

Article

Digitalization Of Early Childhood Education In Nigeria: Benefits, Challenges And Way Forward

Okafor Ikechukwu Maduka PhD.

Department of Foundations, Arts and Social Science Education
Faculty of Education, Federal University Otuoke
okaforii@fuotuoke.edu.ng

Okani Doris Ugo-onyeka PhD.

okanidoris@gmail.com
Department of Educational Management,
Faculty of Education, University of Abuja, Nigeria

Abstract: This paper examined the digitalization of early childhood education in Nigeria with a focus on its benefits, challenges, and possible solutions. Early childhood education, as the foundation of lifelong learning, is increasingly being influenced by advancements in digital technology. The study adopted a descriptive and analytical approach, drawing on existing literature to explore how digital tools are being integrated into early learning environments. The findings revealed that digitalization offers numerous benefits, including improved access to learning resources, enhanced learner engagement, promotion of individualized learning, development of cognitive and creative skills, early acquisition of digital literacy, improved teaching effectiveness, and strengthened home-school relationships. However, the study also identified several challenges militating against effective implementation, such as inadequate infrastructure, limited teacher competence, high cost of digital technologies, persistent digital divide, weak policy implementation, and concerns about children's exposure to screen time. Based on these findings, the paper concludes that while digitalization holds great promise for transforming early childhood education in Nigeria, its success depends on addressing these structural and pedagogical challenges. The paper recommends strategic investment in infrastructure, teacher training, policy enforcement, and the development of age-appropriate digital content to ensure inclusive and sustainable digital learning at the early childhood level.

Keywords: Digitalization, Early childhood education, Technology



This is an open-access article under the [CC-BY 4.0](https://creativecommons.org/licenses/by/4.0/) license

INTRODUCTION

Early childhood education has long been recognized as the foundation upon which all other levels of education are built. In Nigeria, this level of education plays a critical role in shaping children's cognitive, emotional, and social development during their formative years. Traditionally, teaching and learning at this stage have relied heavily on face-to-face interaction, play-based activities, and the use of physical instructional materials. However, the rapid advancement of information and communication technologies has begun to reshape how knowledge is delivered and acquired, even among very young learners [1].

Digitalization in education refers to the integration of digital technologies into teaching, learning, and administrative processes. In recent years, Nigeria has witnessed a gradual shift toward the adoption of digital tools in schools, including early childhood centres. This shift has been accelerated by global trends, increased access to mobile devices, and the need for alternative learning approaches during disruptions such as the COVID-19 pandemic. As a result, digital platforms, multimedia resources, and interactive applications are increasingly being introduced into early learning environments.

Despite these developments, the digitalization of early childhood education in Nigeria presents a mixed picture [2]. On one hand, it offers opportunities for improving access to quality learning materials, enhancing children's engagement, and supporting individualized learning. On the other hand, challenges such as inadequate infrastructure, limited teacher capacity, poor funding, and unequal access between urban and rural areas continue to hinder effective implementation. There are also concerns about age-appropriate usage, screen time, and the readiness of both teachers and parents to support digital learning at this foundational stage [3]. Given these realities, there is a need to critically examine the benefits, challenges, and possible solutions associated with the digitalization of early childhood education in Nigeria. Such an examination will provide insights that can guide policymakers, educators, and other stakeholders in making informed decisions that promote sustainable and inclusive early learning in the digital age.

CONCEPTUAL OF TERMS

2.1 Concept of Early Childhood Education

According to the National policy on education early childhood care education (pre-primary education) is an education given in an educational institution to children aged 3-5 plus prior to their enrollment in the primary school. Maduewesi sees the early childhood care education as the education offered to children who have not yet reached the statutory age of beginning primary school. He further maintained that it is a semi-formal education arrangement, usually outside home whereby young children from about the age of 3 years are exposed through play like activities in a group setting through mental, social and physical learning suited to their developmental stages, until the mandatory age of government approved formal schooling. Early childhood education refers to the structured teaching and care provided to children from birth to about eight years of age, although in the Nigerian context it is often associated with children aged three to five years in nursery and kindergarten settings [4]. This stage of education is designed to support the holistic development of the child, including physical, cognitive, language, emotional, and social growth. At this level, learning is largely activity-based and child-centred. Children are introduced to basic concepts such as numbers, letters, colours, and shapes through play, storytelling, music, and interaction with peers and teachers. The goal is not only to prepare children for formal schooling but also to develop curiosity, creativity, and problem-solving skills.

The early child education is the first education that a child receives. It is a foundational education. In Nigeria and across the world have been many studies on the early child education [5]. Akindele observed that early childhood is a critical period of rapid physical, cognitive, and psycho-social development of a child. The quality of care and education which a child receives at this crucial age will determine to a great extent the level of his/her physical and cognitive development in the future. In Nigeria, Early Childhood Care, Development and Education (ECCDE) is an aspect of Universal Basic Education which was introduced in 1999 to increase the access of children to basic education and improve the state of education in the country. While all hands are on deck to ensure successful implementation and achievement of the objectives of the scheme, it is unfortunate that ECCDE is facing some challenges thus making it unrecognized in Nigeria. In Nigeria, early childhood education is recognized as part of the formal education system and is guided by national policies such as the National Policy on Education [6], [7]. However, its implementation varies widely across regions, with differences in quality, access, and availability of trained caregivers. While private providers dominate the sector in urban areas, many rural communities still face limited access to quality early childhood education services.

2.2 Concept of Digitalization

Digitalization in education is the a variety of approaches for transitioning conventional modes of teaching and learning into the virtual world, such as online courses, online assessments, and web-seminars/conferences or workshops, among other things, using electronic platforms. Machekhina defined digitalization as translation of all information kinds, such as text, audio, pictures, video, and other data from multiple sources into digital language. Digitalization according to Ogunode, Olowonefa and Ukozor is the act of transforming information data into digital format for easy transmission that support effectiveness and efficiency in service delivery in an organization. Digitalization involves the process of converting analog information into digital formats through the use of digital tools to enhance services delivery in organization. Digitalization in education is the process of utilizing digital technologies to practically implement the school curriculum. Digitalization involves moving from manual model of carrying out services into digital model by deploying technological resources [8], [9].

Digitalization refers to the process of using digital technologies to transform traditional systems, processes, and services into more efficient and accessible forms. In the context of education, it involves the integration of tools such as computers, tablets, interactive whiteboards, internet-based platforms, and educational software into teaching and learning activities. Digitalization goes beyond simply introducing devices into the classroom; it includes the redesign of instructional methods, curriculum delivery, assessment practices, and school management systems. For early childhood education, digitalization may involve the use of animated learning applications, digital storytelling, audio-visual content, and interactive games that support foundational learning skills. In Nigeria, digitalization in education is still evolving [10]. While some urban schools have begun to adopt modern technologies, many institutions particularly at the early childhood level struggle with issues such as unreliable electricity, limited internet connectivity, and inadequate funding. Furthermore, the successful implementation of digitalization depends not only on the availability of technology but also on the capacity of teachers to use it effectively and responsibly.

METHOD

The paper examined the digitalization of early childhood education in Nigeria. Thee paper is a position paper that adopted a systematic literature review-based method. The method allows to collect and review the related previous literature from various online sources. With the aid of digital platform, the researcher collected secondary information to generate knowledge on this topic from 2015-2025. The position paper followed qualitative narrative design method. The researcher has visited different online sites to collect the previous literature and analyze the digitalization of early childhood education in Nigeria. The previous findings are critically analyzed and presented in different themes as on the digitalization of early childhood education in Nigeria.

INCLUSION AND EXCLUSION CRITERIA

Inclusion

This output of the literatures on the digitalization of early childhood education in Nigeria presents an in-depth study and result that can infer conclusion on the topic. The study includes: online publication; conference paper, journals sorted from reputable international journals such as CEON, Elsevier, Hindawi, JSTOR, IEEE, Learn Techlib, SAGE, Nebraska and Springer.

Exclusion

Also, the literature review excludes information from edited books, preprints, monographs, information below 2015 and book chapters.

RESULT AND DISCUSSION ON BENEFITS OF DIGITALIZING EARLY CHILDHOOD

EDUCATION IN NIGERIA

Improved Access to Learning Resources

Digitalization expands access to a wide range of educational materials that are often unavailable in traditional classroom settings. Through digital tools such as tablets, educational apps, and online platforms, children can access interactive stories, videos, and learning games that enhance their understanding of basic concepts [11]. In Nigeria, where many early childhood centres lack adequate instructional materials, digital resources can help bridge this gap by providing standardized and high-quality content. This is particularly useful in underserved and rural areas where physical learning materials are limited. Studies show that digital technologies provide “access to a range of educational resources” that enrich early learning environments and improve knowledge acquisition among young learners. Digitalization has been found to increase accessibility to learning opportunities and support inclusive education for children. Through digitalization, children can have access to online libraries, educational websites, and interactive learning platforms. This allows for a more personalized and engaging learning experience, as they can access resources that cater to their individual needs and interests [12]. Additionally, digital learning resources are often more up-to-date and relevant, providing children with the most current knowledge and information. Musa noted that digitalization also eliminates the physical barriers that may prevent children from accessing traditional learning resources. For example, students who live in remote areas or those with physical disabilities can now have equal access to education through digital resources. This promotes inclusivity and ensures that every child has the opportunity to learn and thrive. Peter opined that by digitalizing early childhood education, learning resources become more accessible and affordable. With the use of digital tools, students can save on costs such as textbooks and transportation, making education more affordable for families. This also reduces the burden on schools in terms of providing physical resources, ultimately leading to improved access to learning for all students [13].

Enhanced Learner Engagement and Motivation

Young children are naturally attracted to colourful, animated, and interactive content. Digital tools such as games, videos, and multimedia presentations make learning more engaging compared to traditional methods. In early childhood education, engagement is critical because it directly influences attention span and retention. Digital learning environments stimulate multiple senses visual, auditory, and sometimes tactile thereby making learning enjoyable and meaningful. Research indicates that the use of interactive digital media increases children’s motivation and participation in learning activities, leading to improved comprehension of concepts. Digital tools make learning more “meaningful and engaging for young children. By incorporating digital tools and resources into the curriculum, Peter maintained that students are able to interact with the material in a more dynamic and engaging way [14]. This can lead to increased interest and motivation in learning, as well as a deeper understanding of the subject matter. Digitalizing early childhood education according to Kolosky, can also create a more inclusive and interactive learning environment, where students can collaborate and share ideas with their peers. This can further enhance their engagement and motivation as they feel more connected to the learning experience.

Promotion of Personalized and Individualized Learning

Digitalization allows teachers to tailor instruction to meet the individual needs, pace, and abilities of each child. Unlike traditional classrooms where all learners are taught at the same pace, digital tools can adapt to children’s learning styles and progress (Jain International Residential School ,2021a). For example, educational applications can provide immediate feedback, adjust difficulty levels, and allow children to revisit lessons as needed. This helps slow learners catch up while also challenging advanced learners. Scholarly findings highlight that digitalization supports personalized learning experiences and helps educators design instruction that suits individual learners’ developmental needs [15], [16]. This is particularly beneficial in Nigeria where classrooms are often overcrowded, making individualized attention difficult. Femi concluded that promotion of personalized and individualized learning through digitalizing early childhood education in Nigeria has proven to be a significant benefit in improving the quality of education for young children. He opined that by leveraging technology, children are able to learn at their own pace and in a way that caters to their specific needs and interests [17]. This approach has shown

to increase engagement and motivation in learning, resulting in better academic outcomes. He noted that digitalization allows for a more diverse and inclusive learning environment, catering to different learning styles and abilities. This helps to bridge the gap between students of varying backgrounds and provides equal opportunities for all to excel in their academic journey. Ogunode et al asserted that the use of technology also promotes critical thinking and problem-solving skills, which are essential for children's development in today's digital age [18].

Development of Cognitive and Creative Skills

Digital learning environments promote critical thinking, problem-solving, and creativity among young learners. Interactive applications, storytelling platforms, and simulation-based learning tools encourage children to explore, experiment, and think independently. In early childhood education, such stimulation is essential for cognitive development [19]. Digital tools enable children to engage in activities that improve memory, reasoning, and imagination. Research shows that integrating digital tools in early education enhances children's cognitive development, creativity, and problem-solving abilities. Digital platforms stimulate imagination and support intellectual growth through interactive learning experiences [20]. Muhammed observed that the development of cognitive and creative skills is a major benefit of digitalizing early childhood education in Nigeria. With the integration of technology in the learning process, children are able to engage in interactive and engaging activities that stimulate their cognitive and creative abilities. This in turn leads to a more well-rounded and holistic development of children. The according to Femi of digitalization promotes cognitive development is through the use of educational games and activities. These games are designed to challenge children's thinking and problem-solving skills, helping them to develop critical thinking and decision-making abilities. Ogara, and Ezema, and Tetiana, and Melnyk, affirmed that digitalization also improves creative skills by providing children with a platform to express themselves creatively [21]. Through the use of digital tools such as drawing programs and multimedia software, children are able to explore their creativity and imagination and digitalization allows for a more personalized learning experience, catering to the individual needs and learning styles of each child. This not only promotes the development of cognitive and creative skills, but also fosters a love for learning in children.

Early Development of Digital Literacy Skills

Digitalization exposes children to technology at an early age, helping them develop essential digital literacy skills needed in the 21st century. These skills include basic computer operations, navigation of digital platforms, and familiarity with technological tools. In Nigeria's rapidly evolving digital economy, early exposure to technology prepares children for future academic and professional environments. It also helps them become confident users of technology rather than passive consumers. Studies emphasize that children growing up in a digitalized environment become "digital natives," acquiring technological competencies that are essential for future learning and participation in a technology-driven society. Richard opined that benefits of digitalizing early childhood education in Nigeria are numerous, with one of the key advantages being the development of digital literacy skills at a young age. By integrating technology into the curriculum, young learners are exposed to a wide range of digital tools and resources that help them improve their literacy skills. These skills include basic computer literacy, digital communication, problem-solving, and critical thinking. Ogunode,etal (2023a) noted that in addition to these core skills, digitalizing early childhood education also helps to foster creativity and innovation in young minds. Through the use of interactive and engaging digital activities, children are able to explore their creativity and learn through hands-on experiences. This not only enhances their academic performance, but also prepares them for the ever-evolving digital world that they will be entering as they grow older. Ogunode, Olowonefa and Ukozor. maintained that digitalizing early childhood education in Nigeria also helps to bridge the digital divide that exists in the country. By providing access to technology and digital tools, children from all socio-economic backgrounds are given equal opportunities to develop their digital literacy skills. This not only promotes inclusivity, but also sets the foundation for a more digitally literate and technologically advanced society in the future [22].

Improved Teaching Effectiveness and Instructional Delivery

Digitalization enhances the quality of teaching by providing educators with innovative instructional tools and methods. Teachers can use multimedia presentations, animations, and virtual demonstrations to simplify complex concepts for young learners. It also supports lesson planning, assessment, and classroom management. For instance, digital tools can help teachers track children's progress and identify learning gaps more efficiently. Evidence shows that digital technologies enable teachers to provide better instruction, improve understanding, and support effective learning delivery in early childhood settings [23]. This is particularly important in Nigeria where teacher quality and instructional methods vary widely. Inuwa and Muhammad, and Mainerová, ascertained that the digitalization of early childhood education in Nigeria has greatly improved teaching effectiveness and instructional delivery. With the use of technology, teachers are now able to provide more engaging and interactive lessons, leading to better retention of information by young learners. The incorporation of digital tools in the classroom has allowed for a more personalized and adaptive learning experience, catering to the individual needs and learning styles of each student and this has led to increased motivation and enthusiasm for learning, resulting in improved academic performance [24]. Ademi, & Kpangban, observed that the use of technology in early childhood education has enabled teachers to track and analyze students' progress more effectively, allowing for targeted interventions and support.

Strengthening Home–School Connection and Parental Involvement

Digitalization facilitates communication between teachers and parents, thereby strengthening the learning process beyond the classroom. Through digital platforms, parents can monitor their children's progress, access learning materials, and participate actively in their education. In early childhood education, parental involvement is crucial for reinforcing learning at home [25]. Digital tools such as messaging apps, online portals, and virtual learning platforms make it easier for parents to stay engaged [26]. Research suggests that digital technologies support collaborative learning environments and improve communication between stakeholders in education, including parents and teachers. This enhances continuity in children's learning experiences both at home and in school [27]. Research has shown that digitalizing early childhood education in Nigeria can have numerous benefits, specifically in the areas of strengthening home-school connection and increasing parental involvement. Aderibigbe, noted that by utilizing technology in the classroom, parents are able to have a better understanding of their child's education, as well as have easier access to information and resources from the school and this can ultimately lead to increased communication between parents and teachers, which has been shown to have a positive impact on a child's academic success. Digitalization as put by Angkur, can also provide parents with opportunities to participate in their child's learning, such as through virtual parent-teacher meetings or online learning platforms. This increased involvement can create a stronger support system for children, leading to improved academic outcomes [28].

B- Challenges militating against the digitalization of early childhood education in Nigeria.

Inadequate Infrastructure

One of the most significant barriers to digitalization in early childhood education in Nigeria is the lack of basic infrastructure. Many preschools, especially in rural and semi-urban areas, do not have access to reliable electricity, internet connectivity, or appropriate digital devices such as computers and tablets. Without stable power supply and internet access, the use of digital tools becomes impractical. Even where devices are available, irregular electricity limits their consistent use in teaching and learning. This challenge creates a digital divide between urban and rural schools, thereby limiting equal access to digital learning opportunities. Research shows that inadequate infrastructure, including poor electricity and limited internet access, remains a major constraint to the adoption of digital technologies in education [29]. Similarly, studies emphasize that infrastructure deficits significantly hinder the effective integration of ICT in Nigerian schools. Ojo Concluded that the lack of adequate infrastructure in Nigeria poses a significant challenge for the digitalization of early childhood education. He noted that despite the potential benefits of integrating technology into this education sector, the lack of resources such as computers, internet access, and electricity hinder progress. He affirmed that without these basic infrastructure, it is difficult for teachers to incorporate technology into their curriculum and for students to access digital learning

materials. This not only limits the potential for interactive and engaging learning experiences, but it also widens the digital divide between urban and rural areas, where access to infrastructure is even more limited and the inadequate infrastructure also affects the training and professional development of teachers, as they may not have access to necessary technology and resources to enhance their skills [30].

Limited Teacher Competence and Digital Skills

The effectiveness of digitalization largely depends on the ability of teachers to use technology effectively. However, many early childhood educators in Nigeria lack the necessary digital skills to integrate technology into their teaching practices. Most teachers were trained using traditional methods and have limited exposure to modern digital tools. As a result, even when digital devices are available, they are often underutilized or used ineffectively. This situation is more pronounced at the early childhood level, where specialized training in digital pedagogy is required. Studies have found that inadequate ICT competence among teachers is a major barrier to technology integration in Nigerian education [31]. Teacher preparedness and professional development are critical factors influencing the success of digital learning initiatives. Akinsola, et al observed that limited teacher competence and digital skills are significant challenges that hinder the digitalization of early childhood education in Nigeria. These challenges have a direct impact on the quality of education provided, as well as the successful integration of technology into the classroom. Angkur, noted that many teachers in Nigeria do not have the necessary training or knowledge to effectively incorporate technology into their teaching practices. As a result, they may struggle to use digital tools to enhance learning and engage their students in meaningful ways. The lack of digital skills among teachers can also lead to frustration and resistance towards digitalization. Many teachers may feel overwhelmed or intimidated by technology, which can lead to a reluctance to embrace it in their classrooms [32]. This can slow down the implementation of digital initiatives and hinder the progress towards a more digitally advanced education system. Also Atakpo asserted that the lack of teacher competence and digital skills can also have a negative impact on students' learning outcomes. Without the necessary knowledge and skills to effectively use technology, teachers may not be able to provide a well-rounded and engaging learning experience for their students. As a result, students may not develop the necessary digital literacy skills needed in today's digital world.

High Cost of Digital Technologies

The cost of acquiring, maintaining, and upgrading digital technologies is another major challenge. Devices such as tablets, computers, projectors, and educational software are often expensive for many schools, particularly public and low-cost private early childhood centres. In addition to initial purchase costs, there are recurring expenses related to maintenance, internet subscriptions, software licensing, and technical support. Many schools operate with limited funding and cannot afford these costs, making digitalization difficult to sustain. Research indicates that financial constraints and high costs of ICT infrastructure significantly limit technology adoption in developing countries, including Nigeria. Similarly, the affordability of digital tools remains a key concern in expanding access to digital education. The high cost of digital technologies in early childhood education is a multifaceted problem with various factors contributing to it. The cost of acquiring digital devices such as laptops, tablets, and interactive whiteboards is relatively high, making it difficult for schools to invest in them. The cost of maintaining and upgrading these devices also adds up to the overall cost. The high cost of internet services in Nigeria makes it challenging for schools to have a reliable and fast internet connection – a crucial element for effective use of digital technologies in education. This further compounds the problem and hinders the digitalization of early childhood education. The lack of trained personnel and resources for integrating digital technologies in early childhood education also contributes to the high cost. Teachers need to undergo training to effectively use these technologies in the classroom, which can be expensive for schools. Moreover, the lack of educational content and materials designed specifically for digital platforms also adds to the overall cost.

Inequality and Digital Divide

Digitalization has the potential to widen existing inequalities if not properly managed. In Nigeria, there is a significant gap between urban and rural areas, as well as between wealthy and low-income households,

in terms of access to digital technologies. Children in well-funded urban schools are more likely to benefit from digital learning tools, while those in rural or underprivileged communities are left behind. This digital divide affects not only access to devices but also access to trained teachers and supportive learning environments. Studies highlight that unequal access to digital resources exacerbates educational inequalities and limits inclusive education. The digital divide remains a persistent challenge in ensuring equitable access to technology-driven learning in Nigeria.

Lack of Appropriate Policies and Implementation Frameworks

The lack of appropriate policies and implementation frameworks in Nigeria has posed significant challenges for the digitalization of early childhood education. However, there is a growing need for such initiatives as digitalization brings numerous benefits to young learners and educators alike. As a result, we must address the obstacles hindering the advancement of this field. The absence of well-defined policies puts the digitalization of early childhood education in Nigeria at a disadvantage. Without clear guidelines and regulations, it is challenging to establish a standardized approach to incorporating technology in the classroom. This leads to a fragmented and inconsistent implementation of digital tools, making it difficult for students and teachers to fully reap the benefits. The lack of an effective implementation framework further exacerbates the challenges. Even with policies in place, a proper framework is required to guide the utilization of digital resources. Without it, there is a risk of mismanagement and misuse of technology, which can have detrimental effects on young learners and their development. The absence of appropriate policies and implementation frameworks also hinders the integration of digital literacy into early childhood education. This is a critical skill in today's digital age, and the lack of emphasis on it at a young age can impede the country's progress towards a more technologically advanced society. Yusuf, noted that although Nigeria has policies supporting ICT integration in education, there is often a gap between policy formulation and implementation. Many early childhood education centres lack clear guidelines on how to effectively integrate digital tools into teaching and learning. In some cases, policies do not adequately address the specific needs of early childhood education, which requires age-appropriate and child-centred digital content. The absence of monitoring and evaluation mechanisms also affects the sustainability of digitalization initiatives. Research shows that weak policy implementation and lack of strategic planning hinder ICT adoption in Nigerian schools. Effective digitalization requires coherent policies, proper funding, and consistent monitoring.

Concerns about Child Development and Screen Time

There are growing concerns about the potential negative effects of excessive screen time on young children. Early childhood is a sensitive stage of development, and overexposure to digital devices may affect children's physical health, social interaction, and attention span. Experts argue that young children learn best through play, social interaction, and hands-on experiences. Over-reliance on digital tools may reduce opportunities for these essential developmental activities. As a result, some educators and parents are cautious about fully embracing digitalization at this level. Research indicates that excessive screen exposure can impact children's cognitive and social development if not properly managed. Therefore, the integration of digital tools in early childhood education must be balanced and guided by appropriate usage policies.

CONCLUSION AND RECOMMENDATIONS

The digitalization of early childhood education in Nigeria represents a significant step toward aligning the nation's educational system with global technological trends. As the world becomes increasingly driven by digital innovation, introducing technology at the foundational level of education is both timely and necessary. The study has shown that digitalization can enrich early learning experiences by making education more engaging, accessible, and responsive to the needs of young learners. It also prepares children for future academic and social environments that are deeply rooted in technology.

The realization of these benefits is constrained by several systemic challenges, including inadequate infrastructure, insufficient teacher capacity, financial limitations, and inequality in access to digital resources. These challenges highlight the gap between policy intentions and practical implementation within the Nigerian education system. Furthermore, concerns about the developmental appropriateness of

digital tools for young children underscore the need for careful and guided integration. Digitalization should not replace traditional early childhood practices such as play-based and social learning but should complement them. Based on the findings, the paper recommends the following:

- 1) Government and relevant stakeholders should invest in reliable electricity supply, internet connectivity, and provision of digital devices in early childhood education centres, especially in rural areas.
- 2) Regular training and professional development programmes should be organized to equip early childhood educators with the necessary digital skills and pedagogical knowledge for effective technology integration.
- 3) There is a need for increased budgetary allocation to early childhood education and the promotion of partnerships with private organizations and NGOs to support digital initiatives.
- 4) Educational authorities should ensure that digital learning materials are child-friendly, culturally relevant, and aligned with the developmental needs of young learners.
- 5) Policies and interventions should focus on reducing inequalities by ensuring that children in rural and low-income communities have equal access to digital learning opportunities.
- 6) Existing policies on ICT in education should be effectively implemented, monitored, and evaluated to ensure accountability and sustainability.
- 7) Clear guidelines should be established for the appropriate use of digital devices in early childhood education to prevent excessive screen exposure and promote balanced learning experiences.
- 8) Parents should be sensitized on the benefits and risks of digital learning and encouraged to support their children's use of technology in a controlled and educational manner.

References

- [1] M. F. M. Angkur, "Utilization of technology in early childhood education," *International Journal of Language and Ubiquitous Learning*, vol. 3, no. 1, 2024.
- [2] E. A. Ademi and E. Kpangban, "Application of ICTs in Nigerian secondary schools," *Library Philosophy and Practice*, 2010.
- [3] S. A. Aderibigbe, "Digital inequality in Nigerian education: Issues and challenges," *Journal of Educational Development*, vol. 5, no. 2, pp. 45–56, 2020.
- [4] T. E. Atakpo, "Digital natives and digitalization for building early childhood education future in Nigeria," *International Journal of Research and Innovation in Social Science*, vol. 8, no. 11, pp. 3657–3663, 2024.
- [5] H. O. Ajayi, "Book development for under-fives," presented at the 5th Pan-African Reading for All Conference, University of Ghana, Legon, Aug. 6–10, 2007.
- [6] M. I. Akindele, "The challenges facing early childhood care, development and education (ECCDE) in an era of Universal Basic Education in Nigeria," 2011.
- [7] F. Amadi, "Challenges of early childhood care education in sustaining girl-child development in Nigeria," *Mediterranean Journal of Social Sciences*, vol. 4, no. 5, pp. 23–30, 2013.
- [8] O. S. Akinsola and O. O. Okubanjo, "Infrastructure and ICT integration in Nigerian schools," *International Journal of Education and Development*, vol. 9, no. 1, pp. 112–120, 2021.
- [9] American Academy of Pediatrics, "Media and young minds," *Pediatrics*, vol. 138, no. 5, 2016.
- [10] Federal Republic of Nigeria, *National policy on education*, 6th ed. Lagos: NERDC Press, 2013.
- [11] Federal Ministry of Education, *National policy of education*. Lagos: NERDC, 2014.
- [12] Federal Republic of Nigeria, *The national policy on education*. Lagos: NERDC, 2008.
- [13] T. Gillpatrick, "Innovation and the digital transformation of education," *Sınırsız Eğitim ve Araştırma Dergisi*, vol. 5, no. 3, pp. 194–201, 2020.

- [14] Jain International Residential School, "Introduction to digital education and its benefits for students," 2021. [Online]. Available: <https://jirs.ac.in/>
- [15] Jain International Residential School, "The emergence of digitalisation in education," 2021. [Online]. Available: <https://jirs.ac.in/>
- [16] C. Kolosky, "How to digitize education and classroom learning," 2023. [Online]. Available: <https://www.knack.com/blog/how-to-digitize-education/>
- [17] S. A. Inuwa and S. Muhammad, "Early childhood care and education in the digital age: Emerging opportunities and challenges," *Journal of Institute of Africa Higher Education Research and Innovation*, vol. 5, no. 1, pp. 31–36, 2025.
- [18] N. Mainerová, "Barriers to digitalization in a preschool institution," *Power System Technology Journal*, vol. 48, no. 4, 2024.
- [19] E. J. Maduwesi, *Early childhood education: Theory and practice*. Lagos: Macmillan, 1999.
- [20] O. N. Machekhina, "Digitalisation of education as a trend of its modernization and reforming," *Revista Espacios*, vol. 38, no. 40, pp. 26–32, 2017.
- [21] N. J. Ogunode, "Benefit of digital literacy for academic staff and students of tertiary institutions in Nigeria," *American Journal of Alternative Education*, vol. 2, no. 2, pp. 43–53, 2025.
- [22] N. J. Ogunode, J. A. Olowonefa, and C. U. Ukozor, "Basic education digitalization in Nigeria: Implication for administrative decision making," *International Journal of Formal Education*, vol. 4, no. 2, pp. 1–7, 2025.
- [23] N. J. Ogunode and A. J. Ndayebom, "Digitalization of higher education in Nigeria: Benefits, problems and solutions," *Electronic Research Journal of Social Sciences and Humanities*, vol. 5, no. 2, pp. 31–47, 2023.
- [24] N. J. Ogunode, V. O. Ayoko, and V. Orifah, "Digitalization of post-basic education and career development in Nigeria: Problems and way forward," *European Multidisciplinary Journal of Modern Science*, no. 19, pp. 32–40, 2023.
- [25] N. J. Ogunode, A. Abdulrazak, and J. A. Abubakar, "Digitalization of educational institutions in Nigeria: Benefits, problems and solutions," *World of Semantics: Journal of Philosophy and Linguistics*, pp. 13–21, 2023.
- [26] P. I. Ogara and V. S. Ezema, "Childhood education in an era of digitalization," *Sapientia Foundation Journal of Education, Sciences and Gender Studies*, 2024.
- [27] T. L. Tetiana and V. Melnyk, "The role of digitalization in enhancing the cognitive-developmental environment of preschool education institutions," *Journal of Danubian Studies and Research*, 2023.
- [28] W. M. Olatokun and C. I. Nwafor, "ICT competence and readiness among teachers in Nigeria," *International Journal of Education and Development using ICT*, vol. 8, no. 1, pp. 85–93, 2012.
- [29] UNESCO, *ICT competency framework for teachers*. Paris: UNESCO Publishing, 2019.
- [30] UNICEF, *The state of the world's children: On my mind – Promoting, protecting and caring for children's mental health*. New York: UNICEF, 2021.
- [31] World Bank, *Realizing the future of learning through digital tools: From learning poverty to learning for everyone, everywhere*. Washington, DC: World Bank, 2020.
- [32] A. T. Yusuf, "Information and communication technology and education: Analysing the Nigerian national policy for information technology," *International Education Journal*, vol. 6, no. 3, pp. 316–321, 2025.