

IMPACT OF DIGITAL LITERACY ON THE EARLY LITERACY DEVELOPMENT OF NURSERY ONE IN ASA LOCAL GOVERNMENT AREA OF KWARA STATE, NIGERIA

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Abstract

This study examined the impact of digital literacy on early literacy development among Nursery One children in Asa Local Government Area, Kwara State, Nigeria. A one-group pre-test/post-test quasi experimental design was employed to measure literacy outcomes using standardised tests, and the study developed a Rating Scale on Early Literacy Skills and Digital Resources, which demonstrated high reliability (ICC = 0.87). Sixty children aged four to six participated in an eight-week intervention that integrated interactive storybooks, phonics applications and multimedia learning platforms into daily instruction. Results showed significant improvements in overall literacy ($M = 24.86$, $SD = 2.65$ at pre-test; $M = 30.76$, $SD = 1.21$ at post-test; $t(59) = 15.03$, $p < .001$) and in reading skills, vocabulary breadth and phonemic awareness ($M = 24.18$, $SD = 3.54$ at pre-test; $M = 30.13$, $SD = 1.87$ at post-test; $t(59) = 12.45$, $p < .001$). The findings suggest that digital literacy tools can effectively scaffold early reading and language skills in semiurban Nigerian classrooms. It is recommended that schools invest in tablets and internet connectivity, embed routine digital literacy sessions into curricula, and provide targeted professional development for teachers to sustain and scale observed literacy gains.

Keywords: digital literacy; early literacy development; phonemic awareness; vocabulary acquisition

Introduction

Literacy in early childhood is not merely about decoding letters or reciting the alphabet; it serves as the foundation for understanding, self-expression and lifelong learning. Today's young learners must master phonics and vocabulary while also navigating vast streams of online information, evaluating credibility and maintaining a responsible digital presence. Digital storytelling and interactive literacy applications combine text, sound, animation and movement to create immersive, multisensory experiences that reduce reliance on rote instruction, stimulate curiosity and build critical-thinking skills essential for later academic success (ProFuturo Observatory Team, 2025). Neumann (2018) further demonstrated that tablets and literacy apps can significantly enhance emergent literacy skills in young children by providing interactive opportunities to practice phonological awareness, print knowledge, and vocabulary development.

National Bureau of Statistics and World Bank (2024) report that only 38 per cent of Nigerian children aged four to six can write a simple word other than their name, and only 44 per cent recognise basic letter and sound correspondences. These findings corresponded with the reality that one in four remains out of school and fewer than half of teachers possess basic ICT competencies, limiting the impact of classroom technology. In response, the National Information Technology Development Agency has set targets of 70 per cent digital literacy by 2027 and 95 per cent by 2030. Government and non-government initiatives have sought to expand access and build capacity through national frameworks and pilot programmes, but implementation challenges remain (UNICEF Nigeria, 2023; Ajayi, 2025; UNICEF Nigeria, 2025).

Empirical studies have demonstrated the transformative potential of digital tools in early literacy development. Maitra (2024) found that interactive eBooks improved decoding skills and vocabulary retention among preschoolers. Van Herwegen (2024) reported that digital engagement strengthened neural pathways for working memory and phonological processing. Garba (2018) showed that exposure to tablet-based modules featuring

local folktales recorded notable increases in oral reading fluency and comprehension. Lawan *et al.* (2024) confirmed that digital storytelling enhanced pupils' academic achievement and retention in literacy. Rahiem (2021) emphasised that digital storytelling provided engaging opportunities for young learners, while Judijanto and Rusiadi (2024) reported through systematic review that digital learning tools improved literacy skills when integrated with teacher support.

Qualitative findings have revealed that home environments, parental support and community values strongly influenced engagement with digital literacy tools. In rural Nigerian households, inconsistent electricity and device scarcity inspired creative adaptations such as combining mobile animations with locally recorded audio. Professional development programmes for early years teachers, therefore, prioritised both technical skills and cultural sensitivity to ensure technology use aligned with lived experiences (Kumpulainen *et al.*, 2020; Pereira *et al.*, 2023). Comparative policy analysis further showed gaps between Nigeria and countries with more established frameworks, underscoring the need for contextually tailored strategies (Ololade *et al.*, 2024; Odesanya, 2024).

Infrastructure challenges persisted in semi-urban and rural schools in Kwara State, where power outages, limited devices and weak internet connections forced teachers to rotate tablet access and rely on paper-based alternatives. Without investment in community engagement, device maintenance and local capacity building, these gaps risked widening the digital divide (National Information Technology Development Agency, 2023; Ajayi, 2025; UNICEF Nigeria, 2025). Realising the promise of digital literacy in early childhood requires embedding these tools within coherent, context-sensitive curricula. The National Digital Literacy Framework defined competencies ranging from basic navigation to content creation and offered implementation guidelines for schools. Pilot programmes that integrated app-based phonics with Yoruba and Hausa narratives improved pupil engagement and retention while honouring cultural identity. These locally grounded approaches, informed by both global evidence and national realities, presented a sustainable path for advancing literacy across Nigeria's multilingual communities.

This study is grounded in Vygotsky's socio-cultural theory, which views learning as a socially mediated process shaped by cultural tools and interaction. Vygotsky (1978) proposed that higher mental functions developed through social interaction and the internalisation of cultural tools. Vygotsky's socio-cultural theory described the Zone of Proximal Development (ZPD) as the variation between tasks a learner can perform independently and tasks realisable with appropriate support. Scaffolding denotes the temporary, targeted assistance provided by teachers, peers or tools that enables learners to progress within the ZPD. Digital storybooks, phonics applications and interactive e-Books function as cultural tools that present prompts, multimodal cues and adaptive challenges. When teachers organise activities, model strategies and provide corrective feedback, these tools broaden each child's ZPD and scaffold emergent literacy. Repeated guided use of digital resources supports the internalisation of letter sound correspondences, decoding strategies and vocabulary.

Vygotsky's socio-cultural framework, therefore, explains both the mechanism by which digital tools support early literacy and the importance of teacher mediation and peer collaboration for converting digital engagement into sustained learning gains. Thus, Vygotsky's emphasis on socially mediated learning directly informed this investigation of digital literacy and early literacy development among Nursery one Children in Asa Local Government Area, Kwara State, Nigeria.

Statement of the Problem

Early literacy skills among Nigeria's youngest learners remain alarmingly low despite intensive policy efforts. Fewer than half of children aged four to six can recognise basic letter sound correspondences or write a simple word beyond their name. In the Asa Local Government Area of Kwara State, irregular power supply, scarce digital devices and limited teacher training further hinder the adoption of technology-enhanced learning. Although digital storytelling and interactive literacy applications have demonstrated gains in pilot studies elsewhere, their feasibility and impact in semi-urban and rural Nigerian classrooms have not been systematically assessed. Research on technology in early year's education often focuses on urban, well-resourced settings, leaving a critical gap in understanding how digital tools perform where infrastructure and cultural contexts differ. Educators and policymakers lack evidence on adapting multimedia interventions to local languages, home literacy practices and community values, which limits the design of sustainable, scalable

programmes. Therefore, this study is designed to investigate the impact of digital literacy on early literacy development among Nursery One pupils in the Asa Local Government Area of Kwara State, Nigeria.

Research Purpose

The purpose of the study is to investigate the impact of digital literacy on early literacy development among Nursery One pupils in the Asa Local Government Area of Kwara State, Nigeria. Specifically, the study sought to:

1. Assess the impact of classroom-based digital literacy tools on the literacy development of Nursery One pupils in Asa Local Government Area and
2. Examine improvements in reading skills, vocabulary breadth, and phonemic awareness following a digital learning intervention among Nursery One pupils in Asa Local Government Area.

Research Questions

The following research questions were raised for this study:

1. How does the use of digital literacy tools affect overall literacy development in Nursery One pupils in Asa Local Government Area?
2. To what extent do interactive digital resources enhance reading skills, vocabulary breadth, and phonemic awareness of Nursery one pupils?

Research Hypotheses

The following hypotheses are postulated for this study:

H01. There is no significant difference between pre-test and post-test overall literacy development scores of Nursery One pupils in Asa Local Government Area following the classroom-based digital literacy intervention.

H02. There is no significant difference between pre-test and post-test reading skills, vocabulary breadth, or phonemic awareness scores of Nursery One pupils in Asa Local Government Area after the digital learning intervention.

Emergent literacy refers to the early skills, knowledge and attitudes that develop before they learn to read and write conventionally. These include print awareness, phonological sensitivity and emergent writing behaviours such as scribbling and letterlike forms. In Ilorin West area of Kwara State, Saadu *et al.* (2021) found that those who participated in shared book reading, storytelling and dialogic conversations at home scored significantly higher on letter sound mapping and narrative comprehension tasks, highlighting how everyday print rich interactions lay the groundwork for later literacy.

Home and community environments critically shape emergent literacy trajectories. Saadu *et. al.* (2021) reported that preschoolers from households with abundant's books, storytelling routines and parental literacy support entered school with stronger vocabulary and phonemic awareness. Conversely, many in semi-urban and rural Nigerian communities lack access to age-appropriate print materials, leading to gaps in alphabet knowledge and narrative skills before formal schooling even begins. Classroom practices and policy frameworks also influence early literacy development. Newman and Obed (2015) critique Nigeria's National Policy on Integrated Early Childhood Development for its general emphasis on "literacy-rich environments" without prescribing specific benchmarks or resource allocations, resulting in uneven implementation across local government areas. Where teachers receive scaffold training in play-based, phonics-oriented strategies, pupils demonstrate rapid gains in phonemic awareness; in contrast, classrooms relying on rote copying and recitation often see lower engagement and shallow processing. Digital literacy tools encompass interactive apps, animated e-books and touch screen storytelling platforms designed to integrate visual, auditory and kinaesthetic channels for learning. According to the National Information Technology Development Agency (2023), these tools can deliver personalised feedback, adaptive phonics practice and multimedia narratives that engage young learners beyond what print alone can offer. When thoughtfully integrated digital platforms extend the classroom into the home, reinforcing emergent literacy through play and exploration.

Research on multimedia learning emphasises the cognitive benefits of digital tools. Maitra (2024) conducted an experimental study which found that preschoolers using interactive e-books with tap-to-hear pronunciations,

on-screen letter tracing and comprehension prompts improved early decoding skills by 30 per cent and vocabulary retention by 25 per cent compared with using print materials alone. Neuron-imaging evidence further suggests that multisensory digital engagement strengthens neural pathways for working memory and phonological processing, accelerating emergent reading development. In Nigeria, infrastructural and contextual barriers often limit effective digital integration, yet targeted pilots show promise. Imhanyehor (2021) found that despite 90 per cent of private-school teachers in Benin City possessing basic digital skills, device shortages and outdated hardware constrained the implementation of literacy apps. To address this, UNICEF Nigeria (2023) equipped over 780 rural schools with tablets preloaded with offline literacy content, solar chargers and teacher coaching. Early evaluations report increased student engagement, extended access to story-like experiences and measurable gains in letter recognition in under-resourced settings.

Methodology

This study employed a quasi experimental design using a one-group pre-test post-test approach to evaluate the impact of digital literacy tools on early literacy development among Nursery One pupils. An intact class of approximately 60, aged 4 to 6 years, was selected from a private nursery pre-primary and primary school in Asa Local Government Area, Kwara State. The design was suitable for natural classroom environments where random assignment was not feasible, enabling the study to infer the effects of the digital intervention while maintaining ecological validity.

Before the intervention commenced, each child's literacy abilities were measured using instruments, which adopted for the study: Rating Scale on Early Literacy Skills and Digital Resource (RSELSDR), and Classroom Observation Template (COT). Rating Scale on Early Literacy Skills and Digital Resource (RSELSDR) was designed by this study to determine the level of improvement in early literacy skills following the use of digital tools. The instrument comprises three sections: A, B, and C. Section A captures children's demographic information, while Sections B and C each contain eight items: Section B evaluates early literacy performance, and Section C assesses engagement with digital resources. All items are rated on a four-point scale (1 = Not Yet Demonstrated; 2 = Emerging; 3 = Developing; 4 = Proficient). Intraclass Correlation Coefficient was used to determine the reliability index of the instrument. A reliability coefficient of [0.87](#) was obtained. This instrument captured baseline performance across critical domains including letter recognition, phonemic awareness, and vocabulary development and listening comprehension. For a duration of eight weeks, selected digital literacy tools, such as interactive storybooks, phonics based mobile applications and multimedia learning platforms, were integrated into daily classroom instruction. Teachers received targeted orientation to ensure that digital resources were aligned with lesson objectives and effectively incorporated into instructional routines.

At the conclusion of the intervention period, the same literacy assessment was administered as a post-test to identify changes in pupils' literacy performance. The collected data were analysed using inferential statistics, specifically paired sample t-tests, to determine whether differences in mean scores between pre-test and post-test results were statistically significant. Descriptive statistics, including mean scores, standard deviations and percentage gains, were also computed to summarise performance patterns and highlight overall literacy development among the children.

Results

Research Question One: How does the use of digital literacy tools affect overall literacy development in Nursery One children in Asa Local Government Area?

Table 1. Descriptive Analysis of Digital Literacy Tools Affects Overall Literacy development in Nursery One children

S/N	ITEMS	Mean	Std. Deviation
1	Recognizes and names more letters of the alphabet after using digital tools.	2.82	.833
2	Identifies beginning sounds in common words with increased accuracy.	2.97	.991

3	Segments simple spoken words into sounds or syllables more confidently.	3.17	.847
4	Uses newly learned vocabulary during classroom discussions.	3.28	.761
5	Understands and responds to oral instructions using richer vocabulary.	3.10	.858
6	Reads familiar sight words aloud with improved fluency.	3.32	.792
7	Retells stories more clearly and with relevant details.	3.03	.823
8	Shows increased interest and motivation in literacy activities after exposure to digital tools.	3.18	.813
Weighted Average Mean and StD		3.11	0.84

Table 1.1 presents how digital literacy tools influenced the literacy development of Nursery One children in Asa Local Government Area. Pupils showed notable progress across key areas such as letter recognition ($x = 2.82$, $SD = 0.833$), sound identification ($x = 2.97$, $SD = 0.991$), segmentation ($x = 3.17$, $SD = 0.847$), vocabulary use ($x = 3.28$, $SD = 0.761$), oral comprehension ($x = 3.10$, $SD = 0.858$), sight-word fluency ($x = 3.32$, $SD = 0.792$), story retelling ($x = 3.03$, $SD = 0.823$), and motivation ($x = 3.18$, $SD = 0.813$). With a weighted average mean of 3.11 and a standard deviation of 0.84, the impact of digital tools on pupils' literacy development is interpreted as high.

Research Question Two. To what extent do interactive digital resources enhance reading skills, vocabulary breadth, and phonemic awareness of Nursery one children?

Table 2. Descriptive analysis of digital resources enhance reading skills, vocabulary breadth, and phonemic awareness

S/N	ITEMS	Mean	Std. Deviation
1	Pupils show improved vocabulary usage when describing objects or actions.	3.08	.766
2	Pupils listen attentively and respond accurately during digital story time.	3.07	.880
3	Pupils recognize and read more high-frequency words than before.	3.12	.783
4	Pupils recall story events or characters with greater detail.	3.07	.936
5	Pupils actively participate in phonics-based digital games.	3.15	.799
6	Pupils pronounce words more clearly after digital word tracing practice.	2.92	.889

7	Pupils display more confidence when asked to read aloud in class.	3.10	.775
8	Recognizes and names more letters of the alphabet after using digital tools.	3.18	.813
Weighted Average Mean and StD		3.08	0.830

Table 2 highlights the influence of interactive digital resources on pupils' development in reading, vocabulary, and phonemic awareness. Notable improvements were observed in vocabulary use for object description ($x = 3.08$, $SD = 0.766$), attentiveness during digital story time ($x = 3.07$, $SD = 0.880$), high-frequency word recognition ($x = 3.12$, $SD = 0.783$), story recall ($x = 3.07$, $SD = 0.936$), phonics game participation ($x = 3.15$, $SD = 0.799$), pronunciation clarity ($x = 2.92$, $SD = 0.889$), reading-aloud confidence ($x = 3.10$, $SD = 0.775$), and alphabet naming ($x = 3.18$, $SD = 0.813$). The weighted average mean of 3.08 and a standard deviation of 0.83, the analysis show that pupils responded positively to digital learning tools, demonstrating moderate to high gains in key literacy domains.

Testing the Hypotheses

H01. There is no significant difference between pre-test and post-test overall literacy development scores of Nursery One children in Asa Local Government Area following the classroom-based digital literacy intervention.

Table 3: Pair Sample t-test of overall literacy development scores of Nursery one children

Test Variable	Grouping Variables		Paired Differences				t	Df	Sig. (2-tailed)	
Literacy Skill Improvement	(Literacy Skill Improvement)	N	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower	Upper			
		Pre_test_LGDR -	60	24.86	2.645	.39251	-6.68542	-5.11458	15.031	59
	Post_test_LGDR		30.76	1.212						

Table 3 presents the analysis of children's literacy development scores before and after the classroom-based digital literacy intervention in Asa Local Government Area. The mean score before the intervention was 24.86, while it increased to 30.76 after the intervention. This reflects a meaningful improvement in pupils' literacy outcomes. The paired sample t-test yielded a statistically significant result with $t = -15.031$, $df = 59$, and $p < 0.05$, confirming that the observed difference is unlikely due to chance. The confidence interval for the mean difference ranged from -6.69 to -5.11, further supporting the effectiveness of the intervention. Therefore, the null hypothesis (H01), which states that there is no significant difference between pre-test and post-test overall literacy development scores, is rejected.

H₀2. There is no significant difference between pre-test and post-test reading skills, vocabulary breadth, or phonemic awareness scores of Nursery One children in Asa Local Government Area after the digital learning intervention.

Table 4: Paired Samples Test of reading skills, vocabulary breadth, or phonemic awareness scores of Nursery One pupils

Test Variable	Grouping Variables		Paired Differences				t	Df	Sig. (2-tailed)	
Literacy Gains After Digital Resource Use	(Literacy Gains After Digital Resource Use)	N	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
						Lower	Upper			
		Pretest_LG DR	60	24.18	3.543	.47800	-6.90649	-4.99351	-12.448	59
	Posttest_LGDR	30.13		1.872						

Table 4 reports the reading, vocabulary, and phonemic awareness scores of Nursery One children in Asa Local Government Area before and after using digital learning resources. The mean score increased from 24.18 to 30.13, indicating a strong improvement. The paired t-test result ($t = -12.448$, $df = 59$, $p < 0.05$) confirms that the difference is statistically significant, with a confidence interval ranging from (6.91 to 4.99). Based on this, the null hypothesis (H_{02}) is rejected, showing that digital learning resources had a significant positive effect on pupils' literacy gains. The result affirms that the digital literacy intervention had a positive and significant impact on Nursery One pupils' literacy.

Discussion of Findings

The infusion of digital literacy tools into Nursery One classrooms coincided with broad-based gains in foundational reading and language skills. Pupils demonstrated stronger letter and sound recognition, more confident word segmentation, richer classroom vocabulary, improved oral comprehension, and heightened motivation to engage with texts. These collective improvements suggest that multimedia storybooks, phonics apps, and interactive vocabulary exercises can create an immersive learning environment that scaffolds emerging literacy. This pattern mirrors Judijanto and Rusiadis (2024) systematic review, which found that digital learning tools, when integrated with teacher support, significantly bolster early decoding, vocabulary growth, and phonemic awareness.

Beyond core literacy foundations, the use of interactive digital resources also appeared to deepen pupils' reading fluency, expand their vocabulary breadth, and sharpen phonemic awareness through playful, game-like interfaces. responded enthusiastically to digital story time and phonics games, translating into clearer pronunciation and more detailed story recall, an effect that aligns closely with the International Literacy Association's (2019) position statement, which underscores how thoughtfully designed touch-screen storybooks and phonics activities foster multimodal meaning-making and strengthen emergent literacy in early childhood settings.

Nursery One children in Asa Local Government Area displayed a marked uplift in their overall literacy development after an eight-week, classroom-based digital literacy intervention. Prior to the program, struggled with smooth decoding and produced limited vocabulary in oral retellings; following exposure to interactive storybooks, phonics apps, and guided multimedia practice, they approached texts with noticeably greater fluency, richer word use, and more coherent story retellings. Neumann's (2018) content-analysis study, which found that pre-schoolers using well-designed touch screen apps made significant gains in letter sound correspondence, vocabulary acquisition, and narrative competence when digital activities were carefully scaffold by educators.

Similarly, children's reading accuracy, vocabulary breadth, and phonemic awareness deepened substantially after engaging with targeted digital resources. Where many had hesitated over unfamiliar words before the intervention, they were able to decode new high-frequency words with confidence, participate actively in phonics games, and recount story details with precision by the program's end. Taylor and Leung (2020) corroborate these findings in their social-semiotic analysis of multimodal literacy, which demonstrates that integrating speech, print, image, and gesture through digital storytelling platforms significantly boosts young learners' narrative skills, word learning, and motivation to read.

Conclusion

The eight-week classroom-based digital literacy intervention in Nursery One classrooms within Asa Local Government Area produced clear improvements in children's early reading and language skills. Learners progressed from tentative letter sound matching and limited sight-word recognition to fluent decoding, expanded vocabulary, heightened phonemic awareness, and coherent story retellings. These results demonstrate that carefully chosen multimedia storybooks, phonics applications, and interactive vocabulary games can effectively scaffold foundational literacy skills while fostering learner confidence and motivation.

Recommendations

1. Education authorities and local authorities should invest in tablets, secure charging stations, and reliable internet access, and curate a vetted collection of curriculum-aligned digital literacy resources.
2. School administrators should embed routine digital-literacy sessions into the timetable to complement rather than replace traditional literacy instruction.
3. Educators should incorporate guided multimedia storytelling, small-group phonics games, and reflective discussion prompts into daily lesson plans to reinforce links between digital and print literacy.
4. Parents and caregivers should set aside regular, supervised time at home to engage with approved digital reading materials, reinforcing school-based learning and promoting healthy device habits.

Professional development providers should offer ongoing workshops and establish online communities where early-years educators share best practices for selecting high-quality digital content, managing classroom technology, and blending screen-based methods with hands-on literacy strategies.

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