

Equity And Access In Mobile Learning: Assessing The Impact Of Mobile Platforms On Educational Inclusion In Rural Nigerian Schools

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Abstract

This paper focused on equity and access in mobile learning: assessing the impact of mobile platforms on educational inclusion in rural Nigerian schools. Five research questions and three hypotheses guided the study. Through multistage sampling, 15 Local Government Areas from the 5 five states that made up the zone, were selected. Through randomization, a sample of 300 students and 60 teachers were selected. The study adopted a mixed-method research design, combining quantitative and qualitative approaches. The instruments for data collection comprised of a 20-item questionnaire tagged 'Questionnaire on Equity and Access in Mobile Learning' (QEAML) and a semi-structured interview of 20 guided-questions. Validity was carefully established by three experts and Chronbach Alpha Statistics reliability co-efficient of 0.88 and 0.85 were realized. Data analysis was through descriptive and inferential statistics. Qualitative data obtained from structures interview was analyzed thematically, responses were transcribed, coded, and organized into themes reflecting equity, access, opportunities, and challenges associated with equity and access in mobile learning in Rural Nigerian Schools. The findings indicate that mobile platforms can significantly enhance access to learning materials, support flexible and personalized learning, and reduce barriers related to geographic isolation and teacher shortages. However, its effectiveness depends on supportive infrastructure, inclusive policy frameworks, and targeted capacity-building initiatives. It therefore, recommends policymakers, educators, and development partners aimed at leveraging mobile technologies to foster more inclusive and equitable educational opportunities in rural Nigerian schools.

Keywords: *Mobile Learning, Educational Equity, Access to Education, Rural Schools, Nigeria.*

Date of Submission: 01-07-2026

Date of Acceptance: 10-07-2026

I. Introduction

The rapid evolution of digital technology has reshaped educational systems globally, including in developing nations. E-learning platforms have become increasingly relevant in response to limitations posed by inadequate physical infrastructure and shortage of teachers in rural schools. In Nigeria, particularly in under-served regions, digital tools offer an alternative means of delivering quality education to students via online teaching where there are shortages of teaching personnels (Babalola & Aina, 2024; Ezeude et al., 2023; Jegede, 2019).

Mobile learning (m-learning) refers to education facilitated by portable, handheld devices like smartphones, tablets, and e-readers, enabling learning to occur anywhere and anytime. It is a subset of e-learning that supports on-the-go access to educational content, collaborative tools, and interactive resources. Mobile learning according to Mbaka (2021) is the learning that occurs in online contents via digital devices like mobile phones, tablets, personal digital assistants etc. O'Malley et al. (2019) defines mobile learning as any sort of learning that happens via mobile digital technological devices. Mobile learning has gained traction across diverse contexts due to availability of smartphones, flexibility of usage and ease of digital content delivery. Thus, Literature documents that mobile learning entails the process of using mobile digital technological devices and platforms to support teaching and learning processes (Ekwu, Njoku, Ikwanusi, & Madu, 2025).

The rapid adoption of mobile learning strategies as a measure to bridge the gap in educational learning opportunities and make it easily available to learners in rural communities is well documented in literature. For example, Mmaduike (2019) noted that the application of mobile learning strategies has limited disparities in attaining quality educational service due to gender, socioeconomic and locational inequalities in contemporary societies. Agbo (2023) affirmed that the rapid adoption of mobile teaching and learning strategies has helped to increase learners access to quality educational learning resources and opportunities. This measure mostly makes educational learning opportunities inclusive as it offers affordable education for disadvantaged remote rural students without bias. James (2023) pointed out that with mobile learning, students in hard-to-reach areas can access the same content and learning opportunities as urban peers. Offline-capable apps also help when internet connectivity is limited. By increasing access to education regardless of location, mobile learning is reducing disparities for marginalized communities. Likewise, Obeta (2024) assert that the utilization of e-mobile teaching and learning strategies prioritize equity in education service delivery by creating pathways for marginalized groups to access educational learning opportunities. This leads to a more inclusive society where individuals can contribute fully, driving social and economic progress. Equal access to quality education empowers students, boosts their futures, and benefits communities in general.

Despite this potential, gender inequality in accessing educational learning opportunities in some parts of the world and mostly in rural communities in Nigeria has made inclusive education for boys and girls a challenge with compounding negative reservations against the girl-child. Educational learning opportunities for girls in rural Nigerian communities is often limited. The reason is that most rural families see the girl child as made only for marriage and child bearing and not to be educated. The other version of thought is that if the girl child is sent to school and become educated, she will eventually take the benefit to the husbands' house if married. This makes investment in the education of the girl child a difficult compromise and instead boys are sent to school because they are said to bare the family name. Also, in Nigeria, most rural families are poor with limited economic resources and since men are seen as the breadwinner of the family, this often make the choice of educating the male child instead of the girl child more pronounced. This corroborates the assertions of Achuonye (2004) who stated that in many societies, gender roles and expectations can impact opportunities and experiences, particularly for women and girls. Understanding gender involves recognizing these dynamics and how they intersect with other factors like culture, religion, and socioeconomic status. This helps promote inclusivity and equality in areas like education, work, and social interactions.

Also, because most families in rural Nigerian communities are poor and cannot afford to buy android mobile phone device and other digital devices that can facilitate effective online teaching and learning experiences, children from such background becomes disadvantaged. Again, even for some that can afford to buy digital devices for online learning, persistent poor internet connectivity services, unpredictable electricity supply, and high data costs etc., continue to marginalize rural students (Achuonye, Williams & Longjohn, 2026). Low internet connectivity in rural areas hampers mobile learning, limiting access to online resources and virtual classes. This forces students to rely on offline content or travel to areas with better connectivity, disrupting their learning. Unpredictable electricity supply makes it hard for students to charge devices and access digital content. High data costs make mobile learning expensive for students with limited budgets. This restricts access to online resources, forcing students to rely on limited offline content or drop out. This leads to missed learning opportunities and adds costs for alternative power sources like generators or solar chargers. Lack of reliable access to mobile devices marginalizes students who cannot afford smartphones or tablets. This creates a gap compared to peers with better resources, affecting academic performance and opportunities (Aid et al., 2024; Eteng et al., 2022). Likewise, the apparent gap in digital literacy among rural teachers and learners can hinder the pedagogical integration of mobile technologies into everyday instruction (Hamza & Shehu, 2025). These challenges reflect broader patterns observed in rural education globally (Ahiaku, Uleanya, & Muyambi, 2025).

However, to the best knowledge of the researchers, documented literature in Nigeria has laid more emphasis on terms such as equity (Egbo, 2017), educational equity, (Mbatu, 2019), Poor network connectivity (Achuonye, Ushie & Williams, 2026) as major hindrance in mobile learning, in Nigeria (Achuonye, Ushie & Williams, 2026). Thus, there is dearth in research in Nigeria on how mobile learning influences educational inclusion in rural settings and this is a necessary research gap to fill. Based on this context, this study is focused on examining equity and access in mobile learning: Assessing the impact of mobile platforms on educational inclusion in rural Nigerian schools while considering the moderating role of gender and socio-economic status.

According to Nomusa (2016), Mobile learning has helped bridge the gap for girls and women in education, particularly in regions where cultural or societal barriers limit their access to schools. With mobile devices, girls can access educational content, online classes, and resources from home, reducing the need for physical presence in classrooms. This flexibility helps girls balance education with other responsibilities or cultural expectations. Duruji (2016) observed that in many countries, mobile learning platforms are making education more accessible to girls who might otherwise drop out due to early marriage, household duties, or

lack of nearby schools. By providing access to quality content and connecting girls with mentors or support networks, mobile learning is helping reduce gender-based education disparities.

Socioeconomic status (SES) is a combined measure of an individual's or families' economic and social position relative to others, typically based on income, education, and occupation. It reflects social standing, power, and access to resources like healthcare, quality housing, and education. Socioeconomic status can influence opportunities, lifestyle, and overall well-being, impacting areas like education, health, and social mobility (Ahiaku, Uleanya, & Muyambi, 2025). According to Agbo (2023), socioeconomic status often influences access to quality education, with disadvantaged students facing barriers like lack of resources or support. Students from low-income backgrounds might struggle with limited access to textbooks, technology, or even basic needs like nutrition and healthcare, affecting their academic performance (Achuonye, Ushie & Williams, 2026).

According to Okunniyi (2019), mobile learning has offered affordable access to quality education for students from low-income backgrounds, who might not afford traditional schooling or resources. With internet-enabled devices, students can access free or low-cost educational apps, online textbooks, and learning platforms. This levels the playing field, giving disadvantaged students tools to keep up with peers. Ochonogor and Ajaja (2018) pointed out that in many areas, mobile learning platforms have provided targeted support like exam prep, literacy programmes, or vocational training, helping students from disadvantaged backgrounds improve their skills.

Access refers to the ability or right to approach, use, or obtain something, like education, resources, or services. In education, access means having opportunities to participate, learn, and benefit from quality educational experiences. Mobile learning expands education access to remote or under-served areas where schools or quality teachers are scarce. Students in rural or conflict-affected regions can use mobile devices to connect with online classes, virtual teachers, or learning resources. This helps overcome barriers like distance, lack of infrastructure, or insecurity (Meenu Dev, 2016).

Statement of the Problem

Despite sustained efforts to expand access to basic and secondary education in Nigeria, significant inequities persist between urban and rural schools. Rural Nigerian schools continue to experience systemic challenges, including inadequate instructional resources, shortages of qualified teachers, poor infrastructure, and geographic isolation. These conditions limit learners' opportunities to acquire quality education and contribute to persistent gaps in academic achievement, digital skills, and long-term socioeconomic outcomes.

In recent years, mobile learning platforms have been promoted as a viable strategy for addressing these inequities by extending educational resources beyond the traditional classroom. The widespread availability of mobile phones in Nigeria suggests strong potential for mobile technologies to enhance access, flexibility, and learner engagement in rural contexts. However, the extent to which mobile learning platforms promote educational equity and inclusion in rural Nigerian schools remains insufficiently understood. While some initiatives report improved access to learning materials, many rural learners still face barriers such as limited device ownership, unreliable internet connectivity, high data costs, low digital literacy, and minimal institutional support for technology integration.

Moreover, existing research on mobile learning in Nigeria has largely focused on urban settings, higher education institutions, or short-term pilot projects, with limited empirical attention to rural primary and secondary schools. This gap in literature constrains evidence-based policy-making and obscures the contextual factors that shape the effectiveness of mobile learning for marginalized learners. Without a clear understanding of how mobile platforms influence access, participation, and inclusion in rural schools, investments in mobile learning risk reinforcing, rather than reducing, existing educational inequalities.

Therefore, the problem this study addresses is the lack of comprehensive, context-specific evidence on the impact of mobile learning platforms on educational equity and access in rural Nigerian schools. By systematically assessing both the opportunities and constraints associated with mobile learning adoption, this study sought to inform more inclusive policies and practices aimed at leveraging mobile technologies to reduce educational disparities in rural Nigeria.

Research Objectives

The specific objectives of this study are to:

1. Determine correlation relationship between access to mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools
2. Determine correlation relationship between socioeconomic status and utilization of mobile devices for learning engagement among students in rural Nigerian schools
3. Determine the coefficient of relationship between access to mobile devices and reduced educational disparities in rural Nigerian schools

4. Determine the challenges affecting the effective use of mobile learning platforms in rural Nigerian schools
5. Determine the strategies that can enhance equitable access to mobile learning resources for students in rural Nigerian schools?

Research Questions

The study sought to answer the following research questions:

1. What is the coefficient of relationship between access to mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools?
2. What is the coefficient of relationship between socioeconomic status and utilization mobile devices for learning engagement among students in rural Nigerian schools?
3. What is the coefficient of relationship between access to mobile devices and educational disparities in rural Nigerian schools?
4. What are the challenges affecting the effective use of mobile learning platforms in rural Nigerian schools?
5. What are the strategies that can enhance equitable access to mobile learning resources for students in rural Nigerian schools?

Research Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance:

1. **H₁** : There is a significant positive correlation between mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools.
2. **H₂** : There is a significant correlation between socioeconomic status and mobile learning engagement among students in rural Nigerian schools.
3. **H₃** : There is a significant relationship between access to mobile devices and educational disparities in rural Nigerian schools.

Themes for In-dept Interviews:

1. Mobile learning adoption
2. Utilization
3. Impact on educational disparities in rural schools
4. Challenges and barriers

II. Literature Review

Access to Education

The Nigerian National Policy on Education (NPE, 2004) emphatically stated that access to education means ensuring all individuals, regardless of background, have equal, affordable, and, sustainable opportunities to enroll, attend, and complete schooling. It involves removing physical, economic, and social barriers—such as distance, fees, or discrimination to guarantee, a safe learning environment. Access to education is the opportunity that every Nigeria child ought to receive freely from their parents or guardians that owe them the responsibility to enroll and facilitate the entry and encourage, sustain the enrolment of the learner in appropriate education programme.

Thus, logical notion underlying the 2004 education policy is that every Nigerian child will have full access to quality education with academic or technical aptitude of individuals as the limiting factor. The consequence of this is that every Nigerian child would be given the opportunity to receive the best education that would make them self-sufficient and self-supportive to the limit of their ability regardless of the economic, political and religious prominence of the parents (NPE, 2004).

Access to educational opportunities is a right of every citizen in Nigeria, as enshrined in the constitution of the Federal Republic of Nigeria (1999). It provides, with respect to the nations educational objectives that: Government shall through its policy ensure that equal and adequate educational opportunities are provided at all levels. The Constitution of the Federal Republic of Nigeria guarantees equality and equitable opportunities to all citizens. Though, the educational gap between urban and rural dwellers in Nigeria is dated back to educational inequality in Nigeria, since the foundation of western education in the country (Okoli, 2007). However, Nigerian policy of access to higher education is aimed at equal educational opportunities to all citizens of the country. The policy aims at giving equal educational opportunities at the higher education level (Chimombo, 2005). As the higher education system expands, the request of who benefits from the participation, and the consequent constitutional rights it offers, becomes critical.

Rural Schools

Rural schools are educational institutions located in sparsely populated areas, typically defined by geographic isolation, small student populations, and limited access to public services. Rural schools according

to Ukwueji (2017) are educational institutions located in countryside or village areas, often with limited resources, fewer teachers, and less access to tech compared to urban schools. Students in rural areas are less exposed to the outside world and lack knowledge about the current issues that are happening.

Gender: Gender refers to the socially and culturally constructed differences between men and women, boys and girls, which give them unequal value, opportunities and life chances (Kabeer, 2017). It also refers to typically masculine and feminine characteristics, abilities and expectations about how women and men should behave in society. These characters are time bound and changeable. Gender according to Mark (2021) refers to the social and cultural roles, behaviors, and expectations associated with being male or female. It's distinct from biological sex, which refers to physical characteristics. Gender is a complex concept that varies across cultures and societies, influencing how individuals identify with themselves and are perceived by others. He further pointed out that in many societies, gender roles and expectations can impact opportunities and experiences, particularly for women and girls. Understanding gender involves recognizing these dynamics and how they intersect with other factors like culture, religion, and socioeconomic status. This helps promote inclusiveness and equality in areas like education, work, and social interactions.

Socioeconomic Status: **Socioeconomic** status refers to the complex interplay between social and economic elements that influence an individual's or group's quality of life, opportunities, and outcomes. These factors encompass a wide range of variables, including income, education, occupation, wealth, and social status, which can affect access to resources, services, and opportunities. Socioeconomic factors can be thought of as the building blocks of a person's or group's social and economic position, shaping their ability to participate in society and achieve their goals (Okunniyi, 2019). According Onyi (2018), socioeconomic factors refer to the social and economic characteristics that influence an individual's or group's quality of life, opportunities, and outcomes. These factors can include income, education, occupation, wealth, and social status, as well as access to resources, services, and opportunities

Mobile Learning

Mobile Learning, which is also called M-learning has been defined differently by different author. Generally mobile learning refers to the learning that happens through the interaction with content in devices like mobile phones, tablets, personal digital assistants etc. O'Malley et al., (2003) defines mobile learning as "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when learner takes advantage of the learning opportunities offered by mobile technologies." Mobile learning provides educational contents and resources on personal pocket devices like smartphones, tablets, i- pads etc. Mobile learning can be defined as "any educational provision where the sole or dominant technologies are handheld or palmtop devices". Traxler also defined as anywhere and anytime learning that is supported by mobile devices which learners use to access the content (Traxler, 2014). Therefore, mobile learning can be defined as learning multiple contexts, through social and content resources, using personal electronic devices. Mobile learning according to Nnaji (2023) is a technique that uses mobile and wireless technologies for learning and education. M-Learning enables learners to merge their learning experiences in a shared collaborative environment. O'Malley et al., (2003) defined it as "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies". Sharples (2005), Views it as "a process of coming to know, by which learners in cooperation with their peers and teachers, construct transiently stable interpretations of their world," emphasizing communication and interaction. This describes learning as a social process where knowledge is co-created through interaction with peers/teachers - like discussing modular arithmetic approaches in a group, building understanding together. Wexler et al. (2007) defined mobile learning as using compact devices (like phones) to boost productivity in handling info - like using apps to organize math notes, create modular arithmetic examples, or interact with math content on-the-go. Mobile learning focuses on the ability to access educational content on-demand, allowing learning to happen conveniently without being tied to a specific time or place. Mobile learning, often referred to as m-learning, signifies a transformative shift in educational practices worldwide, particularly within the realm of secondary education. It encompasses a wide array of technologies and applications that facilitate learning through mobile devices such as smartphones, tablets, and laptops. Recent studies have highlighted how m-learning can support various pedagogical approaches and contribute to enhancing student engagement and learning outcomes (Zhang & He, (2022). For instance, mobile learning platforms not only allow for the dissemination of educational content but also encourage interactive and collaborative learning environments, where students can engage with peers and educators in real time, thereby forging deeper learning connections (Kumar et al., 2022; Alrasheedi et al., 2015).

Mobile Learning Platforms, Students' Educational Inclusion and Learning Engagement in Rural Nigerian Schools

Agbo (2023) listed some impact of mobile learning platforms on students' educational inclusion and learning engagement in rural Nigerian schools

- a) Increased Access to Resources: Mobile learning platforms give rural students access to digital textbooks, videos, and educational apps, bridging resource gaps. For example, students in rural Nigeria can use apps like Khan Academy or local platforms for subjects like math, even if physical textbooks are scarce
- b) Personalized Learning: Students can learn at their own pace, revisiting tough topics like quadratic equations via math apps. This helps students in rural areas catch up, even with limited teacher support.
- c) Improved Engagement: Interactive content (quizzes, games) on mobile platforms boosts interest in subjects like science and math. Imagine students in a rural school using a math game app to practice fractions
- d) Overcomes Teacher Shortages: Digital tools help fill gaps when specialized teachers aren't available in rural areas. For instance, a biology app can help teach complex topics if there's no specialist teacher.
- e) Flexibility in Learning: Students can study anytime, fitting education around daily chores or farm work. A student helping with family farming in the morning can study math on a phone later.

Educational Equity

According to Mbatu (2019) educational equity means giving every student fair access to quality learning, resources, and opportunities - regardless of background, location, or financial situation. It is about leveling the playing field. Also, according to Satos (2017) educational equality means that every child, regardless of race, ethnicity, gender, gender identity, religion, family income or regional location has access to a high-quality education, including well-trained, professional educators; safe and stimulating learning environments that provides all students with access to the resources they need to be college and career ready. Mark (2018) stated that it is about ensuring access to effective teachers and teaching, regardless of the school setting. It is about providing necessary resources, regardless of parental support or involvement. Every student deserves an equal opportunity for success, regardless of their race, socioeconomic status, parental support, zip code, or background knowledge (Mark, 2018).

Benefit of Educational Equity

- a) Reduced Achievement Gaps: Educational equity helps bridge performance gaps by ensuring all students - regardless of background, income, or location - get resources, support, and opportunities they need to succeed, like extra tutoring in math if needed
- b) Increased Student Engagement: Fair opportunities boost students' connection to learning by making them feel valued and included - like having access to the same math tools/apps as peers, sparking interest and engagement in topics like modular arithmetic.
- c) Better Social Cohesion: Equity fosters understanding and unity by letting students from different backgrounds learn together, share perspectives, and appreciate diversity - like collaborating on a math project, building connections beyond just numbers
- d) Improved Economic Opportunities: Equitable education opens doors to jobs and growth by giving all students - regardless of background - skills and opportunities needed for careers, like using math to solve real-world problems in tech or business, boosting economic prospects.
- e) Enhanced Critical Thinking: Diverse perspectives enrich problem-solving (like in math).

III. Methodology

The study adopted a mixed-method research design, combining quantitative and qualitative approaches to comprehensively assess the impact of mobile learning platforms on equity and access to education in rural Nigerian schools. The population of the study comprised of 11,760 students and 684 teachers in public rural secondary schools across the selected 15 Local Government Areas from the 5 States that made up the South Eastern zone. The targeted population were focused on all students and teachers in these schools who had some level of exposure to or awareness of mobile learning platforms, whether through formal school initiatives or informal learning practices. A sample of 300 students and 60 teachers was drawn from the study population. Through multistage sampling, 15 Local Government Areas from the 5 five states that made up the zone, (Abia, Anambra, Ebonyi, Enugu and Imo States) were selected. 3 (Three) public schools were selected from each of the LGAs. The rural local government areas were selected based on their rural classification and presence of public secondary schools. Second, 3 schools each, were randomly selected from the identified local government areas. Finally, simple random sampling was used to select 300 students, while purposive sampling was employed in the selection of 60 teachers who were directly involved in teaching and instructional delivery.

The instruments for data collection comprised of a 20-item questionnaire tagged Questionnaire on Equity and Access in Mobile Learning' (QEAML) and a semi-structured interview of 20 guided-questions.

These items were drawn from the five research questions and four hypotheses that guided the study. The quantitative component enabled the collection of measurable data on access, usage, and perceived impact of mobile learning, while the qualitative component provided in-depth insights into participants' experiences, challenges, and contextual realities.

The instruments were presented to three specialists, two from the Department of Curriculum/Instruction (Educational Technology) and one from the Department of Educational Measurement and Evaluation all from Faculty of Education of Alvan Ikoku Federal University of Education, Owerri, Imo State. The corrections and inputs made by these experts yielded the basis for the modification of the items of the instruments. In order to establish the reliability of the research instrument, the instruments were administered to 20 other respondents from public rural secondary schools outside the sample group. Analysis was done using Chronbach Alpha Statistics. A reliability co-efficient of 0.88 and 0.85 were realized which signified that the instruments were reliable.

Quantitative data collected through the structured questionnaire were analyzed using descriptive statistics - frequencies, percentages, means, and standard deviations, with the aid of statistical software such as SPSS. Inferential statistics - t-tests or regression analysis were used to test relationships between variables. Qualitative data obtained from semi-structured interview guide was analyzed thematically. Responses were transcribed, coded, and organized into themes reflecting equity, access, opportunities, and challenges associated with mobile learning. The integration of quantitative and qualitative findings enabled a comprehensive interpretation of the results.

IV. Results And Discussion

The results of the study are presented based on the research questions, hypotheses and in-dept interview obtained via Quantitative data obtained using QEAML instrument used for the study and analyzed in tables 1 to 8 as well as Qualitative data thematically analyzed in themes 1, 2, 3 and 4.

Research Question 1: What is the coefficient relationship between mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools?

Table 1: Summaries of Pearson “r” statistics used to explain the relationship between mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools

V	N	Σ	R	r^2	DR	Remarks
X	360	11632				High
			0.81	65.61%	Positive	Positive
Y	360	12826				Relationship

Size (n), Summation (Σ), Pearson (r), Proportion of Variance (r^2), Direction of Relationship (DR) and Remarks

Table 1 reveals a high positive relationship between mobile learning adoption and reduced gender disparities in educational outcomes in rural Nigerian schools, indicating mobile learning adoption possesses the likelihood of reducing the gender disparities in educational outcomes in rural Nigerian schools. Specifically, the coefficient value of 0.81 suggests that approximately 65.61% ($r^2 = 0.6561$) of the variation in reduction of gender disparities in educational outcomes in rural Nigerian schools can be attributed to adoption of mobile learning in educational sectors, highlighting the significant impact of mobile learning adoption outcomes among the 60 teachers and 300 students sampled. Therefore, the answer to the above question reveals a high and positive coefficient of relationship between the mobile learning adoption and reduced gender disparities in educational access and outcomes in rural Nigerian schools.

Hypothesis One

H_{01} : There is a significant relationship between mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools

Table 2: Summaries of t-test of significance of Pearson “r” statistics used to test the coefficient of relationship between mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools

V	N	Σ	R	A	Df	t_{cal}	t_{tab}	Decision
X	360	11632						
			0.81	0.05	359	23.652	1.96	Reject H_{01}
Y	360	12826						

Sample Size (n), Summation (Σ), Pearson (r), Alpha Level (α), Degree of Freedom (df) and t-test of Significance of Pearson ‘r’ statistics between two Variables

Table 2 shows the result for the test of the coefficient of relationship between mobile learning adoption and reduced gender disparities in educational outcomes in rural Nigerian schools. The null hypothesis, which states that there is no significant relationship between mobile learning adoption and reduced gender disparities in educational outcomes in rural Nigerian schools, is rejected. The calculated t-value (23.652) exceeds the critical t-value (1.96), indicating a statistically significant relationship at the 0.05 level with 359 degrees of freedom. It was therefore concluded that there is significant relationship between mobile learning adoption and reduced gender disparities in educational outcomes in rural Nigerian schools. This finding is in line with Hedo (2023), who stated that mobile learning adoption can contribute to reduced gender disparities in educational outcomes in rural Nigerian schools. By increasing access to digital resources and learning opportunities, mobile learning can help bridge gaps in areas like literacy, STEM participation, and enrollment rates for girls. Effective implementation, including addressing barriers like device access and digital literacy, is key to maximizing impact

Research Question two: What is the coefficient of relationship between socioeconomic status and mobile learning engagement among students in rural Nigerian schools?

Table 3: Summaries of Pearson “r” statistics used to explain the relationship between socioeconomic status and mobile learning engagement among students in rural Nigerian schools

V	N	Σ	R	r^2	DR	Remarks
X	360	9744				High
			0.67	44.89%	Positive	Positive
Y	360	12826				Relationship

Size (n), Summation (Σ), Pearson (r), Proportion of Variance (r^2), Direction of Relationship (DR) and Remarks.

In Table 3, the analysis reveals a high positive relationship between the socioeconomic status and mobile learning engagement among students in rural Nigerian schools, indicating that as the socioeconomic status improves, the likelihood of mobile learning engagement among students in rural Nigerian schools improves. Specifically, the coefficient value of 0.67 suggests that approximately 44.89% ($r^2 = 0.4489$) of the variation in socioeconomic status can be attributed to mobile learning engagement among students' outcomes among the 60 teachers and 300 students sampled. Therefore, the answer to the above question reveals a high and positive coefficient of relationship between the socioeconomic status and mobile learning engagement among students in rural Nigerian schools.

Hypothesis two

H_{02} : There is no significant relationship between the socioeconomic status and mobile learning engagement among students in rural Nigerian schools.

Table 4: Summaries of t-test of significance of Pearson “r” statistics used to test the coefficient of relationship between the socioeconomic status and mobile learning engagement among students in rural Nigerian schools

V	N	Σ	R	A	Df	t_{cal}	t_{tab}	Decision
X	360	9744						
			0.66	0.05	359	21.198	1.96	Reject H_{02}
Y	360	12826						

Sample Size (n), Summation (Σ), Pearson (r), Alpha Level (α), Degree of Freedom (df) and t-test of Significance of Pearson ‘r’ statistics between two Variables

Table 4 shows the result for the test of the coefficient of relationship between the socioeconomic status and mobile learning engagement among students in rural Nigerian schools. The null hypothesis, which states that there is no significant relationship between socioeconomic status and mobile learning engagement among students in rural Nigerian schools is rejected. The calculated t-value (21.198) exceeds the critical t-value (1.96), indicating a statistically significant relationship at 0.05 level with 359 degrees of freedom. It was therefore concluded that there is significant relationship between socioeconomic status and mobile learning engagement among students in rural Nigerian schools. This finding finds support in Chima (2024) that Students from higher socioeconomic backgrounds tend to have more access to devices, data, and digital literacy skills, leading to greater engagement with mobile learning opportunities. In contrast, low-income students often face barriers like limited device access, high data costs, and connectivity issues, hindering their engagement and potentially widening educational disparities.

Research Question Three: What is the coefficient of relationship between accesses to mobile devices and educational disparities in rural Nigerian schools?

Table 5: Summaries of Pearson “r” statistics used to explain the coefficient of relationship between the accesses to mobile devices and educational disparities in rural Nigerian schools

V	N	Σ	R	r^2	DR	Remarks
X	360	12866				High
			0.65	42.25%	Positive	Positive
Y	360	12826				Relationship

Size (n), Summation (Σ), Pearson (r), Proportion of Variance (r^2), Direction of Relationship (DR) and Remarks

In Table 5, the analysis reveals a high positive relationship between the accesses to mobile devices and reduced educational disparities in rural Nigerian schools, indicating that accesses to mobile devices reduces educational disparities in rural Nigerian schools. Specifically, the coefficient value of 0.65 suggests that approximately 42.25% ($r^2 = 0.4225$) of the variation in reducing of educational disparities in rural Nigerian schools can be attributed to accesses to mobile devices, highlighting the significant impact of accesses to mobile devices in reducing of educational disparities in rural Nigerian schools’ outcomes among the 60 teachers and 300 students sampled. Therefore, the answer to the above question reveals a high and positive coefficient of relationship between the accesses to mobile devices and reduced educational disparities in rural Nigerian schools.

Hypothesis Three

H_{03} : There is a significant relationship between access to mobile devices and reduced educational disparities in rural Nigerian schools.

Table 6: Summaries of t-test of significance of Pearson “r” statistics used to test the coefficient of relationship between the accesses to mobile devices and educational disparities in rural Nigerian schools

V	N	Σ	R	A	Df	t_{cal}	t_{tab}	Decision
X	360	12866						
			0.65	0.05	398	16.839	1.96	Reject H_{03}
Y	360	12826						

Sample Size (n), Summation (Σ), Pearson (r), Alpha Level (α), Degree of Freedom (df) and t–test of Significance of Pearson “r” statistics between two Variables

Table 6 shows that the null hypothesis, which states that there is no significant relationship between access to mobile devices and reduced educational disparities in rural Nigerian schools, can be rejected. The calculated t-value (16.839) exceeds the critical t-value (1.96), indicating a statistically significant relationship at the 0.05 level with 398 degrees of freedom. It was therefore concluded that there is significant relationship between access to mobile devices and reduced educational disparities in rural Nigerian schools. This finding support report in Odoh (2024) that increased access to mobile devices can bridge gaps in learning opportunities, enabling students to access digital resources, online content, and virtual support.

Research Question Four: What are the challenges affecting the effective use of mobile learning platforms in rural Nigerian schools?

Table 7: Responses on the challenges affecting the effective use of mobile learning platforms in rural Nigerian schools

S/N	ITEMS	mean	SD	Decision
1.	Limited or unreliable internet access hinders access to online resources and virtual classes	2.89	0.6537	Accepted
2.	Inconsistent power supply makes it hard to charge devices and access digital content	3.13	0.6317	Accepted
3.	Expensive data plans limit students' access to online resources and mobile learning opportunities	2.80	0.7535	Accepted
4.	Many students lack reliable access to smartphones or tablets, creating a gap in learning opportunities	2.69	0.8079	Accepted
5.	Some teachers and students may lack the skills to effectively use mobile learning platforms, reducing their impact	3.41	0.7986	Accepted
	Cumulative Grand Mean	3.0		Accepted

The grand mean ($\bar{x}$) score of 3.0 which is greater than the reference mean ($\bar{x}$) score of 2.5 is an indication that there are challenges affecting the effective use of mobile learning platforms in rural Nigerian schools. This finding finds support in Odoh (2024) that challenges like poor internet connectivity, unpredictable

electricity supply, high data costs, limited access to devices, and limited digital literacy hinder the effective use of mobile learning platforms in rural Nigerian schools, creating barriers to equitable access and quality learning experiences for students

Research Question Five: What are the strategies that can enhance equitable access to mobile learning resources for students in rural Nigerian schools?

Table 8: Responses on the strategies that can enhance equitable access to mobile learning resources for students in rural Nigerian schools

S/N	ITEMS	Mean	SD	Decision
1.	Providing affordable devices and data plans for low-income students	2.45	0.77373	Accepted
2.	Establishing community centers or schools with mobile learning resources for shared access	3.15	0.72126	Accepted
3.	Developing offline-compatible learning materials for areas with poor internet connectivity	2.80	0.7535	Accepted
4.	Collaborating with telecom companies for affordable data plans or free access to educational platforms	2.69	0.8079	Accepted
5.	Offering digital literacy training for students, teachers, and parents to boost effective use of mobile learning resources	2.95	0.78500	Accepted
	Cumulative Grand Mean	2.81		Accepted

The grand mean ($\bar{x}$) score of 2.81 which is greater than the reference mean ($\bar{x}$) score of 2.5 is an indication of accepted, that these are some of the strategies that can enhance equitable access to mobile learning resources for students with varying socioeconomic status in rural Nigerian schools. This above finds support in Chima (2024) that implementing strategies like subsidized devices and data plans, community access points, offline content solutions, partnerships with telecommunication providers, and digital literacy training can enhance equitable access to mobile learning resources for students with varying socioeconomic statuses in rural Nigerian schools.

Thematic Analysis of In-Depth Interviews

Themes for In-dept Interviews:

1. Access to mobile learning platforms
2. Utilization
3. Impact on educational disparities in rural schools
4. Challenges and barriers

The narrations are reported in the original word of the interviewee.

Four main themes emerged from the interview data which are as follows:

Theme 1: mobile learning adoption and gender disparities in educational outcomes in rural Nigerian schools. The expressed views of (p1, 2, 5, 8, 9, 11, 12, 15, 17, 18, 19, and 20) affirmed that “Mostly android phones are available with few iPhones for personal uses and has helped make access to educational teaching and learning process easy for male and female learners. Also, there are few desktops and laptops available across schools for teaching and learning interactive experience. Government Educational Agencies supports the use of ICT / computers in teaching and learning in primary and secondary schools by providing and equipping schools in rural areas with Solar, Internet connectivity and Desktops Computers”.

This supports the assertion of Mmaduikwe (2019) who noted that the application of mobile learning strategies has limited disparities in attaining quality educational service due to gender, socioeconomic and locational inequalities in contemporary societies. Also, Agbo (2023) affirmed that the rapid adoption of mobile teaching and learning strategies has helped to increase learners access to quality educational learning resources and opportunities. This measure mostly makes educational learning opportunities inclusive as it offers affordable education for disadvantaged remote rural students without bias. According to Okunniyi (2019), mobile learning has offered affordable access to quality education for students from low-income backgrounds, who might not afford traditional schooling or resources. With internet-enabled devices, students can access free or low-cost educational apps, online textbooks, and learning platforms. This levels the playing field, giving disadvantaged students tools to keep up with peers. Ochonogor and Ajaja (2018) pointed out that in many areas, mobile learning platforms have provided targeted support like exam prep, literacy programmes, or vocational training, helping students from disadvantaged backgrounds improve their skills.

Theme 2: socioeconomic status and utilization mobile devices for learning engagement among students in rural Nigerian schools. (P2, 5, 6, 8, 9, 10, 1, 13, 15, 16, 17, 18, 19, and 20) stated that:

“Awareness often created by National Orientation Agency of Nigeria on the importance of education the girl Child has made parents changed their earlier negative orientation and adopted a positive attitude towards educating the girl child.

Because of this paradigm shift, boys and girls in most families are equally supported and encouraged to attain education. Therefore, resources such as needed technological digital devices that would facilitate learning are made available by parents and significant others within the family and society”.

This development is consistent with the report of Mark (2018). Mark stated that every student deserves an equal opportunity for success, regardless of their race, socioeconomic status, parental support, zip code, or background knowledge.

Theme 3: impact of mobile devices on educational disparities in rural Nigerian schools (P1, to 20) stated that:

“Actually, in contemporary time, learners in rural areas typically strive to get necessary digital tools like Android Phone, Laptop, PC etc., to enable them access learning materials online due to the cost of buying most print textbooks. Some children even engage in economic labour activities such as selling Sachet Water, Bread, Fruits, etc., in other to raise money to buy mobile phones. Presently, students in rural communities are very conscious of the importance of education. This has made them to be more resilient and focused and this why of late, students in rural communities have been exceling in WASCE and JAMB and gaining admission into tertiary institutions of higher learning in Nigeria. This has reduced educational disparities between rural and urban communities in Nigeria”.

This is consistent with the assertions of previous researchers. For example, Kumar et al. (2022); Alrasheedi et al. (2015) stated that mobile learning platforms not only allow for the dissemination of educational content but also encourage interactive and collaborative learning environments, where students can engage with peers and educators in real time, thereby forging deeper learning connections.

Theme 4: challenges and barriers affecting the effective use of mobile learning platforms in rural Nigerian schools (P1, to 20) stated that:

“Poor power supply, high cost of mobile learning devices, unskilled teachers and government attitude towards sponsoring and or, training the teachers on how to effectively and efficiently utilize mobile learning platform for instructional delivery”.

This finding is in congruence with the affirmation of Achuonye et al. (2026). They said persistent poor internet connectivity services, unpredictable electricity supply, and high data costs etc., continue to marginalize rural students. Low internet connectivity in rural areas hampers mobile learning, limiting access to online resources and virtual classes. This forces students to rely on offline content or travel to areas with better connectivity, disrupting their learning. Unpredictable electricity supply makes it hard for students to charge devices and access digital content. High data costs make mobile learning expensive for students with limited budgets. This restricts access to online resources, forcing students to rely on limited offline content or drop out. This leads to missed learning opportunities and adds costs for alternative power sources like generators or solar chargers (Achuonye et al., 2026). Lack of reliable access to mobile devices marginalizes students who cannot afford smartphones or tablets. This creates a gap compared to peers with better resources, affecting academic performance and opportunities (Aid et al., 2024; Eteng et al., 2022). Likewise, the apparent gap in digital literacy among rural teachers and learners can hinder the pedagogical integration of mobile technologies into everyday instruction (Hamza & Shehu, 2025). These challenges reflect broader patterns observed in rural education globally (Ahiaku, Uleanya, & Muyambi, 2025).

V. Conclusion

The analysis and presentation shown in the tables above indicated mobile learning adoption can contribute to reduced gender disparities in educational outcomes in rural Nigerian schools. It also indicated on students from higher socioeconomic backgrounds tend to have more access to devices, data, and digital literacy skills, leading to greater engagement with mobile learning opportunities. It further indicated increased access to mobile devices can bridge gaps in learning opportunities, enabling students to access digital resources, online content, and virtual support.

It also finds out that challenges like poor internet connectivity, unpredictable electricity supply, high data costs, limited access to devices, and limited digital literacy hinder the effective use of mobile learning platforms in rural Nigerian schools, creating barriers to equitable access and quality learning experiences for students. Finally, it also indicated implementing strategies like subsidized devices and data plans, community access points, offline content solutions, partnerships with telecommunication providers, and digital literacy training can enhance equitable access to mobile learning resources for students with varying socioeconomic statuses in rural Nigerian schools.

VI. Recommendations

1. The governments should help and improve internet access and infrastructure in rural areas which involves upgrading network coverage, increasing bandwidth, and ensuring reliable connectivity to support mobile learning.
2. There should also be enhancing connectivity in other to enable students to access online resources, participate in virtual classes, and engage with digital content, ultimately supporting more effective mobile learning experiences
3. There should be implementing subsidies or partnerships that can make mobile devices and data plans more affordable for low-income students. This could involve government funding, corporate sponsorship, or collaborations with telecommunication companies to offer discounted rates.
4. There should be an offering of training for students, teachers, and parents to boost effective use of mobile learning resources. Digital literacy training can equip students, teachers, and parents with skills to effectively use mobile learning resources. This training could cover basics like navigating devices and apps, online safety, and digital content evaluation, as well as strategies for integrating mobile learning into daily life.
5. The government should help and create learning materials accessible without reliable internet connectivity. Developing offline-compatible content involves creating learning materials that can be accessed and used without internet connectivity. This could include downloadable apps, re-loaded content on devices, or physical resources like SD cards with educational content

Ethical Statement

The ethical approval for the conduct of this study was granted on September, 8th 2025 by the ethical committee on Research and Development of the Department of Curriculum Studies and Educational Technology, Alvan Ikoku Federal University of Education. The Committee sought the expertise of those in Educational Technology and ICT units of the University for the review of the instruments. The committee ensured the research instrument and the intended purpose to determine the suitability for the target participant of the study (Teachers and students in secondary schools in rural areas), also made necessary inputs and clearance was given as the study procedures upheld confidentiality principles and voluntary participation as represented in the consent letter written and approved by the State Universal Education Board of the area under study. This was done considering the fact that the study **“Equity and Access in Mobile Learning: The Impact of Mobile Platforms on Educational Inclusion in Rural Nigerian Schools”** would add to knowledge in studies carried out in Educational Technology.

Statement of Informed Consent

The consent of the participants was attained. Also, the conduct of this study aligned to the detailed procedures set by the research ethical committee board of the Department of Curriculum Studies and Educational Technology, Alvan Ikoku Federal University of Education, Owerri, Imo State, Nigeria. The names of schools and teachers remained anonymous while the responses (data) remained confidential.

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