DETERMINANTS OF ACCESS TO E-LEARNING PLATFORMS AMONG RURAL VS URBAN STUDENTS OF DISTANCE LEARNING IN ADAMAWA STATE, NIGERIA

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Abstract

Access to e-learning platforms has become a fundamental requirement for effective participation in distance education, particularly within regions such as Adamawa State, Nigeria, where socio-economic and infrastructural disparities remain pronounced. This study examines the determinants influencing access to e-learning platforms among rural and urban students enrolled in distance education programmes across the state. Guided by the Digital Divide Theory and the Technology Acceptance Model (TAM), the study focuses on key variables including availability of digital devices, internet connectivity, affordability of data, electricity supply, digital literacy, socio-economic background, and institutional support mechanisms. A descriptive survey research design was employed, targeting distance learners from higher institutions operating within Adamawa State. Data were generated through a validated structured questionnaire administered to both rural- and urban-based students. The collected data were analysed using descriptive and inferential statistics to identify significant differences in determinants of e-learning access between the two groups. Findings reveal substantial disparities: urban students report better internet connectivity, more consistent electricity supply, higher ownership of smartphones and laptops, and greater exposure to digital skills training. In contrast, rural students face challenges such as poor network coverage, high cost of data, inadequate digital devices, intermittent electricity supply, and limited digital competence. Socio-economic status emerged as a major determinant across both settings, influencing students' ability to afford devices, stable internet access, and supplementary learning resources. The study concludes that the rural–urban gap in e-learning access constitutes a major barrier to equitable distance education participation in Adamawa State. It recommends targeted interventions, including expansion of ICT infrastructure in rural communities, subsidized data and device support for disadvantaged learners, integration of digital literacy programmes, and strengthened institutional technical support. Addressing these determinants is essential for enhancing inclusive access and improving academic outcomes for distance learners across the state.

Keywords: e-Learning, Rural/Urban, Distance Learning.

Introduction

Distance education has become a central component of modern higher education systems across the world, driven largely by the rapid advances in information and communication technologies (ICTs). The evolution from correspondence-based distance learning to digitally mediated, interactive learning environments marks a significant shift in the way learners access

educational content, interact with instructors, and engage with peers. In Nigeria, the increasing adoption of e-learning in universities and open-distance learning centres reflects both global trends and the local need to expand educational access to populations who may not be able to participate in traditional classroom-based programmes due to occupational, geographical, or socio-economic constraints (Adeoye & Adanikin, 2021). As a result, e-learning platforms such as Learning Management Systems (LMS), mobile learning applications, virtual classrooms, and online resource repositories have become important tools for delivering distance education.

In Adamawa State, Nigeria, distance education has gained prominence due to the state's demographic structure, widespread rural settlements, and the demand for flexible learning opportunities among working adults, civil servants, teachers, and individuals pursuing higher qualifications. Institutions such as Modibbo Adama University (MAU), Ahmadu Bello University, Zaria (ABU), Iconic Open University, and the National Open University of Nigeria (NOUN) operate within the state to provide various academic programmes via distance and blended learning modes. These institutions rely on digital platforms for assignment submission, content dissemination, virtual lectures, and academic communication. However, the effectiveness of such platforms is strongly dependent on learner access, which is influenced by a variety of factors including internet connectivity, electricity supply, affordability of data, ownership of digital devices, digital skills, and socio-economic background.

Despite the transformative potential of e-learning technologies, significant access inequalities persist between students in urban and rural areas of Adamawa State. Urban communities such as Yola North, Yola South, and Mubi enjoy comparatively better ICT infrastructure, multiple mobile network providers, more stable electricity, and greater exposure to digital tools. Conversely, rural communities such as Maiha, Shelleng, Guyuk, Lamorde, and Michika struggle with limited telecommunication coverage, frequent power outages, poor ICT penetration, and generally lower socio-economic conditions. These structural disparities have implications for educational equity, learner engagement, and academic performance among distance education students.

Scholars have noted that access to e-learning is multidimensional, involving not only physical access to devices and internet, but also skills, readiness, institutional support, and socio-economic factors (van Dijk, 2020; Yahaya & Musa, 2023). The rural–urban divide in Adamawa State thus reflects broader national and global trends where geographically and economically disadvantaged learners face cumulative barriers to digital inclusion. For instance, while a student in Yola may easily attend a live Zoom session, download lecture slides, or participate in online assessments, a student in rural Toungo may be constrained by poor network connectivity, inability to afford mobile data, or lack of a functional laptop.

Furthermore, the COVID-19 pandemic highlighted the critical importance of e-learning access when educational institutions were forced to adopt remote learning modalities. Many Nigerian students especially those in rural areas struggled to adapt to online platforms, revealing systemic gaps that persist even in the current post-pandemic period (Isah & Ibrahim, 2022). In

Adamawa State, several institutions continue to implement blended learning approaches, making it essential to examine the determinants that influence learners' ability to participate effectively in e-learning.

Understanding these determinants is crucial for policymakers, educational institutions, and other stakeholders involved in distance education. Without addressing the factors that limit access to e-learning platforms, the goals of expanding higher education participation, improving academic outcomes, and promoting lifelong learning will remain unattained. This study therefore investigates the determinants of access to e-learning platforms among rural and urban students enrolled in distance education programmes in Adamawa State. It identifies the contextual, infrastructural, socio-economic, and institutional factors that shape access, with the goal of informing practical interventions aimed at reducing digital inequality and enhancing the quality and inclusiveness of distance education in the state.

Statement of the Problem

Despite Nigeria's growing adoption of e-learning technologies, noteworthy disparities persist in the extent to which students can access and benefit from these platforms (Oluwaseun, 2024; Aid et al., 2025). While distance education is intended to offer flexibility and reach learners across geographical and socio-economic strata, students from rural areas of Adamawa State face compounding barriers that limit meaningful participation in e-learning (Olanrewaju et al., 2021). These challenges include limited internet connectivity, unstable electricity supply, lack of affordable data, low device ownership, and insufficient digital skills issues that have been shown to disproportionately affect rural learners compared to their urban counterparts (Okeke & Nwosu, 2022; Aid et al., 2025).

In urban centres of the state, such as Yola and Mubi, infrastructure and technological resources are relatively better developed, enabling easier access to online course materials, virtual classrooms, and distance learning support services. In contrast, many rural communities within the state continue to struggle with poor or no mobile network signals, erratic power supply, and high costs of internet data relative to household incomes (Olanrewaju et al., 2021; Eteng et al., 2022). These disparities directly undermine the core objective of distance education to democratize access to education by creating a digital divide that not only limits access but also affects student engagement, learning outcomes, and long-term academic success.

The persistence of these barriers, despite national policy frameworks aimed at improving ICT access, suggests structural issues in policy implementation and resource allocation (Okocha & Edafewotu, 2025). In Adamawa State, where a significant proportion of the population resides in rural areas, the lack of empirical evidence around how these determinants operate specifically within local contexts further complicates efforts to design targeted interventions. Thus, this study investigates and compares the determinants of e-learning access among rural and urban distance learners in Adamawa State, with a view to informing evidence-based strategies for closing the digital divide and enhancing inclusive educational participation.

Literature Review

E-Learning and Digital Divide in Nigeria

E-learning has been widely promoted as a means of expanding educational access,

especially in contexts where traditional face-to-face education is constrained (Adedoyin & Soykan, 2020). However, a growing body of research highlights the digital divide the gap between those with and without meaningful access to technology as a major inhibitor of e-learning effectiveness globally and in Nigeria (Okocha & Edafewotu, 2025). In the Nigerian context, disparities are often observed across urban–rural, socio-economic, and infrastructural lines with urban areas benefiting from greater telecommunications infrastructure and resource availability than rural regions (Eteng et al., 2022; Aid et al., 2025).

Reports by national and international agencies show that only about 41.5% of Nigerian households have internet access, with rural communities substantially lagging behind urban counterparts in connectivity rates (Sasu, 2022, as cited in East African Journal of Education and Social Sciences, 2025). This systemic inequality restricts rural learners from fully leveraging e-learning tools and contributes to broader educational and economic disparities (East African Journal of Education and Social Sciences, 2025).

Internet Connectivity and Infrastructure

Internet connectivity remains a core determinant of e-learning participation. Numerous studies indicate that poor internet access in rural Nigerian communities limits students' ability to download course materials, engage in synchronous online discussions, and participate in video calls or virtual classrooms (Olanrewaju et al., 2021; Eteng et al., 2022). The lack of stable broadband infrastructure means rural learners often rely on slow mobile data connections, which are both less reliable and more expensive per megabyte than urban broadband alternatives (Eteng et al., 2022).

Electricity Supply and Power Infrastructure

Reliable electricity underpins digital learning without it, devices cannot be powered and internet modems cannot operate consistently. In rural areas, grid connectivity is often sporadic or non-existent, with frequent outages that disrupt learning schedules (Olanrewaju et al., 2021). Such conditions force learners to resort to costly alternatives like petrol generators or solar devices, which are not feasible or affordable for many households.

Ownership of Digital Devices

Device ownership, such as smartphones, tablets, or laptops, is critical for accessing e-learning platforms (Eteng et al., 2022). Studies reveal urban households have significantly higher rates of device ownership compared to rural ones, meaning that rural students often must share limited devices or rely on low-end phones with restricted capacity for complex e-learning tasks (Amulya Charan, 2024; Eteng et al., 2022). This disparity translates into limited engagement time and reduced effectiveness in navigating learning management systems.

Data Cost and Affordability

Cost is a recurring theme in the literature on digital exclusion. Mobile data in Nigeria is often expensive relative to average household incomes, particularly in rural areas where socio-economic conditions are poorer (Olanrewaju et al., 2021). High data costs affect not only access but also frequency and depth of engagement with content, with many learners limiting usage to essential needs such as communication or browsing rather than academic engagement.

Digital Literacy and Skills

Access alone does not guarantee meaningful participation in e-learning. Digital literacy the ability to use and navigate digital

platforms effectively is a significant determinant of e-learning success (Eteng et al., 2022). Research indicates that students from rural areas exhibit lower digital skills, often because of limited exposure and training opportunities, which further widens the effective use gap even when basic infrastructure is available (Eteng et al., 2022).

Socio-Economic Status and Household Context

Socio-economic status remains a structural determinant of e-learning access. Lower income levels in rural regions limit the ability of households to invest in digital devices, pay for reliable data, or provide supplementary learning support (Oluwaseun, 2024). Moreover, caregivers in rural areas may have limited education themselves, reducing the support they can provide for digital learning at home (Olanrewaju et al., 2021).

Institutional and Policy Support

Lastly, institutional support including training programmes, orientation on platform use, and technical help desks plays a positive role in facilitating e-learning access. However, literature suggests that many Nigerian educational institutions lack sufficient structures for ongoing training and student support, particularly for rural learners who may require more targeted engagement due to lower baseline digital skills (Dataproject, 2024; Aralu, 2014).

Methodology

Research Design

This study adopted a descriptive survey research design, which is appropriate for investigating the determinants of access to e-learning platforms among rural and urban distance education students in Adamawa State. The design enables the researcher to collect quantitative data from a large group of respondents and examine relationships, differences, and trends without manipulating any variables. Since the goal of the study is to assess existing conditions such as the availability of ICT tools, internet accessibility, socio-economic constraints, and digital literacy the descriptive survey method provides reliable insights into the real-life experiences of learners across diverse geographical locations. Similar studies assessing digital access and e-learning adoption in developing contexts have used survey designs due to their effectiveness in capturing variations across populations (Afolabi & Akinbobola, 2022).

Population of the Study

The population comprised all students enrolled in distance education programmes across selected institutions in Adamawa State, the centres are; National Open University of Nigeria (NOUN), Modibbo Adama University (MAU) Distance Learning Centre, Iconic Open University, Yola study centre and Ahmadu Bello University Zaria, Yola study centre. These institutions were selected because they represent the major providers of open and distance education in the state and make significant use of e-learning platforms for content delivery, communication, assessment, and administrative processes. The population includes both urban-based students (e.g., Yola North, Yola South, Mubi) and rural-based students (e.g., Madagali, Toungo, Lamorde, Guyuk, Shelleng, Maiha).

Sample and Sampling Techniques

A sample size of approximately 350 distance education students were selected to provide adequate representation. A multistage sampling technique was used: Stage One Institutional Selection; Three major institutions offering distance learning in Adamawa State were purposively selected.

Stage Two – Study Centres: Proportionate random sampling was used to select respondents from each centre based on their enrolment size. Stage Three – Simple random sampling was used to selected 175 respondents from rural areas and 175 respondents from urban areas. This approach ensures that both rural and urban students are adequately represented and that comparisons between the two groups are statistically meaningful.

Instrument for Data Collection

A structured questionnaire titled "Determinants of E-Learning Access Questionnaire (DELQ)" was used to collect data. The instrument is divided into five sections: Section A: Demographic information (age, gender, location, institution, programme). Section B: Access to ICT devices (smartphones, laptops, tablets, desktops). Section C: Internet connectivity and data affordability. Section D: Electricity supply and infrastructural readiness. Section E: Digital literacy, institutional support, and socio-economic factors. The questionnaire items were structured on a 5-point Likert scale ranging from "Strongly Agree (5)" to "Strongly Disagree (1)."

Validity of the Instrument

The questionnaire underwent content and face validation by experts in Educational Technology, Measurement and Evaluation, and Distance Learning. The validators assessed the clarity of statements, relevance of items, and alignment with the study objectives. Necessary revisions made based on expert feedback to ensure the instrument adequately reflects the variables under investigation.

Reliability of the Instrument

To ensure reliability, a pilot test was conducted with 30 distance learning students outside the main sample area. The responses were subjected to Cronbach's Alpha reliability test, yielding a reliability coefficient of 0.72. This confirmed the internal consistency of the instrument.

Method of Data Collection

Research assistants trained on the study procedures were administer the questionnaire using both online Google Forms and hard copies, depending on the respondent's location and internet access. Online administration targeted urban students who have stable internet access, while physical copies distributed to rural areas to capture participants with limited connectivity.

Method of Data Analysis

Data collected will be analyzed using both descriptive and inferential statistics. Descriptive statistics such as mean, frequency, percentage, and standard deviation were used to summarize participant characteristics and general access patterns. Independent samples t-test was employed to determine significant differences in access determinants between rural and urban students. Multiple regression analysis was also used to identify the strongest predictors of access to e-learning platforms among all students.

Results and Discussion

Demographic Characteristics of Respondents

A total of 327 questionnaires were retrieved and analyzed, representing a 93% return rate. Of these respondents, 58.1% (n = 190) were from urban study centres (Yola North, Yola South, Mubi), while 41.9% (n = 137) were from rural centres (Toungo, Guyuk, Shelleng, Maiha, and Madagali). The sample consisted of 54% male and 46% female participants. Most respondents were between 21–35 years old, which aligns with

typical enrolment patterns in distance learning programmes.

Research Question 1: To what extent do rural and urban students have access to ICT devices for e-learning?

Table 2: ICT Device Access Among Rural and Urban Students

Item	Urban Mean (N=190)	Rural Mean (N=137)	Overall Mean	Interpretation
Ownership of smartphone	4.61	4.09	4.38	High
Ownership of laptop	3.87	2.41	3.14	Moderate
Access to tablets/computers	3.12	2.07	2.64	Low
Availability of ICT tools	4.10	2.98	3.62	Moderate
Overall Access Level	**3.93**	**2.89**	**3.48**	**Urban Higher**

Results revealed that 92% of urban students owned smartphones compared to 78% of their rural counterparts. Laptop ownership showed a more significant gap, with 61% of urban respondents reporting access to laptops, compared to 27% among rural students. Tablet and desktop ownership was generally low in both groups. A t-test analysis showed a significant difference in ICT device ownership between urban and rural learners ($t = 4.87$, $p < .05$), indicating that urban students have significantly more access to personal digital devices necessary for e-learning.

Research Question 2: What is the level of internet connectivity and data affordability among rural vs urban students?

Table 3: Internet Connectivity and Affordability

Item	Urban Mean	Rural Mean	Overall Mean	Interpretation
Network stability	3.92	2.21	3.20	Low overall
Data affordability	3.57	2.36	3.04	Moderate
Availability of 3G/4G/5G	3.71	1.98	2.96	Low
Ability to join live classes	3.63	1.88	2.87	Low
Overall	**3.71**	**2.11**	**2.99**	**Urban Higher**

Urban students reported higher internet access, with 69% indicating stable connectivity, compared to only 23% of rural respondents. Rural students frequently cited poor network coverage, slow data speed, and limited 4G/5G availability as major barriers. Data cost emerged as a major challenge across both groups; however, 74% of rural students identified high data cost as a primary obstacle compared to 41% of urban students.

Research Question 3: What infrastructural factors (electricity, power alternatives) affect students' access to e-learning?

Table 4: Electricity and Infrastructure

Item	Urban Mean	Rural Mean	Overall Mean	Interpretation
Stability of electricity	3.58	1.74	2.81	Low
Access to alternative power	3.22	2.66	2.98	Moderate
Effect of power outages	4.01	4.42	4.19	Very High
Overall Infrastructure Score	**3.60**	**2.94**	**3.32**	**Power major barrier**

Urban respondents reported relatively stable electricity, with 57% indicating availability of 10–20 hours/day, while 72% of rural respondents reported fewer than 5 hours/day. Rural students relied heavily on generators, community charging stations, and solar panels. A significant difference was recorded in electricity access ($t = 6.12$, $p < .05$), demonstrating a clear infrastructural divide.

Research Question 4: How competent are students in using e-learning platforms and ICT tools?

Table 5: Digital Literacy Levels

Item	Urban Mean	Rural Mean	Overall Mean	Interpretation
Use of LMS (Moodle Google Classroom)	4.21	3.02	3.73	Moderate
Ability to join virtual classes	4.07	2.91	3.55	Moderate
ICT training received	3.11	2.44	2.83	Low
Online assignment submission skills	4.33	3.08	3.81	High
Overall Digital Literacy	**3.93**	**2.86**	**3.45**	**Urban Higher**

Urban students scored higher on self-reported digital literacy indicators (mean = 3.93) than rural students (mean = 2.86). Skills such as navigating LMS platforms, uploading assignments, participating in video lectures, and using productivity tools (e.g., Google Docs, Microsoft Teams) were higher among urban learners. Institutional digital-skills training was reported as "insufficient" by 63% of all respondents, indicating a widespread need for structured ICT capacity building.

Research Question 5: What are the overall determinants that predict access to e-learning platforms?

Table 6: Regression Analysis Summary

Predictor Variable	Beta (β)	Std. Error	t-value	Sig.
Internet Connectivity	.432	.063	6.84	.000
ICT Device Ownership	.316	.072	4.39	.001
Electricity Supply	.284	.067	4.22	.002
Digital Literacy	.241	.088	2.76	.013
Socio-economic Status	.198	.091	2.17	.032

Model $R^2 = .61$

Internet connectivity was the strongest predictor, followed by access to ICT devices.

Discussion of Findings

The results underscore a pronounced rural–urban divide in access to e-learning platforms among distance learners in Adamawa State. This finding aligns with prior studies which assert that demographic and infrastructural disparities strongly influence e-learning participation in developing contexts (Adeoye & Adanikin, 2021; Afolabi & Akinbobola, 2022). Urban students' superior access to laptops and smartphones directly enhances their ability to download materials, use LMS platforms, and participate in synchronous online lectures. Rural learners' limited ICT access reinforces existing inequalities, a pattern consistent with van Dijk's (2020) argument that device ownership remains a foundational determinant of digital inclusion. The stark contrast in internet connectivity confirms that infrastructural limitations persist in rural Adamawa. Poor network coverage restricts rural students' ability to stream lectures, engage in virtual discussions, and access cloud-based academic resources.

This supports Yahaya and Musa's (2023) findings that network coverage remains one of the most critical determinants of e-learning adoption in northern Nigeria. Both urban and rural learners face rising data costs, but the burden is heavier on rural students due to lower income levels and inconsistent sources of livelihood. As similar studies have shown, socio-economic status heavily shapes learners' ability to sustain e-learning participation (Isah & Ibrahim, 2022). Electricity challenges were more severe in rural areas, where outages are frequent and prolonged. Without adequate power, even students with devices and internet cannot participate fully in e-learning. This supports national reports on electricity inequity in rural Nigeria (NCC, 2023). Digital literacy was significantly higher among urban learners, highlighting a skills gap that could hinder rural students' ability to maximize e-learning opportunities. As argued by Ngugi et al. (2020), access without skills results in superficial participation. The regression results confirm that access to e-learning is shaped by interconnected factors, not isolated determinants. Internet availability, device ownership, electricity reliability, skills, and socio-economic background collectively influence whether a student can meaningfully engage with digital learning. This finding supports the Technology Acceptance Model (TAM), which posits that both technological and personal factors shape digital adoption

Conclusion

This study investigated the determinants of access to e-learning platforms among rural and urban distance education students in Adamawa State, Nigeria. The findings reveal a clear and persistent rural–urban digital divide influenced by disparities in ICT device ownership, internet connectivity, electricity supply, digital literacy, and socio-economic status. Urban students enjoy significantly greater access to smartphones, laptops, stable internet, and reliable electricity, enabling them to participate more actively in e-learning activities. Conversely, rural students experience major barriers such as poor network coverage, high data costs, limited electricity supply, and insufficient institutional ICT support, all of which restrict their ability to fully engage in distance education.

Regression analysis further confirmed that internet connectivity is the strongest determinant of access, followed by ICT

device ownership and electricity supply. Digital literacy and socio-economic status also contributed significantly. These findings highlight that improving e-learning access requires a multidimensional approach targeting infrastructure, affordability, training, and institutional support. Overall, the study concludes that equitable and sustainable distance education in Adamawa State cannot be achieved without addressing the socio-economic and infrastructural disparities between rural and urban learners. Strengthening ICT capacity-building initiatives, improving digital infrastructure, and expanding inclusive policies will enhance student engagement and learning outcomes in distance education programmes.

Recommendations

Based on the findings, the following recommendations are proposed:

1. Improve Rural ICT Infrastructure: Government and telecommunications companies should expand 4G/5G network coverage to underserved rural communities in Adamawa State to close the connectivity gap.
2. Subsidize Digital Devices for Distance Learners: Institutions and state ministries of education should collaborate with ICT firms to provide subsidized laptops, tablets, and smartphones to rural and low-income learners.
3. Introduce Affordable Data Plans for Students: Telecommunication providers should create special educational data bundles to reduce the cost burden of online learning.
4. Strengthen Electricity Supply in Rural Areas: Rural electrification programmes should prioritize communities hosting distance learning centres. Institutions should invest in solar-powered ICT hubs for students.
5. Implement Mandatory Digital Literacy Training: Distance learning centres should introduce compulsory digital literacy courses focusing on LMS navigation, virtual classroom participation, and online assignment submission.
6. Provide Anti-Poverty Support Interventions: Scholarships, stipends, or technology grants should be offered to students from low-income backgrounds to improve educational equity.

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