy-teachers.pdf

Gyuse, G., Godwin, S., & Liam, O. (2024). Dwindling Quality Of Education In Nigeria: A Cause For Concern. Al Hikmah Journal of Education, 11(1), 94 - 105.

https://www.researchgate.net/publication/384844052_DWINDLING_QUALITY_OF_EDUCATION_IN_NIGERIA_A_CAUSE_FOR_CONCERN

Hazzan, M.K. (2024). Managing Nigerian Education System: A Blueprint for Economic Diversification and Emancipation. MDPI, 1-12. https://doi.org/10.20944/preprints202406.0802.v1

Ikwuka, O., Eleje, L., Iheanacho, E., & Onyebuchi, A. (2024). Teacher's Attitude towards the Use of Digital Technologies for Capturing Students' Data in Secondary Schools in Imo State, Nigeria. Futurity of Social Sciences, 2(4), 39-59. https://doi.org/10.57125/FS.2024.12.20.03

Imhanyehor, G. (2021). Digital Literacy And Primary Educational System In Nigeria. Journal of Public Administration, Finance and Law, 10(20), 206-221. https://doi.org/10.47743/jopafl-2021-20-13

Jibrin, M., Oyinvwi, U.V., & Ibrahim, A. (2024). Innovative Educational Technologies For Africa: Bridging The Digital Divide. International Journal of Educational Research and Library Science, 6(8), 97-108. https://doi.org/10.70382/tijerls.v06i8.008

Kotoua, S., Ilkan, M., & Kilic, H. (2015). The Growing of Online Education in Sub Saharan Africa: Case Study Ghana. Procedia - Social and Behavioral Sciences, 191 (1), 2406-2411. http://dx.doi.org/10.1016/j.sbspro.2015.04.670

Legg-Jack, D. (2021). Digitalisation Of Teaching And Learning In Nigeria Amid Covid-19 Pandemic: Challenges And Lessons For Education 4.0 AND 4IR. Il Ponte, 77(10), 156-178. https://doi.org/10.21506/j.ponte.2021.10.10

Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic inquiry. SAGE.

Maune, A. (2023). Adoption and use of eLearning platforms by universities in developing countries: Evidence from Zimbabwe. Cogent Education, 10(2), 1-13. https://doi.org/10.1080/2331186X.2023.2287905

Mbaleki, C. I., Elegbeleye, F., Esan, O., Rabotapi, T. (2023). Power supply rationing in an era of e-learning: evidence from the rural university. EUREKA Social and Humanities, 6(1), 1-12. https://doi.org/10.21303/2504-5571.2023.003184.

Mukabagorora, T., Habarurema, G., & Mukiza, J. (2022). Challenges Faced by the Implementation of E-learning Educational Approach during the Covid-19 Pandemic Disease. Journal of Education Technology, 6(2), 308-314. https://doi.org/10.23887/jet.v6i2.45534

Mutale, J. (2025). Post-COVID-19 Review: Challenges and Determinants of E-Learning Adoption with a Focus on Heritage-Based Curriculum in Victoria Falls Cluster, Hwange District Secondary Schools, Zimbabwe. International Journal of Research and Innovation in Social Science, IX, 58-78. https://doi.org/10.47772/IJRISS.2025.903SEDU0011

Noble, K. G., Houston, S. M., Brito, N. H., Bartsch, H., Kan, E., Kuperman, J. M., & Sowell, E. R. (2015). Family income, parental education and brain structure in children and adolescents. Nature Neuroscience, 18(5), 773–778. https://doi.org/10.1038/nn.3983

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. International Journal of Qualitative Methods, 16(1), 1–13. https://doi.org/10.1177/1609406917733847

Oats, R., Kapeko, R., & Kelebeng, K. (2019). Understanding Mobile Learning In Sub-Saharan Africa: Applying And Extending The Technology Acceptance Model. Mosenodi: Journal of the Botswana Educational Research Association, 22(1), 1-19. https://journals.ub.bw/index.php/mosenodi/article/view/1598?utm_source=chatgpt.com

Okeke, C.C. (2023, March 23). Poor power, unskilled teachers, cost of gadgets affecting digital education in Nigeria. DailyTrust. https://dailytrust.com/poor-power-unskilled-teachers-cost-of-gadgets-affecting-digital-education-in-nigeria/

Olorundare,. J., Olowe, A., & Olorundare, A. (2022). Digital transformation in Nigeria: The prospects and challenges of the gig economy. IEEE Nigercon, 1-5. https://doi.org/10.1109/NIGERCON54645.2022.9803148

Olusola, E., Fadipe, B. M., Obabori, H., Taofeeq, B., Ezekwudo, C., & Samiala, B. (2024). Impact Of Inadequate Infrastructure On The Effective Teaching And Learning Of Physics In Senior Secondary Schools In Bwari Area Council Of Abuja, Implications For Development In Engineering. International Journal of Humanities & social Science studies (IJHSSS), 4(4), 1281-1288. https://www.researchgate.net/publication/383456488_Impact_Of_Inadequate_Infrastructure_On_The_Effective_Tea

ching_And_Learning_Of_Physics_In_Senior_Secondary_Schools_In_Bwari_Area_Council_Of_Abuja_Implications_For_Development_In_Engineering

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. Administration and Policy in Mental Health and Mental Health Services Research, 42(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

Patel, N., Kadyamatimba, A., & Madzvamuse, S. (2018). E-Learning Adoption in Rural-Based Higher Education Institutions in South Africa. Open Innovations, 320-324. https://doi.org/10.1109/OI.2018.8535601

Rafiq, S., Iqbal, S., & Afzal, D. (2024). The Impact of Digital Tools and Online Learning Platforms on Higher Education Learning Outcomes. Al-Mahdi Research Journal, 5(4), 359-369. https://www.researchgate.net/publication/380734414_The_Impact_of_Digital_Tools_and_Online_Learning_Platforms_on_Higher_Education_Learning_Outcomes

Sarpong, R. (2023). Digitalisation of Education in Ghana: An Overview. Teacher Education Journal of Bangladesh, 2(1), 97-106.
(TEJB)https://www.researchgate.net/publication/377255805_Digitalisation_of_Education_in_Ghana_An_Overview/citation/download?_tp=eyJjb250ZXh0Ijp7InBhZ2UiOiJwdWJsaWNhdGlvbiIsInByZXZpb3VzUGFnZSI6bnVsbH19

Trines, S. (2018). Educating the Masses: The Rise of Online Education in Sub-Saharan Africa and South Asia. World Education News+ Review, 1-10. https://www.researchgate.net/publication/327790405_Educating_the_Masses_The_Rise_of_Online_Education_in_Sub-Saharan_Africa_and_South_Asia

Vincent, O., Sam, Z., Rose, K., & University, A. (2024). E-learning Platforms and Access to Education: A Case Study of Makerere University. Metropolitan Journal of Science & Technology, 3(10), 724-738. https://www.researchgate.net/publication/385218208_E-learning_Platforms_and_Access_to_Education_A_Case_Study_of_Makerere_University

Vlasov, M. (2021). The higher education system as the driving force of the country's sustainable development. E3S Web of Conferences, 258 (10006), 1-9. http://dx.doi.org/10.1051/e3sconf/202125810006

Yidana, P., Asapeo, A., Laar, S., & Chibelitu, L. (2023). Challenges Facing Online Teaching And Learning In African Higher Education Institutions: Empirical Review. European Journal of Open Education and E-learning Studies, 8(2), 133-158. https://doi.org/10.46827/ejoe.v8i2.4974