



Mobile Learning Innovations and Literacy Facilitators' Training in Nigeria: A Developmental Study

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Abstract

Adult literacy programmes in Nigeria are faced with several challenges, one of which is the use of inadequately trained facilitators. Most facilitators are volunteers who lack mastery of the needed andragogical principles and essential facilitation skills. This has hindered the quality of literacy delivery in the country. This study, therefore, aimed to design, develop, and evaluate a Mobile Training Application (MTA) for enhancing adult literacy facilitation skills in Oyo State, Nigeria. The study adopted a developmental research design guided by the principles of design-based research. Data were gathered through expert validation involving specialists in Information and Communication Technology (ICT), Educational Technology, and Adult Literacy. Feedback informed iterative refinements, resulting in an enhanced version of the application featuring animated videos, voiceovers, interactive quizzes, and culturally sensitive design elements. The findings revealed that the app effectively addressed the training needs of facilitators by improving engagement, accessibility, and skill acquisition in key areas including communication, active listening, participation enhancement, lesson planning, and evaluation. The paper further situates the innovation within the broader discourse on AI-enabled learning in Africa, underscoring its implications for inclusive digital transformation.

Keywords: Artificial Intelligence, Mobile Learning, Literacy Facilitation, Adult Education, Digital Skills

1. Introduction

Artificial intelligence (AI) and digital technologies are increasingly reshaping education worldwide by transforming how knowledge is delivered, assessed, and personalised. AI-driven systems such as intelligent tutoring, predictive analytics, and adaptive assessments are being employed to support individualised instruction, enabling learners to progress at their own pace while receiving instant feedback (UNESCO, 2021; Holmes et al., 2021). These technologies have the potential to improve learning efficiency, expand access to quality education, and reduce inequities between learners across different contexts. In Africa, the deployment of AI in education presents significant opportunities to address historical gaps in access and learning quality. However, infrastructural limitations, digital literacy deficits, and inadequate policy frameworks continue to constrain widespread adoption (OECD, 2023; UNESCO, 2022).

Nigeria, like many African nations, faces persistent challenges of low adult literacy, especially in rural and underserved communities. The National Commission for Mass Literacy, Adult and Non-Formal Education (NMEC, 2022) reports that despite government and non-governmental interventions, millions of adults remain non-literate, largely due to the shortage of well-trained facilitators and

outdated training methods. The effectiveness of adult literacy facilitators is central to learner engagement and retention, yet their professional development often suffers from logistical difficulties, resource constraints, and the absence of technology-enhanced training (Olaniran, 2021). Traditional face-to-face training approaches are limited in scalability, flexibility, and cost-efficiency, necessitating innovative solutions to enhance facilitation skills through digital platforms.

In response to these limitations, this study developed and tested a Mobile Training Application (MTA) that integrates AI-supported features such as adaptive feedback, audio-visual content, and interactive modules. The application was designed to enhance literacy facilitation skills by providing flexible, user-friendly, and contextually relevant learning experiences. This initiative aligns with the African Union's Digital Transformation Strategy for Africa (2020–2030), which emphasises the use of digital tools to strengthen education systems and promote lifelong learning. By leveraging AI and mobile learning technologies, this study contributes to the growing discourse on how digital innovation can bridge capacity gaps in adult education and improve the professional competence of literacy facilitators in Nigeria.

2. Problem Statement and Rationale

Previous studies on literacy facilitation in Nigeria have predominantly examined facilitators' demographics, motivation, working conditions, and remuneration, with limited attention to the integration of technology in capacity development (Ogunbameru, 2021; Adekoya & Salami, 2020; Aderinoye & Odewale, 2021). While these studies underscore the critical role of facilitators in learner success, they reveal a persistent gap in the use of digital tools to enhance facilitation competencies. Globally, digital learning and mobile technologies have redefined teaching and learning practices, providing flexible, interactive, and learner-centred platforms for training and professional development (UNESCO, 2021; Kukulska-Hulme, 2020). However, adult literacy education in Nigeria remains largely dependent on traditional, face-to-face models that are often resource-constrained and inaccessible to facilitators in remote areas.

As digital transformation accelerates worldwide, the neglect of technology integration in adult literacy threatens to deepen existing inequalities in educational delivery and outcomes (World Bank, 2022). To address this concern, the present study developed and validated a mobile-based training application (MTA) designed to improve literacy facilitation skills among adult educators in Oyo State, Nigeria. The study aligns with ongoing discourse on artificial intelligence (AI) and digital innovation in education, illustrating how context-sensitive, mobile-supported learning systems can strengthen capacity-building, promote inclusivity, and enhance teaching effectiveness within non-formal education. By situating mobile learning within the broader framework of AI-driven educational reform, this study contributes to efforts to modernise adult education delivery in Nigeria and across sub-Saharan Africa.

3. Objectives of the Study

The study specifically sought to:

1. Design and develop a Mobile Training Application (MTA) to enhance adult literacy facilitation skills in Oyo State, Nigeria.
2. Validate the content and usability of the MTA through expert review.
3. Evaluate facilitators' engagement with and feedback on the application's design and functionality.

4. Research Questions

1. What features should be integrated into a mobile training application to enhance literacy facilitation skills?
2. What are experts' evaluations of the design, usability, and content validity of the developed MTA?
3. How effective is the final prototype in enhancing facilitators' engagement and learning experience?

5. Methodology

5.1 Research Design

The study adopted a developmental research design, which is suitable for creating and refining instructional products through iterative testing and expert validation (Richey & Klein, 2014).

5.2 Development Process

The Mobile Training Application (MTA) was built using the Website 2 APK Android Builder. The training content (developed by the researcher) focused on five literacy facilitation skills:

- i. Effective Communication Skills (ECS)
- ii. Active Listening Skills (ALS)
- iii. Participation Enhancement Skills (PES)
- iv. Lesson Planning Skills (LPS)
- v. Evaluation Skills (ES)

Each module contained interactive units featuring scenario-based learning, tasks, and quizzes to evaluate understanding.

5.3 Expert Validation

The first prototype was installed on mobile devices and reviewed by experts in ICT for Adult Literacy and Educational Technology. Their feedback highlighted areas for improvement such as layout consistency, sequence control, icon placement, user navigation, and feedback mechanisms.

5.4 Revision and Final Prototype

Based on the feedback, a final version of the MTA was produced incorporating:

- a) Sequential navigation to ensure completion of modules.
- b) Animated videos and voiceovers for enhanced engagement.
- c) Culturally appealing colour schemes suitable for adult users (Hurlbert & Ling, 2007; Palmer & Schloss, 2010).
- d) Quizzes, scenario-based tasks, and gamified elements for skill reinforcement (Aljohani, Loke & Ng, 2010).

6. Integration of AI and Mobile Learning

The Mobile Training Application (MTA) integrates foundational principles of artificial intelligence (AI) through its adaptive learning features, automated feedback mechanisms, and interactive multimedia design. These components reflect the core pedagogical affordances of AI in education (personalisation, real-time assessment, and learner-centred engagement) which collectively enhance instructional relevance and learning efficiency (UNESCO, 2021; Luckin et al., 2016). By adjusting content to individual learners' pace and performance, the MTA embodies the principles of adaptive learning that Holmes et al. (2022) describe as central to effective AI-enabled systems. Such adaptive designs not only promote engagement but also foster mastery by responding dynamically to learners' needs and preferences.

Furthermore, the MTA's integration of mobile technology situates it within the broader discourse on digital inclusion in Africa. Mobile-based learning platforms have been identified as key enablers for expanding access to education in resource-limited environments, particularly where broadband infrastructure and computing facilities remain inadequate (GSMA, 2023; World Bank, 2022). The application's ability to function offline, coupled with its intuitive design and audio-visual components, ensures usability among adult literacy facilitators with varying levels of digital proficiency. This aligns with UNESCO's (2023) emphasis on leveraging mobile technologies to bridge educational divides and foster lifelong learning.

Thus, the MTA demonstrates how AI principles can be operationalised within mobile learning environments to advance literacy facilitation, enhance engagement, and promote equity in professional development across underserved contexts.

7. Findings and Discussion

The expert evaluation of the Mobile Training Application (MTA) revealed several key findings that underscore its potential as an innovative digital learning tool for adult literacy facilitators in Nigeria. Experts from the fields of Information and Communication Technology (ICT), Educational Technology, and Adult Education jointly affirmed that the MTA effectively addressed facilitators' training needs by enhancing interactivity, promoting learner motivation, and improving accessibility through its adaptive and multimedia-rich design. This aligns with prior evidence suggesting that gamified and multimedia content fosters engagement, supports learner autonomy, and sustains motivation among adult learners (Gee, 2021; Mayer, 2020).

A major strength identified was the app's capacity to deliver flexible, on-demand learning experiences unconstrained by geography or time. This flexibility is crucial in contexts such as Nigeria, where literacy facilitators often operate in rural or resource-limited areas with minimal access to conventional training opportunities (World Bank, 2022). The use of mobile delivery platforms, as noted by GSMA (2023), significantly expands access to professional development and helps overcome infrastructural and logistical constraints. By enabling asynchronous learning, the MTA supports facilitators' ability to balance work, learning, and family responsibilities; an essential consideration for adult learners (Knowles, Holton, & Swanson, 2020).

The structured sequencing of modules was also commended for ensuring progressive skill acquisition. Experts observed that the app's sequential design prevented learners from skipping ahead without completing prior units, thereby reinforcing mastery-based learning. This aligns with the constructivist principle that adult learners build knowledge cumulatively through structured, scaffolded experiences (Merriam & Baumgartner, 2020). Furthermore, the incorporation of voiceovers, illustrations, and animations proved particularly effective for users with limited literacy or digital experience. Such multimodal elements have been shown to enhance comprehension and retention, particularly in multilingual or low-literacy contexts (Paivio, 2022; UNESCO, 2023).

Critically, the integration of AI-inspired design principles (such as adaptive feedback loops and interactive tasks) demonstrates how digital learning environments can operationalise learner-centred pedagogy in African adult education. The app exemplifies how mobile-based innovations can support sustainable human capital development by bridging gaps in facilitator training and digital inclusion (Holmes, Bialik, & Fadel, 2022; OECD, 2023). However, experts noted that future iterations could further benefit from enhanced offline functionality and local language integration to deepen accessibility and cultural relevance.

Therefore, the findings affirm that the MTA provides a scalable, contextually relevant model for leveraging AI-related digital tools to enhance adult literacy facilitation, promote equitable learning opportunities, and strengthen workforce capacity in Nigeria and beyond.

8. Significance and Policy Implications

The study demonstrates that artificial intelligence (AI)-integrated mobile learning applications can significantly transform adult literacy facilitator training, especially in low-resource settings where traditional workshops are often costly, centralised, and logistically challenging. By leveraging adaptive learning features, interactive multimedia, and feedback mechanisms, mobile-based platforms can provide flexible, on-demand, and personalised learning opportunities that align with the realities of facilitators working in dispersed and underserved communities. This approach not only enhances accessibility but also promotes lifelong learning, an essential goal in adult education systems across Africa.

For policymakers and education planners, the findings highlight the urgent need to institutionalise digital and AI-driven innovations within national literacy frameworks. Integrating mobile learning technologies into adult education policies could enhance the efficiency and scalability of capacity-building programmes, allowing continuous professional development without disrupting facilitators' work schedules. Partnerships between government agencies, universities, and private technology providers could further support the development and deployment of such applications, ensuring affordability and long-term sustainability.

Moreover, embedding local languages, indigenous knowledge systems, and culturally responsive pedagogies into these digital tools is crucial. Doing so enhances cultural resonance, learner engagement, and content relevance; factors that determine the long-term success of educational innovations in diverse African contexts. By aligning AI-supported mobile training with indigenous learning philosophies such as communalism and oral transmission, digital tools like the Mobile Training Application (MTA) can serve not merely as technological interventions but as transformative instruments for inclusive, context-sensitive, and sustainable literacy development.

9. Conclusion

The development and validation of the Mobile Training Application (MTA) for adult literacy facilitators highlight the transformative potential of Artificial Intelligence (AI)-enabled mobile learning within Nigeria's non-formal education landscape. The innovation addressed a critical challenge in the sector, limited access to continuous professional development for facilitators due to inadequate funding, time constraints, and geographical barriers. By providing an interactive, self-paced, and context-responsive training platform, the MTA bridged the gap between traditional, face-to-face training limitations and the urgent need for flexible, scalable, and inclusive capacity-building approaches. Through AI integration, the application enabled adaptive learning experiences, personalized feedback, and performance tracking, fostering improved teaching competence and confidence among literacy facilitators.

Beyond its immediate relevance to Oyo State, the MTA model presents a replicable framework for national and regional literacy enhancement efforts, especially in sub-Saharan Africa, where infrastructural and human resource constraints persist. Future research should empirically assess the long-term effects of the MTA on facilitators' instructional performance, learner engagement, and literacy achievement outcomes across diverse socio-cultural and linguistic contexts. Such evidence will be crucial in informing national education policies and guiding sustainable adoption of AI-driven mobile technologies in adult education and lifelong learning programmes.

Recommendations

Drawing from the findings of this study, the following recommendations are proposed to strengthen the integration of Artificial Intelligence (AI) into adult literacy facilitation and broader educational development in Nigeria and across Africa:

1. Policymakers should integrate AI-enabled mobile training solutions into national literacy and skills development strategies to expand access and quality.
2. Facilitator and teacher trainers should adopt mobile-based continuous professional development models to complement face-to-face training.
3. App developers should design culturally responsive and linguistically inclusive AI-driven applications for adult education.
4. Upcoming researchers should conduct longitudinal studies assessing AI-enabled apps' effectiveness on facilitator performance and learner achievement.
5. Funding agencies should support scalable digital innovations that align with Africa's educational and digital transformation goals.

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