THE INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGY IN EARLY CHILDHOOD EDUCATION

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Abstract

This paper explores the role of integration of Information and Communication Technology (ICT) in early childhood education. The study also highlights how age appropriate digital tools can enhance learning experiences, promote engagement and support individualized learning for young children. The study explored the extent to which ICT tools are utilized in early childhood education, the training and support available for teachers, the involvement of parents, and the overall impact on children's cognitive and socio-emotional development. The research provides insights into the benefits, challenges, and opportunities associated with ICT integration in early childhood education.

Keywords: Information Communication Technology, integration, Early Childhood Education

Introduction

The integration of information and communication Technology (ICT) into various aspects of life has not only become inevitable but crucial to the rapid advancement of technology in the contemporary society. Globally, evolution of technology-enhanced learning for young children is reflected in these areas; offering valuable insights into the challenges, opportunities, and implications of technology integration in early childhood education. In Nigeria, access, infrastructure, and teacher preparedness disparities pose significant challenges. While government initiatives and policies lay the groundwork, the digital divide remains a barrier to equitable integration. Ensuring quality content, fostering research efforts, and involving parents are the main focus. Educational sector has also undergone rapid transformation as a result of increasing use of digital tools and resources. Among the most impactful and evolving area is early childhood education. According to UNICEF (2025), early childhood span the period up to eight years of age, which is critical for cognitive, social, emotional and physical development. Ideally, early childhood is defined as the period from birth to eight years of age, it is a critical phase in human development, characterized by rapid, cognitive, emotional, social and physical growth. During this period which is the foundational stage, the quality of educational experiences can have long term effects on the development and future learning experiences of a child. Early childhood education is the education given in an educational institution to children prior to their entering into the primary school (NPE, 2024)

Early childhood education plays a pivotal role in laying the foundation for children's lifelong learning and development. In recent years, Information and Communication Technology (ICT) has emerged as a valuable tool in enhancing educational practices across various levels. In the context of early childhood education, ICT encompasses a wide range of digital technologies, including interactive learning apps, educational games, and multimedia resources, which have the potential to engage young learners and facilitate their cognitive and socio-emotional

development (Plowman & Stephen, 2018). Despite the increasing recognition of I CT's potential benefits, its successful integration into early childhood education remains a complex and multifaceted process, influenced by various factors such as access to technology, teacher training, parental involvement, and cultural contexts (Chaudron et al., 2015).

This study aims to explore the impact of ICT integration in early childhood education, to assess the current status of ICT integration in early childhood education. To explore the utilization of ICT tools in early childhood education and the types of technologies available. To explore the training and support provided to teachers for effectively integrating ICT into their teaching practices in the early childhood education.

ICT integration in early childhood education

Information and communication technologies (ICT) have been widely introduced as agents of change in educational practices. The ability to use and embed ICT as an integral component in educational practices is increasingly considered an important qualification for early childhood education (Masoumi 2021). The integration of ICT in early childhood education encompasses the use of digital technologies such as computers, tablets, interactive whiteboards, educational software, and online learning platforms to support and enrich educational practices. These technologies are being used to create engaging, interactive, and developmentally appropriate learning environments that foster creativity, problem solving, collaboration, and early literacy and numeracy skills. In my opinion, ICT can support inclusive education by providing differentiated learning opportunities geared towards the diverse needs of the young children. Studies revealed that the current status of ICT integration in early childhood education across learning institutions in our society. While some early childhood institutions have made significant strides in incorporating ICT tools into their curriculum, others face challenges related to limited access to technology and resources. Factors such as funding constraints, infrastructure limitations, and inadequate teacher training contribute to disparities in ICT integration in early childhood education in our society. The benefits of ICT in Early Childhood Education cannot be over emphasized, research has highlighted several potential benefits of ICT integration in early childhood education. ICT tools, such as educational apps and interactive multimedia resources, can provide engaging and interactive learning experiences for young children, promoting active exploration and discovery (Plowman & Stephen, 2018). Additionally, ICT can cater to individual learning styles and preferences, offering personalized learning opportunities (Petrina, 2015). Furthermore, ICT can enhance children's cognitive skills, such as problem-solving and critical thinking, by providing opportunities for hands-on exploration and experimentation (Siraj-Blatchford et al., 2010).

Utilization of ICT Tools in Early Childhood Education.

Using ICT in early childhood education can significantly influence learning experiences, promote engagement, and foster skills development among young children. Below are the different ICT tools and their applications in early childhood education.

Interactive Whiteboard - These are technological tools that allow teachers to display digital content and interact with it in real time. It engages children in collaborative activities, enhances visual learning and enables interactive learning. For instance, using an interactive whiteboard for group games and educational software (Higgins, Xiao & katsipataki, 2012)

Tablets and Touchscreen Device - Devices like iPads or Android tablets offer a wide range of educational apps. Its utilization is to promote literacy, numeracy, and creativity through interactive apps and games meant for young children. For instance, reading apps that use phonics and visuals to help children learn to read (Neumann & Neumann, 2014).

Educational Softwares and Applications - The utilization of the software and apps can support a wide range of subjects and skills, such as mathematics, science, and social skills through games (Berk,2013). Examples of such Apps like Starfall for reading and math development.

Digital Cameras and Videos - These tools are used to record and create digital content. It encourages creativity and self-expression as children document their learning experiences (Burnett, 2010. For instance, children use videos to create presentations on their favourite topics.

Online Learning Platforms- Websites and platforms that provide interactive contents. It is used in facilitating remote learning opportunities and personalized learning. For example, platforms such as ABC mouse offer structured early learning programs.

Robotics and coding tools-Introduction to basic coding through programmable robots. It is used in developing problem-solving skills and logical thinking (Bers, 2018). For example using robots like Bee-Bots in the classroom to tea ch sequencing and basic programming.

Exploring the training and support provided to teachers for effectively integrating information and communication technology.

Some early childhood teacher preparation programs include modules on ICT literacy and pedagogical use. The integration is often uneven and may not focus sufficiently on developmentally appropriate practices with technology. In-service training and Continuing Professional Development (CPD) such as workshops, online courses, and webinars on basic digital literacy, pedagogical integration of ICT, use of specific educational software apps, cyber safety and ethical issues. Some programs should be mandated by education departments and others voluntary or school-led. Teachers of early childhood education should be mentored and coached by tech-savvy colleagues, and provided with on-site and ongoing support. For successful integration of ICT in early childhood education, government or school-level ICT strategies that prioritize digital integration in ECE are to provide support to teachers of the ECE. School leaders are to be committed to modelling ICT use, provide devices such as software and internet connectivity.

Teachers of ECE face several challenges ranging from lack of confidence in using ICT tools, inadequate access to technology such as hardware and software, limited training focused on early pedagogy, curriculum alignment difficulties, concerns about screen time and developmental appropriateness, resistance to change or lack of motivation.

The theoretical framework for this study draws upon socio-cultural perspectives of learning, which emphasize the importance of social interaction, cultural context, and tools for cognitive development (Vygotsky, 1978). According to Vygotsky's theory, learning occurs through social interactions with more knowledgeable others, and the use of tools, including technological ones, can scaffold children's learning and development. This framework provides a lens through which to understand how ICT integration in early childhood education can enhance children's learning experiences within their socio-cultural contexts.

Challenges of ICT Integration

Several challenges and barriers to ICT integration in early childhood education are identified, including limited access to technology, inadequate infrastructure, insufficient funding, and cultural norms and attitudes towards technology use. Additionally, concerns about privacy, security, and the quality of digital content pose significant challenges for educators and policymakers. Addressing these barriers requires a multi-faceted approach, involving collaboration between government agencies, educational institutions, and community stakeholders to promote equitable access to technology and ensure its responsible and effective use in preschool settings jua2s

Despite the potential benefits, ICT integration in early childhood education also presents various challenges. Limited access to technology, particularly in low-resource settings, can hinder equitable opportunities for all children to benefit from ICT-enhanced learning experiences (Chaudron et al., 2015). Additionally, concerns have been raised about the quality and appropriateness of digital content for young children, including issues related to screen time and potential negative effects on socio-emotional development (Rideout, 2017). Furthermore, the effective integration of ICT into teaching practices requires adequate teacher training and support, which may be lacking in some contexts (UNESCO, 2019). The following are the challenges of ICT integration in early childhood education

Access to Technology

Access to technology, including devices and internet connectivity, is a crucial factor influencing ICT integration in early childhood education. Disparities in access can exacerbate existing inequalities, with children from marginalized communities facing greater barriers to accessing ICT tools (Livingstone & Helsper, 2007).

Teacher Training and Support

Teacher training and support play a critical role in ensuring effective ICT integration in early childhood education. Teachers need opportunities for professional development to enhance their digital literacy skills and pedagogical knowledge for incorporating ICT into their teaching practices (Kervin et al., 2017).

Parental Involvement

Parental involvement is another important factor influencing ICT integration in early childhood education. Collaboration between parents and educators is essential for promoting the responsible use of technology at home and in school, as well as for fostering a positive attitude towards ICT among children (Plowman et al., 2012).Parental involvement in supporting ICT integration in preschools varies among families. While some parents actively encourage and facilitate their children's engagement with technology both at home and in school, others express reservations and concerns regarding excessive screen time and potential negative effects on children's development. Strengthening partnerships between parents and educators through communication, workshops, and family engagement activities is crucial for promoting positive attitudes towards ICT and fostering collaborative learning environments.

Cultural Considerations

Cultural factors also influence the integration of ICT in early childhood education. Cultural norms, values, and beliefs shape attitudes towards technology use in education, as well as the design and implementation of ICT-enhanced learning activities (Selwyn, 2010).

Impact on Children's Development

The impact of ICT integration on children's development is multifaceted, encompassing cognitive, socio-emotional, and academic domains. Preliminary findings suggest that exposure to ICT tools can enhance children's digital literacy skills, problem-solving abilities, and creativity. However, concerns exist regarding the potential displacement of hands-on, experiential learning activities and the need to balance screen time with other forms of play and interaction. Further research is needed to assess the long-term effects of ICT integration on children's holistic development.

Recommendations

Several recommendations can be made for policy and future research. Policymakers should develop comprehensive ICT policies that address issues such as funding, infrastructure development, and teacher training. Moreover, longitudinal studies are needed to assess the long-term effects of ICT integration on children's learning outcomes and socio-emotional development. Future research should also explore innovative approaches to ICT integration, such as the use of mobile technologies and online learning platforms, to meet the evolving needs of preschool education in the digital age.

Efforts should continuously be made to address the differences in technology access, both in schools and at home, to ensure that all children have equal opportunities for technology-enhanced learning. Valuable standards should be maintained for evaluating the quality and appropriateness of digital content and resources used in early childhood education. • Ongoing research efforts should be encouraged to assess the impact of technology integration on learning outcomes, child development, and health, with a focus on evidence-based practices. • Invest in professional development programs for educators to enhance their skills in effectively integrating technology into early childhood teaching practices. • Provide resources and guidance to parents on best practices for using technology with young children, emphasizing the importance of balance and age-appropriateness.

References

Braun V. & Clarke V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101.

Couse L. J. & Chen D. W. (2010). A tablet computer for young children? Exploring its viability for early childhood education. *Journal of Research on Technology in Education* 43(1), 75-98.

Chaudron S. Di Gioia R. Gemo M. & Devineau L. (2015). Young children (0-8) and digital technology: A qualitative exploratory study across seven countries. *Joint Research Centre, European Union.*

Creswell J. W. & Creswell J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. *Sage publications.*

Creswell J. W. & Clark V. L. (2018). Designing and conducting mixed methods research. Sage publications

Dockett S. & Fleer M. (2017). Play and learning in early childhood settings: International perspectives. *Springer.*

Edwards S. & Cutter-Mackenzie A. (2018). Routledge international handbook of young children's thinking and understanding. Routledge.

Fleer M., & Ridgway A. (2014). Digital play: A new classification. *Australasian Journal of Early Childhood, 39*(4), 93-102.

Froese V. (2016). Exploring digital technologies for early childhood education. *European Early Childhood Education Research Journal*, 24(1), 5-24.

Kervin L., Mantei J. & Mantei, E. (2017). Teacher professional learning for digital pedagogy: Exploring the intersection of teacher professional development and student learning with technology. *Australian Journal of Teacher Education*, 42(3).

Kozma R. B. (2005). National policies that connect ICT-based education reform to economic and social development. *Human Technology*, 1(2), 117-156.

Livingstone S. & Helsper E. J. (2007). Gradations in digital inclusion: Children, young people and the digital divide. *New Media & Society*, 9(4), 671-696.

Marsh J. (2019). Digital technologies in early childhood: Challenges for education and change. Routledge.

Mendoza K. & Reese D. D. (2019). Early childhood education in a digital age: Perspectives from a digital nativity. *Routledge.*

Plowman L. & Stephen C. (2018). Children, play, and technology: The building blocks of play. *Routledge*.

Plowman L., McPake J. & Stephen C. (2012). The technologization of childhood. Young children and technology in the home. *Children and Society*, 26(1), 63-76.

Rideout V. (2017). The common sense census: Media use by kids age zero to eight. *Common Sense Media*.

Selwyn, N. (2010). Looking beyond learning: Notes towards the critical study of educational technology. *Journal of Computer Assisted Learning* 26(1), 65-73.

Siraj-Blatchford I., Sylva K., Muttock S., Gilden R. & Bell D. (2010). Researching effective pedagogy in the early years. *Department for Children, Schools and Families (DCSF)*.

Tamim R. M., Bernard R. M., Borokhovski E., Abrami P. C. & Schmid R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research*, 81(1), 4-28.

UNESCO. (2019). ICT in education in Nigeria. United Nations Educational, Scientific and Cultural Organization.

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

Plowman L. & McPake J. (2013). Seven myths about young children and technology. *Childhood Education*, 89(1), 27-33.

Ponte I. & Severo M. (2017). Digital play in early childhood: A European overview. *Digital Education Review* 31, 1-12.

Scott J. (2016). Digital play: A new way to look at the relationship between children and technology. *Journal of Playwork Practice* 3(1), 5-15.