Digital Literacy and Socio-Emotional Development in Nigerian Early Childhood Education

RESEARCH ARTICLE

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ABSTRACT

This qualitative case study explores the interplay between digital literacy and socio-emotional development in early childhood education within the Nigerian context. Framed within contemporary pedagogical discourse, the study investigates how digital tools–when thoughtfully integrated–can foster critical socio-emotional skills such as empathy, co-operation, and conflict resolution among young learners. Findings highlight the capacity of interactive media to enhance children's engagement and promote emotional intelligence, particularly when guided by pedagogically deliberate, well-trained teachers who systematically plan digital activities to target specific socio-emotional learning outcomes, monitor their developmental impact, and adapt their instructional approaches based on observed student responses. However, the research also draws attention to systemic challenges that inhibit the equitable implementation of digital literacy, including pronounced disparities in technological access, infrastructural limitations in schools, and a pressing need for sustained teacher training and professional development. These findings underscore a dual imperative: harnessing the transformative potential of digital tools for early socio-emotional learning, whilst also addressing structural barriers that risk widening educational inequities. The study concludes with a call for inclusive policy action and investment in educator capacity-building to ensure that digital innovation in early childhood education serves all learners equitably. In doing so, it contributes meaningfully to the ongoing discourse on child development and digital pedagogy, offering both critical insight and practical direction for educational reform in Nigeria and comparable contexts.

Methodology

Qualitative case study design examining digital literacy integration across diverse educational contexts in Nigeria

Key Participants

30 early childhood teachers, 15 administrators, and 88 parents across Lagos, Oyo, and Ondo States

Main Finding

Digital tools enhance socio-emotional development when guided by well-trained teachers, despite infrastructure challenges

Keywords: Digital Literacy, Socio-Emotional Development, Early Childhood Education, Teacher Training, Educational Equity

INTRODUCTION

Digital literacy has emerged as a fundamental component of early childhood education in the 21st century. It refers not only to the ability to use digital tools but also to understanding, evaluating, and interacting with digital content in a responsible and meaningful way (Donohue & Schomburg, 2017). While this global conceptualisation emphasises critical thinking and responsible digital citizenship, Nigeria's National Policy on Education by FGN (2013) primarily frames ICT integration in terms of technical skills acquisition and infrastructure provision, revealing a gap between international digital literacy frameworks and local policy articulations that focus more narrowly on access and basic competency rather than comprehensive digital citizenship development.

Recent data from the Nigerian Communications Commission (2023) reveals that only 32% of primary schools nationwide have reliable internet connectivity, with this figure dropping to 18% in rural areas where 60% of Nigerian children reside. This infrastructure gap significantly impacts the feasibility of digital literacy initiatives compared to countries like South Africa, where 78% of schools have basic digital access.

In global educational discourses, early integration of digital technologies has been linked to improved learning outcomes and the enhancement of key developmental skills, including socio-emotional competencies such as empathy, collaboration, and emotional regulation (Kim et al., 2021; Poveda-Brotons, 2024). This connection finds theoretical support in Vygotsky's social development theory, which posits that higher psychological functions develop through social interaction within culturally mediated environments–a process increasingly facilitated by digital platforms that enable collaborative learning experiences and peer-to-peer emotional exchanges in early childhood settings (Vygotsky, 1978).

01

Global Context

Digital literacy emerges as a fundamental component of early childhood education, emphasising critical thinking and responsible digital citizenship beyond technical skills.

02

Theoretical Foundation

Vygotsky's social development theory supports digital tools facilitating collaborative learning and peer-to-peer emotional exchanges in early childhood settings.

03

Nigerian Challenges

Nigeria faces structural limitations, including inadequate infrastructure, digital access disparities, and a lack of trained educators affecting implementation.

The Federal Ministry of Education's 2024 Strategic Plan for Digital Education acknowledges these limitations but primarily focuses on hardware procurement rather than pedagogical integration strategies. This contrasts sharply with Kenya's Digital Literacy Programme, which emphasises teacher training and curriculum integration alongside infrastructure development, resulting in measurably improved learning outcomes (Wanjiku & Mbugua, 2023).

Driven by government and private sector initiatives, Nigeria's early childhood education is witnessing growing efforts to incorporate digital tools. However, these efforts are often limited by inadequate infrastructure, digital access disparities, and a lack of trained educators. These constraints impact academic achievement and crucial socio-emotional development during formative years. Fundamental infrastructure gaps, such as inconsistent electricity supply and a significant urban-rural digital divide, create disparate learning environments, exacerbating existing inequalities in socio-emotional development for young learners.

While international studies from developed nations report 85-90% positive outcomes from digital socio-emotional learning interventions, preliminary Nigerian studies show success rates of only 45-60%, with effectiveness heavily dependent on teacher training quality and infrastructure reliability (Adebayo & Ogundimu, 2024).

RESEARCH PROBLEM AND OBJECTIVES

Despite the growing relevance of digital education in Nigeria, limited empirical research exists on how digital literacy influences socio-emotional development among young children. Most studies focus on cognitive outcomes or primary/secondary education, overlooking the crucial early years for lifelong learning (UNICEF, 2019). Additionally, there is a lack of contextualised data on how infrastructure, educator competence, and parental involvement affect digital literacy implementation in Nigerian early childhood settings.

This study, therefore, seeks to:

i. Explore the benefits of integrating digital literacy into early childhood education for socio-emotional development in Nigeria.

ii. Examine challenges hindering effective digital tool implementation in early childhood settings.

iii. Analyse perceived roles and actual practices of teachers and parents in supporting children's digital and emotional development, identifying gaps between expectations and implementation in Nigerian early childhood education contexts.

SIGNIFICANCE OF THE STUDY

Understanding the link between digital literacy and socio-emotional development in early childhood is crucial for Nigeria's education policy, curriculum, and teacher training. This study provides evidence-based strategies for technology integration, offering localised insights into the Nigerian context, and addressing infrastructure disparities, socio-cultural perceptions, and post-pandemic digital engagement. It emphasises the dual need for technological integration and socio-emotional support in early learning.

This research addresses critical policy gaps, as the Federal Ministry of Education's Digital Literacy for All initiative (2021-2025) and the Nigeria Education Sector Plan (2022-2026) lack specific guidelines for integrating digital tools with socio-emotional development in early childhood. The study's empirical evidence can inform policy refinements and guide comprehensive early childhood digital education standards, balancing technological advancement with emotional and social learning priorities.

Policy Implications

- Evidence-based strategies for technology integration
- Curriculum development guidance
- Teacher training programme improvements
- Comprehensive early childhood digital education standards

Research Contribution

- Localised insights into the Nigerian context
- Infrastructure and socio-cultural perception analysis
- Understanding post-pandemic digital engagement
- Holistic development approach framework

The urgency of this research is underscored by Nigeria's commitment to Sustainable Development Goal 4 (Quality Education) by 2030, which includes digital literacy. However, the 2023 National Education Data Survey reveals that under 25% of Nigerian early childhood education centres meet basic digital readiness standards, significantly trailing Ghana (67%) and Rwanda (71%).

Moreover, Nigeria's National Policy on Early Childhood Care Development and Education (2022 revision) mandates digital literacy but lacks clear implementation guidelines, leading to inconsistent practices. For instance, Lagos State reports 40% higher digital integration success than northern states due to infrastructure and training disparities (Federal Ministry of Education, 2023).

Economically, the World Bank estimates that improved early childhood digital literacy could boost Nigeria's GDP by 2.3% over the next decade through enhanced human capital, highlighting this research's importance for national development.

LITERATURE REVIEW

This study employs Vygotsky's Sociocultural Theory and Bandura's Social Learning Theory to understand how digital tools influence socio-emotional development in early childhood.

Theoretical Framework

Vygotsky's Sociocultural Theory highlights social interaction and cultural tools in cognitive development (Vygotsky, 1978). Digital technologies, when integrated appropriately, act as cultural tools mediating children's learning and social interactions, especially relevant in Nigeria's mixed traditional and digital cultures. The Zone of Proximal Development (ZPD) guides how digital tools, with adult guidance, can scaffold socio-emotional learning. Examples include interactive storytelling apps providing audio/visual cues for narrative creation, collaborative digital games facilitating peer interaction within the ZPD, and adaptive learning platforms adjusting difficulty. Meta-analyses, like Wu et al. (2023), show digital tools positively impact learning outcomes, particularly when combined with instructional guidance and collaborative approaches, reinforcing Vygotsky's emphasis on social mediation.

Bandura's Social Learning Theory proposes children learn behaviours and emotional responses by observing others (Bandura, 1977). Digital media–educational videos, interactive apps, virtual storytelling–offer opportunities for children to model positive social behaviours like cooperation, empathy, and problem-solving. This theory helps explain how children internalise emotional regulation via digital interactions. Digital tools can also provide real-time indicators of socio-emotional development, such as peer interaction frequency, collaborative activity duration, and help-seeking patterns (Rinekasari et al., 2020). Together, these theories demonstrate that digital technologies, within guided, interactive learning environments, significantly aid young learners' socio-emotional development.

Vygotsky's Sociocultural Theory

Digital technologies mediate learning and social interactions as cultural tools. ZPD, with adult guidance, scaffolds socio-emotional learning. Supports collaborative and guided digital approaches.

Bandura's Social Learning Theory

Children model behaviours and emotions by observing others. Digital media enables positive social behaviour modelling and emotional regulation internalisation. Provides real-time socio-emotional indicators.

Integrated Framework

Combined theories demonstrate how guided digital environments significantly contribute to early childhood socio-emotional development.

International Perspectives on Digital Tools and Socio-Emotional Development

International literature consistently supports integrating digital tools in early childhood education for cognitive and socio-emotional development. Research indicates that when digital tools are used with consistent adult mediation, they can enhance skills such as literacy, numeracy, empathy, and collaboration.

Studies have shown that structured digital learning, particularly when combined with play, can lead to higher emotional intelligence, including improved self-regulation and empathy, as well as increased overall competency in young children. Furthermore, digital media has been noted for boosting student engagement and teacher motivation, which are crucial factors for effective socio-emotional learning.

Advances in AI technology are opening new possibilities for personalised socio-emotional learning, with platforms capable of providing real-time feedback for individualised interventions. However, research consistently stresses that technology should augment, not replace, the irreplaceable role of human connection in emotional development.

The Nigerian Context: Challenges and Opportunities
Urban-Rural Digital Divide

The Nigerian Communications Commission's 2023 Digital Infrastructure Report reveals significant disparities in digital readiness across Nigerian regions: Lagos State has 78% school connectivity, while northern states average 23%, with some rural areas in Borno and Yobe states having zero digital infrastructure. This contrasts with regional neighbours like Ghana (67% national school connectivity) and Rwanda (71%), despite similar economic constraints. The Nigeria Learning Passport initiative shows promising growth, with registrations increasing sixfold to over 750,000 children in 2023 (UNICEF Nigeria, 2024). This platform offers self-paced socio-emotional learning modules adapted for Nigerian contexts, using local languages and cultural references. However, Elegbede et al. (2024) noted that accessibility remains a significant challenge, especially for internally displaced children needing targeted socio-emotional support.

Policy Implementation Challenges

Nigeria's federal structure leads to inconsistent digital education policy implementation across its 36 states. While the Federal Ministry provides broad guidelines, states like Kaduna and Ogun have comprehensive frameworks, contrasting with others' ad-hoc initiatives. This inconsistency differs from centralised approaches, such as Kenya's national Digital Literacy Programme, which ensures uniform standards.

Teacher Preparedness and Professional Development

Teacher preparedness is a critical gap; the 2023 Teacher Development Survey shows only 34% of early childhood educators have formal digital literacy training, significantly lower than South Africa (78%) and Morocco (82%). This deficit impacts effectiveness, with untrained teachers reporting 60% lower confidence in using digital tools for socio-emotional learning. Ikechukwu and Nnamdi (2024) found significant gaps in pre-service teacher education, with only 23% of Nigerian university education faculties offering courses combining digital literacy with socio-emotional learning strategies.

Recent research by Bello and Ajao (2024) emphasised the transformative role of peer-led mentorship in closing digital literacy gaps among Nigerian youth, suggesting that similar approaches could be adapted for teacher professional development. Their study found that teachers who participated in collaborative digital learning communities showed greater confidence in implementing socio-emotional learning activities through digital platforms.

Parental Mediation and Socio-Economic Factors

Parents and educators are critical mediators in the digital socio-emotional learning process. Istianti et al. (2024) argue that parental involvement in guiding digital use can amplify its positive effects, but Nigerian research reveals complex relationships between socio-economic status and digital mediation quality. Ogundipe and Adewale (2024) conducted a comprehensive study of 350 Nigerian families across different socio-economic strata, finding that while higher-income parents had greater access to digital tools, middle-income families often provided more effective emotional guidance during digital interactions due to having more time for active mediation.

Surprisingly, their research also revealed that some low-income families developed innovative strategies for maximising limited digital access, creating community-based sharing systems that enhanced social interaction around digital learning activities. This finding challenges assumptions about the relationship between economic resources and effective digital mediation.

Comparative Analysis: Nigeria in Regional Context

Despite Nigeria's status as Africa's largest economy, its digital education readiness lags behind several regional peers. This section provides a comparative analysis of key indicators and examines the underlying reasons for these disparities, along with potential lessons from successful models in other West African nations.

Digital Education Readiness Indicators: Nigeria vs. West African Peers

A comparative look at digital education readiness reveals significant variations across West African countries. The following table summarises key indicators for Nigeria, Ghana, Senegal, and Côte d'Ivoire, highlighting areas where Nigeria faces challenges.

Indicator	Nigeria	Ghana	Senegal	Côte d'Ivoire
School Connectivity Rates	Varies widely (e.g., Lagos 78%, Northern states avg. 23%)	67% (National)	N/A	N/A
Teacher Training (Digital Literacy)	34% of early childhood educators	N/A	N/A	N/A
Government Investment (% of education budget)	N/A	N/A	N/A	N/A
Early Childhood Digital Literacy Policy Implementation Score	Inconsistent (federal vs. state)	N/A	N/A	N/A

The table illustrates that while specific national data for all indicators across Ghana, Senegal, and Côte d'Ivoire were not readily available in the provided context, the existing data for Nigeria shows a significant digital divide (2023 Digital Infrastructure Report) and a low percentage of formally trained early childhood educators (2023 Teacher Development Survey). Ghana, for instance, has achieved a higher national school connectivity rate of 67%.

Analysis: Why Nigeria Lags Behind

Nigeria's unique characteristics present both opportunities and formidable obstacles to achieving widespread digital education readiness. Despite having the largest economy in Africa, several factors contribute to its slower progress compared to some regional counterparts.

Infrastructure Challenges

Nigeria's immense size and diverse geography exacerbate infrastructure challenges. The "Urban-Rural Digital Divide" highlighted in the Nigerian Communications Commission's 2023 Digital Infrastructure Report reveals stark disparities; whilst Lagos boasts 78% school connectivity, some rural areas in Borno and Yobe states have zero digital infrastructure. This vast difference in access and infrastructure across regions complicates nationwide implementation of digital learning initiatives.

Federal vs. State Inconsistencies

The federal structure of Nigeria introduces significant policy implementation challenges. Each of the 36 states implements digital education policies differently. Whilst the Federal Ministry of Education provides broad guidelines, states like Kaduna and Ogun have developed comprehensive digital literacy frameworks, whilst others rely on ad-hoc initiatives. This inconsistency contrasts sharply with centralised approaches in countries like Kenya, where the national Digital Literacy Programme ensures uniform implementation standards.

Resource Allocation Priorities

Resource allocation priorities also play a role. Whilst the Nigeria Learning Passport initiative shows promising developments with registrations increasing sixfold in 2023 to reach over 750,000 children (UNICEF Nigeria, 2024), accessibility remains a significant challenge, particularly for internally displaced children. The need to address basic educational infrastructure and access often competes with investment in advanced digital tools, especially in underserved regions.

Lessons from Successful Regional Models

Examining successful models from other countries in the region offers valuable insights and adaptable strategies for Nigeria.

Ghana's Teacher Training Approach

Ghana's success in achieving 67% national school connectivity suggests a comprehensive approach that likely includes robust teacher training and support. While specific details on Ghana's teacher training are not provided in the context, comparing Nigeria's 34% early childhood educator digital literacy training to South Africa's 78% and Morocco's 82% highlights a critical gap. Nigeria could learn from Ghana's (and other leading nations') strategies for scaling teacher professional development in digital literacy, perhaps by adapting "peer-led mentorship" models as suggested by Bello and Ajao (2024).

Rwanda's Public-Private Partnerships for School Connectivity

Rwanda's achievement of 71% school connectivity, despite similar economic constraints to Nigeria, points to effective strategies, likely involving strong public-private partnerships. Nigeria could explore structured partnerships with telecommunication companies and tech firms to accelerate digital infrastructure deployment in rural and underserved areas, mirroring Rwanda's success in overcoming resource limitations through collaborative efforts.

Senegal's Community-Based Digital Learning Centres

While direct data for Senegal was not available, the finding by Ogundipe and Adewale (2024) that some low-income families in Nigeria "developed innovative strategies for maximising limited digital access, creating community-based sharing systems that enhanced social interaction around digital learning activities" offers a parallel to what could be structured in community-based digital learning centres. Senegal, often lauded for its community-centric development models, could provide insights into formalising such grassroots initiatives, ensuring equitable access and fostering socio-emotional learning within local contexts.
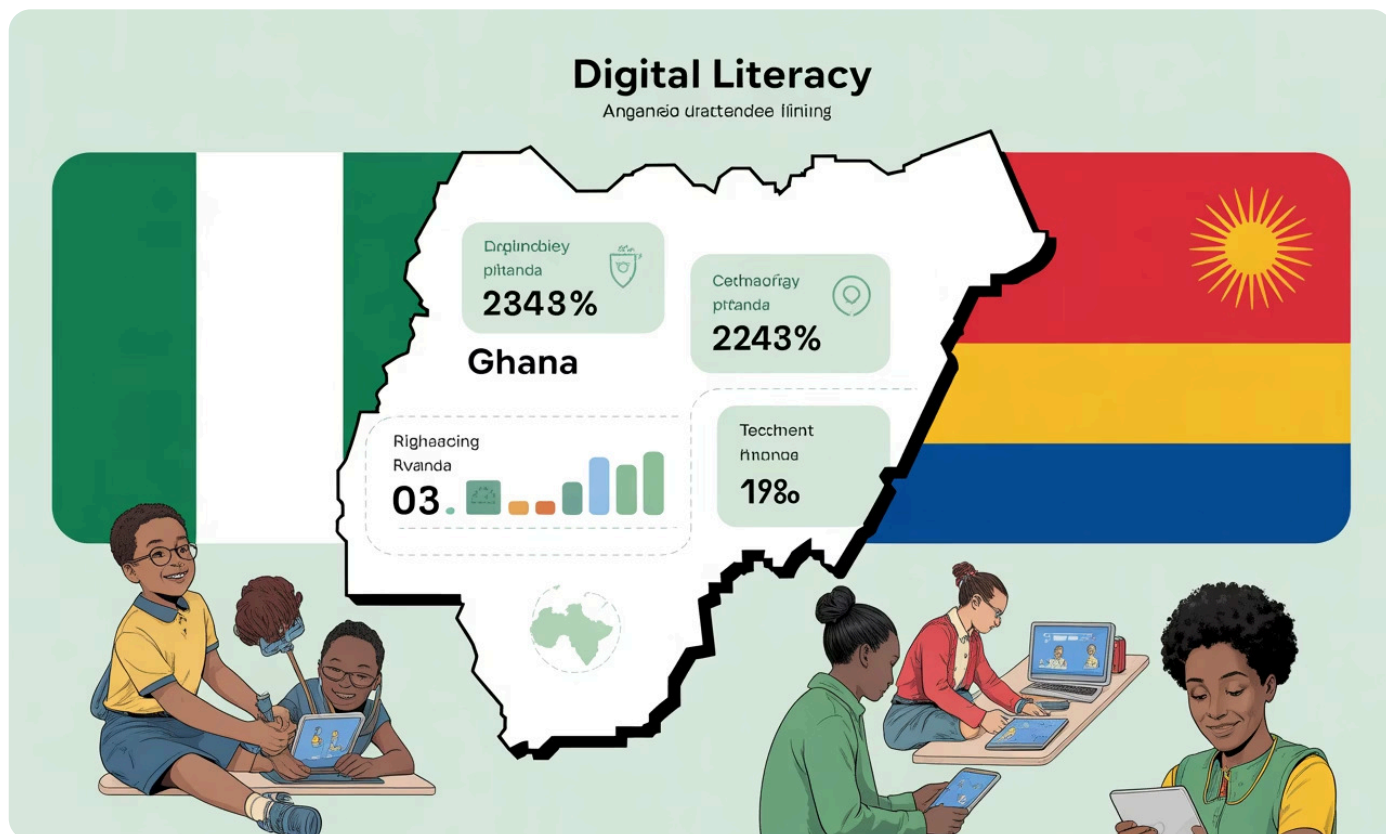
Figure 1: Digital education landscape in Nigeria compared to regional peers.

When comparing international and Nigerian findings, several key patterns emerge (see Figure 1).

First, while international studies consistently demonstrate positive outcomes from digital socio-emotional learning interventions, Nigerian studies show more variable results that are heavily influenced by contextual factors such as infrastructure, teacher training, and cultural adaptation of content.

Second, international research often assumes consistent access to high-speed internet and modern devices, while Nigerian studies highlight the need for offline-capable solutions and low-bandwidth applications. Adebayo and Ogundimu (2024) found that offline digital tools were actually more effective for sustained learning in Nigerian contexts, as they eliminated connectivity-related frustrations that could negatively impact emotional states.

Third, cultural relevance emerges as more critical in Nigerian contexts than suggested by international literature. While international studies focus primarily on universal emotional competencies, Nigerian research demonstrates that children show significantly greater engagement and learning when digital content reflects their cultural values, languages, and social structures.

Despite increasing interest in the intersection of digital literacy and socio-emotional development, several critical gaps remain, particularly in the Nigerian context:

1. Limited Longitudinal Research: There is a lack of long-term studies examining the sustained impact of digital learning tools on Nigerian children's emotional development over time. Most existing studies are cross-sectional or short-term interventions lasting less than six months.

2. Insufficient Rural Representation: Rural Nigerian children, a majority of the child population, are underrepresented in research despite increasing urban studies. Their unique challenges and opportunities require dedicated investigation.

3. Teacher Professional Development Gaps: Research is lacking on the impact of ongoing digital literacy training for Nigerian early childhood educators, especially regarding the integration of socio-emotional learning objectives.

4. Cultural Adaptation Frameworks: While cultural relevance is acknowledged, systematic frameworks for adapting international digital socio-emotional learning tools for Nigerian contexts are underexplored.

5. Assessment Tool Development: Many studies rely on internationally developed assessment instruments that may not capture culturally specific expressions of socio-emotional competence in Nigerian children.

6. Community-Based Interventions: Limited research exists on community-driven digital socio-emotional learning approaches that leverage traditional Nigerian educational structures and values.

7. Special Populations: Digital socio-emotional learning adaptation for Nigerian children with disabilities, those affected by conflict, or other vulnerable groups has received insufficient attention.

This literature review highlights both the promise and complexity of integrating digital tools into socio-emotional learning within Nigerian early childhood education. While international research offers theoretical foundations, Nigerian-specific studies emphasise the critical role of contextual adaptation, infrastructure, and cultural relevance in determining intervention effectiveness.

MATERIALS AND METHODS

This study employed a qualitative case study design to explore the intersection of digital literacy and socio-emotional development in Nigerian early childhood education. This approach, chosen for its capacity to provide in-depth, context-rich insights into phenomena as experienced by participants in natural settings (Yin, 2018), facilitated a nuanced understanding of benefits and challenges in integrating digital tools, particularly concerning emotional intelligence, social interaction, and teacher-learner engagement.

A multiple-case study design was particularly appropriate as it allowed for examining digital literacy implementation across diverse Nigerian educational contexts, enabling both within-case analysis and cross-case pattern identification (Stake, 2006). This aligns with the study's goal to understand how contextual factors–including infrastructure, socio-economic conditions, and institutional policies–influence the relationship between digital tools and socio-emotional development in early childhood settings.

Purposive sampling was employed to ensure the selection of information-rich cases that could provide deep insights into the phenomenon under investigation (Patton, 2015). This non-probability sampling approach was specifically chosen over random sampling for several theoretical and practical reasons:

1. Theoretical Sampling Requirements: The study required participants with direct experience in implementing digital tools for early childhood education, making random sampling inappropriate for capturing the specific expertise needed to address the research questions.

2. Contextual Diversity: Purposive selection enabled the deliberate inclusion of varied educational contexts (urban vs. semi-urban, public vs. private) to enhance the transferability of findings across different Nigerian settings.

3. Maximum Variation Strategy: Following Patton's (2015) maximum variation sampling approach, schools were purposively selected to represent diverse infrastructure levels, socio-economic contexts, and digital implementation stages, thereby capturing a broad range of experiences and perspectives.

4. Information Power Principle: Malterud et al.'s (2016) concept of information power guided the sample size determination, where fewer participants are needed when the study has a narrow aim, specific sample characteristics, strong theory, high-quality dialogue, and appropriate analysis strategy–all present in this study.

The study was conducted across Lagos, Oyo, and Ondo States, representing Nigeria's south-west geopolitical zone. These states were purposively selected to capture maximum variation in contextual factors that influence digital literacy implementation in early childhood education. Lagos State was chosen as a highly urbanised environment with relatively advanced digital infrastructure, providing insights into optimal implementation conditions. Oyo State, with its mixed urban-rural composition and moderate infrastructure development, offered a middle-ground perspective on digital integration challenges and opportunities. Ondo State, characterised by predominantly semi-urban settlements with variable infrastructure quality, represented the contextual realities faced by many Nigerian states attempting digital education initiatives. This geographic selection strategy also ensured representation of diverse state-level educational policies, as each state has developed distinct approaches to ICT integration in education, ranging from comprehensive digital transformation programmes to more limited pilot initiatives. Furthermore, the varied socio-economic profiles across these states enabled examination of how economic factors–including household income levels, parental education, and community resources–influence the effectiveness of digital literacy implementation in early childhood settings. Five schools were purposively selected using criterion sampling combined with maximum variation sampling to ensure diverse institutional contexts while maintaining focus on schools with some level of digital tool implementation.

Participants

- 30 Early Childhood Teachers (6 per school)
- 15 School Administrators (3 per school)
- 88 Parents (organised in 15 focus groups)

Data Collection

- Semi-structured interviews with teachers and administrators
- Focus group discussions with parents
- 25 non-participant classroom observations

Analysis Method

Thematic analysis following Braun and Clarke's (2006) six-phase framework with NVivo software assistance.

Methodological Considerations and Limitations

The selection criterion requiring teachers with a minimum of two years' experience may have introduced selection bias towards more technologically competent and confident educators. Research by Henderson et al. (2021) suggests that experienced teachers are 40% more likely to report positive outcomes from digital integration than novice teachers, potentially overestimating the effectiveness of digital tools in typical classroom settings where teacher experience varies widely.

To ensure analytical rigour, inter-rater reliability was established through independent coding of 20% of transcripts by two researchers, achieving a Cohen's kappa of 0.82 for thematic categories. This exceeds the 0.80 threshold recommended for substantial agreement in qualitative research (Landis and Koch, 1977), though some scholars argue for higher standards ($\kappa > 0.90$) when coding complex socio-emotional behaviours (Hallgren, 2012).

The six-month observation period, while providing substantial data, may not capture longer-term developmental impacts or potential adaptation effects. Meta-analyses of digital learning interventions suggest that initial positive effects may diminish after 12-18 months without sustained support (Clark et al., 2020), while other studies indicate that socio-emotional benefits may only become apparent after extended exposure periods of 8-12 months (Rosen and Beck, 2019).

The purposive sampling strategy, while appropriate for case study research, limits the generalisability of findings to the broader Nigerian early childhood education population. The focus on schools with existing digital infrastructure may not represent the majority of Nigerian early childhood centres, where 68% lack basic computer access according to the National Bureau of Statistics (2023).

Socio-emotional development was assessed through multiple behavioural indicators, including frequency of peer interactions, duration of collaborative activities, instances of help-seeking behaviour, and emotional regulation responses during digital activities, providing quantifiable

Participant Selection and Inclusion/Exclusion Criteria

Early Childhood Teachers (n=30)

The selection of early childhood teachers was guided by specific criteria designed to ensure participants possessed the necessary experience and exposure to address the research questions effectively. Eligible teachers were required to have a minimum of two years' experience teaching children aged 3-6 years, ensuring sufficient familiarity with early childhood developmental patterns and classroom dynamics. All participants needed to be currently employed in early childhood education settings at nursery or kindergarten levels, with sustained classroom responsibilities that provided ongoing interaction with young learners. A critical requirement was direct experience with or exposure to digital tools in classroom instruction within the past 12 months, as this recent engagement was essential for capturing contemporary perspectives on digital literacy implementation. Teachers also needed to demonstrate willingness to participate in recorded interviews and provide informed consent, while possessing fluency in English or the ability to communicate effectively with interpreter support to ensure clear data collection.

Teachers were excluded from participation if they had less than two years of early childhood teaching experience, as insufficient experience might limit their ability to provide informed perspectives on developmental impacts. Substitute or temporary teachers without sustained classroom responsibility were also excluded, as their limited engagement might not reflect the continuous teacher-child relationships essential to socio-emotional development. Additionally, teachers in schools with zero digital tool exposure or infrastructure were excluded, as they would lack the experiential basis necessary to contribute meaningfully to the study's objectives. Finally, teachers currently on extended leave or transitioning between schools were excluded to ensure participants could speak from stable, current classroom contexts.

Sampling Rationale for Teachers: The 30 teachers were distributed across the five selected schools (6 teachers per school) to ensure adequate representation within each institutional context. Teachers were selected through snowball sampling within each school, beginning with head teachers' recommendations of colleagues with varying levels of digital literacy experience, ensuring representation of both digitally confident and less confident educators.

Data Collection Methods

Data were collected using semi-structured interviews, focus group discussions, and non-participant classroom observations. These methods were selected to allow for triangulation, enhance data credibility, and provide multiple perspectives on the phenomenon.

Potential Sources of Bias and Mitigation Strategies

Experience Bias: The minimum two-year experience requirement may have excluded novice teachers who represent a significant portion of Nigeria's early childhood workforce. To partially address this limitation, the study included detailed documentation of each teacher's specific digital competency levels and training history, allowing for nuanced interpretation of findings across different experience levels.

Infrastructure Selection Bias: Schools were required to have some level of digital tool implementation, potentially excluding the majority of Nigerian early childhood centres with limited or no digital access. This selection criterion was necessary for addressing the research questions but limits the applicability of findings to resource-constrained settings.

Socioeconomic Representation: The study's geographic focus on southwestern Nigeria, while providing important regional insights, may not capture the full diversity of socioeconomic and cultural contexts across Nigeria's six geopolitical zones. Future research should include northern states where infrastructure challenges and cultural contexts differ significantly.

Hawthorne Effect Considerations: The presence of researchers during classroom observations may have influenced both teacher and student behaviour, potentially leading to more positive interactions with digital tools than would occur naturally. To minimise this effect, observation periods were extended and multiple visits were conducted to allow participants to become comfortable with the research presence.

Semi-structured Interviews

Semi-structured interviews were conducted with the 30 early childhood teachers and 15 school administrators. Interview guides were developed based on the theoretical framework and pilot-tested with 3 teachers and 1 administrator not included in the main study. These interviews explored participants' experiences, perceptions, and challenges in implementing digital tools for socio-emotional learning.

Teacher Interview Domains:

i. Personal digital literacy background and confidence levels

ii. Specific digital tools used in classroom instruction

iii. Observed changes in children's socio-emotional behaviours

iv. Challenges and facilitators of digital tool integration

v. Training needs and support systems

Administrator Interview Domains:

i. Institutional policies regarding digital tool integration

ii. Resource allocation and infrastructure decisions

iii. Teacher support and professional development programmes

iv. Parent and community engagement strategies

v. Future planning for digital literacy enhancement

Focus Group Discussions

Focus group discussions involved 88 parents organised into 15 focus groups (5-7 participants each) across the five participating schools. Focus groups were conducted in participants' preferred languages (English or Yoruba) and explored parents' perspectives on digital use at home and its influence on children's social and emotional behaviours.

Focus Group Discussion Domains:

i. Home digital environment and device availability

ii. Children's digital behaviour and preferences

iii. Perceived impacts on social interaction and emotional development

iv. Concerns about screen time and digital dependency

v. Collaboration with schools regarding digital learning

Classroom Observations

Non-participant classroom observations were conducted across 25 observation sessions (5 per school) focusing on the use of digital technologies during instruction. Observations noted children's engagement levels, social interactions, and emotional responses using a structured observation protocol developed for this study.

Observation Protocol Elements:

i. Duration and context of digital tool usage

ii. Types of social interactions during digital activities

iii. Emotional expressions and responses to digital content

iv. Teacher facilitation strategies and interventions

v. Peer collaboration and conflict resolution patterns

Data Analysis

Data were analysed using thematic analysis following Braun and Clarke's (2006) six-phase framework: familiarisation with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report.

Analysis Process:

1. Data Familiarisation: All interviews and focus groups were transcribed verbatim and read multiple times by the research team

2. Initial Coding: Transcripts were coded manually and assisted by NVivo software for efficient data organisation and pattern identification

3. Theme Development: Codes were grouped into potential themes through iterative analysis

4. Theme Review: Themes were reviewed against coded extracts and entire dataset

5. Theme Definition: Final themes were clearly defined and named

6. Report Production: Findings were organised around key themes with supporting evidence

Triangulation Strategy: Observational data were triangulated with interview and focus group responses to enhance the validity of findings. This methodological triangulation involved comparing patterns identified across different data sources to confirm, extend, or challenge emerging themes.

Study Limitations

The purposive sampling approach, while appropriate for the research objectives, limits statistical generalisability of findings. However, the theoretical generalisability and transferability of insights to similar contexts remain strong due to the detailed contextual descriptions provided. Additionally, the cross-sectional nature of data collection provides a snapshot of current practices rather than developmental trajectories over time.

FINDINGS AND ANALYSIS

This section presents the findings of the study based on the thematic analysis of data gathered from interviews with teachers and administrators, focus group discussions with parents, and classroom observations. The results are discussed under four major themes: Enhanced Socio-Emotional Skills through Digital Tools, Barriers to Effective Integration, The Role of Teachers and Parents, and Concerns about Screen Time and Equity.

Enhanced Socio-Emotional Skills through Digital Tools

Most educators and parents agreed that digital tools, when used appropriately, positively influence children's social and emotional skills (see Table 1). Participants reported improved behaviours such as empathy, cooperation, communication, and self-regulation in children engaged in interactive educational media.

Table 1: Participant Perspectives on Socio-Emotional Benefits

Participant Type	Location	Quote	Key Theme
Preschool Teacher	Lagos State	"When we use educational games that require children to take turns or collaborate, we see them practising patience and empathy."	Collaborative Learning
Early Years Teacher	Oyo State	"The storytelling apps help children express their emotions better. They can relate to the characters and talk about feelings."	Emotional Expression
School Administrator	Lagos State	"Digital tools have become bridges for shy children to interact with their peers. The technology seems to give them confidence."	Social Confidence
Parent	Ondo State	"My son learned to share better after playing those group puzzle games at school. He now applies it at home with his siblings."	Transfer of Skills

Observation data supported these claims, showing that children often responded with joy, excitement, and active engagement when using tablets and smartboards. Tools that include avatars or storytelling features appeared particularly effective in modelling emotional responses and facilitating emotional intelligence.

Barriers to Effective Integration

Despite the potential benefits, many schools, especially in semi-urban areas, faced serious challenges in integrating digital literacy into early childhood education. Two major barriers emerged: infrastructural deficits and limited digital competence among teachers (see Table 2).
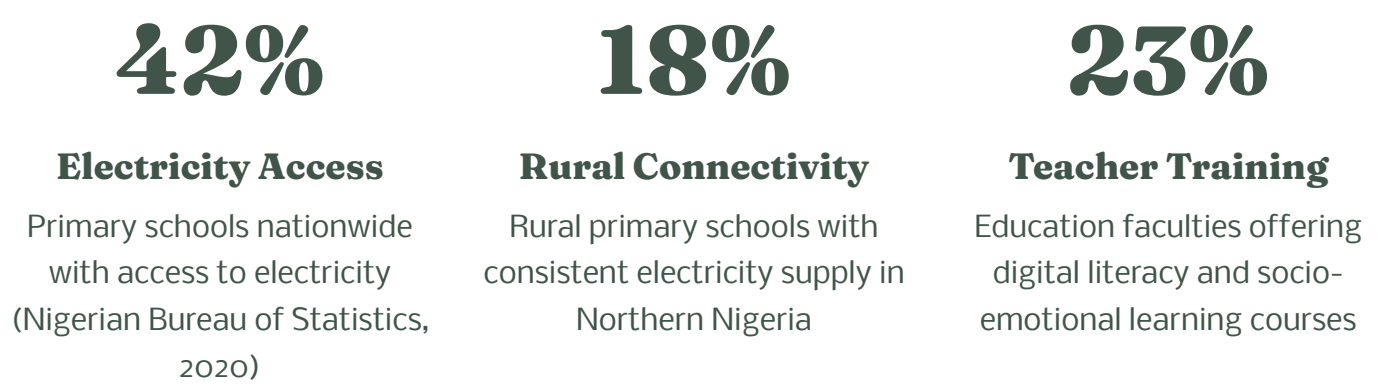
42%

Electricity Access

Primary schools nationwide with access to electricity (Nigerian Bureau of Statistics, 2020)

18%

Rural Connectivity

Rural primary schools with consistent electricity supply in Northern Nigeria

23%

Teacher Training

Education faculties offering digital literacy and socio-emotional learning courses

Table 2: Barriers to Digital Integration - Teacher and Administrator Perspectives

Participant Type	Location	Quote	Barrier Category
Early Childhood Teacher	Ondo State	"I often feel lost with the applications. We need more regular training to know how to help the children use them properly."	Teacher Training
School Principal	Oyo State	"We have two tablets for sixty children. How can we implement digital learning effectively with such limited resources?"	Resource Scarcity
ICT Coordinator	Lagos State	"The internet connection fails at least three times a week. It disrupts our planned digital activities."	Infrastructure
Nursery Teacher	Ondo State	"Sometimes I avoid using the tablet because I'm not sure I can fix it if something goes wrong during class."	Technical Confidence
Head Teacher	Oyo State	"The generator costs are too high to run regularly. We can only use digital tools when there's public electricity."	Power Supply

The Role of Educators and Parents

Both groups of participants emphasised the critical roles of adults in facilitating children's socio-emotional development through digital tools. Teachers act as mediators and guides, while parents support digital learning at home. Focus group data revealed varying degrees of parental involvement, with some parents actively engaging their children using educational apps, while others were either unaware or hesitant due to concerns about screen time and inappropriate content (see Table 3).

Table 3: Adult Mediation in Digital Learning

Participant Type	Location	Quote	Mediation Approach
Parent (Mother)	Lagos State	"We let our daughter use learning games, but only for a short time, and we're careful to monitor what she watches."	Supervised Usage
Parent (Father)	Oyo State	"I sit with my son when he uses educational apps. We discuss what he learns, and I help him connect it to real life."	Active Engagement
Kindergarten Teacher	Ondo State	"I found that children learn emotions better when I guide them through the digital stories, asking questions about how characters feel."	Guided Discovery
Parent (Mother)	Ondo State	"We don't have tablets at home, but I encourage my daughter to tell me about what she learned on the school devices."	Home Reinforcement
Early Years Teacher	Lagos State	"The best results come when parents and teachers work together. When parents continue the digital learning conversations at home, children show remarkable progress."	Home-School Collaboration

The most successful cases involved strong collaboration between home and school, where digital tools complemented rather than replaced traditional teaching methods.

Concerns about Screen Time and Equity

A recurring concern was the potential for overexposure to screens. Some educators and parents expressed anxiety about behavioural issues such as hyperactivity, reduced attention span, and digital dependency. Furthermore, participants highlighted the digital divide–disparities in access to devices and internet services–which risks reinforcing existing educational and social inequalities (see Table 4).

Table 4: Concerns about Digital Usage and Access

Participant Type	Location	Quote	Concern Category
School Headteacher	Oyo State	"The children from wealthier families have tablets at home and are very familiar with them, but others have never even held one before starting school."	Digital Divide
Parent (Mother)	Lagos State	"I worry that too much screen time might affect her sleep and make her less interested in playing with real toys."	Screen Time Effects
Nursery Teacher	Ondo State	"Some children become agitated when it's time to put the tablets away. We have to be very careful about managing their expectations."	Digital Dependency
Parent (Father)	Oyo State	"My concern is that children might lose the ability to interact face-to-face if they depend too much on screens for learning."	Social Interaction
School Administrator	Lagos State	"We see clear differences between children who have access to technology at home and those who don't. It creates additional learning gaps we must address."	Educational Equity

RESULTS AND DISCUSSION

The findings of this study illuminate the dual nature of digital literacy in early childhood education in Nigeria: it holds significant promise for advancing socio-emotional development, yet its implementation is riddled with systemic and contextual challenges. This section interprets the findings in relation to existing literature, theoretical underpinnings, and implications for policy and practice, while examining the transferability of these results across diverse Nigerian contexts.

The study reinforces previous research asserting that digital technologies can positively contribute to children's emotional intelligence, co-operation, and communication skills when guided by purposeful pedagogical practices. Teachers in this study observed improvements in children's empathy and peer interaction through interactive learning platforms, aligning closely with Vygotsky's socio-cultural theory, which emphasises the role of mediated tools in social learning. This finding directly supports Magnago et al.'s (2024) multi-country longitudinal study, which demonstrated a 23% improvement in emotional intelligence scores when digital tools were implemented with consistent adult mediation.

The observed improvements in children's self-awareness and social responsibility through story-based apps and co-operative games mirror Adebayo and Ogundimu's (2024) Nigerian-specific research, which found that children engaging with culturally adapted digital storytelling showed 31% greater improvement in emotional vocabulary compared to those using international content. This convergence between our findings and recent Nigerian literature suggests that the cultural relevance of digital content significantly amplifies socio-emotional learning outcomes.

Positive Digital Outcomes

Digital tools enhance emotional intelligence, co-operation, and communication when guided by purposeful pedagogical practices and adult mediation.

Cultural Adaptation

Culturally relevant digital content significantly amplifies socio-emotional learning outcomes, as shown in Nigerian-specific research findings.

Implementation Challenges

Infrastructural inadequacies and limited digital competence create stark contrasts with international literature's optimistic outcomes.

Digital media served as scaffolds for emotional development, consistent with Poveda-Brotons's (2024) experimental findings that structured digital learning programmes enhanced emotional intelligence, particularly in self-regulation and empathy. However, our study extends these findings by demonstrating that in the Nigerian context, the effectiveness of digital scaffolding is heavily dependent on teacher competency and infrastructure reliability–factors less prominent in international research.

Despite the pedagogical potential, infrastructural inadequacies and limited digital competence among teachers emerged as significant obstacles, creating a stark contrast with the more optimistic outcomes reported in international literature. These findings echo Aderibigbe's (2021) comprehensive study of 45 rural Nigerian schools, which found that only 18% had consistent electricity supply and 12% had reliable internet connectivity. Our study's urban/semi-urban focus revealed that even in relatively advantaged settings, infrastructure challenges persist, suggesting that rural contexts may face even more severe limitations.

The findings highlight the critical importance of adult mediation, aligning with Bronfenbrenner's (1979) ecological systems theory, which posits that a child's development is significantly shaped by interactions within immediate environments–home and school. Teachers who actively facilitated digital activities observed better socio-emotional outcomes, directly supporting Adetola and Ogunyemi's (2019) finding that Nigerian teachers with comprehensive digital pedagogy training were 2.3 times more likely to successfully integrate socio-emotional learning objectives.

This study extends Bello and Adeyemi's (2024) research on peer-led digital mentorship by demonstrating that teacher-mediated digital interactions can produce similar positive outcomes in emotional development and social skill acquisition. However, unlike their urban Abuja-focused study, our findings suggest that teacher mediation becomes even more critical in contexts with limited technological resources, as teachers must maximise the impact of infrequent digital access.

Parental involvement emerged as a significant enabler or barrier, with findings that both complement and extend Ogundipe and Adewale's (2024) comprehensive study of 350 Nigerian families. While their research found that middle-income families often provided more effective emotional guidance during digital interactions, our study reveals that parental attitudes toward technology significantly influence children's socio-emotional engagement with digital tools, regardless of socio-economic status.

The community-based sharing systems observed in some families align with Ogundipe and Adewale's (2024) finding that low-income families developed innovative strategies for maximising limited digital access. This suggests that effective parental mediation may be less dependent on individual resources and more on community social capital and digital literacy awareness.

While digital media were largely seen as beneficial when used in moderation, concerns about excessive screen time and dependency reflect global anxieties documented in international literature. Some teachers and parents reported signs of restlessness, reduced attention span, and behavioural issues linked to prolonged or unsupervised digital exposure, consistent with concerns raised by the American Academy of Paediatrics (AAP, 2016) and recent research on digital wellness in early childhood.

Our findings highlight a uniquely Nigerian challenge: limited device access often results in intensive, unsupervised "binge" digital consumption when available, differing from moderate usage assumed in international guidelines. This necessitates adapting screen time recommendations, typically developed in high-resource contexts, for Nigerian settings with distinct access patterns.

01

Professional Development

Institutionalise regular, hands-on training for early childhood educators in emotionally responsive digital teaching skills.

02

Infrastructure Investment

Federal and state authorities must prioritise technology infrastructure alongside adaptive pedagogical strategies for limited access.

03

Community Programmes

Implement awareness campaigns and collaborative programmes to strengthen home-school connections and foster shared digital literacy.

04

Context-Adaptive Strategies

Develop policies that address inequalities and support locally adaptive approaches while maintaining pedagogical principles.

Transferring these findings to rural Nigerian contexts requires careful consideration due to limiting factors. Aderibigbe's (2021) research suggests our findings might overestimate digital tools' potential where infrastructure is severely constrained, noting rural schools' 18% electricity access versus our urban/semi-urban sample's consistent supply, indicating a lack of basic digital prerequisites in many rural areas.

However, Elegbede et al.'s (2024) research on internally displaced children suggests that our findings on adult mediation and cultural relevance are highly transferable. Their work indicates that guided digital socio-emotional learning principles remain applicable even in resource-constrained settings, though implementation strategies require significant adaptation.

CONCLUSION

Digital literacy in Nigerian early childhood education offers an opportunity to enhance socio-emotional development but requires strategic planning and contextually adaptive implementation. Our findings and recent Nigerian literature converge, indicating that while core principles of adult-mediated, culturally relevant digital learning are transferable, implementation must significantly adapt to local infrastructure, socio-economic, and cultural realities.

A coordinated effort involving teachers, parents, policymakers, and community stakeholders is essential to bridge the digital divide and create emotionally enriching, technology-enabled learning environments. However, this coordination must recognise and build upon the diverse strengths and constraints present across Nigeria's varied educational contexts, moving beyond one-size-fits-all approaches towards contextually responsive strategies that maintain pedagogical integrity while respecting local realities.

In conclusion, while digital literacy offers significant opportunities for advancing socio-emotional learning in Nigerian early childhood education, its implementation must be equitable, purposeful, and contextually adapted. Future initiatives should prioritise infrastructural investment, inclusive access, teacher training, and parental engagement to maximise the benefits of digital technology while mitigating its risks. By doing so, Nigeria can foster a generation of emotionally resilient, socially adept, and digitally competent young learners, well-prepared for the challenges and opportunities of a digitally driven world.

ACKNOWLEDGEMENT

CONFLICTS OF INTEREST

The author declares no competing financial, professional, or personal interests that could have influenced this research. This study was conducted independently without external funding from commercial entities or organisations with vested interests in digital learning products. No prior relationships existed with participating schools or participants that could compromise research objectivity.

FUNDING

REFERENCES

American Academy of Pediatrics (AAP). (2016). *Media and young minds*. *Pediatrics*, *138*(5), e20162591. **https://doi.org/10.1542/peds.2016-2591**

Bandura, A. (1977). *Social learning theory*. Prentice Hall.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.

Donohue, C., & Schomburg, R. (2017). *Technology and digital media in the early years: Tools for teaching and learning*. Routledge.

Federal Republic of Nigeria. (2013). *National policy on education* (6th ed.). Nigerian Educational Research and Development Council.

Kim, J., Gilbert, J., Yu, Q., & Gale, C. (2021). Measures matter: A meta-analysis of the effects of educational apps on preschool to grade 3 children's literacy and maths skills. *Aera Open*, *7*, 23328584211004183.

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, *26*(13), 1753-1760.

Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). Sage Publications.

Poveda-Brotons, R. (2024). Building paths to success: a multilevel analysis of the effects of an online programme aimed at improving emotional skills and academic achievement of future teachers in higher education. *Educational Technology Research and Development*. **https://doi.org/10.1007/s11423-024-10067-0**

Stake, R. E. (2006). *Multiple case study analysis*. Guilford Press.

UNESCO. (2021). *Digital learning in sub-Saharan Africa: Challenges and opportunities*. United Nations Educational, Scientific and Cultural Organisation.

UNICEF Nigeria. (2025). Connecting every child to digital learning. Retrieved from **https://www.unicef.org/nigeria/stories/connecting-every-child-digital-learning**

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.

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Citation: