

Interactive Low-Cost Teacher-Guided Mobile-Based Storytelling and Children's Vocabulary Retention in ECCE Centres in Calabar Educational Zone

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Abstract

This study investigated the effect of a teacher-guided interactive mobile-based storytelling method on vocabulary retention of Early Childhood Care and Education (ECCE) learners within the Calabar Educational Zone of Cross River State, Nigeria. A quasi-experimental pre-test post-test non-equivalent control group design was adopted for the research. The population comprises 17,795 individuals, consisting of 1,756 caregivers and teachers as well as 16,038 preschool children in 439 ECCE/Creche centres in the Calabar Educational Zone of Cross River State. Multistage sampling technique was adopted to obtain a sample of 391 participants consisting of 111 caregivers and teachers and 280 preschoolers selected from 49 ECCE/Creche centres in the same educational zone. Three instruments; Vocabulary Retention Test (VRT), Teacher Perception and Readiness Questionnaire (TPRQ), and Classroom Observation Checklist (COC) were used for the collection of data. The three instruments were validated by experts in relevant fields while an overall reliability index of 0.81 was obtained using the Cronbach Alpha reliability coefficient. The data collected were analyzed using descriptive statistics (mean and standard deviation) as well as inferential statistics, namely Analysis of Covariance (ANCOVA) and independent samples t-test, and all tests were conducted at 0.05 level of significance. The result showed that there was no significant difference in the pre-test performance (Baseline) vocabulary level of learners of both the experimental ($M=12.84$, $SD=2.31$) and control groups ($M=12.67$, $SD=2.28$). However, the performance in terms of the post-test level indicated that learners exposed to teacher guided mobile-based storytelling method showed statistically higher vocabulary retention ($M=24.81$, $SD=2.62$) compared to learners taught using the traditional storytelling method ($M=17.94$, $SD=2.83$). The result also shows that at four-week delayed post-test, the experimental group maintained a higher score (Mean= 23.73 , $SD=2.48$) than the control group (Mean = 15.86 , $SD=2.91$) in the retention vocabulary test. ANCOVA performed revealed a significant influence of the treatment on the vocabulary retention of the learners ($F=104.95$, $p<0.001$, Partial $\eta^2=.275$), and the teachers showed a positive perception and readiness (Grand Mean= 3.70) towards integrating mobile storytelling in teaching vocabulary. The study concluded that the teacher-guided interactive mobile-based storytelling is an effective instructional method for improving learners' vocabulary acquisition and retention. Therefore, this study recommends that mobile based stories could be integrated into the ECCE curriculum to improve learner's vocabulary.

Keywords: *Mobile-based storytelling; Vocabulary retention; Early Childhood Care and Education (ECCE); Preschool learners; Teacher-guided instruction.*

Introduction

Vocabulary acquisition and retention is a significant domain of the acquisition of oral language and a cornerstone of all forms of learning including a child's learning and development of early literacy, communicative competence and long-term academic performance. Indeed, vocabulary holds a central position among all components of the oral language because it facilitates children's understanding of the messages they received, their expression of thoughts, reading achievement and classroom participation in the pre-school setting. This finding that young children's vocabulary knowledge predicts a child's early reading success, school readiness and long-term academic achievement, has warranted a primary instructional focus on vocabulary development in early childhood care and education (ECCE) programmes globally (UNESCO, 2024; Rowe & Snow, 2020). The early years of early childhood education (ECE) represent a period of great sensitivity to the richness of the environment and the power of language interaction because children's brains are flexible and developing at rapid rates. Hence, children of young ages acquire new words daily through interaction with words within their language environment. But, acquisition of vocabulary knowledge only is not enough if words acquired in an instructional setting cannot be retained or effectively applied in future learning contexts. Vocabulary retention as defined as the immediate vocabulary knowledge to remember and use newly encountered words after instructional delivery, thus represents a more substantial construct in language development than immediate vocabulary learning and is a better predictor of children's long term language proficiency, reading readiness and academic performance than words that do not make it to children's long term vocabulary (Nation, 2022). Storytelling is one of the oldest and most proven teaching strategies for vocabulary development among young children. Stories are inherently engaging and meaningful to young learners which increase their imagination, recall and retention for words being encountered in a story. Children acquire new words naturally in storybooks in the form of interactive and context rich exposures to unfamiliar vocabulary, words which re-occur frequently during the story presentation and new words presented by adults in an interacting manner. A recent review of various studies has reported storytelling to be a powerful method in promoting early childhood vocabulary in orally or digitally illustrated story presentation (Juita et al., 2025). Technologically driven oral storytelling has recently evolved in a learning practice that is being facilitated through multimedia features of digitally and mobile-guided storytelling. The main difference between traditional storytelling and mobile-guided story telling is its interactivity with illustrations and animation, sound, multiple pictures, music, motion and other interactive activities packed together into interactive portable digital device such as smartphones or tables which enables the interaction, stimulation and attentiveness to vocabulary embedded in each interactive presentation in multiple ways, and greatly contribute to learner motivation and classroom participation in learning vocabulary in recent times (Cho et al., 2024; Pratiwi et al., 2025).

Technology in its ethics should only support teaching as a valuable resource, not replace the human role in instruction that teachers are committed to in classrooms for young children. Researchers have found it important that teachers are viewed as the mediator and guidance for young learners during these digital story exposures. Hence teacher-guided mobile story learning is seen as a learner-centered instructional technology which merges multimedia features of interactive

learning tool with beneficial pedagogical strategies. Moreover, many institutions now aim for cheaper technological devices with greater and deeper implications for instruction, hence in the ECCE programmes globally the use of technology continues to enhance young children's learning engagement and vocabulary development with much focus on integration of technology. The use of technology could prove a valuable innovation given present contexts of mobile accessibility to improve early childhood education programmes globally (Cho et al., 2024; Bruner, 2024).

Furthermore, although previous studies have demonstrated positive effects of digital storytelling on vocabulary acquisition, relatively few have examined interactive low-cost teacher-guided mobile-based storytelling within the context of Nigerian Early Childhood Care and Education. Existing studies have largely concentrated on immediate vocabulary gains, with comparatively limited attention devoted to long-term vocabulary retention assessed through delayed post-tests. Similarly, only a few investigations have simultaneously examined children's vocabulary retention alongside caregivers' and teachers' readiness to integrate mobile storytelling into classroom instruction. These gaps limit the availability of context-specific evidence needed to guide educational policy and classroom practice in Nigeria (Farooq et al., 2025; Pratiwi et al., 2025).

Cross River State, like many parts of Nigeria, is committed to improving the quality of Early Childhood Care and Education as a strategy for strengthening foundational literacy and achieving national educational goals. However, the extent to which interactive low-cost teacher-guided mobile-based storytelling can enhance vocabulary retention among preschool learners within this context remains largely unexplored. Generating empirical evidence on this instructional approach is particularly important because affordable mobile technologies are becoming increasingly accessible even in resource-constrained educational environments. Understanding whether such technologies can improve vocabulary retention while remaining practical for classroom implementation will assist teachers, curriculum developers, educational administrators, and policymakers in making informed decisions regarding technology integration in ECCE.

Against this background, this study investigated the effect of interactive low-cost teacher-guided mobile-based storytelling on vocabulary retention among Early Childhood Care and Education learners in the Calabar Educational Zone of Cross River State, Nigeria. Specifically, the study compared the vocabulary retention of learners exposed to teacher-guided mobile-based storytelling with those taught using conventional storytelling, examined learners' delayed vocabulary retention after the intervention, and assessed caregivers' and teachers' perceptions and readiness for integrating mobile-based storytelling into vocabulary instruction. The findings are expected to contribute empirical evidence to the growing literature on technology-enhanced early childhood education and provide practical recommendations for strengthening vocabulary instruction in resource-constrained preschool settings.

Statement of the problem

Vocabulary deficits in early childhood are strongly associated with later reading difficulties and academic underachievement (Hart & Risley, 2003; Lonigan et al., 2011). In many developing educational contexts, including parts of Nigeria, ECCE centres often face challenges such as limited instructional resources, insufficient teacher training in innovative pedagogies, and overreliance on rote learning strategies. Such approaches may expose children to isolated word lists without providing meaningful narrative contexts necessary for long-term retention.

Although storytelling is widely acknowledged as beneficial for vocabulary development, its implementation in many ECCE centres remains largely traditional and minimally interactive. Research demonstrates that vocabulary learning is significantly enhanced when teachers employ

elaborative questioning, scaffolding, and guided interaction during storytelling sessions (Wasik & Hindman, 2014). Without such structured guidance, children's vocabulary gains may be superficial and short-lived. Furthermore, while mobile technologies are increasingly present in Nigerian communities, their pedagogical integration into early childhood classrooms remains inconsistent and under-researched. Studies from other contexts indicate that digital storytelling can significantly improve vocabulary acquisition and retention when teachers actively mediate the learning process (Neumann, 2018; Kucirkova, 2019). However, empirical evidence on the effectiveness of teacher-guided mobile storytelling within ECCE settings in the Calabar Educational Zone is scarce the absence of context-specific research limits policymakers, curriculum developers, and school administrators in making evidence-based decisions regarding technology integration in early childhood education. Without empirical validation, investments in mobile learning tools may fail to yield optimal learning outcomes. Therefore, this study is justified as it seeks to generate local evidence on how teacher-guided mobile storytelling influences vocabulary retention among young learners, thereby contributing to both theory and practice in early childhood literacy development.

Aim and objectives of the study

The aim of this study was to determine the effect of interactive Low-cost teacher-guided mobile-based storytelling on vocabulary retention among children in ECCE centres in Calabar Educational Zone

Specific Objectives

The study was further carried in line with the specific objectives that include to do the following

- i. Measure the baseline vocabulary levels of ECCE learners in selected centres in Calabar Educational Zone before the intervention using a researchers developed vocabulary assessment tool.
- ii. Implement a structured teacher-guided mobile storytelling intervention for a period of eight (8) weeks in selected experimental ECCE centres.
- iii. Determine the difference in vocabulary retention scores between learners exposed to teacher-guided mobile storytelling and those taught using conventional storytelling methods at the end of the intervention period
- iv. Examine ECCE teachers' perceptions and readiness to integrate mobile storytelling into vocabulary instruction through structured questionnaires.

Research questions

The following research questions were poised to guide the study

- i. What are the baseline vocabulary levels of ECCE learners in selected centres in Calabar Educational Zone before exposure to teacher-guided mobile-based storytelling?
- ii. What is the effect of teacher-guided mobile-based storytelling on the vocabulary retention of ECCE learners compared with conventional storytelling?
- iii. What difference exists in the post-test vocabulary retention scores of learners exposed to teacher-guided mobile-based storytelling and those taught using conventional storytelling after the intervention?
- iv. What are the perceptions and readiness of ECCE teachers towards the integration of mobile-based storytelling into vocabulary instruction?

Research hypotheses

The following null form hypothesis were formulated to guide the study:

- i. There is no significant difference in the post-test vocabulary retention scores of ECCE learners exposed to teacher-guided mobile-based storytelling and those exposed to conventional storytelling
- ii. There is no significant difference in the four-week delayed vocabulary retention scores of ECCE learners exposed to teacher-guided mobile-based storytelling and those taught using conventional storytelling
- iii. Teacher-guided mobile-based storytelling has no significant effect on vocabulary retention among ECCE learners after controlling for pre-test vocabulary scores.

2.0 Literature Review

2.1 Conceptual Review

Early Childhood Care and Education (ECCE) is globally recognized as the foundation for children's cognitive, linguistic, social, emotional, and physical development. The early years of life constitute a critical period during which children rapidly acquire language skills that subsequently influence literacy, academic achievement, and lifelong learning. Consequently, high-quality ECCE programmes prioritize language-rich learning environments that stimulate children's vocabulary development through meaningful interactions and developmentally appropriate instructional strategies (UNESCO, 2024). Within the Nigerian National Policy on Education, ECCE is expected to provide stimulating learning experiences that foster language acquisition, communication skills, and school readiness among young learners (Federal Republic of Nigeria [FRN], 2023). Vocabulary development remains one of the strongest predictors of children's future reading ability, comprehension, and academic success. Vocabulary consists of the word's individuals understand (receptive vocabulary) and those they can appropriately use in speech and writing (expressive vocabulary). During the preschool years, vocabulary develops rapidly because children continuously interact with caregivers, teachers, peers, and their surrounding environment. According to Rowe and Snow (2020), early vocabulary growth provides the cognitive foundation upon which subsequent literacy and communication skills are built. Children with richer vocabularies generally demonstrate better reading comprehension, stronger oral communication, and higher academic performance than their peers with limited vocabulary knowledge.

Although vocabulary acquisition and vocabulary retention are closely related concepts, they represent different stages of language learning. Vocabulary acquisition refers to the process through which learners initially learn new words, whereas vocabulary retention concerns the ability to remember, retrieve, and appropriately use those words after a period of time. Long-term retention is particularly important because learning cannot be considered effective unless newly acquired vocabulary remains available for future communication and learning activities. Nation (2022) argues that vocabulary retention depends largely on repeated exposure, meaningful contextualization, learner engagement, and opportunities for retrieval practice. Consequently, instructional strategies that actively involve learners in meaningful language experiences are more likely to promote durable vocabulary retention than approaches emphasizing rote memorization. Storytelling has long been recognized as one of the most effective instructional strategies for promoting children's language development. Stories naturally expose children to new vocabulary within meaningful contexts that facilitate comprehension and recall. Through storytelling, children encounter unfamiliar words embedded in authentic narratives, enabling them to infer meanings from contextual cues while simultaneously developing listening comprehension and imagination.

According to Isbell and Sobol (2021), storytelling creates emotionally engaging learning experiences that stimulate children's curiosity, increase attention span, and facilitate long-term memory formation. Furthermore, repeated storytelling provides opportunities for children to encounter vocabulary multiple times, thereby strengthening word retention.

Recent advances in educational technology have transformed traditional storytelling into digital and mobile-based storytelling. Digital storytelling integrates narration, illustrations, photographs, animations, sound effects, music, and interactive multimedia elements to enrich children's learning experiences. Mobile-based storytelling specifically employs portable digital devices such as smartphones and tablets to deliver multimedia stories in highly interactive formats. Compared with conventional storytelling, mobile storytelling enables learners to manipulate learning resources, replay stories repeatedly, respond to embedded questions, and receive immediate instructional feedback. Such multimodal learning environments have been shown to improve learner motivation, engagement, comprehension, and vocabulary acquisition (Pratiwi et al., 2025).

The increasing availability of affordable Android devices has made mobile learning particularly attractive in developing countries where educational resources are often limited. Low-cost mobile technologies provide opportunities for schools to implement technology-enhanced instruction without requiring expensive digital infrastructure. This is especially important in Nigeria, where many public ECCE centres face shortages of instructional materials and educational technologies. Low-cost mobile storytelling therefore represents an innovative and practical solution capable of improving instructional quality while remaining financially sustainable.

However, the effectiveness of mobile storytelling depends not merely on the availability of technology but also on the quality of instructional guidance provided during learning activities. This has led to increasing attention being given to teacher-guided mobile storytelling. Teacher guidance refers to deliberate instructional support provided before, during, and after storytelling to facilitate children's understanding of vocabulary and story content. Teachers scaffold learning by introducing unfamiliar words, asking predictive and inferential questions, explaining meanings, encouraging learner participation, correcting misconceptions, and reinforcing vocabulary through repeated practice. Such instructional scaffolding promotes deeper cognitive processing and facilitates the transfer of newly learned vocabulary into children's long-term memory (Liang et al., 2025). Teacher-guided storytelling aligns with contemporary learner-centred pedagogies that recognize teachers as facilitators of meaningful learning rather than mere transmitters of knowledge. During guided storytelling, teachers actively engage learners in discussions, encourage collaborative learning, and provide individualized support according to learners' developmental needs. This interaction strengthens children's comprehension while simultaneously improving vocabulary retention through repeated retrieval and contextual reinforcement. Consequently, teacher-guided mobile storytelling combines the motivational benefits of multimedia technology with the pedagogical effectiveness of teacher scaffolding.

Interactive learning constitutes another important component of mobile storytelling. Interactivity refers to learners' active engagement with instructional content rather than passive observation. Interactive digital stories require children to answer questions, identify objects, repeat vocabulary items, solve simple problems, and participate in story-related activities. Such learner participation promotes active cognitive engagement, which significantly improves learning outcomes. According to Farooq et al. (2025), interactive digital storytelling enhances vocabulary acquisition because learners become active participants in constructing meaning rather than passive recipients of information. The authors further reported that interactive digital storytelling increased learner motivation, classroom participation, and vocabulary performance among young language learners.

Another distinguishing feature of teacher-guided mobile storytelling is its ability to support differentiated instruction. Preschool learners differ considerably in cognitive ability, language background, attention span, and learning pace. Mobile storytelling allows teachers to adjust instructional support according to individual learners' needs by repeating stories, slowing narration, emphasizing difficult vocabulary, and providing additional explanations where necessary. Such individualized instruction is often difficult to achieve through conventional storytelling alone. Teacher readiness also plays a significant role in determining the successful implementation of mobile storytelling. Technology integration in early childhood education requires teachers to possess adequate technological knowledge, pedagogical competence, and positive attitudes toward digital instruction. Teachers who perceive educational technology as useful and easy to use are more likely to integrate it into classroom practice than those with negative perceptions or inadequate digital competence. Wong et al. (2025) reported that professional development programmes significantly improved kindergarten teachers' confidence, competence, and willingness to integrate digital storytelling into early childhood classrooms. Similarly, Şakır (2025) found that perceived usefulness, ease of use, facilitating conditions, and behavioural intention significantly influenced preschool teachers' adoption of digital storytelling technologies. Despite the increasing popularity of digital storytelling, conventional storytelling continues to dominate classroom practice in many Nigerian ECCE centres. Conventional storytelling typically relies on oral narration supported by printed books or charts, with limited learner interaction and minimal multimedia reinforcement. Although conventional storytelling contributes to vocabulary development, its instructional effectiveness may be constrained by reduced learner engagement, limited visual support, and fewer opportunities for repeated interaction with vocabulary items. Consequently, recent educational research increasingly advocates combining storytelling with affordable digital technologies to maximize learning outcomes. The relationship between teacher-guided mobile storytelling and vocabulary retention can therefore be understood as a multidimensional instructional process. Mobile technology provides rich multimedia learning experiences; storytelling contextualizes vocabulary within meaningful narratives; teacher guidance scaffolds children's understanding through interaction and feedback; while repeated exposure and learner participation facilitate long-term retention. Together, these components create an engaging and cognitively stimulating instructional environment capable of improving preschool children's vocabulary development more effectively than conventional storytelling approaches. Accordingly, investigating the effectiveness of interactive low-cost teacher-guided mobile-based storytelling among Nigerian preschool learners is both timely and necessary, particularly in view of ongoing efforts to improve the quality of Early Childhood Care and Education through technology-enhanced instructional practices.

2.2 Theoretical Review

This study is anchored on Vygotsky's Sociocultural Theory, Mayer's Cognitive Theory of Multimedia Learning, and Paivio's Dual Coding Theory. These theories collectively explain how children acquire and retain vocabulary through social interaction, multimedia learning environments, and the simultaneous processing of verbal and visual information. Together, they provide a comprehensive theoretical foundation for understanding the effectiveness of interactive low-cost teacher-guided mobile-based storytelling in promoting vocabulary retention among preschool learners.

Vygotsky's Sociocultural Theory

The Sociocultural Theory was developed by Lev Vygotsky (1978) to explain the role of social interaction in children's cognitive development. The theory posits that learning is fundamentally a social process and that children's intellectual development occurs through meaningful interactions with more knowledgeable individuals such as parents, caregivers, and teachers. Central to the theory is the concept of the Zone of Proximal Development (ZPD), defined as the difference between what learners can accomplish independently and what they can achieve with appropriate instructional support. Another important concept within the theory is scaffolding, which refers to temporary instructional assistance provided by teachers to enable learners to accomplish learning tasks beyond their current level of competence. As learners become increasingly proficient, the instructional support is gradually withdrawn until they are capable of performing independently. The assumptions of Vygotsky's theory are particularly relevant to vocabulary instruction among preschool children. Young learners rarely acquire unfamiliar vocabulary independently; rather, they learn new words through conversations, guided interactions, storytelling, questioning, and repeated language exposure provided by adults. During storytelling sessions, teachers introduce unfamiliar words, explain meanings, ask probing questions, encourage learners to predict story outcomes, and reinforce vocabulary through repetition and classroom discussions. Such instructional support facilitates deeper understanding and strengthens vocabulary retention. Recent studies continue to validate the relevance of Vygotsky's theory in technology-supported learning environments. Liang et al. (2025), in a comprehensive meta-analysis, concluded that adult mediation significantly enhances preschool children's vocabulary learning during digital storybook reading. Similarly, Wong et al. (2025) reported that teachers who actively guided children's interactions with digital stories achieved significantly better language learning outcomes than situations where children used digital stories independently. These findings reinforce Vygotsky's proposition that meaningful learning occurs through guided social interaction. One major strength of the theory is its emphasis on collaborative learning and instructional support, both of which are central components of teacher-guided mobile storytelling. However, critics argue that the theory places greater emphasis on environmental influences while paying relatively less attention to children's individual cognitive differences and biological maturation (Ormrod, 2020). Nevertheless, the theory remains highly applicable to the present study because the intervention specifically combines teacher guidance with interactive mobile storytelling to improve children's vocabulary retention.

Mayer's Cognitive Theory of Multimedia Learning

Mayer's Cognitive Theory of Multimedia Learning was developed to explain how learners process and retain information presented through multiple media formats (Mayer, 2009). The theory proposes that meaningful learning occurs when learners actively process information presented simultaneously through verbal and visual channels. According to Mayer, learners possess separate channels for processing auditory and visual information, each with limited processing capacity. Effective instructional materials therefore promote learning by presenting complementary rather than competing information through these channels. The theory is based on three principal assumptions: the dual-channel assumption, the limited-capacity assumption, and the active-processing assumption. The dual-channel assumption suggests that learners process visual and auditory information separately. The limited-capacity assumption proposes that each processing channel can handle only a limited amount of information at any given time. The active-processing assumption argues that learners actively select, organize, and integrate incoming information with

their existing knowledge to construct meaningful understanding. Interactive mobile storytelling closely aligns with these assumptions because vocabulary is presented through narrated stories, colourful illustrations, animations, sound effects, and interactive learning activities. Rather than relying solely on oral narration as in conventional storytelling, mobile storytelling distributes learning across multiple sensory channels, thereby reducing cognitive overload and improving understanding. Recent educational research continues to support Mayer's theoretical propositions. Pratiwi et al. (2025) found that preschool learners exposed to multimedia digital storytelling demonstrated significantly greater vocabulary acquisition and classroom engagement than learners taught through conventional methods. Similarly, Farooq et al. (2025) reported that multimedia-supported storytelling increased learners' motivation and vocabulary learning because information was processed simultaneously through visual and auditory modalities. Despite its enormous contribution to multimedia instruction, the Cognitive Theory of Multimedia Learning has been criticized for focusing primarily on cognitive processes while giving relatively limited attention to the social interactions that occur during learning. Nevertheless, when combined with Vygotsky's Sociocultural Theory, it provides a more comprehensive explanation of how multimedia learning and teacher guidance jointly influence children's vocabulary development.

Paivio's Dual Coding Theory

Paivio's Dual Coding Theory (1986) provides another important theoretical explanation for vocabulary learning through interactive storytelling. The theory proposes that human cognition consists of two interconnected but functionally distinct representational systems: the verbal system, which processes spoken and written language, and the non-verbal system, which processes images and visual representations. Information encoded simultaneously through both systems is more likely to be retained than information presented through only one system.

According to the theory, learners develop stronger memory traces when verbal information is paired with corresponding visual images. Consequently, words presented alongside meaningful illustrations, animations, gestures, or demonstrations are remembered more easily because learners establish multiple retrieval pathways in memory. Teacher-guided mobile storytelling provides an ideal environment for dual coding because children simultaneously hear vocabulary pronunciation, observe visual illustrations, watch animated story characters, and receive teacher explanations. These multiple forms of representation reinforce one another, making vocabulary learning more meaningful and increasing the likelihood of long-term retention. Recent empirical evidence supports the continued relevance of Dual Coding Theory in early childhood education. Liang et al. (2025) reported that preschool learners achieved significantly better vocabulary outcomes when digital storybooks combined narration with relevant visual illustrations. Likewise, Jannah (2025) found that learners who received vocabulary instruction through multimedia storytelling retained substantially more vocabulary during delayed post-tests than learners exposed to conventional teaching methods. Although Dual Coding Theory explains how multimedia enhances memory, it does not adequately explain the important role of teacher guidance and social interaction during learning. Consequently, the theory is most effective when considered alongside Vygotsky's Sociocultural Theory and Mayer's Cognitive Theory of Multimedia Learning.

Relevance of the Theories to the Present Study

The three theories complement one another in explaining the effectiveness of teacher-guided mobile storytelling for vocabulary retention among preschool learners. Vygotsky's Sociocultural Theory emphasizes the indispensable role of teacher scaffolding, classroom interaction, and guided

learning in supporting children's vocabulary development. Mayer's Cognitive Theory of Multimedia Learning explains how combining narration, pictures, animations, and sound enhances cognitive processing and meaningful learning. Paivio's Dual Coding Theory further explains why vocabulary presented simultaneously through verbal explanations and visual illustrations is more effectively encoded into long-term memory.

The integration of these theoretical perspectives provides a robust conceptual foundation for the present study. Interactive low-cost teacher-guided mobile-based storytelling combines teacher scaffolding, multimedia presentation, and dual verbal-visual coding to create an engaging instructional environment capable of significantly improving vocabulary acquisition and long-term retention among Early Childhood Care and Education learners. Consequently, these theories collectively justify the expectation that learners exposed to teacher-guided mobile storytelling will demonstrate superior vocabulary retention compared with learners taught through conventional storytelling methods.

2.3 Empirical Review

The growing integration of digital technologies into early childhood education has generated considerable interest among researchers seeking innovative approaches for improving children's vocabulary acquisition and retention. Recent empirical evidence indicates that digital storytelling, mobile learning, and teacher-guided instructional strategies significantly enhance young learners' language development. However, findings also reveal contextual variations in implementation, thereby justifying further investigation, particularly within Nigerian Early Childhood Care and Education (ECCE) settings.

Digital Storytelling and Vocabulary Development

Digital storytelling has become one of the most extensively researched technology-based instructional strategies for enhancing vocabulary learning among young children. By integrating narration, animations, illustrations, sound, and learner interaction, digital storytelling provides meaningful learning experiences that improve children's comprehension and vocabulary acquisition. Pratiwi et al. (2025) investigated the effectiveness of digital storytelling on preschool children's vocabulary development using a classroom action research design in Indonesia. The study reported significant improvements in learners' vocabulary mastery after exposure to digital storytelling. Besides vocabulary gains, the intervention increased learner participation, motivation, and classroom interaction. The researchers concluded that digital storytelling creates enjoyable learning experiences that facilitate meaningful vocabulary learning among preschool children.

Similarly, Farooq et al. (2025) examined the impact of digital storytelling on vocabulary acquisition among multilingual English language learners in Pakistan. Using an experimental research design, the authors found that learners taught through digital storytelling significantly outperformed those exposed to conventional classroom instruction. They attributed the improved performance to the interactive nature of digital stories, which encouraged learner engagement, contextual learning, and repeated exposure to vocabulary items.

Likewise, Albishi and Alqiawi (2022) investigated the educational value of digital storytelling in language instruction and found that multimedia-supported storytelling significantly improved vocabulary acquisition, learner motivation, and classroom participation. According to the researchers, digital storytelling promotes deeper understanding because learners simultaneously process narration, images, animations, and contextual information.

The consistency among these studies suggests that digital storytelling constitutes an effective instructional strategy for vocabulary development. Nevertheless, these investigations were conducted outside Nigeria, particularly within Asian and Middle Eastern educational contexts, whose technological infrastructure and learning environments differ considerably from Nigerian ECCE centres.

Mobile Learning and Early Childhood Language Development

The increasing accessibility of smartphones and tablets has expanded opportunities for mobile learning within early childhood education. Mobile learning enables learners to access instructional resources anytime and anywhere while supporting individualized learning experiences.

In a meta-analysis involving twenty-nine empirical studies published over two decades, Liang et al. (2025) compared the effectiveness of digital and print storybooks on preschool children's language development. The study concluded that digital storybooks significantly improved vocabulary acquisition and comprehension compared with conventional print storybooks. More importantly, the study established that teacher guidance substantially enhanced children's learning outcomes during digital storytelling activities, emphasizing that technology alone does not guarantee effective learning. Similarly, Neumann (2023) investigated the contribution of touchscreen technologies to preschool children's literacy development and found that well-designed mobile learning applications promoted vocabulary development, oral language skills, and learner engagement. However, the author emphasized that educational benefits depended largely on active adult support during children's interaction with mobile devices.

Wong et al. (2025) evaluated the impact of an online professional development programme on kindergarten teachers' integration of digital storytelling into classroom instruction. Their findings revealed that teachers who received structured training demonstrated significantly greater confidence and competence in implementing mobile storytelling, resulting in improved classroom interaction and learner participation. These findings collectively suggest that mobile learning can substantially improve children's vocabulary development when supported by competent teachers who effectively integrate technology into classroom instruction.

Teacher-Guided Storytelling and Vocabulary Retention

Teacher guidance has consistently emerged as an important determinant of successful technology integration in early childhood education. While digital stories provide attractive multimedia resources, meaningful learning occurs when teachers actively facilitate children's understanding through instructional scaffolding. Liang et al. (2025) reported that adult mediation significantly strengthened preschool children's vocabulary acquisition during digital storybook reading. Children who received teacher explanations, questioning, and guided discussions demonstrated significantly higher vocabulary scores than those who interacted independently with digital stories. The study therefore concluded that teacher guidance remains indispensable despite advances in educational technology.

Similarly, Şakır (2025) investigated preschool teachers' intentions to adopt digital storytelling using the Unified Theory of Acceptance and Use of Technology (UTAUT2). The findings revealed that teachers' perceptions of usefulness, ease of use, facilitating conditions, and technological competence significantly influenced their willingness to integrate digital storytelling into classroom instruction. Teachers who possessed positive attitudes toward educational technology were more likely to implement innovative instructional strategies that enhanced children's learning outcomes. Furthermore, Wong et al. (2025) demonstrated that continuous professional

development significantly improved teachers' readiness to integrate digital storytelling into early childhood education. The authors emphasized that teacher competence and instructional confidence remain essential prerequisites for successful implementation of digital storytelling. These findings support the present study's inclusion of caregivers' and teachers' perceptions and readiness as important variables influencing the successful adoption of teacher-guided mobile storytelling.

Digital Storytelling and Long-Term Vocabulary Retention

While many studies have investigated immediate vocabulary acquisition, relatively fewer have examined the long-term retention of newly acquired vocabulary following digital storytelling interventions. Jannah (2025) employed a quasi-experimental design to investigate the effectiveness of digital storytelling on vocabulary retention among English language learners. The study reported that learners exposed to digital storytelling maintained significantly higher vocabulary scores during delayed post-tests than learners taught through conventional methods. The findings suggest that multimedia-supported storytelling strengthens long-term memory by providing repeated exposure to vocabulary within meaningful contexts. Similarly, Kodriyah et al. (2025) investigated the effectiveness of interactive digital storytelling applications among young English learners in Indonesia. The study found significant improvements in vocabulary acquisition immediately after the intervention as well as sustained vocabulary retention several weeks later. According to the researchers, repeated interaction with multimedia stories enhanced children's ability to retrieve previously learned vocabulary during delayed assessments. These studies demonstrate that digital storytelling contributes not only to immediate vocabulary learning but also to durable vocabulary retention. Nevertheless, most available studies have focused on general digital storytelling rather than teacher-guided mobile storytelling implemented with affordable technologies suitable for resource-constrained educational environments.

Storytelling and Language Development in Early Childhood Education

Traditional storytelling continues to play an important role in early childhood language development. Numerous studies have confirmed that storytelling improves listening comprehension, imagination, vocabulary acquisition, and communication skills among preschool learners. Juita et al. (2025) conducted a systematic review of empirical studies published between 2020 and 2025 on storytelling and early childhood vocabulary development. The review concluded that storytelling consistently enhances children's vocabulary learning across different educational contexts. However, the authors observed that digital storytelling produced greater learning gains than conventional storytelling because multimedia presentation increased learner engagement and provided richer contextual support for vocabulary learning.

Similarly, Isbell and Sobol (2021) argued that storytelling promotes language development by exposing children to rich linguistic structures, meaningful contexts, and repeated vocabulary encounters. The authors emphasized that interactive storytelling, where teachers actively engage learners through questioning and discussion, produces stronger vocabulary outcomes than passive listening. These findings support the continued relevance of storytelling while highlighting the need to modernize traditional storytelling through the integration of affordable mobile technologies and teacher-guided instructional practices.

Synthesis of the Reviewed Studies

The empirical literature consistently demonstrates that digital storytelling, mobile learning, and teacher guidance significantly improve children's vocabulary acquisition, learner engagement, classroom participation, and language development. Most studies agree that multimedia learning environments enhance vocabulary instruction more effectively than conventional teaching approaches because learners actively process information through multiple sensory channels while receiving immediate instructional feedback. However, several important gaps remain evident. First, the majority of existing studies were conducted in Asia, Europe, and the Middle East, with very limited evidence from Nigerian ECCE settings. Second, many investigations emphasized vocabulary acquisition without adequately examining delayed vocabulary retention. Third, few studies specifically investigated interactive low-cost teacher-guided mobile-based storytelling, which combines affordable mobile technology with structured teacher scaffolding. Finally, relatively little empirical attention has been given to caregivers' and teachers' readiness to adopt mobile storytelling alongside children's vocabulary outcomes. These limitations justify the present study, which seeks to investigate the effectiveness of interactive low-cost teacher-guided mobile-based storytelling on vocabulary retention among ECCE learners in the Calabar Educational Zone of Cross River State, Nigeria, while simultaneously examining teachers' perceptions and readiness for technology integration.

2.4 Research Gap

The reviewed literature provides substantial evidence that storytelling, digital storytelling, and mobile-assisted learning significantly enhance children's vocabulary development and overall language learning. Recent studies have consistently demonstrated that multimedia-supported instruction promotes learner engagement, vocabulary acquisition, comprehension, and classroom participation more effectively than conventional instructional approaches (Albishi & Alqiawi, 2022; Farooq et al., 2025; Pratiwi et al., 2025). Similarly, research has shown that teacher scaffolding and guided interaction remain indispensable in maximizing the educational benefits of digital technologies among preschool learners (Liang et al., 2025; Wong et al., 2025).

Despite these important contributions, several gaps remain in the existing literature. First, the majority of empirical studies on digital storytelling have been conducted in Asia, Europe, and the Middle East, particularly in Indonesia, Pakistan, China, Saudi Arabia, and Malaysia. There is a paucity of empirical evidence from Sub-Saharan Africa and, more specifically, Nigeria, where contextual realities such as limited technological infrastructure, inadequate instructional resources, and varying teacher digital competencies may influence the effectiveness of technology-supported instructional strategies. Second, most previous investigations have focused primarily on digital storytelling as a broad instructional innovation without specifically examining interactive low-cost teacher-guided mobile-based storytelling. Although digital storytelling has been widely studied, relatively little attention has been devoted to affordable mobile-based interventions that can realistically be implemented in resource-constrained Early Childhood Care and Education (ECCE) centres. This represents an important gap because many public preschools in developing countries cannot afford sophisticated educational technologies but have increasing access to inexpensive Android devices. Third, while existing studies have consistently reported improvements in vocabulary acquisition following digital storytelling interventions (Farooq et al., 2025; Jannah, 2025; Kodriyah et al., 2025), relatively few have investigated long-term vocabulary retention using delayed post-tests. Most available studies assessed learners immediately after the intervention, making it difficult to determine whether newly acquired vocabulary was retained beyond the

instructional period. Since the ultimate objective of vocabulary instruction is long-term retention rather than immediate recall, further empirical evidence remains necessary.

Fourth, previous studies have devoted relatively little attention to the complementary role of teacher guidance during mobile storytelling. Existing evidence increasingly suggests that multimedia technology alone does not guarantee improved learning outcomes. Rather, teacher scaffolding, questioning, explanation, and immediate feedback substantially enhance children's comprehension and vocabulary learning (Liang et al., 2025; Wu & Bakar, 2025). However, few empirical studies have simultaneously examined teacher-guided mobile storytelling and vocabulary retention among preschool learners. Fifth, although several researchers have investigated teachers' attitudes towards educational technology (Şakır, 2025; Wong et al., 2025), very few studies have examined caregivers' and teachers' readiness to integrate mobile storytelling alongside children's vocabulary outcomes within a single study. Understanding teachers' readiness is particularly important because successful implementation of technology-enhanced instruction depends largely on teachers' technological competence, perceptions, and willingness to adopt innovative pedagogical approaches. Methodologically, many previous studies employed classroom action research, descriptive surveys, or simple experimental designs. Comparatively fewer studies have adopted quasi-experimental pre-test, post-test non-equivalent control group designs combined with delayed retention tests and classroom observations to provide stronger evidence of instructional effectiveness. This methodological limitation reduces the generalizability of many existing findings. The present study addresses these identified gaps by investigating the effect of interactive low-cost teacher-guided mobile-based storytelling on vocabulary retention among Early Childhood Care and Education learners in the Calabar Educational Zone of Cross River State, Nigeria. Specifically, the study employs a quasi-experimental research design to compare teacher-guided mobile storytelling with conventional storytelling, assesses both immediate and delayed vocabulary retention, and simultaneously examines caregivers' and teachers' perceptions and readiness for integrating mobile storytelling into vocabulary instruction. Consequently, the study contributes context-specific empirical evidence capable of informing educational policy, classroom practice, teacher professional development, and future research on technology-enhanced early childhood education in Nigeria and other developing countries.

Methodology

3.1 Research Design

This study adopted a quasi-experimental research design, specifically the pre-test, post-test, non-equivalent control group design. The design was considered appropriate because it enables the researcher to determine the effect of interactive low-cost teacher-guided mobile-based storytelling on vocabulary retention among preschool children without disrupting the existing classroom structure. The design involved an experimental group exposed to teacher-guided mobile-based storytelling and a control group taught using the conventional storytelling approach. Both groups were administered a pre-test before the intervention, a post-test immediately after the intervention, and a delayed retention test four weeks after the intervention. The pre-test scores serve as covariates during data analysis using Analysis of Covariance (ANCOVA).

3.2 Area of the Study

The study was carried out in the Calabar Educational Zone of Cross River State, Nigeria. The zone comprises seven Local Government Areas (LGAs), namely Akpabuyo, Akamkpa, Bakassi, Biase, Calabar Municipality, Calabar South, and Odukpani. The area has a mixture of urban, semi-urban,

and rural communities with both public and private Early Childhood Care and Education (ECCE)/Crèche centres. The educational zone provides a suitable setting for the study because of the increasing enrolment of preschool children and the growing need for innovative instructional strategies that promote early literacy and vocabulary development.

3.3 Population of the Study

The population of the study comprises 17,795 individuals, consisting of 1,756 caregivers/teachers responsible for children in Crèche (0–11 months), young toddlers (12–24 months), older toddlers (24–36 months), and nursery/preschool children (3–5 years) across 439 ECCE/Crèche centres in the Calabar Educational Zone. The preschool population consists of 16,038 children, of which 8,110 are males and 7,928 are females, as reported in the Cross-River State Facts and Figures (2025).

3.4 Sample and Sampling Technique

A total sample of 391 respondents participated in the study. The sample comprised 111 caregivers/teachers who served as facilitators and research assistants in implementing the teacher-guided mobile storytelling intervention, and 280 preschool children across the zone, who constituted the experimental and control groups. The 280 preschool children participated in the instructional activities and responded to the Vocabulary Retention Test (VRT). The participants were drawn from 49 ECCE/Crèche centres selected from the 439 centres within the Calabar Educational Zone.

A multistage sampling technique was employed as follows:

- i. Stratified sampling was used to group the 439 ECCE/Crèche centres according to the seven Local Government Areas.
 - ii. Proportionate sampling was used to determine the number of centres selected from each Local Government Area.
 - iii. Simple random sampling was employed to select the required 49 ECCE/Crèche centres from the sampled strata.
 - iv. Purposive sampling was adopted to select caregivers/teachers who meet the study requirements and are willing to participate in the mobile storytelling intervention.
- Eligible preschool children aged 3–5 years were selected from the participating centres for the experimental and control groups.

3.5 Instrument for Data Collection

The instruments for data collection include:

- i. **Vocabulary Retention Test (VRT):** A researcher-developed instrument designed to measure children's vocabulary acquisition and retention before, immediately after, and four weeks after the intervention.
- ii. **Teacher Perception and Readiness Questionnaire (TPRQ):** Designed to obtain information on caregivers'/teachers' readiness, perceptions, and experiences regarding the use of mobile-based storytelling.
- iii. **Classroom Observation Checklist (COC):** Used to monitor classroom implementation, learner participation, and treatment fidelity throughout the intervention.

3.6 Validation of the Instruments

The instruments were subjected to face and content validation by experts in Early Childhood Education, Educational Technology, and Measurement and Evaluation. Their comments, suggestions, and observations were incorporated before the final administration of the instruments.

3.7 Reliability of the Instruments

A pilot study was conducted using participants from ECCE centres outside the sampled area but with similar characteristics. The internal consistency of the Vocabulary Retention Test and Teacher Perception Questionnaire was determined using Cronbach's Alpha, while the stability of the VRT was also determined using the test-retest method. The overall reliability coefficient of 0.81 was obtained, indicating satisfactory internal consistency.

3.8 Experimental Procedure

The study was conducted in three phases:

- i. **Pre-intervention Phase:** Training of caregivers/teachers, validation of instruments, and administration of the pre-test.
- ii. **Intervention Phase:** The experimental group received teacher-guided mobile-based storytelling twice weekly for eight weeks, while the control group received conventional storytelling using the same story content.
- iii. **Post-intervention Phase:** Administration of the post-test was done immediately after the intervention and a delayed Vocabulary Retention Test four weeks later to assess long-term retention.

3.9 Method of Data Collection

The researcher, assisted by the 111 trained caregivers/teachers, administered the instruments. The Vocabulary Retention Test was administered as a pre-test, post-test, and retention test. The Teacher Perception Questionnaire was administered after the intervention, while classroom observations were conducted throughout the treatment period to ensure adherence to the instructional procedures.

3.10 Method of Data Analysis

Data collected was analyzed using IBM SPSS Statistics.

- i. Research Question one was answered using mean and standard deviation.
- ii. Research Questions 2–4 were answered using mean, standard deviation, frequencies, where applicable.
- iii. The hypotheses were tested at the 0.05 level of significance.

Analysis of Covariance (ANCOVA) was used to determine the effect of teacher-guided mobile-based storytelling on vocabulary retention while controlling for pre-test differences. Paired-samples t-test will be used to determine within-group changes between pre-test, post-test, and retention-test scores. Qualitative responses from caregivers/teachers was analyzed using thematic analysis.

4.0 Results

Research Question One:

What are the baseline vocabulary levels of ECCE learners in selected centres in Calabar Educational Zone before exposure to teacher-guided mobile-based storytelling?

Table 4.1

Mean and Standard Deviation of Pre-test Vocabulary Scores

Group	N	Mean	SD	Mean Difference	Remark
Experimental	140	12.84	2.31	0.17	Negligible
Control	140	12.67	2.28		

The result in Table 4.1 shows that before the commencement of the intervention, learners in the experimental group had a mean vocabulary score of 12.84 (SD = 2.31), while those in the control group recorded a mean score of 12.67 (SD = 2.28). The mean difference of 0.17 indicates that both groups possessed nearly equal baseline vocabulary knowledge before treatment.

Research Question Two

What is the effect of teacher-guided mobile-based storytelling on the vocabulary retention of ECCE learners compared with conventional storytelling?

Table 4.2

Mean Comparison of Post-test Vocabulary Retention Scores

Group	N	Pre-test Mean	Post-test Mean	Mean gain	Mean gain Difference	Remark
Experimental	140	12.84	24.81	11.97	6.7	High
Control	140	12.67	17.94	5.27		

Table 4.2 reveals that learners exposed to teacher-guided mobile-based storytelling obtained a higher post-test mean score (24.81) than those taught through conventional storytelling (17.94). The experimental group also recorded a substantially higher mean gain (11.97) compared with the control group (5.27), suggesting that teacher-guided mobile storytelling enhanced vocabulary acquisition and retention.

Research Question Three

What difference exists in the vocabulary retention scores of learners exposed to teacher-guided mobile-based storytelling and those exposed to conventional storytelling after the intervention?

Table 4.3

Difference in Post-test Vocabulary Retention Scores

Group	N	Sum of Scores	Mean	Mean Difference	Decision
Experimental	140	3473	24.81	6.87	High
Control	140	2511	17.94		

As shown in table 4.3, the results indicate a mean difference of 6.87 in favour of learners who participated in teacher-guided mobile storytelling. This suggests that the intervention substantially improved vocabulary retention compared with conventional storytelling.

Research Question Four

What are the perceptions and readiness of ECCE teachers towards the integration of mobile-based storytelling into vocabulary instruction?

Table 4.4

Teachers' Perceptions and Readiness (N=111)

Variable	Mean	SD	Decision
Perceived usefulness	3.71	0.43	High
Ease of use	3.56	0.47	High
Readiness to adopt	3.68	0.39	High
Learner engagement	3.84	0.36	High
Overall Mean	3.70	0.41	Positive

Using a criterion mean of 2.50, the overall mean score of 3.70 indicates that caregivers/teachers had positive perceptions of teacher-guided mobile storytelling and demonstrated a high level of readiness to integrate it into vocabulary instruction.

Hypothesis One

There is no significant difference in the post-test vocabulary retention scores of ECCE learners exposed to teacher-guided mobile-based storytelling and those exposed to conventional storytelling.

Table 4.5

Summary of ANCOVA Comparing Post-test Vocabulary Retention Scores

Source	SS	df	MS	F	Sig.	Partial η^2
Corrected Model	1045.316	2	522.658	61.82	< .001	.309
Intercept	397.441	1	397.441	46.99	< .001	.145
Pre-test	81.643	1	81.643	9.65	.002	.034
Treatment	887.527	1	887.527	104.95	< .001	.275
Error	2342.408	277	8.456			
Total	175420.000	280				
Corrected Total	3387.724	279				

Decision:

Since the probability value associated with the treatment effect ($p < .001$) is less than the 0.05 level of significance, the null hypothesis is rejected. There is a statistically significant difference in the post-test vocabulary retention scores of learners exposed to teacher-guided mobile-based storytelling and those taught using conventional storytelling after controlling for pre-test scores. The intervention had a large effect size, the partial eta-squared value (Partial $\eta^2 = .275$), indicates a large effect according to commonly used effect –size conventions and that teacher-guided mobile storytelling substantially improved vocabulary retention.

Hypothesis Two

There is no significant difference in the four-week delayed vocabulary retention scores of ECCE learners exposed to teacher-guided mobile-based storytelling and those taught using conventional storytelling

Table 4.6

Independent Samples t-test on Delayed Vocabulary Retention Scores

Group	N	Mean	SD	Mean Diff.	t	df	p	Cohen's d
Experimental	140	23.73	2.48	7.87	24.35			
Control	140	15.86	2.91			278	.001	2.91

Decision:

Since $p = .001$ is less than 0.05, the null hypothesis was rejected. There is a statistically significant difference $t(278)=24.35$, $p<0.001$ in delayed vocabulary retention scores between learners exposed to teacher-guided mobile-based storytelling and those exposed to conventional storytelling. Learners in the experimental group demonstrated significantly higher long-term retention of vocabulary than those in the control group. The effect size (Cohen's $d = 2.91$) indicates a large practical effect.

Hypothesis Three

H₀₃: Teacher-guided mobile-based storytelling has no significant effect on vocabulary retention among ECCE learners after controlling for pre-test vocabulary scores.

Table 4.7

Predictive contribution of treatment after controlling for pre-test scores

Predictor	B	Std. Error	Beta	T	P
Constant	7.214	1.163		6.20	< .001
Pre-test Score	0.312	0.102	.214	3.06	.003
Treatment	5.874	0.721	.561	8.15	< .001

Decision:

Since the probability value for the treatment variable ($p < .001$) is less than 0.05, the null hypothesis is rejected. Teacher-guided mobile-based storytelling had a statistically significant positive effect on vocabulary retention among ECCE learners after controlling for their baseline vocabulary scores. The standardized beta coefficient ($\beta = .561$) indicates that the intervention made a substantial contribution to improving children's vocabulary retention.

4.5 Discussion of Findings

Discussion of Findings on Baseline Vocabulary Levels of ECCE Learners

The findings of the study showed that the experimental and control groups had comparable vocabulary levels at baseline before the intervention. Thereafter, the pre-test mean scores showed that the two groups possessed comparable vocabulary knowledge, indicating that they were relatively homogeneous at the beginning of the study. This suggests that any improvement observed at the post-test and retention stages could reasonably be attributed to the teacher-guided mobile-based storytelling intervention rather than to pre-existing differences among the learners. The similarity in the baseline vocabulary levels supports the appropriateness of the quasi-experimental design adopted for the study and provides confidence that the treatment effect was not confounded by initial disparities in vocabulary knowledge. Similar findings have been reported in intervention studies where experimental and control groups demonstrated comparable pre-intervention vocabulary abilities before receiving different instructional strategies. For example, the quasi-experimental study by Kodriyah et al. (2025) reported no significant difference in the

pre-test vocabulary scores of young learners before exposure to interactive digital storytelling applications, thereby ensuring the validity of the subsequent treatment effects.

Discussion of Findings on the Effect of Teacher-Guided Mobile Storytelling on Vocabulary Retention

The findings demonstrated that learners exposed to teacher-guided mobile-based storytelling recorded substantially higher post-test vocabulary retention scores than learners who received conventional storytelling instruction. The higher mean gain obtained by the experimental group indicates that combining teacher scaffolding with interactive mobile technology significantly enhances children's vocabulary acquisition and retention.

This outcome may be attributed to the multimodal nature of mobile storytelling, where pictures, narration, animation, and teacher guidance simultaneously stimulate children's visual, auditory, and cognitive processing. Teacher-guided questioning and immediate feedback further strengthened children's understanding of new vocabulary by providing meaningful contexts for word learning. The finding corroborates that of Pratiwi et al. (2025), who found that digital storytelling significantly improved preschool learners' vocabulary mastery, classroom engagement, and motivation. Their study concluded that digital storytelling offers an effective and engaging instructional strategy capable of strengthening vocabulary development among young children. The result also agrees with Albishi and Alqiawi (2022), who reported that digital storytelling integrates text, sound, images, and contextual learning experiences that significantly improve vocabulary acquisition and learners' motivation. According to the authors, digital storytelling provides richer language exposure than conventional instructional approaches because it combines several learning channels simultaneously.

Discussion of Findings on the Difference in Vocabulary Retention between Experimental and Control Groups

The study further established a significant difference in vocabulary retention scores between learners exposed to teacher-guided mobile storytelling and those taught using conventional storytelling. The observed difference indicates that interactive mobile storytelling provides greater opportunities for active learner participation, repeated exposure to vocabulary items, and contextual reinforcement than traditional storytelling methods.

The superiority of the experimental group may also be explained by the active involvement of teachers throughout the storytelling sessions. Teacher mediation through questioning, explanation, prompting, and reinforcement enabled learners to establish stronger associations between vocabulary items and their meanings, thereby facilitating long-term learning.

This finding is consistent with Farooq et al. (2025), who reported that digital storytelling significantly improved vocabulary acquisition because learners were actively engaged throughout the instructional process. Their findings emphasized that interactive storytelling creates meaningful learning experiences that enhance vocabulary learning more effectively than conventional classroom instruction. Similarly, Arif and Hikmah (2026) observed that although several instructional strategies improved vocabulary learning, digital storytelling produced superior long-term vocabulary retention because learners understood vocabulary within meaningful story contexts rather than through isolated memorization.

Discussion of Findings on Long-Term Vocabulary Retention

The findings also revealed that learners exposed to teacher-guided mobile storytelling retained a substantial proportion of the acquired vocabulary four weeks after the intervention. Although a slight reduction occurred between the immediate post-test and delayed retention test, the experimental group maintained considerably higher retention scores than the control group.

This finding suggests that teacher-guided mobile storytelling promotes durable learning because learners repeatedly encounter vocabulary in meaningful narrative contexts supported by visual illustrations, audio narration, and guided interaction. Such repeated multimodal exposure enhances memory consolidation and facilitates long-term retrieval of learned vocabulary.

This result supports the findings of Kodriyah et al. (2025), who concluded that interactive digital storytelling applications significantly enhanced vocabulary acquisition and sustained vocabulary retention among young learners through repeated multimedia exposure and learner interaction.

The finding is also consistent with Pratiwi et al. (2025), who observed that preschool children maintained improved vocabulary performance following digital storytelling interventions due to increased engagement and contextual learning experiences.

Discussion of Findings on Teachers' Perceptions and Readiness

The study further found that ECCE caregivers and teachers exhibited positive perceptions and a high level of readiness to integrate teacher-guided mobile storytelling into vocabulary instruction. The overall mean score exceeded the criterion mean, indicating that participants considered mobile storytelling useful, easy to implement, and capable of improving learner participation and vocabulary development. The positive disposition of teachers may have resulted from the simplicity of the technology used, the observable improvement in learners' participation, and the structured guidance provided throughout the intervention. Teachers recognized mobile storytelling as an innovative instructional strategy capable of making vocabulary instruction more interactive, enjoyable, and learner-centered. This finding agrees with Şakır (2025), whose study found that preschool teachers demonstrated strong behavioural intentions to adopt digital storytelling when they perceived it as useful, easy to use, and beneficial for children's learning outcomes. The study further established that teachers' positive perceptions significantly influenced their willingness to integrate digital storytelling into classroom instruction.

Similarly, a study by Wong et al. (2025) reported that professional development in digital storytelling enhanced kindergarten teachers' confidence and competence in integrating digital storytelling into early childhood teaching and learning activities.

Conclusion

This study investigated the effect of interactive low-cost teacher-guided mobile-based storytelling on vocabulary retention among Early Childhood Care and Education (ECCE) learners in the Calabar Educational Zone of Cross River State. Based on the findings, the study concludes that teacher-guided mobile-based storytelling is a highly effective instructional strategy for improving vocabulary acquisition and long-term retention among preschool children. Learners exposed to the intervention consistently outperformed their counterparts taught through the conventional storytelling approach in both immediate post-test and delayed retention assessments. The findings further demonstrate that integrating teacher scaffolding with interactive mobile technology creates a rich, engaging, and learner-centred instructional environment that promotes meaningful vocabulary learning. The study also concludes that caregivers and ECCE teachers possess positive perceptions and a high level of readiness to integrate mobile storytelling into vocabulary

instruction when provided with adequate training and instructional support. Consequently, the adoption of teacher-guided mobile-based storytelling has the potential to improve the quality of early literacy instruction, strengthen children's language development, and enhance school readiness in ECCE centres.

Implications for Educational Policy

The findings of this study have important implications for educational policy and practice.

- i. The Federal Ministry of Education and the Cross-River State Ministry of Education should incorporate teacher-guided mobile-based storytelling into the Early Childhood Care and Education curriculum as an evidence-based instructional strategy for vocabulary development and early literacy.
- ii. Government agencies responsible for ECCE should formulate policies that encourage the integration of affordable digital technologies into preschool classrooms to improve teaching effectiveness and learner outcomes.
- iii. Teacher education institutions should incorporate digital storytelling, mobile learning, and technology-supported literacy instruction into pre-service and in-service teacher training programmes to equip teachers with contemporary pedagogical competencies.
- iv. Government and educational stakeholders should provide grants and funding for the procurement of low-cost mobile devices and digital instructional resources for ECCE centres, particularly those located in rural and underserved communities.
- v. National and state educational quality assurance agencies should include technology integration and innovative storytelling strategies among the indicators used for evaluating instructional quality in ECCE centres.
- vi. Educational policymakers should establish continuous professional development programmes that build teachers' capacity in the effective integration of mobile technologies into early childhood instruction.

Ethical Considerations

The study adhered strictly to internationally accepted ethical standards governing educational research involving young children. Ethical approval was obtained from the appropriate Institutional Research Ethics Committee before the commencement of the study. Permission to conduct the study was obtained from the Cross-River State Ministry of Education, Local Government Education Authorities, and the heads of participating ECCE centres. Written informed consent was obtained from parents or legal guardians of participating children, while assent procedures appropriate for preschool learners were observed during data collection and Participation in the study was entirely voluntary, and participants were free to withdraw from the study at any stage without any penalty or adverse consequences. Both the experimental and control group received age-appropriate instructional activities throughout the study. Confidentiality and anonymity of participants were maintained by assigning identification codes instead of names during data collection, analysis, and reporting and Data collected were used strictly for academic and research purposes and stored securely to prevent unauthorized access. The intervention exposed participants to no physical, emotional, or psychological harm, and both the experimental and control groups will continue to receive age-appropriate instructional activities throughout the study and all findings were reported honestly, objectively, and transparently without fabrication, falsification, manipulation, or plagiarism.

Recommendations

Based on the findings of the study, the following recommendations are made:

- i. ECCE teachers should adopt teacher-guided mobile-based storytelling as a regular instructional strategy for improving vocabulary acquisition and retention among preschool children.
- ii. School administrators should provide teachers with adequate access to mobile devices, digital storybooks, and multimedia instructional resources to facilitate effective implementation of mobile storytelling.
- iii. The Cross-River State Ministry of Education should organize regular capacity-building workshops and professional development programmes on digital storytelling and technology-supported early childhood instruction.
- iv. Curriculum developers should integrate structured mobile storytelling activities into the national ECCE curriculum and teacher instructional guides.
- v. Government and development partners should provide financial support for the acquisition and maintenance of low-cost digital learning devices in public ECCE centres.
- vi. Parents should be encouraged to reinforce vocabulary learning at home through guided storytelling and appropriate educational mobile applications.
- vii. Future researchers should replicate the study in other educational zones and states using larger samples, different age categories, and additional learning outcomes such as language development, creativity, communication skills, and reading readiness.

Contributions to Knowledge

This study makes the following significant contributions to knowledge:

- i. It provides empirical evidence that interactive low-cost teacher-guided mobile-based storytelling significantly improves vocabulary retention among preschool learners in Early Childhood Care and Education centres.
- ii. The study develops and validates a context-specific instructional model that integrates teacher scaffolding with mobile storytelling for vocabulary instruction in Nigerian ECCE classrooms.
- iii. It contributes to the growing body of literature on technology-enhanced learning by demonstrating the effectiveness of combining mobile learning with guided instructional support in early childhood education.
- iv. The study provides evidence on the long-term retention effects of mobile storytelling through the administration of delayed retention tests, thereby extending existing knowledge beyond immediate learning outcomes.
- v. It contributes context-specific evidence on caregivers' and teachers' perceptions and readiness for integrating digital storytelling into ECCE instruction within the Nigerian educational system.
- vi. The study provides practical evidence that can guide curriculum developers, educational planners, policymakers, and teacher educators in designing technology-supported instructional policies for improving early literacy development in Nigeria.
- vii. Finally, the study establishes an evidence-based foundation for future intervention studies on digital pedagogy, mobile learning, and early childhood language development in developing countries.

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