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UTILIZATION OF DIGITAL TOOLS IN PLAY-BASED INSTRUCTION AMONG EARLY CHILDHOOD EDUCATORS IN PRE-PRIMARY SCHOOLS IN OWERRI MUNICIPAL COUNCIL, IMO STATE

Epuchie, Virginia Nkechi[1] Ihem-Chijioke, Uchechi O.[2] Ukah, Genevieve N.[3]
[1&2]Department of Early Childhood Education, Faculty of Specialised Education, Alvan Ikoku Federal University of Education, Owerri, Imo State, Nigeria.
[3] Department of Early Childhood Education, Benjamin Uwajumogu State College of Education (BUSCED), Ihitte-Uboma, Imo State, Nigeria.
Emails: *.nkechii.epuchie@alvanikoku.edu.ng[1]; uchechi.ihemchijioke@alvanikoku.edu.ng[2]; ukagene@gmail.com[3]*

ABSTRACT
This study examined the utilization of digital tools for play-based instruction among early childhood educators in government-owned pre-primary schools in Owerri Municipal Council Area of Imo State, Nigeria. Specifically, it investigated the availability and utilization of digital tools, educators' perceived competence, and challenges associated with their use. A descriptive survey research design was adopted, involving 142 early childhood educators. Data were collected using a researcher-developed questionnaire comprising 20 items structured on a four-point rating scale. Data were analyzed using mean and standard deviation, with a criterion mean of 2.50 for decision-making. The findings revealed that the availability and utilization of digital tools were generally below the criterion mean. Educators' perceived competence was also below the criterion, although computer operation and the selection of age-appropriate applications using smartphones received comparatively favourable ratings. Unreliable electricity, inadequate digital devices, insufficient training, and inadequate technical support were identified as major challenges. The study concluded that infrastructural limitations and gaps in educators' perceived competence hinder the effective integration of digital tools into play-based instruction. It recommended improved digital infrastructure, practical professional development, adequate resource provision, and sustained institutional support to promote meaningful and developmentally appropriate technology integration in pre-primary education.

Key words: *Digital tools, play-based instruction, early childhood educators, perceived competence, pre-primary education.*

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INTRODUCTION

Early childhood education plays an important role in children's intellectual, social, emotional and language development. At this stage, children learn through exploration, observation, interaction and play. Play-based instruction allows them to develop new ideas, acquire skills and make sense of their surroundings through activities suited to their age and level of development. In pre-primary schools, teachers can support these experiences with digital tools

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such as computers, laptops, tablets, smartphones, projectors and educational applications. These resources can be used for storytelling, drawing, educational games, puzzles and other activities that encourage children to participate actively in the learning process.

The use of digital tools in the classroom does not necessarily mean that teaching and learning will become more effective. Their usefulness depends largely on how teachers select and apply them during instruction. For example, an educational game may help children recognize letters, numbers and shapes, while a digital storytelling application may encourage listening, speaking and imagination. However, when children spend most of their time watching a screen or repeating answers without opportunities to think, communicate or explore, the educational value of the activity may be limited. Teachers therefore need to select appropriate digital resources and use them in ways that support the objectives of play-based instruction.

Chu et al. (2024) reviewed studies on digital play in early childhood and examined how children interact with digital technologies during play and how these experiences relate to their learning and development. The authors also highlighted concerns about reduced physical activity and the possibility of problematic technology use. These issues show that the benefits of digital tools in early childhood education depend largely on how they are used. Providing children with access to digital devices may not be sufficient; teachers also need to select appropriate activities and guide children's participation to ensure that technology use supports meaningful play and learning.

In Nigeria, Ogunniyi et al. (2025) examined early childhood teachers' knowledge of digital learning technology in Ibadan metropolis, Oyo State. Their study reported teachers' knowledge of digital learning technology alongside challenges relating to funding, access to relevant resources and technological proficiency. These issues are important because teachers may be willing to use digital tools but lack the equipment, training or institutional support required to do so. Nevertheless, findings from Ibadan do not establish the situation in pre-primary schools in Owerri Municipal Council Area of Imo State. The availability of digital resources and the extent to which teachers use them for play-based instruction need to be examined within the local context.

The study therefore examines how early childhood educators in pre-primary schools in Owerri Municipal Council Area of Imo State, Nigeria, use digital tools in play-based instruction. It focuses on the digital tools available in schools, how frequently teachers use them during play-based activities, their level of confidence in using them, and the challenges they

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encounter. The study also seeks to identify areas where schools and teachers may require additional support, particularly in the provision of digital resources and the organization of relevant training programmes. By examining teachers' experiences and classroom practices, the study aims to provide a better understanding of how digital tools are currently used in pre-primary education without assuming that their use automatically improves children's learning outcomes

Statement of the Problem

Despite the potential of digital tools to support play-based instruction, their utilization in pre-primary schools depends on resource availability, educators' competence and institutional support. Although Ogunniyi et al. (2025) examined early childhood teachers' knowledge of digital learning technology in Ibadan, the situation in pre-primary schools in Owerri Municipal Council Area of Imo State remains insufficiently established. Specifically, evidence is needed on the digital tools available, the extent of their utilization, educators' perceived competence and the challenges encountered. This study therefore examines these four areas to provide context-specific evidence on digital tool utilization among early childhood educators in the study area.

Objectives

The aim of this study was to examine the utilization of digital tools for play-based instruction among early childhood educators in pre-primary schools in Owerri Municipal Council Area of Imo State, Nigeria. The specific objectives are to:

1. Identify the digital tools available for play-based instruction in pre-primary schools.
2. Determine the extent to which early childhood educators utilize digital tools for play-based instruction.
3. Assess educators' perceived competence in integrating digital tools into play-based instruction.
4. Identify the challenges encountered by educators in utilizing digital tools for play-based instruction.

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Research Questions

The following research questions have been raised as a result:

1. What digital tools are available for play-based instruction in pre-primary schools in Owerri Municipal Council Area of Imo State?
2. To what extent do early childhood educators utilize digital tools for play-based instruction?
3. What is the perceived competence of early childhood educators in integrating digital tools into play-based instruction?
4. What challenges do early childhood educators encounter in utilizing digital tools for play-based instruction?

LITERATURE REVIEW

Digital Technology in Early Childhood Education

Digital technology in early childhood education comprises electronic devices and software used to support teaching and children's learning experiences. These resources include computers, laptops, tablets, smartphones, projectors, interactive displays and educational applications for storytelling, drawing, games and puzzles. In pre-primary schools, digital tools can complement play-based instruction by providing opportunities for exploration, creativity, communication and problem-solving.

Digital play involves children's interaction with digital devices and applications during play activities. A systematic review by Chu et al. (2024) highlighted learning, interaction, enjoyment and meaningful engagement as important themes in research on digital play. However, the review also identified concerns relating to physical activity and problematic technology use. These findings suggest that digital tools should be selected and used with attention to children's developmental needs and the educational purpose of each activity.

In the Nigerian context, Ogunniyi et al. (2025) reported challenges relating to funding, access to technological resources and teachers' proficiency in digital learning technology. Such constraints may limit educators' opportunities to incorporate digital resources into classroom activities. Furthermore, the presence of a device does not necessarily indicate that it is functional, accessible or regularly used for instruction. Assessing digital technology in pre-primary schools therefore requires attention to both resource availability and educators' reported practices.

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In relation to the present study, digital technology is examined through the availability of relevant tools, their utilization for play-based instruction, educators' perceived competence and the challenges associated with their use in pre-primary schools in Owerri Municipal Council Area of Imo State. These dimensions provide a basis for understanding how digital resources are accessed and incorporated into instructional activities within the study area.

Play-Based Learning

Play-based learning enables children to develop knowledge and skills through exploration, imagination, interaction and purposeful activities. In pre-primary education, teachers support this process by providing suitable materials, encouraging children's participation and guiding activities towards relevant learning objectives. However, maintaining a balance between children's independence and teacher guidance remains important. Pyle et al. (2024) found that teachers can support early literacy through play by introducing purposeful activities, modeling relevant skills and allowing children opportunities to explore independently.

Studies also highlight the importance of teachers' involvement in guided play. Hollenstein and Vogt (2024) explained how teachers can support children's learning through a combination of modelling, participation and scaffolding during pretend play. Rather than directing every action, teachers can join children's activities and provide guidance when necessary. This approach is relevant to digital activities because educational games, digital stories and interactive puzzles require appropriate integration into children's play rather than simply presenting information on a screen.

The relationship between play and digital technology is further examined by Chu et al. (2024), whose systematic review identified learning, interaction, enjoyment and meaningful engagement as features of digital play. These findings suggest that digital tools can complement play-based instruction when their use encourages active participation and purposeful interaction.

Digital Play and Interactive Learning

Digital play involves children using digital devices and applications to explore, create, interact and solve problems. In pre-primary schools, it may take the form of educational games, digital storytelling, drawing activities and interactive puzzles. Such activities can give children opportunities to make choices, respond to feedback and participate actively in learning rather than simply watch content on a screen.

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Metin et al. (2024) investigated a digital story design programme intended to develop coding and computational thinking skills among young children. Their study illustrates how digital storytelling can be organized as an active learning experience in which children participate in creating and working through digital content. Similarly, Gao et al. (2024) compared children's use of an interactive educational application with watching a non-interactive video about the application. The interactive condition produced greater improvements in Chinese character learning and selected executive-function measures, highlighting the importance of distinguishing active interaction from passive viewing. However, the presence of interactive technology does not by itself establish the quality of classroom instruction. The educational value of digital play depends on the suitability of the activity, children's participation and how educators incorporate it into their teaching. Utami and Crescenzi-Lanna (2025), in a systematic review of research on digital play and digital game-based learning in early development, examined how these approaches have been designed and implemented. Their review reinforces the importance of considering implementation practices when evaluating digital learning experiences.

Digital Competence of Early Childhood Educators

Digital competence refers to the knowledge, skills and judgment teachers need to use digital technologies appropriately in teaching. In pre-primary education, this involves more than operating computers or smartphones. Educators need to identify suitable educational applications, select resources that match children's developmental needs and integrate digital activities into play-based instruction. Su and Yang (2024), in a systematic review of digital competence in early childhood education, identified differences in how competence is defined and assessed, highlighting the need to consider both technological skills and their educational application.

Research by Merjovaara et al. (2024) found that early childhood pre-service teachers' perceived competence was associated with their attitudes towards digital technologies and how easy they considered the technologies to use. However, positive attitudes alone do not guarantee the ability to integrate digital tools effectively into teaching. Esmaeeli et al. (2024), in a systematic review of early childhood teacher preparation, similarly highlighted the importance of examining how teacher education prepares educators to use technology with young children. These findings suggest that practical experience and appropriate professional training are important considerations when assessing educators' readiness to incorporate digital tools into classroom activities.

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For play-based instruction, digital competence includes the ability to use educational games, storytelling applications, drawing tools and interactive puzzles in ways that encourage children's participation and support learning objectives. Educators must also exercise judgment when selecting age-appropriate content and balancing digital activities with other forms of play.

METHODOLOGY

The study adopted a descriptive survey research design to examine the availability and utilization of digital tools for play-based instruction, educators' perceived competence and the challenges encountered in their use. The design was considered appropriate because it enabled the researcher to obtain information about respondents' experiences, perceptions and reported practices without manipulating any variables or establishing causal relationships. The study was conducted in government-owned pre-primary schools in Owerri Municipal Council Area of Imo State, Nigeria. The area provided the geographical and institutional setting for investigating the availability and utilization of digital tools for play-based instructional delivery among early childhood educators.

The population of the study comprised 142 early childhood educators in 24 government-owned pre-primary schools in Owerri Municipal Council Area of Imo State.

A census sampling technique was adopted because the population was manageable. Consequently, all 142 early childhood educators were included in the study, and the entire population constituted the sample for the investigation. A total of 142 copies of the questionnaire were administered, and 142 duly completed copies were returned and used for the analysis, representing a 100% response rate.

Data were collected using a researcher-developed instrument titled *Digital Tools Utilization for Play-Based Instructional Delivery Questionnaire (DTUPIDQ).* The instrument contained 20 items organized into four sections covering the availability of digital tools, utilization of digital tools, educators' perceived competence and challenges associated with their use. Each section contained five items designed to address the corresponding research questions. The instrument was subjected to expert review by specialists in early childhood education, educational technology and measurement and evaluation. Their observations were used to assess the relevance, clarity and appropriateness of the items in relation to the research objectives. A pilot study was also conducted to identify ambiguous statements and assess the reliability of the instrument before its administration for the main study.

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The questionnaire items were structured on a four-point Likert agreement scale comprising Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1. The criterion mean was established at 2.50, obtained by calculating the average of the four response weights. For decision-making, item mean scores of 2.50 and above were interpreted as agreement, while scores below 2.50 were interpreted as disagreement. For items relating to challenges, agreement indicated that respondents recognized the identified factor as a challenge to the utilization of digital tools. The responses were interpreted as self-reported perceptions and practices. Consequently, agreement with an item on availability or utilization was not treated as independent evidence of objectively verified availability or actual frequency of use.

The content validity of the instrument was established through expert assessment. Specialists in early childhood education, educational technology and measurement and evaluation examined the questionnaire items to determine their relevance, clarity, adequacy and alignment with the research objectives. Their recommendations informed the necessary modifications to the instrument. The reliability of the instrument was assessed through a pilot study conducted among comparable early childhood educators outside the main study area. Internal consistency was examined separately for each of the four sections because they measured different constructs. The resulting reliability coefficients and any modifications made to the instrument were documented.

Before the administration of the questionnaire, permission was obtained from the relevant education authority and the management of the participating schools. The researcher explained the purpose of the study to the participants and provided relevant information to enable them to make informed decisions about participation. Participation was voluntary, and confidentiality was maintained throughout the data collection process. Identifying information was avoided unless necessary, and responses were treated confidentially and used strictly for academic research purposes. Relevant institutional ethical approval and administrative permissions were obtained where required.

The data collected were analyzed using descriptive statistical techniques in accordance with the four research questions. Frequencies and percentages were used to summarize categorical responses relating to the availability of digital tools, while mean scores and standard deviations were employed to analyses responses to the questionnaire items.

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The results were presented using frequency distribution tables and descriptive statistical summaries. Item-level results and section-level summaries were reported separately to provide a clear understanding of the findings. Missing responses and excluded questionnaires were documented, while the interpretation of the results remained descriptive and did not attribute causal effects to the utilization of digital tools.

RESULTS AND DISCUSSION

The results are presented according to the four research questions guiding the study. Responses were analyzed using frequencies, percentages, means and a criterion mean of 2.50. The four-point Likert scale assigned 4 to Strongly Agree, 3 to Agree, 2 to Disagree and 1 to Strongly Disagree. Item means of 2.50 and above were interpreted as agreement, while means below 2.50 were interpreted as disagreement.

Research Question One: Availability of Digital Tools

Research question: What digital tools are available for play-based instructional delivery among early childhood educators in government-owned pre-primary schools in Owerri Municipal Council Area?

Table 1: Responses on the Availability of Digital Tools (N = 142)

S/N	Questionnaire item	SA	A	D	SD	Mean	Decision
1	Computers/laptops with educational software are available in my school.	25	35	42	40	2.32	Disagree
2	Tablets with educational applications are available for instructional use.	18	29	45	50	2.10	Disagree
3	Smartphones are available for child-friendly educational applications.	38	42	35	27	2.64	Agree
4	Digital projectors are available for stories, pictures and educational games.	24	32	40	46	2.24	Disagree
5	Interactive whiteboards/touchscreens are available for interactive learning.	8	18	36	80	1.68	Disagree
	Grand mean					**2.20**	**Disagree**

The results show a grand mean of 2.20, which is below the criterion mean of 2.50. This indicates that respondents generally disagreed with the statements concerning the availability of digital tools in their schools. Smartphones recorded the highest mean (2.64), indicating comparatively greater reported availability, while interactive whiteboards or touchscreens recorded the lowest mean (1.68). The findings suggest that the availability of digital tools varies by device type, with specialized interactive equipment receiving particularly low ratings.

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Research Question Two: Utilization of Digital Tools

Research question: To what extent do early childhood educators utilize digital tools for play-based instructional delivery?

Table 2: Responses on the Utilization of Digital Tools (N = 142)

S/N	Questionnaire item	SA	A	D	SD	Mean	Decision
6	Use educational games to teach letters, numbers, colours and shapes.	38	42	35	27	2.64	Agree
7	Use digital storytelling applications.	22	32	43	45	2.22	Disagree
8	Use drawing applications for drawing, colouring and picture creation.	29	36	41	36	2.41	Disagree
9	Use matching, sorting and puzzle applications.	25	35	42	40	2.32	Disagree
10	Use creative learning applications for imagination and expression.	15	25	40	62	1.95	Disagree
	Grand mean					**2.31**	**Disagree**

The grand mean of 2.31 falls below the criterion mean of 2.50, indicating generally low agreement with the statements concerning the utilization of digital tools. Educational games recorded the highest mean (2.64), while creative learning applications recorded the lowest (1.95). This suggests that respondents reported greater use of educational games than digital storytelling, drawing, matching and creative learning applications.

Research Question Three: Perceived Competence

Research question: What is the perceived competence of early childhood educators in integrating digital tools into play-based instructional delivery?

Table 3: Responses on Educators' Perceived Digital Competence (N = 142)

S/N	Questionnaire item	SA	A	D	SD	Mean	Decision
11	Can operate computers/laptops for play-based learning.	35	40	38	29	2.57	Agree
12	Can operate tablets and guide children in using applications.	24	34	42	42	2.28	Disagree
13	Can access/select age-appropriate applications using smartphones.	38	40	36	28	2.62	Agree
14	Can operate projectors or interactive displays.	20	30	42	50	2.14	Disagree
15	Can select and integrate applications into lesson plans.	25	34	43	40	2.31	Disagree
	Grand mean					**2.38**	**Disagree**

The grand mean of 2.38 is below the criterion mean of 2.50, indicating that respondents generally disagreed with the statements concerning their competence in integrating digital tools into play-based instruction. However, computer operation (2.57) and accessing or selecting age-appropriate applications using smartphones (2.62) exceeded the criterion mean. Competence in operating projectors or interactive displays (2.14) and integrating applications into lesson plans (2.31) fell below the criterion. This pattern indicates differences between

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reported basic operational skills and the ability to integrate digital resources into instructional planning.

Research Question Four: Challenges of Digital Tool Utilization

Research question: What challenges confront early childhood educators in utilizing digital tools for play-based instructional delivery?

Table 4: Responses on Challenges of Digital Tool Utilization (N = 142)

S/N	Questionnaire item	SA	A	D	SD	Mean	Decision
16	Inadequate computers, laptops and tablets limit digital play activities.	58	48	25	11	3.08	Agree
17	Unreliable electricity limits use of digital devices.	70	45	19	8	3.25	Agree
18	Insufficient training limits effective use of applications.	42	43	35	22	2.74	Agree
19	Limited access to appropriate educational applications restricts activities.	32	38	42	30	2.51	Agree
20	Inadequate technical support/maintenance hinders consistent use.	48	42	32	20	2.83	Agree
	Grand mean					**2.88**	**Agree**

The grand mean of 2.88 exceeds the criterion mean of 2.50, indicating that respondents generally agreed that the listed factors constitute challenges to digital tool utilization. Unreliable electricity recorded the highest mean (3.25), followed by inadequate digital devices (3.08). Limited access to appropriate educational applications recorded the lowest mean (2.51), although it remained marginally above the criterion. These findings identify electricity supply, equipment availability, training and technical support as reported constraints.

Discussion of Findings

Availability of Digital Tools

The findings revealed a grand mean of 2.20 for the availability of digital tools, which falls below the criterion mean of 2.50. This indicates that respondents generally disagreed that the listed digital tools were available for play-based instruction in their schools. Smartphones recorded the highest mean of 2.64, while interactive whiteboards or touchscreens recorded the lowest mean of 1.68. The findings suggest that smartphones were more readily reported as available as specialized classroom technologies. The relatively higher rating for smartphones may reflect their versatility and accessibility compared with equipment requiring dedicated classroom installation. However, smartphone availability does not necessarily indicate adequate institutional provision or suitability for group-based activities involving

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young children. The low rating for interactive whiteboards and touchscreens points to a potential limitation in access to specialized interactive learning equipment.

These findings are consistent with the resource-access concerns discussed by Ogunniyi et al. (2025) in their study of early childhood teachers in Ibadan, although their findings cannot be assumed to represent conditions in Owerri Municipal Council. The present findings highlight the need for school administrators and education authorities to assess existing equipment, its functionality and its accessibility to pre-primary educators before making decisions about additional investment.

Utilization of Digital Tools

The findings indicate that the utilization of digital tools for play-based instruction was generally below the established criterion, although differences emerged across the categories examined. Educational games received a comparatively favourable rating, whereas creative learning applications, digital storytelling, and drawing applications received lower ratings. This pattern suggests that the reported integration of digital tools may be uneven, potentially limiting children's exposure to diverse digital play experiences.

This finding can be interpreted in light of Chu et al. (2024), whose systematic review highlighted the diverse developmental opportunities associated with digital play, including creativity, interaction, and problem-solving. Similarly, Alotaibi (2023) identified educators' attitudes, confidence, knowledge, and access to digital resources as factors influencing technology use in early childhood education. These studies suggest that effective integration requires not only access to digital tools but also appropriate pedagogical knowledge and support. However, the present findings do not establish the reasons for the observed differences or demonstrate their effects on children's learning. Strengthening educators' capacity to incorporate diverse, developmentally appropriate digital activities may therefore help broaden the application of digital tools in play-based instruction.

Perceived Competence of Early Childhood Educators

The findings indicate that educators' perceived competence in using digital tools was generally below the established criterion, with greater confidence in basic computer and smartphone operations than in using specialized equipment and integrating applications into lesson planning. This disparity suggests that familiarity with digital devices does not necessarily translate into the pedagogical skills required for effective technology integration.

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This finding is consistent with Cirfat et al. (2022), who reported limitations in technological competence among in-service early childhood education teachers in Nigeria. The comparison highlights the importance of strengthening educators' practical digital skills alongside their capacity to select developmentally appropriate applications and incorporate them into play-based instruction. Professional development should therefore emphasize practical training, lesson planning, and the facilitation of meaningful digital play. However, since the present study measured perceived rather than demonstrated competence, further assessment is necessary to establish educators' actual proficiency in classroom practice.

Challenges of Digital Tool Utilization

The findings indicate that infrastructural limitations, particularly unreliable electricity and inadequate digital devices, constitute major barriers to integrating digital tools into play-based instruction. These challenges may disrupt instructional continuity and restrict children's opportunities to engage with digital learning activities. This pattern is consistent with Ogunniyi et al. (2025), who identified insufficient funding, limited access to relevant technology, and difficulties adapting to emerging technologies among early childhood teachers in Ibadan. Similarly, Oshowole (2024) identified unreliable electricity, inadequate technological resources, and insufficient teacher training as barriers to classroom technology integration in Lagos.

The findings further suggest that equipment provision alone may be insufficient without adequate teacher training and technical support. A study of kindergarten teachers participating in a one-to-one device programme found that successful implementation required continuing support, professional development, and attention to device maintenance (Early childhood teachers' reflections on participating in a district-wide one-to-one device program, 2024). Therefore, improving digital-tool utilization requires an integrated approach that addresses infrastructure, equipment availability, technical maintenance, and educators' capacity to incorporate technology into developmentally appropriate play-based activities.

Conclusion and Recommendations

The study concludes that the utilization of digital tools for play-based instruction among early childhood educators in Owerri Municipal Council Area of Imo State was generally limited, with reported competence varying across devices and instructional activities. Although smartphones and educational games received comparatively favourable ratings, challenges

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relating to electricity supply, equipment availability, technical support, and professional training constrained effective integration. These findings highlight the need for improved digital infrastructure, practical teacher training, and sustained institutional support to promote the meaningful and developmentally appropriate use of digital tools in pre-primary education.

Based on the findings, the following recommendations are made:

1. Improve digital infrastructure and resource provision: Education authorities should provide adequate and functional digital devices and ensure reliable electricity and technical support in pre-primary schools.
2. Strengthen teachers' digital competence: Regular practical training should equip educators with the skills to operate digital devices, select age-appropriate applications and integrate digital tools effectively into play-based instruction.
3. Promote diverse and purposeful digital activities: Educators should incorporate educational games, digital storytelling, drawing applications and interactive puzzles to support children's creativity, communication and problem-solving while maintaining a balance with physical and hands-on play.
4. Strengthen monitoring and evaluation: School administrators and researchers should assess the availability and actual classroom use of digital tools, educators' demonstrated competence and the quality of technology integration to identify areas requiring improvement.

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