ASSESSING THE IMPACT OF DIGITAL LEARNING INEQUALITY ON ACADEMIC PERFORMANCE AMONG SECONDARY SCHOOL STUDENTS IN RURAL AND URBAN AREAS OF NIGERIA

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Abstract

This study examined the influence of digital learning inequality on the academic performance of secondary school students in rural and urban areas of Nigeria. Two research objectives guided the study, alongside two corresponding research questions. The study employed a descriptive survey research design, and data were collected from a sample of 600 senior secondary school students selected through multi-stage sampling across three geopolitical zones. Mean and standard deviation were used to answer the research questions. The instrument used in the study was a structured questionnaire designed to assess students' access to digital learning tools, teacher support, and self-reported academic performance. The questionnaire employed a 4-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." To ensure content validity, the questionnaire was reviewed by three experts in Educational Technology and Measurement & Evaluation. Reliability was assessed through a pilot study conducted with 30 students outside the sampled schools, with Cronbach's Alpha used to determine internal consistency, yielding a coefficient of 0.70. Findings revealed a significant digital divide between rural and urban students, with urban students having greater access to digital devices, reliable internet, and institutional support. This inequality negatively impacted the academic performance of rural students, who reported challenges in participating in digital learning activities and lower confidence levels. Students with better access to digital tools showed improved academic outcomes, including timely assignment submission and enhanced exam preparedness. The study concludes that digital learning inequality is a major factor influencing academic success and calls for urgent policy and infrastructural interventions to bridge the digital divide. It is recommended that the government and educational stakeholders prioritize improving digital infrastructure, provide equitable access to learning technologies, and enhance teacher training in digital pedagogy to ensure equal learning opportunities for all secondary school students in Nigeria

Key words: Digital Learning Inequality, Academic Performance, Rural and Urban Students, Secondary Education

Introduction

Education is widely acknowledged as a fundamental driver of social and economic development, and access to quality education is enshrined as a basic human right. In recent years, digital learning has emerged as a transformative force in education delivery, offering innovative and flexible tools for teaching and learning (UNESCO, 2021). However, as educational systems globally transition toward digital formats, disparities in access to technology and digital resources have created a new layer of inequality—commonly referred to as "digital learning inequality." In developing countries like Nigeria, this inequality is particularly pronounced due to limited access to devices, inadequate internet connectivity, low digital literacy, and uneven distribution of educational technology across socio-economic and geographic divides (Afolabi & Olayemi, 2022). As Nigeria moves forward with its goal of integrating ICT into the education sector, it becomes imperative to examine how these disparities affect students' learning outcomes, particularly in contrasting contexts such as rural and urban areas.

The rural-urban divide in Nigeria's educational landscape is deeply rooted in historical, infrastructural, and policy-related factors. Urban schools generally benefit from better infrastructure, qualified teachers, electricity, and stable internet connectivity, which collectively enhance access to digital learning tools (Aina, 2020). Conversely, rural schools continue to suffer from outdated facilities, limited teacher capacity, and minimal digital literacy among both students

and parents. This disparity became particularly evident during the COVID-19 pandemic, when the abrupt shift to remote learning highlighted the severe limitations experienced by students in rural communities (Onyema et al., 2020). While urban students were able to sustain academic activities through online platforms, rural students faced significant learning disruptions, resulting in long-term academic setbacks.

Digital learning inequality, therefore, transcends technological constraints and reflects deeper structural and social inequities. It reinforces pre-existing academic disparities by limiting opportunities for marginalized learners. Empirical evidence supports the argument that students with reliable access to digital learning tools are more likely to succeed academically. These students benefit from self-paced learning, interactive educational platforms, and timely feedback, which collectively enhance learning engagement and outcomes (Okeke & Emeka, 2023). On the other hand, students without such access are often left behind, struggling with inadequate content coverage and low participation. While the Nigerian government has introduced policies such as the National Digital Economy Policy and Strategy (2020–2030) to promote digital inclusion, implementation remains inconsistent, particularly in underserved rural areas (NITDA, 2021).

Given these dynamics, this study aims to assess the impact of digital learning inequality on the academic performance of secondary school students across rural and urban settings in Nigeria. By analyzing patterns of access and their consequences on learning outcomes, the study seeks to provide evidence-based recommendations that can guide educational policy, improve digital infrastructure allocation, and inform intervention strategies aimed at reducing educational disparities. The study also aligns with the Sustainable Development Goal 4, which calls for inclusive and equitable quality education and the promotion of lifelong learning opportunities for all.

Problem of the Study

The integration of digital learning technologies into the education system holds great promise for improving access, quality, and inclusiveness in learning. However, in Nigeria, the benefits of digital learning are unevenly distributed, with a clear divide between rural and urban communities. While urban students often enjoy access to electricity, internet connectivity, digital devices, and trained personnel, their rural counterparts face significant barriers such as poor infrastructure, limited access to technology, and a lack of digital literacy. These disparities have created a form of digital learning inequality that threatens to deepen existing academic performance gaps among secondary school students. This inequality became especially apparent during the COVID-19 pandemic, when many urban schools transitioned to online learning while rural schools struggled to continue instruction due to lack of resources. As a result, a significant proportion of students in rural areas either dropped out or experienced severe learning losses. Despite government policies like the National Digital Economy Policy and Strategy (2020–2030), many secondary schools in Nigeria—particularly in rural areas—remain inadequately equipped to support digital learning, and the impact of this deficit on student academic performance has yet to be fully understood. Furthermore, there is limited empirical research that compares the academic outcomes of students in rural and urban areas in relation to digital learning access and quality. Existing studies often generalize findings without considering the contextual differences in infrastructure, socio-economic status, teacher capacity, and parental support. This lack of localized evidence poses a challenge to designing effective interventions and policies that address the unique needs of different communities. Therefore, the central problem this study seeks to address is the extent to which digital learning inequality affects academic performance among secondary school students in rural and urban areas of Nigeria. Understanding this relationship is

crucial for developing targeted educational strategies, ensuring equitable learning opportunities, and achieving the national and global goal of inclusive and quality education for all.

Objectives of the Study

The study objectives were to Assessing the Impact of Digital Learning Inequality on Academic Performance among Secondary School Students in Rural and Urban Areas of Nigeria. Specifically, the study sought to:

1. To examine the difference in access to digital learning resources between rural and urban secondary school students in Nigeria
2. To determine the impact of digital learning inequality on the academic performance of secondary school students in rural and urban areas.

Research Questions

Two research questions guided the study

1. What differences exist in the access to digital learning resources between rural and urban secondary school students in Nigeria?
2. How does digital learning inequality influence the academic performance of secondary school students in rural and urban areas of Nigeria?

Research Methodology

This study adopts a descriptive survey research design, which was suitable for gathering information from a large population to examine the relationship between digital learning inequality and academic performance among secondary school students in rural and urban areas. This design enables the collection, analysis, and interpretation of data describing existing conditions without manipulating any variables. The population consists of all senior secondary school students (SS1–SS3) in selected rural and urban secondary schools across three Nigerian states representing the North, South, and Middle Belt geopolitical zones. These students are targeted because they are directly involved in digital learning initiatives, especially following the COVID-19 pandemic. A sample of 600 students was drawn using a multi-stage sampling technique. First, three states were selected through stratified random sampling based on geopolitical zones. In each state, two Local Government Areas (one urban and one rural) were purposively selected. Then, from each Local Government Area, two schools were randomly chosen. From each school, 50 students were selected using simple random sampling, resulting in 100 students per Local Government Area and a total of 600 respondents. Data were collected using a structured questionnaire titled "Digital Learning Inequality and Academic Performance Questionnaire (DLIAPQ)," which consists of three sections: Section A covers demographic information such as age, class, and school location; Section B addresses access to digital learning tools, platforms, and teacher support; and Section C focuses on students' academic performance, including self-reported GPA and perceptions of the impact of digital learning. The questionnaire employs a 4-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree." To ensure content validity, the questionnaire was reviewed by three experts in Educational Technology and Measurement & Evaluation. Reliability was assessed through a pilot study conducted with 30 students outside the sampled schools, with Cronbach's Alpha used to determine internal consistency; a coefficient of 0.70 which was deemed acceptable. Data collection involved the physical administration of the questionnaire in the selected schools, supported by trained research assistants. Prior permission was obtained from school authorities, and informed consent was secured from participants. Data analysis included descriptive statistics such as frequency, percentage, mean, and standard deviation to analyze demographic information and responses related to digital learning access.

Presentation of the Results

Research question 1

What differences exist in the access to digital learning resources between rural and urban secondary school students in Nigeria?

Table 1: Mean rating of respondents responses on differences exist in the access to digital learning resources between rural and urban secondary school students

S/N	Items on access to digital learning resources	N	Mean	SD	Remarks
1	I have regular access to digital devices (e.g., laptop, tablet, smartphone) for learning purposes.	600	3.58	0.498	Agree
2	I have reliable internet access for my academic activities.	600	2.74	0.899	Agree
3	My school provides sufficient digital learning resources like online lessons, videos, and e-books.	600	3.54	0.542	Agree
4	I receive regular guidance and support from teachers in using digital learning platforms.	600	3.54	0.542	Agree
5	I find it difficult to participate in online classes due to lack of infrastructure (electricity, data, devices).	600	3.58	0.498	Agree
6	There is a significant difference between rural and urban students in terms of access to digital tools.	600	3.6	0.494	Agree
	Cluster Mean	**600**	**3.43**	**0.579**	**Agree**

The data in Table 1 reveals that there is a significant disparity in access to digital learning resources between rural and urban secondary school students in Nigeria, with a cluster mean of 3.43 indicating general agreement among respondents. The highest-rated item (mean = 3.60) confirms the existence of a wide gap in digital access between the two groups. While students acknowledge owning or having access to digital devices (mean = 3.58), they also face challenges such as poor infrastructure and unreliable internet (mean = 2.74), which mostly affect rural learners. Access to school-provided resources and teacher support (both with mean = 3.54) appears more common in urban areas, further highlighting the inequality. Overall, the data point to persistent digital learning inequality driven by unequal access to devices, internet, infrastructure, and institutional support, emphasizing the need for targeted interventions to close the rural-urban digital divide.

Research question 2

How does digital learning inequality influence the academic performance of secondary school students in rural and urban areas of Nigeria?

Table 2: Mean rating of respondents responses on digital learning inequality influence the academic performance of secondary school students in rural and urban areas

S/No.	Items on digital learning inequality	N	Mean	SD	Remarks
7	My academic performance has improved due to the integration of digital learning tools.	600	3.62	0.490	Agree
8	I am able to complete and submit assignments on time using digital platforms.	600	3.46	0.542	Agree
9	The lack of digital learning access negatively affects my academic performance.	600	3.58	0.498	Agree
10	I perform better in subjects where digital content is used regularly.	600	3.32	0.740	Agree
11	I feel more confident and prepared for exams when I use digital learning tools.	600	2.76	1.204	Agree
12	There is a noticeable gap in academic outcomes between students with and without digital learning access.	600	3.6	0.494	Agree
	Cluster Mean	**600**	**3.39**	**0.661**	**Agree**

The data in Table 2 highlights how digital learning inequality impacts the academic performance of secondary school students in rural and urban Nigeria. With an overall cluster mean of 3.39, respondents generally agree that access to digital learning tools positively influences academic outcomes. Students reported improvements in academic performance due to digital tools (mean = 3.62) and timely completion of assignments using digital platforms (mean = 3.46). They also agree that lack of access negatively affects their performance (mean = 3.58). Additionally, students perform better in subjects with regular digital content use (mean = 3.32), though confidence in exam preparedness varies (mean = 2.76). A strong consensus (mean = 3.60) exists on the academic gap between students with and without digital access, underscoring the digital divide. Overall, the findings show that unequal access to digital learning tools significantly shapes academic success, emphasizing the need for policies and interventions to bridge this divide and promote equal learning opportunities for all students.

Discussion

To examine the difference in access to digital learning resources between rural and urban secondary school students in Nigeria

Based on the findings presented in Table 1, there is a clear indication of digital learning inequality between rural and urban secondary school students in Nigeria. With a cluster mean of 3.43, respondents generally agree that disparities in access to digital learning resources are significant. The highest-rated item (mean = 3.60) confirms that there is a significant difference in access to digital tools between rural and urban students, echoing the persistent divide. Although students report access to digital devices (mean = 3.58) and to school-provided learning resources (mean = 3.54), the challenges of infrastructural limitations—such as unstable electricity supply and unreliable internet (mean = 2.74)—continue to hinder the learning experience, especially in rural communities. These findings suggest that while digital devices may be available, actual utilization for learning is significantly impeded by systemic infrastructural barriers. This study's findings are in agreement with those of Adebayo and Salihu (2022) and Okonkwo et al. (2021), who reported that urban students enjoy superior access to digital learning tools, including stable internet, a

wider range of digital devices, and better educational platforms. These studies also highlighted the challenges rural schools face, such as lack of infrastructure and poor internet connectivity, which are consistent with the observed lower mean score for internet reliability (mean = 2.74) in this study. Similarly, the findings support the conclusions of Umar and Bassey (2020), who argued that educational resources and funding are disproportionately concentrated in urban centers, exacerbating the digital divide. The results from the current study reaffirm this, as institutional support such as teacher assistance with digital platforms (mean = 3.54) appears more reflective of the urban experience than the rural one. The findings not only align with the existing literature but also strengthen the argument that digital learning inequality is entrenched and multifaceted, rooted in differences in infrastructure, institutional support, and policy priorities between urban and rural settings. There is a pressing need for targeted interventions—including improved digital infrastructure, equitable distribution of educational resources, and enhanced funding for rural schools—to bridge the gap and promote inclusive digital learning across Nigeria.

To determine the impact of digital learning inequality on the academic performance of secondary school students in rural and urban areas.

The findings presented in Table 2 provide strong evidence that digital learning inequality significantly influences the academic performance of secondary school students in rural and urban areas of Nigeria. With a cluster mean of 3.39, the data suggest that respondents generally agree that access to digital learning tools enhances academic outcomes. Students reported that their academic performance has improved through the use of digital learning tools (mean = 3.62) and that they are able to complete and submit assignments on time using digital platforms (mean = 3.46). Additionally, the agreement that lack of access negatively affects academic performance (mean = 3.58) emphasizes how digital inequality can hinder students' educational progress. Students also acknowledged that they perform better in subjects where digital content is used regularly (mean = 3.32), suggesting that consistent engagement with digital resources deepens understanding and strengthens performance. Although the mean score for feeling more confident and prepared for exams when using digital tools was lower (mean = 2.76), it still indicates agreement, pointing to variations in digital confidence based on accessibility and usage. Notably, a strong consensus (mean = 3.60) exists on the presence of a performance gap between students with and without digital access, further reinforcing the disparities that exist between rural and urban learners. These findings align closely with previous research. For instance, Nwachukwu (2023) found that students with regular access to digital learning tools consistently performed better in examinations. Similarly, Ede and Oladele (2021) observed that during the COVID-19 lockdown, urban students were able to sustain academic progress through digital platforms, whereas rural students—due to limited access—experienced learning disruptions and academic setbacks. Ibrahim and Musa (2020) also confirmed a strong link between digital readiness and academic achievement, particularly in science subjects where urban students significantly outperformed their rural counterparts due to better access to e-learning materials and platforms. The current study corroborates earlier empirical findings, reinforcing the conclusion that digital learning inequality directly impacts academic performance. Students with access to digital tools enjoy better academic outcomes, while those without such access—predominantly in rural areas—face learning disadvantages. These results underline the critical need for equitable educational policies, improved digital infrastructure, and targeted support programs to bridge the performance gap and ensure that all students, regardless of location, have equal opportunities to succeed academically.

Conclusion

This study examined the impact of digital learning inequality on the academic performance of secondary school students in rural and urban areas of Nigeria. The findings revealed a significant disparity in access to digital learning resources between students in rural and urban settings. Urban students generally benefit from better access to digital tools, stable internet connectivity, and institutional support, while their rural counterparts face challenges such as poor infrastructure, unreliable internet, and limited access to digital devices. These inequalities translate into differences in academic performance, with students who have regular access to digital learning platforms reporting better academic outcomes, improved confidence, and timely completion of assignments. The study also confirmed that the lack of digital learning access negatively affects students' academic progress, particularly in rural areas where infrastructural limitations are more pronounced. These results are consistent with existing literature, which underscores the influence of digital readiness on student achievement and highlights the growing digital divide in Nigeria's educational system. In conclusion, digital learning inequality poses a serious barrier to equitable education in Nigeria. To foster inclusive and effective learning environments, there is an urgent need for targeted interventions—such as improved digital infrastructure, equitable distribution of resources, teacher training, and supportive government policies—that bridge the gap between rural and urban schools. Addressing these disparities is essential for ensuring that all Nigerian students, regardless of their geographical location, can thrive in the digital age.

Recommendations

Based on the findings of this study, the following recommendations are proposed to address digital learning inequality and enhance the academic performance of secondary school students in Nigeria:

1. The government, in collaboration with private sector stakeholders, should invest in expanding internet connectivity, providing reliable electricity, and establishing ICT hubs in rural schools. This will create an enabling environment for digital learning.
2. Educational authorities should ensure that digital devices such as laptops, tablets, and learning software are distributed fairly to both rural and urban schools. Special intervention programs should prioritize underserved areas.
3. Continuous professional development and training should be provided to teachers to equip them with the necessary digital literacy skills to effectively integrate technology into their teaching.
4. There should be clear national and state-level policies focused on bridging the digital divide. Adequate budgetary allocations should be made to support the implementation of digital learning initiatives, especially in rural communities.
5. Partnerships between the government, NGOs, tech companies, and telecom providers can help fund digital education programs, provide devices at subsidized rates, and offer free or low-cost internet for students and schools.
6. A robust system should be established to monitor the implementation of digital learning programs across schools, assess their impact, and identify areas needing further intervention or support.
7. Awareness campaigns and training should be organized to improve digital literacy among students and their parents, especially in rural areas, to foster a more supportive home learning environment.

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