

Offline Mobile Application and Students' Achievement in English Reading Comprehension among Public Senior Secondary School Students in Ibadan, Nigeria

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Abstract

This study examines the efficacy of an Offline Mobile App Reading Strategy (OMARS) in improving English reading comprehension among senior secondary school students in Ibadan, Nigeria. Technology is increasingly shaping education, and offline mobile apps provide an effective way to address poor internet access and the limits of traditional teaching. The study employed a quasi-experimental research design, involving 102 students from six public schools who participated in an eight-week intervention using the Talo-Reader app. This app was preloaded with reading passages and distributed via Xender, allowing students to engage independently after initial teacher instruction. The English Reading Comprehension Achievement Test (ERCAT) assessed their achievement, with ANCOVA results revealing significantly higher post-test scores for OMARS participants (12.772) compared to the control group (5.817). A Bonferroni post-hoc test confirmed a statistically significant mean difference of 6.955 ($p < 0.001$); a partial eta squared value ($\eta^2 = 0.305$) indicated that OMARS accounted for 30.5% of the variance in reading achievement. These findings highlight offline mobile learning apps' potential in low-connectivity environments. The study recommends integrating OMARS into curricula, providing mobile learning devices, and adopting mobile-assisted language learning (MALL) strategies to enhance literacy and bridge digital divide.

Keywords: Offline mobile applications, English reading comprehension, technology-enhanced learning, mobile assisted learning, Talo-Reader

Introduction

Reading comprehension remains a cornerstone of educational success and cognitive development, particularly in contexts where English serves as the medium of instruction, such as in Nigeria. However, widespread challenges - ranging from overcrowded classrooms, inadequate instructional resources, to teacher-centred pedagogy - have impeded students' performance in English reading (Olatunji, 2022). The persistent underperformance in national examinations such as West African Examination Council (WAEC) and the National

Examination Council (NECO) highlights the urgent need for pedagogical reform and the adoption of context-appropriate educational technologies (Mohammed & Maude, 2022).

Adoption of ICT in knowledge integration has been reported to be beneficial (Eyo, 2016), but this is marred by numerous problems, including digital inequity and digital divide (Eyo, 2012). The digital divide continues to influence learning opportunities in sub-Saharan Africa, especially in public secondary schools where internet access is either unavailable or unreliable. According to the International Telecommunication Union (ITU, 2023), in low-income countries, only about 6 % of school-aged children have internet access at home—meaning approximately 94 % do not. This presents a case for scalable, offline digital interventions that harness the proliferation of smartphones and mobile devices.

Offline mobile applications represent a viable strategy to support learners in such contexts. Mobile-assisted language learning (MALL), especially in its offline form, enables differentiated instruction, supports independent learning, and bridges infrastructural gaps (Stockwell, 2022; Kukulska-Hulme et al., 2023). This study explores the effectiveness of an Offline Mobile App Reading Strategy (OMARS) using the Talo-Reader app, which circumvents internet dependency by offering preloaded reading texts. It hypothesizes that OMARS can significantly enhance English reading comprehension among senior secondary school students in Ibadan.

This study is significant as it provides empirical evidence on the effectiveness of offline mobile learning technologies - specifically the Offline Mobile App Reading Strategy (OMARS) - in enhancing English reading comprehension among senior secondary school students in Nigeria. In a context marked by limited internet access, overcrowded classrooms, and resource constraints, OMARS offers an innovative and accessible solution that supports independent and interactive learning. The findings contribute to the growing body of literature on Mobile-Assisted Language Learning (MALL) and inform policymakers, curriculum developers, and educators about the potential of context-adaptive educational technologies to improve literacy outcomes and bridge the digital divide in underserved communities.

This study is anchored in two complementary theoretical perspectives: The Unified Theory of Acceptance and Use of Technology (UTAUT) and constructivist learning theory. The UTAUT model, developed by Venkatesh et al. (2003) and further validated in educational contexts by Wang et al. (2020), explains how users adopt and utilise technology based on four key constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. In the context of OMARS, students' acceptance and sustained use of the Talo-

Reader app are influenced by its perceived usefulness in improving comprehension, ease of use, peer influence, and availability of support structures like teacher guidance and mobile access. This framework helps to understand the motivational and contextual factors that affect learners' engagement with offline mobile learning tools.

Complementing this, constructivist learning theory – in its modern digital interpretation – emphasizes active, learner-centred engagement where knowledge is constructed through experience, interaction, and reflection (Hodges, 2022). Mobile-assisted language learning (MALL), particularly in offline formats like OMARS, promotes such constructivist learning by enabling students to control the pace of reading, interact with digital texts, and engage in independent exploration. The use of multimedia, localised content, and self-paced reading passages supports cognitive engagement and personalised learning pathways, aligning with constructivist principles. Together, UTAUT and constructivism provide a robust framework for evaluating both the adoption and learning effectiveness of offline mobile applications in enhancing English reading comprehension.

Technology-enhanced learning (TEL) has transformed the landscape of language education by offering multimodal and interactive environments that support various literacy skills. Mobile reading applications, in particular, facilitate learning through the integration of text, audio, visuals, and gamified elements, all of which cater for diverse learner needs (Grabe, 2023). Offline mobile applications have emerged as valuable alternatives in regions with unreliable internet access, ensuring that learners are not excluded due to infrastructural limitations (UNESCO, 2022).

Digital reading environments are known to promote learner autonomy, with features like adjustable text speeds, audio playback, built-in glossaries, and comprehension checks that enable students to engage more deeply with content. Scholars such as Ahmadi (2018) and Gilakjani (2017) highlight how these features contribute to individualized learning pathways and support self-paced reading. This aligns with current pedagogical trends that emphasize personalized learning and differentiated instruction.

Within the Nigerian educational system, poor reading comprehension remains a pervasive issue. Traditional teaching methods often emphasize rote memorization over active engagement with texts, which limits learners' ability to infer, analyse, and synthesize information (Akpan & James, 2020; Olatunji, 2022). Moreover, limited access to updated textbooks and reading materials further compounds the problem, especially in rural and underserved areas.

Offline mobile learning tools provide a promising solution by offering portable and easily accessible reading content. When customized with culturally relevant materials, these tools can engage learners more effectively. Ogunbanwo and Aluko (2023) demonstrated the efficacy of offline mobile apps in improving STEM learning outcomes in low-resource settings, while Apata (2021) reported significant improvements in vocabulary acquisition and inferencing skills among secondary school students using Mobile-Assisted Language Learning (MALL) strategies in Ibadan.

Mobile Assisted Language Learning (MALL) is grounded in the principles of ubiquitous, situated, and personalized learning. It leverages the affordances of mobile technologies to support language acquisition both inside and outside the classroom (Burston, 2022). Offline mobile applications - those that do not rely on internet connectivity - extend the reach of MALL by enabling learning in bandwidth-scarce or remote regions.

Irudayasamy et al. (2021) emphasize the suitability of smartphones for language learning due to their portability and intuitive interfaces. Touchscreen navigation, voice features, and embedded assessments in offline apps create opportunities for interactive and learner-centred instruction. Persson and Nouri (2018) argue that such features foster collaborative learning and increase students' motivation. Additionally, Chen et al. (2023) stress that the effectiveness of offline digital tools is significantly enhanced when paired with teacher facilitation and content that reflects learners' socio-cultural contexts. This supports the instructional design of OMARS and similar tools, which incorporate teacher guidance and locally relevant content.

Several empirical studies have explored the impact of mobile learning interventions on students' reading comprehension. For instance, Alzahrani and Laxman (2021) conducted a quasi-experimental study in Saudi Arabia and found that students who used a mobile reading app performed significantly better on comprehension tasks than those taught using conventional methods. Similarly, Mbatha and Govender (2022) investigated the use of offline mobile learning in South African rural schools and reported improvements in learners' reading speed, accuracy, and overall comprehension.

In Nigeria, Ogunbanwo and Aluko (2023) found that the use of offline STEM learning apps led to significant gains in students' retention and understanding, particularly when teachers were trained to use the tools effectively. Apata (2021) reported similar findings in a study focused on English vocabulary and comprehension, noting that MALL environments

increased learners' participation and inferencing ability among secondary school students in Ibadan.

These empirical studies reinforce the potential of offline mobile reading interventions to address gaps in reading proficiency, especially when such tools are contextually adapted and supported by trained educators.

Hypotheses

Ho1: The Offline Mobile App Reading Strategy (OMARS) has no significant effect on students' achievement in English reading comprehension.

Ho2: There is no significant interaction effect of the Offline Mobile App Reading Strategy (OMARS) and mobile technology self-efficacy on students' achievement in English reading comprehension.

Methodology

The study employed a quasi-experimental pretest–posttest control group design to examine the effect of the Offline Mobile App Reading Strategy (OMARS) on students' reading comprehension. Six public senior secondary schools were purposively selected from six Local Government Areas in Ibadan, based on co-educational status, consistent participation in external examinations, and stakeholders' consent. A total of 102 students participated, with 27 assigned to the OMARS group and 75 to the conventional reading group.

The intervention lasted eight weeks, with three sessions per week, each lasting 40 minutes. Research assistants implemented structured instructional guides. The OMARS group engaged with preloaded comprehension passages, vocabulary tasks, and exercises on the Talo-Reader offline app, while the control group received teacher-centred lessons using printed texts. Both groups completed pre- and post-tests to measure the effect of the intervention.

Two instruments were employed. The first was the English Reading Comprehension Achievement Test (ERCAT), a 50-item supply-response test adapted from Spectrum High Standard English, validated by experts in language education and yielded a test–retest reliability coefficient of 0.76. The Mobile Technology Self-Efficacy Scale (MTSES), a 20-item Likert-type instrument, assessed students' confidence in mobile learning, with a Cronbach's alpha of 0.82, was the second instrument.

Data were analysed using descriptive statistics for preliminary results, while Analysis of Covariance (ANCOVA) tested the hypotheses, with pretest scores as covariates and mobile technology self-efficacy as a moderating variable.

Presentation of results

Ho1: The Offline Mobile App Reading Strategy (OMARS) has no significant effect on students' achievement in English reading comprehension.

Table 1 shows the effect of offline mobile app strategy and mobile technology self-efficacy on students' achievement in English reading comprehension.

Table 1: ANCOVA of post-achievement by offline mobile app reading strategy and mobile technology self-efficacy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	953.493a	5	190.699	11.74	.001*	.338
Intercept	950.262	1	950.262	58.50	.001*	.337
Pre-Achievement Test	135.636	1	135.636	8.35	.005*	.068
Offline Mobile App Reading Strategy	818.778	1	818.778	25.20	.001*	.305
Mobile Technology Self-Efficacy	3.079	1	3.079	0.19	.664	.002
Offline Mobile App × Mobile Tech Self-Efficacy	5.221	1	5.221	0.16	.852	.003
Error	1868.055	115	16.244			
Total	12490.750	128				
Corrected Total	3770.498	127				

R² = .338; Adjusted R² = .311; * denotes significance at p < .05.

Table 1 shows the ANCOVA results which reveal that the Offline Mobile App Reading Strategy (OMARS) had a significant and substantial effect on students' reading comprehension achievement, accounting for 30.5% of the variance in post-test scores after controlling for prior performance, (F (1,115) = 25.20, p < 0.001, Partial η² = .305). In contrast, mobile technology self-efficacy (MTSE) and the OMARS × MTSE interaction were not significant, indicating that the effectiveness of OMARS was consistent regardless of students' confidence in using mobile devices. These findings provide strong evidence to reject the null hypothesis (Ho1) and demonstrate that OMARS is both effective and inclusive.

Ho2: Mobile technology self-efficacy has no significant effect on students' English reading comprehension achievement.

Table 1 shows the ANCOVA results which reveal that mobile technology self-efficacy did not have a significant effect on students' English reading comprehension achievement, $F(1,115) = 0.19$, $p = .664$, $\text{Partial } \eta^2 = .002$. This means that students' level of confidence in using mobile devices, whether high or low, did not significantly influence their reading comprehension performance. Thus, the null hypothesis could not be rejected: mobile technology self-efficacy did not significantly influence students' reading comprehension outcomes.

Table 2: Estimated marginal means of post-test reading comprehension by mobile technology self-efficacy

MTSE Level	Mean	Std. Error	95% Confidence Interval
Low MTSE	48.21	1.13	45.97 – 50.45
High MTSE	48.89	1.15	46.61 – 51.17

The ANCOVA result showed that mobile technology self-efficacy did not have a significant effect on students' English reading comprehension achievement, $F(1,115) = 0.19$, $p = .664$, $\text{Partial } \eta^2 = .002$. As shown in Table 2, the estimated marginal means indicated that students with low MTSE ($M = 48.21$, $SE = 1.13$) and those with high MTSE ($M = 48.89$, $SE = 1.15$) achieved very similar post-test scores, with overlapping confidence intervals. This implies that students' confidence in using mobile devices did not significantly influence their reading outcomes, as OMARS proved effective for all learners regardless of their self-efficacy level.

Discussion of the findings

The study investigated the effect of the Offline Mobile App Reading Strategy (OMARS) and Mobile Technology Self-Efficacy (MTSE) on students' achievement in English reading comprehension. The findings revealed that OMARS had a significant and substantial effect on students' reading comprehension, accounting for over 30% of the variance in post-test scores after controlling for prior achievement. This indicates that OMARS is an effective instructional strategy capable of improving learners' comprehension outcomes in English, particularly in resource-constrained contexts where conventional teaching often dominates. The result corroborates Hazaea and Alzubi (2018), who reported improved autonomy and satisfaction with mobile-assisted reading, suggesting that integrating mobile tools into reading instruction promotes deeper engagement with texts.

In contrast, the study found that MTSE did not have a significant influence on reading comprehension performance. This implies that whether students felt confident in their ability to use mobile devices or not, their achievement outcomes were not affected. This finding is noteworthy because it challenges assumptions that students' digital self-beliefs necessarily shape learning outcomes. Instead, it highlights that when technology is thoughtfully designed and applied, even learners with low self-efficacy can benefit. Such inclusivity supports the perspective of Warschauer (2011) and other scholars who emphasize technology's potential to bridge learning divides.

Moreover, the non-significant interaction between OMARS and MTSE suggests that the strategy's effectiveness is stable across different learner profiles. In other words, OMARS works independently of students' prior technological competence or self-confidence. This reinforces the robustness and equity of the approach, ensuring that no group of learners is disadvantaged.

Taken together, the findings underscore OMARS as a flexible, context-sensitive, and learner-friendly innovation. It supports comprehension by encouraging active engagement with texts, bridging prior knowledge with new ideas, and motivating learners. At the same time, it offers practical solutions for classrooms in Nigeria and similar settings where infrastructural limitations and overcrowding often impede effective reading instruction.

Conclusion

The study established that the Offline Mobile App Reading Strategy (OMARS) significantly improved students' English reading comprehension achievement. Learners taught with OMARS performed better than those exposed to conventional methods, demonstrating the potential of the strategy to foster deeper understanding of texts. The findings further revealed that Mobile Technology Self-Efficacy (MTSE) did not significantly influence students' performance, nor did it interact with OMARS. This shows that OMARS was effective irrespective of learners' confidence in using mobile devices, thereby making it an inclusive strategy. Overall, OMARS emerges as a context-sensitive and equitable approach that enhances comprehension while addressing challenges common in resource-constrained classrooms.

Recommendations

Based on the findings, the following recommendations are made:

1. Teachers of English should adopt OMARS as part of their instructional repertoire to enhance students' comprehension skills.

2. Educational policymakers and school administrators should support the integration of OMARS into classroom practice by providing training opportunities for teachers on mobile-assisted strategies.
3. Curriculum planners should also embed mobile-based instructional approaches within the English curriculum to promote innovative pedagogy.
4. Furthermore, government and stakeholders should invest in making offline mobile reading resources and affordable devices more accessible to learners, particularly in public schools.
5. Finally, further research should explore the long-term impact of OMARS on reading and its applicability to other areas of language learning, such as vocabulary, writing, and critical thinking.

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