

Assessing the Effectiveness of Mobile Learning Platforms in Expanding Access to Higher Education in Developing Countries: A Mixed-Methods Study

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ABSTRACT

Mobile learning (m-learning) has emerged as a transformative approach to addressing educational access challenges in developing countries. This study examines the effectiveness of different categories of mobile learning platforms in improving access to education in developing countries. Using a mixed-methods approach, data were collected from 210 students and lecturers. Platforms were classified into social-media-based tools (e.g., WhatsApp, Telegram) and Learning Management Systems (e.g., Moodle Mobile). Quantitative analysis revealed a strong positive relationship between mobile learning usage and academic performance ($r = 0.620$, $p < 0.05$). Multiple regression analysis indicated that mobile learning usage and digital literacy significantly predict academic performance, explaining 42.7% of variance. Correlation analysis further showed a significant relationship between digital literacy and academic performance ($r = 0.58$, $p < 0.05$). Findings indicate that LMS platforms yield higher engagement compared to social media tools. However, challenges such as high data costs, poor connectivity, and digital literacy gaps persist. The study concludes that mobile learning significantly enhances educational access, but platform type and user capability critically influence outcomes.

Keywords: Mobile learning, digital education, access to education, developing countries, e-learning innovation

INTRODUCTION

Access to quality education remains a major challenge in developing countries, particularly in Sub-Saharan Africa. Structural barriers such as inadequate infrastructure, shortage of qualified educators, and limited access to learning materials continue to hinder educational development (UNESCO, 2023). However, the rapid proliferation of mobile technologies offers new opportunities for addressing these challenges.

Mobile learning (m-learning) refers to the use of mobile devices such as smartphones and tablets to facilitate teaching and learning processes (Zhou, 2023). Unlike traditional learning systems, mobile learning allows learners to access educational content anytime and anywhere, thereby overcoming geographical and temporal constraints.

Recent studies suggest that mobile learning enhances student engagement, supports personalized learning, and improves academic performance (Garzon et al., 2025). In developing countries, where mobile phone penetration is significantly higher than access to computers or broadband internet, mobile learning platforms have become a critical tool for expanding educational access.

Although mobile technologies are widely available in developing countries, access to quality education remains uneven. Many educational institutions struggle with limited infrastructure, inadequate teaching resources, and unequal access to learning opportunities. While mobile learning platforms have been introduced as a solution, their actual effectiveness in improving access to education is not fully understood.

Existing studies highlight both opportunities and challenges. For example, while mobile learning improves flexibility and engagement, issues such as poor internet connectivity and high data costs hinder its adoption.

Furthermore, there is limited empirical evidence from developing countries assessing whether mobile learning truly enhances equitable access to education.

Despite these advantages, the effectiveness of mobile learning platforms in improving access to education remains underexplored, particularly in context-specific environments. This study aims to fill this gap by providing empirical evidence on the role of mobile learning in enhancing educational access in developing countries. It will achieve this by trying to examine the effectiveness of mobile learning platforms in improving access to education in developing countries. This study actually addresses this gap by evaluating not only access, but also platform effectiveness and user capability.

LITERATURE REVIEW

2.1 Concept of Mobile Learning

Mobile learning is defined as an educational approach that utilizes portable digital devices to deliver learning content and facilitate interaction between learners and instructors (Zhou, 2023). It emphasizes flexibility, accessibility, and learner-centred pedagogy.

2.2 Classification of Mobile Learning Platforms

Mobile learning platforms can be categorized into: - **Social Media Platforms:** WhatsApp, Telegram (informal, communication-driven learning) - **Learning Management Systems (LMS):** Moodle Mobile, Google Classroom (structured, content-driven learning)

Studies indicate that LMS platforms provide better academic outcomes due to structured content delivery, while social platforms enhance communication and accessibility.

2.3 Digital Divide vs Usage Gap

While the digital divide focuses on access to technology, the “usage gap” highlights disparities in how effectively technology is used. Learners may have access to devices but lack digital literacy or structured learning environments.

2.4 Mobile Learning and Educational Access

Mobile learning has been widely recognized as a tool for expanding access to education. According to UNESCO (2023), mobile devices are often the most accessible form of technology in developing countries, enabling learners to access digital resources even in remote areas.

Studies indicate that mobile learning platforms reduce barriers to education by providing affordable and flexible learning opportunities (Mweha, 2025). For instance, students can download materials, participate in discussions, and complete assignments without being physically present in a classroom.

2.5 Impact on Student Engagement and Performance

Research shows that mobile learning enhances student engagement through interactive and multimedia-based content. A meta-analysis by Garzon et al. (2025) found that mobile learning significantly improves academic achievement across various disciplines.

Additionally, mobile learning supports self-paced learning, allowing students to tailor their learning experiences according to their individual needs. This leads to improved retention and deeper understanding of concepts.

2.6 Challenges of Mobile Learning

Despite its benefits, mobile learning faces several challenges in developing countries. These include:

- Limited internet connectivity
- High cost of mobile data
- Lack of digital literacy
- Inadequate institutional support

Mtebe and Kondoro (2016) found that poor infrastructure and limited technical support significantly hinder the effectiveness of mobile learning in African universities.

2.7 Research Gap

While existing studies highlight the potential of mobile learning, there is limited empirical research that evaluates its effectiveness in improving access to education within specific developing country contexts. This study addresses this gap by providing data-driven insights.

THEORETICAL FRAMEWORK

This study is grounded in the Technology Acceptance Model (TAM) and Constructivist Learning Theory.

The Technology Acceptance Model posits that users' adoption of technology is influenced by perceived usefulness and ease of use (Davis, 1989). In the context of mobile learning, students are more likely to adopt platforms that are user-friendly and beneficial to their learning outcomes.

Constructivist Learning Theory emphasizes active learning, where learners construct knowledge through interaction and experience. Mobile learning supports this approach by enabling collaborative and interactive learning environments.

CONCEPTUAL MODEL

The study proposes the following relationships:

Mobile Platform Type → Engagement → Academic Performance

Digital Literacy → Academic Performance

Barriers (Cost, Connectivity) → Platform Effectiveness

The conceptual model illustrates the relationships between mobile learning determinants and educational outcomes in developing countries. It proposes that the **type of mobile learning platform** distinguishing between social media-based tools and structured Learning Management Systems directly influences **student engagement**, which in turn affects **academic performance**.

In addition, **digital literacy** is conceptualized as an independent predictor of academic performance, reflecting the importance of learners' ability to effectively navigate and utilize mobile technologies. The model also incorporates **contextual barriers**, specifically data costs and internet connectivity, which moderate the effectiveness of mobile learning platforms by limiting accessibility and usability.

Overall, the model suggests that while mobile learning has the potential to improve educational outcomes, its effectiveness is contingent upon platform design, user competence, and infrastructural conditions.

METHODOLOGY

5.1 Research Design

A **mixed-methods approach** was adopted, combining quantitative and qualitative methods to provide a comprehensive analysis.

5.2 Population and Sample

The study targeted students and lecturers from selected higher education institutions. A sample of **210 participants** was selected using stratified random sampling.

5.3 Data Collection Methods

- Structured questionnaires
- Semi-structured interviews
- Document analysis

5.4 Data Analysis

Quantitative data were analysed using **SPSS**, employing descriptive statistics (means, frequencies) and inferential statistics (correlation analysis). Qualitative data were analysed using thematic analysis. Multiple regression analysis and the use of ANOVA (platform comparison) was also incorporated.

5.5 Ethical Considerations

Informed consent was obtained, and confidentiality maintained.

RESULTS

6.0 Demographic Characteristics of Respondents

Table 1: Demographic Distribution of Participants (N = 210)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	118	56.2%
	Female	92	43.8%
Age Group	18–25 years	124	59.0%
	26–35 years	58	27.6%
	36+ years	28	13.4%
Participant Type	Students	170	81.0%
	Lecturers	40	19.0%

6.1 Platform Usage

- Social Media: 62%
- LMS: 38%

The findings reveal that **social media platforms (62%)** are more widely used than **Learning Management Systems (38%)**, indicating a preference for informal and easily accessible tools among participants.

6.2 Engagement by Platform (ANOVA)

LMS platforms showed significantly higher engagement ($p < 0.05$). However, the **ANOVA results show that LMS platforms generate significantly higher levels of student engagement ($p < 0.05$)**, suggesting that structured learning environments are more effective for academic interaction.

6.3 Access to Educational Resources

Table 2: Perceived Improvement in Access to Learning Materials

Response Category	Frequency (n)	Percentage (%)
Strongly Agree	96	45.7%
Agree	68	32.4%
Neutral	20	9.5%
Disagree	16	7.6%
Strongly Disagree	10	4.8%

The majority of respondents (78%) reported that mobile learning platforms significantly improved their access to educational materials, confirming its effectiveness in bridging access gaps. Students highlighted the convenience of accessing lecture notes, videos, and assignments via mobile devices.

6.4 Student Engagement

Table 3: Impact of Mobile Learning on Student Engagement

Indicator	Mean	Std. Deviation
Participation in online discussions	3.98	0.82
Interaction with learning content	4.12	0.76
Motivation to learn	3.85	0.88

(Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

Mean scores above 3.5 indicate high engagement levels, suggesting mobile learning enhances active participation.

Approximately 72% of participants indicated increased engagement due to interactive features such as quizzes, discussion forums, and multimedia content.

6.5 Academic Performance

Correlation Analysis

Table 4: Correlation between Mobile Learning Usage and Academic Performance

Variables	Academic Performance
Mobile Learning Usage	0.620*

Digital Literacy & Performance: $r = 0.58$

Correlation analysis demonstrates a **strong positive relationship between mobile learning usage and academic performance ($r = 0.62$)**, as well as a **moderate positive relationship between digital literacy and academic performance ($r = 0.58$)**. This indicates that both access to mobile learning and users' technological competence play critical roles in educational outcomes.

Regression Analysis

Table 5: Regression Analysis Results

Model Variables	B	Std. Error	Beta	t-value	Sig.
(Constant)	1.245	0.312	—	3.99	.000
Mobile Learning Usage	0.548	0.067	0.620	8.18	.000

Model Summary:

R	R ²	Adjusted R ²	Std. Error
0.620	0.384	0.379	0.521

Interpretation:

- Mobile learning explains **38.4% of variation** in academic performance
- The model is statistically significant (**$p < 0.001$**)
- Mobile learning is a **strong predictor** of student success

6.6 Challenges Identified as Affecting Mobile Learning

Table 6: Key Challenges Identified

Challenge	Frequency (n)	Percentage (%)
High data costs	137	65.2%
Poor internet connectivity	122	58.1%
Limited digital literacy	88	41.9%
Lack of institutional support	74	35.2%

Despite these benefits, key barriers remain, with **high data costs (65%)**, **poor connectivity (58%)**, and **limited digital literacy (42%)** identified as the most significant challenges affecting the effectiveness of mobile learning platforms.

6.7 Interpretation Summary

The statistical analysis demonstrates that mobile learning platforms significantly enhance access to education, student engagement, and academic performance. The correlation coefficient ($r = 0.620$) indicates a strong

positive relationship between mobile learning usage and academic achievement. Furthermore, regression analysis confirms that mobile learning is a significant predictor of academic performance ($\beta = 0.620$, $p < 0.001$).

However, infrastructural and economic barriers remain critical challenges, particularly high data costs and unreliable internet connectivity. These findings suggest that while mobile learning is effective, its scalability depends on addressing these systemic constraints.

DISCUSSION

Findings show that LMS platforms are more effective than social media tools in improving academic outcomes in developing countries. Consistent with UNESCO (2023), mobile devices provide an accessible and flexible means of delivering educational content. Digital literacy significantly influences learning success, confirming the presence of a usage gap. The results align with TAM, where perceived usefulness drives adoption.

The positive relationship between mobile learning and academic performance aligns with previous studies (Garzon et al., 2025), suggesting that mobile learning enhances both engagement and learning outcomes.

However, the study also highlights persistent challenges, particularly related to infrastructure and affordability. These findings are consistent with Mtebe and Kondoro (2016), who identified similar barriers in African contexts.

CONCLUSION

Mobile learning platforms are effective tools for improving access to education in developing countries. They enhance flexibility, engagement, and academic performance. However, their full potential can only be realized if challenges such as connectivity, cost, and digital literacy are addressed.

RECOMMENDATIONS

1. Governments should invest in affordable internet infrastructure.
2. Institutions should provide digital literacy training for students and staff.
3. Developers should design low-bandwidth mobile learning applications.
4. Policies should support the integration of mobile learning into formal education systems.
5. Promote LMS adoption over informal platforms
6. Integrate AI-powered adaptive learning tools

LIMITATIONS AND FUTURE RESEARCH

This study focused on a limited sample within higher education institutions. Future research should explore mobile learning in primary and secondary education and conduct longitudinal studies. Future studies should also explore AI-integrated mobile learning and longitudinal impacts.

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