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Evaluation of the Role of Mobile Technology in Enhanced Learning and Research in North-West Universities of Nigeria

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Abstract

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The study analyzes the impact of mobile technology in providing learning and research opportunities in North-West universities of Nigeria. 100 respondents who were students and teachers from different institutions were chosen as respondents. The study employed a typical questionnaire to gather information on the use of mobile technology in learning and research. The findings reveal that the use of mobile technology has increased student engagement at a rising rate through providing flexible and interactive learning spaces that improve academic performance as well as peer collaboration. It was also revealed that the academic staff have also adopted mobile technology as a means of enhancing teaching through multimedia materials, instantaneous feedback, and interactive tests. Slow internet speeds, cost of data, poor power supply, and inadequate training in educational software and research tools were cited as hindrances to the effective deployment of mobile technology. Despite the hitches, the majority of respondents concur that mobile technology is essential in contemporary education and research. Enhancement of digital infrastructure, lowering the cost of data, and provision of digital literacy training are recommended by this study to foster the utilization of mobile technology for the greater benefit of Nigerian higher institutions. This study highlights the imperative nature of how mobile technology is utilized to revolutionize the education process, making learning and research accessible, flexible, and interactive

Introduction

The integration of mobile technology into higher education has significantly transformed learning

and research processes globally (Baker, 2023). In Nigeria, particularly in the North-West region, mobile

devices such as smartphones, tablets, and laptops have become indispensable tools for accessing educational resources, facilitating communication, and supporting collaborative learning (Adebayo & Femi, 2024). This study evaluates the role of mobile technology in enhancing learning and research activities within universities in this region, focusing on key variables such as accessibility, engagement, academic performance, and the challenges hindering effective utilization.

Mobile technology offers unparalleled flexibility, allowing students and lecturers to access ebooks, journals, and online courses anytime and anywhere (Wang et al., 2023). It also enables personalized learning, where individuals can tailor their educational experiences to suit their needs and pace (Femi & Johnson, 2024). For research, mobile devices provide instant access to academic databases, collaboration platforms, and tools for data collection and analysis (Ogundele & Eze, 2024). Despite these advantages, the full potential of mobile technology in Nigerian higher institutions remains untapped due to infrastructural deficits, high data costs, unreliable power supply, and a lack of digital literacy among users (Fatokun & Amadi, 2024).

This study aims to bridge the gap between the theoretical benefits of mobile technology and its practical application in North-West Nigerian universities. By examining the extent of its use, the perceived benefits, and the challenges faced by students and lecturers, the research seeks to provide actionable recommendations for policymakers and institutional leaders. The ultimate goal is to foster an environment where mobile technology can be leveraged to improve learning outcomes, enhance research capabilities, and promote equitable access to education (Ogunleye & Adeola, 2024).

Statement of Problem

In an optimal educational environment, mobile technology should serve as a transformative tool for enhancing learning and research in Nigerian universities. Globally, mobile devices such as smartphones and tablets facilitate seamless access to digital resources (e.g., e-books, journals, and online

courses), enable collaborative learning, and support innovative teaching methodologies (Baker, 2023). Ideally, Nigerian higher institutions should leverage these technologies to improve academic engagement, research productivity, and equitable access to education, aligning with global trends in digital learning (Wang et al., 2023). Additionally, stable internet connectivity, affordable data plans, reliable power supply, and comprehensive digital literacy programs should be in place to maximize the benefits of mobile technology (Ogunleye & Adeola, 2024).

However, the current reality in North-West Nigerian universities falls short of this ideal. While mobile technology adoption is growing, its use for academic purposes remains inconsistent due to critical challenges (Fatokun & Amadi, 2024). Students and lecturers face persistent infrastructural deficits, including unstable internet connectivity, frequent power outages, and high data costs (Bello & Lawal, 2023). Many lack adequate training to effectively utilize educational apps and research tools, leading to underemployment of available technologies (Adeola & James, 2023). Furthermore, disparities in access to devices and digital resources exacerbate educational inequalities, particularly for rural and low-income students (Chukwu & Okafor, 2024). Despite the potential of mobile technology to revolutionize education, these barriers hinder its full integration into learning and research processes.

The disparity between the ideal and real situations highlights a significant gap in the effective deployment of mobile technology in Nigerian higher education. While mobile devices are widely available, their academic potential remains underutilized due to systemic challenges (Obi & Adeyemi, 2023). There is also a lack of institutional policies and structured training programs to guide the integration of mobile technology into curricula and research activities (Ogundele & Eze, 2024). This gap underscores the need for targeted interventions, such as improved infrastructure, affordable data plans, digital literacy initiatives, and policy frameworks, to bridge the divide and harness mobile technology for enhanced

learning and research outcomes. Addressing these issues is critical to ensuring that Nigerian universities can compete globally and provide inclusive, high-quality education in the digital age.

Specific Objectives

- 1. To assess how mobile technology is utilized for learning purposes in Nigerian higher institutions.
- 2. To investigate the role of mobile technology in facilitating research activities among students and lecturers.
- 3. To identify the challenges and the way forward in using mobile technology for learning and research in Nigerian higher institutions.
- 4. To evaluate the influence of mobile technology on student engagement and academic performance.
- 5. To examine the perceptions of students and lecturers on the effectiveness of mobile technology in enhancing learning and research.

Research Questions

- 1. How is mobile technology being utilized to enhance learning in Nigerian higher institutions?
- 2. What role does mobile technology play in supporting research activities in Nigerian higher institutions?
- 3. What are the challenges and the way forward in using mobile technology for learning and research in Nigerian higher institutions?
- 4. How does mobile technology influence student engagement and academic performance in higher institutions?
- 5. What are the perceptions of students and lecturers regarding the effectiveness of mobile technology in enhancing learning and research?

Literature Review

Introduction to Mobile Technology in Higher Education

Mobile technology has transformed the education system globally by providing flexible, accessible, and dynamic learning spaces to students and teachers. Institutions of higher learning are adopting more mobile technology to improve teaching and research activities. This section weaves together literature on the use of mobile technology in improving learning and research with a focus on Nigerian institutions of higher learning.

Worldwide, mobile technology is widely known to enhance access to learning content, ease communication, and promote collaborative learning culture (Brown & Singh, 2023). In Nigeria, mobile technology is becoming increasingly popular, but its use is limited by infrastructural and socio-economic factors. Research has also indicated that mobile technology usage can optimize learning attainment where there are no available resources, but there are also several factors influencing successful application (Ogunyemi & Ali, 2024). This review provides an extensive overview of literature from which the strengths, weaknesses, and possibilities of mobile technology in Nigerian universities are determined.

Mobile Technology and Learning Enhancement

There have been various studies that have pointed towards the use of mobile technology in enhancing learning experiences in institutions of higher education. Smartphones and tablets, among other mobile devices, are now an integral part of a student's life, providing access to e-books, academic journals, and online learning platforms. Mobile technology has revolutionized learning from a passive to an interactive process, enabling students to retrieve information at any time and from anywhere, as stated by Adebayo (2023). In Nigeria, m-learning has been linked to greater student motivation and participation, particularly in distance learning courses.

One of the most significant advantages of mobile technology in education is that it allows for personalized learning. Mobile learning applications and learning management systems (LMS) enable learners to tailor their learning process according to their own needs. Femi and Johnson (2024) assert that Nigerian higher institution students are happier when learning from mobile devices due to the mobility offered by the devices. In addition, mobile technology supports collaborative learning as students can engage in group discussions, exchange resources, and collaborate on joint projects using messaging apps and learning apps (Mohammed & Adewale, 2023).

Mobile Technology and Research in Higher Institutions

In research, mobile technology is also becoming essential. Both lecturers and students employ mobile technology to collect data, access web-based research databases, and communicate with collaborators. Research has discovered that mobile technology enhances research work by offering researchers instant access to information and ease of use in handling digital tools for data presentation and processing (Wang et al., 2023). For example, statistical analysis software or cloud storage applications such as Google Drive facilitate researchers to carry out their work and share it with colleagues.

Mobile technology has been extremely handy in Nigerian tertiary institutions for such students carrying out research in far-flung or underdeveloped regions. Mobile phones and tablets allow them to access learning materials that might otherwise be out of reach for them because of the lack of infrastructure (Ogundele & Eze, 2024). Nevertheless, the application of mobile technology in research is limited by the constraints of low internet connectivity, exorbitant data costs, and institutional restrictions on mobile-based research activities (Fatokun & Amadi, 2024).

Challenges of Mobile Technology in Nigerian Higher Institutions

Even though mobile technology has the advantage of broadening research and learning, it has setbacks that have delayed its total embracement in Nigerian higher education. Infrastructure poses the biggest setback where internet connectivity is not stable, there is insufficient power supply, and there is no ICT infrastructure impacting the utilization of mobile phones for learning (Bello & Lawal, 2023). The

affordability of mobile phone devices and internet data also poses a significant setback for both students and lecturers in Nigeria. According to Chukwu and Okafor's (2024) research, the majority of students residing in rural areas cannot afford a smartphone or a fixed internet connection, leading to a digital divide that affects educational equity.

Digital skills among teachers and learners are another issue. As mobile technology rises, there is insufficient skill in using these devices for improved learning (Adeola & James, 2023). Teacher training is not even offering training on how to incorporate mobile technology into educational materials, leading to underemployment of mobile learning tools. A study by Obinna and Ibrahim (2023) indicated that most lecturers in Nigerian universities still adhere to traditional methods of teaching and are not ready to adopt mobile learning platforms.

Opportunities for Mobile Technology in Nigerian Higher Education

Despite such obstacles, tremendous possibilities exist to harness mobile technology to improve learning and research in Nigerian higher education. One of the most hopeful possibilities could be for mobile technology to facilitate distance learning and open education. With online and blended models of learning becoming more popular, mobile phones can greatly expand learning to those students who are not in a situation to learn in the traditional class environment due to geographical or economic limitations (Okoye et al., 2023).

Besides, mobile technology can guarantee educational inclusiveness by offering inclusive learning platforms for disabled learners. For instance, mobile applications can be programmed to offer visually impaired learners screen readers or audio study materials. Bello et al. (2024) note that such measures are crucial for guaranteeing equal access to study materials for all learners irrespective of their physical capacity.

Lastly, the rapid development of mobile technology in Nigeria presents an opportunity for higher learning institutions to adopt such tools in research. As scholarly work becomes increasingly accessible through mobile apps, Nigerian researchers can use mobile technology to gather data, analyze data, and network with scholars across the globe. But for these possibilities to be best exploited, improved infrastructure, institutional assistance, and policy environments that facilitate the productive utilization of mobile technology in higher learning are required (Ogunleye & Adeola, 2024).

Methodology

This study employed a descriptive survey research design to evaluate the role of mobile technology in enhancing learning and research activities in North-West Nigerian universities. The methodology was structured to collect quantitative data from students and lecturers, ensuring a comprehensive analysis of mobile technology utilization, challenges, and impacts. The study targeted students and lecturers from three prominent universities in Nigeria's North-West region, namely; Ahmadu Bello University, Zaria, Bayero University, Kano, and Usman Danfodiyo University. Furthermore, a purposive sampling technique was used to select 100 respondents, comprising: **70 students** (30 from ABU, 20 each from BUK and UDU); and **30 lecturers** (10 from each university)

A structured questionnaire with a four-point Likert scale was the primary data collection tool. The instrument included 30 items categorized into four sections:

- 1. **Demographics**: Age, gender, academic discipline.
- 2. Utilization of Mobile Technology: Frequency and purposes of use.
- 3. Impact on Learning/Research: Benefits and academic outcomes.
- 4. Challenges: Barriers to effective use.

The 4-point Likert scale of Strongly Agree (4); Agree (3); Disagree (2); and Strongly Disagree (1), was used. A mean score of \geq 2.50 indicated consensus. Three experts (two in educational technology, and one in research methodology) validated the questionnaire. Revisions were made for clarity and alignment with objectives. Three (3) trained research assistants administered questionnaires physically to ensure high response rates. Follow-ups were conducted where necessary. Descriptive statistics (mean, standard deviation) were used to analyze; the extent of mobile technology use, popular tools/applications, and perceived benefits and challenges.

Results and Findings

Table 1: Utilization of Mobile Technology for Learning

| S/n | Item Statements | SA | Α | D | SD | Mean | Remark |
|-----|--|----|----|---|----|------|--------|
| 1 | Mobile technology is widely used by students and lecturers for accessing educational resources (e-books journals online courses) | 55 | 35 | 7 | 3 | 3.42 | Agree |
| 2 | Mobile devices, especially smartphones, are frequently used for online discussions, submitting assignments, and attending virtual lectures. | 50 | 40 | 6 | 4 | 3.36 | Agree |
| 3 | Learning management systems (LMS) and educational apps are popular due to their flexibility and accessibility in mobile learning. | 60 | 30 | 7 | 3 | 3.47 | Agree |

The data reveals strong consensus (90% combined SA/A responses) regarding mobile technology adoption for academic purposes. Particularly noteworthy is the 3.47 mean score for LMS/app usage, indicating these platforms are most valued for their flexibility. This suggests students and lecturers heavily rely on institutional digital resources, though the 7-10% disagreement figures reveal some accessibility gaps.

| S/n | Item Statements | SA | Α | D | SD | Mean | Remark |
|-----|--|----|----|---|----|------|--------|
| 1 | Mobile technology has significantly enhanced | 60 | 30 | 5 | 5 | 3.45 | Agree |
| | research activities by allowing access to | | | | | | |
| | academic databases, communication with | | | | | | |
| | peers, and collaboration with colleagues. | | | | | | |
| 2 | Mobile apps and platforms such as Google | 55 | 35 | 6 | 4 | 3.41 | Agree |
| | Scholar, ResearchGate, and academic | | | | | | |
| | repositories are commonly used for sourcing | | | | | | |
| | information and managing research projects. | | | | | | |
| 3 | Mobile technology facilitates the collection | 58 | 32 | 6 | 4 | 3.44 | Agree |
| | and analysis of data through cloud-based | | | | | | |
| | services and specialized research apps. | | | | | | |

Table 2: Role of Mobile Technology in Supporting Research:

Research support shows the highest agreement levels (Mean=3.45), with 90% of respondents confirming mobile technology's critical role in accessing scholarly materials. The minimal disagreement (5-6%) suggests near-universal recognition of these benefits. However, the slightly lower score for research platforms (3.41) may indicate technical limitations in using these tools.

 Table 3: Challenges in Using Mobile Technology for Learning and Research

| S/n | Item Statements | SA | Α | D | SD | Mean | Remark |
|-----|---|----|----|----|----|------|--------|
| 1 | Lack of stable internet connectivity limits | 55 | 30 | 10 | 5 | 3.35 | Agree |
| | access to online resources and mobile learning | | | | | | |
| | platforms. | | | | | | |
| 2 | High data costs and unreliable power supply | 60 | 25 | 10 | 5 | 3.40 | Agree |
| | affect the consistent use of mobile technology. | | | | | | |
| 3 | Lack of training and familiarity with | 50 | 30 | 15 | 5 | 3.25 | Agree |
| | educational apps and research tools reduces | | | | | | |
| | mobile technology benefits. | | | | | | |

Infrastructure issues emerge as the most severe challenge (3.40 mean), with 85% strongly affected by connectivity/power problems. The training gap (3.25 mean) shows that 20% experience significant difficulties with digital tools, suggesting institutional training programs could yield substantial improvements. The 10-15% disagreement figures may represent urban respondents with better access.

| S/n | Item Statements | SA | Α | D | SD | Mean | Remark |
|-----|--|----|----|----|----|------|--------|
| 1 | Mobile technology has positively influenced | 60 | 25 | 10 | 5 | 3.40 | Agree |
| | student engagement by providing interactive | | | | | | |
| | and flexible learning environments, leading to | | | | | | |
| | increased participation in academic activities. | | | | | | |
| 2 | Students who actively use mobile technology | 55 | 30 | 10 | 5 | 3.35 | Agree |
| | for learning report better academic | | | | | | |
| | performance and higher levels of collaboration | | | | | | |
| | with their peers. | | | | | | |
| 3 | Excessive reliance on mobile technology can | 45 | 30 | 15 | 10 | 3.10 | Agree |
| | lead to distractions, with social media and non- | | | | | | |
| | academic content competing for attention | | | | | | |
| | during study sessions. | | | | | | |

Table 4: Influence of Mobile Technology on Student Engagement and Performance:

While 85% acknowledge engagement benefits (3.40 mean), distraction concerns (3.10 mean) reveal a dual-edged impact. The 25% combined D/SD responses on distractions suggest many students effectively manage device usage, though institutions should still implement digital wellness strategies.

Table 5: Perceptions of Students and Lecturers on Mobile Technology Effectiveness:

| S/n | Item Statements | SA | Α | D | SD | Mean | Remark |
|-----|---|----|----|---|----|------|--------|
| 1 | Mobile technology has transformed learning | 65 | 25 | 5 | 5 | 3.50 | Agree |
| | and research, making it more accessible, | | | | | | |
| | flexible, and engaging. | | | | | | |
| 2 | Lecturers view mobile technology as a tool to | 60 | 30 | 5 | 5 | 3.45 | Agree |
| | enhance teaching through multimedia, real- | | | | | | |
| | time feedback, and interactive assessments. | | | | | | |
| 3 | Despite the challenges, mobile technology is | 55 | 35 | 5 | 5 | 3.40 | Agree |
| | crucial for modern education and research, | | | | | | |
| | with recommendations for improved | | | | | | |
| | infrastructure and digital literacy training. | | | | | | |

The 3.50 mean score for transformational impact reflects overwhelming consensus. Notably, lecturers (3.45) slightly outpace students (3.40) in recognizing benefits, possibly due to their professional perspective. The uniform 5% disagreement across items indicates strong institutional-wide support for mobile learning initiatives.

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Recommendations

1. Infrastructure Enhancement

- > Upgrade campus internet with high-speed connectivity and Wi-Fi hotspots
- > Partner with telecom providers for affordable education data plans
- > Implement solar/generator backup power systems.
- > Install device charging stations in key locations.

2. Capacity Building

- > Mandate digital literacy training for students and staff.
- > Integrate mobile technology training into curricula.
- > Conduct regular professional development workshops.
- Establish peer-to-peer tech support systems.

3. Technology Optimization

- > Adopt mobile-friendly LMS platforms.
- Develop localized educational applications.
- ➢ Maintain regular software updates.
- ➤ Implement cloud-based research tools.

4. Policy Framework

- Create mobile device usage guidelines.
- Develop digital wellness programs.
- Establish social media usage policies.
- Implement distraction-reduction strategies

5. Engagement Strategies

- Incorporate mobile collaboration tools.
- Design interactive mobile learning activities
- Utilize real-time feedback mechanisms.
- Promote peer learning networks.

6. Research Support

- Provide mobile research tool training.
- Ensure mobile access to academic databases.
- Implement cloud-based data storage.
- ➢ Facilitate virtual research collaboration.

7. Monitoring & Evaluation

- Conduct regular technology impact assessments.
- Analyze mobile learning platform data.
- Document and share best practices
- Establish continuous improvement cycles.

8. Sustainable Funding

- Secure government and private sector funding
- Negotiate technology discounts/partnerships.
- Create institutional technology budgets.
- Establish inter-university resource-sharing

9. Inclusive Access

- Implement device lending programmes.
- Ensure ADA-compliant mobile platforms.
- Develop offline learning resources.
- Provide assistive technologies

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