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Original Article

Integration of technology in play-based learning: A Review of Early Childhood Education Context

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ABSTRACT

Effective integration of educational technologies into early childhood education remains a significant challenge. This paper examines how technology is integrated into play-based learning settings in the Early Childhood Development Education context. The paper presents a comprehensive review of the foundation of quality early childhood education, play-based learning and the need for integrating technology in play-based learning. The study uses qualitative desktop research as its methodology analyzing research studies that have been conducted in relation to the study topic. The paper is anchored on the social constructivism theory of Lee Vygotsky. The paper has established that there has been low integration of technology in play-based learning in the ECDE sector in developed and developing countries. Despite teachers understanding the benefits associated with digital play-based learning, they have still undertaken play-based learning using traditional pedagogies and outdoor activities. The lack of a clear framework to guide the integration of technology in play-based learning appears to be the challenge that teachers encounter. Furthermore, the situation in most developed countries in Sub-Saharan Africa shows that there is little investment in technological tools hence embedding them in play-based learning remains a dream.

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INTRODUCTION

Early Childhood Education normally refers to the provision of education to children aged four to eight years (Su et al., 2023). Quality early childhood development education (ECDE) is recognized as having a long-term positive influence on children's future education and life and community at large. Aina (2023) said that quality ECDE involves all features of the curriculum and physical resources which encourage, stimulate and enhance children's outcomes in a single or more than one developmental domain. However, ECDE teachers experience challenges when implementing instructional methods aimed at ensuring quality education is provided in schools. Research conducted in South Africa and Nigeria has found that most teachers are inadequately prepared to use play-based learning methodologies hence affecting the implementation of pre-school education (Selepe et al., 2024).

UNICEF (2018) stated that play-based learning should be actively meaningful, engaging, joyful, socially interactive and iterative. Pyle, Prioletta and Poliszczuk (2018) said that through the implementation of play-based learning regularly in ECDE, pupils are eager to learn from one another. With respect to educational learning theorists, Friedrich Frobel said that play is natural learning and children are free to achieve harmony through play (Teichert & Helbig, 2023). Jean Piaget indicated that pupils acquire knowledge when exploring the physical world through playing (Yee et al., 2022). Lev Vygotsky found out that learners build knowledge through social interaction during playing (Yee, et al., 2022). Bruner (1976) observed that children's involvement in playing activities provides meaningful learning experiences (Yee, et al., 2022). Further. Eric Erikson stated that Children can "project a relevant personal theme on the microcosm of a play table (Doris, 2015). Parker et al. (2022) said that the essential of play-based learning is to promote children's engagement, participation, inclusion, and holistic skills growth. The ECDE curriculum in Kenya (for CBC) emphasizes learning through play that crosses all pillars of learning. Through play and routine daily activities, play contributes to children's development and helps them practice newly acquired skills and concepts (Piaget, 1976). This suggests that play-based learning needs to be emphasized in the pedagogy and curriculum for teaching ECD children as a useful way to improve the quality of education.

Play-based learning involves the incorporation of voluntary or free play, collaborative play, directed play, constructive play, physical learning through games, and technological (digital) games, among others (UNICEF, 2018). This paper examines the integration of technology (digital media) in play-based learning in ECDE setup. In recent times, technology has permeated every aspect of human lives and technological devices are among the common objects that children are playing with in homes on regular occasions (Rideout & Robb, 2020). Today, everyone is immersed in many forms of technology use regardless of age (Slutsky et al., 2019). Research has shown that children spend increasing amounts of time daily with digital technologies at increasingly younger ages (Samuelsson et al., 2024). However, the integration of technological artefacts into ECD classrooms remains a challenge. Research in the United Kingdom by Billington (2016) established that one in four teachers felt that digital media does not have a place in pre-school settings.

Despite research demonstrating that the integration of technology has a lot of advantages in promoting play-based learning in classrooms (Vidal-Hall et al., 2019), reservations have been made with respect to their suitability for use among ECD children (Dubicka, Martin, and Firth 2019). A United States research by Davidson (2021) found that technology had been used inappropriately in ECDE settings when it is not integrated into a rational key teaching method. In some contexts, Johnston, Highfield, and Hadley (2018) found out that technology integration in play-based learning is not often seen as having pedagogical value for ECD learning. Nevertheless, it is essential to consider how pupils utilize technological median and what they do with them rather than censuring its integration into classroom learning. Despite calls for children to be protected from the harmful effects of technological media, Dubicka et al. (2019) support the unique benefits the technological tools can offer to improve learning outcomes. Vidal-Hall et al. (2019) cautioned that

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integration of technology in play-based learning does not guarantee its positive impact on learning outcomes since the way they are integrated in learning situations is key.

Teachers tend to appear not to relate technology integration with free play (Nikolopoulou & Gialamas 2015) and do not see its utilization by pupils as a task which can be supported by teacher interaction. Additionally, there has been limited evidence of technology being integrated into play-based learning \\sscurricula in methods that aid the advancement of new and creative learning experiences in the classroom. Some teachers may be open to change, but some remain non-committal on the integration of technology in play-based learning and hence may not use this method in support of child-centred learning approaches. Considering research on the integration of technology in play-based learning in ECD is at formative stages, it shows that there are significant unresolved issues that affect its full integration in the promotion of child-centred learning contexts an issue that this paper dwells upon following the review of secondary literature. This paper examines the benefits and applications of technology in play-based learning situations.

Problem Statement

The potential of technology to influence quality education provision has resulted in its wide acceptance in the education sector (Alrefaie et al., 2020). Early childhood is a time when the foundation for future learning achievement is laid. How to prepare children for the world of technology is an important issue that needs serious consideration by stakeholders in the education sector. The use of technology in classroom learning imparts technical literacy to young children. However, there have been arguments on whether technology could be utilized in the ECDE sector with concerns being raised by scholars and stakeholders on its impact towards children's learning and development (Aina, 2023). Play-based learning methodology is a common teaching strategy used in pre-schools. Research examining the extent to which technology integration is essential in play-based learning, especially within Kenya's context is not present within the ECDE sector. This paper will therefore shed light on how ECD teachers can get insights from the paper to model their play-based learning strategies through integration with technological and digital tools.

REVIEW OF LITERATURE

Play-Based Learning

In the context of ECD, pedagogy involves all instructional approaches which promote learning (Agbagbla, 2018). Play is normally associated with a pleasurable activity or a repertoire of actions involving physical, verbal, or mental encounters with materials, classmates, adults or the environment (Aldhafeeri, et al., 2016). Play has become part of the policy and curriculum framework designed and has been integrated into teacher education across all levels of education, especially in early childhood. Through play and routine daily activities, children are eager to learn from one another (Doris, 2015). Play-based learning contributes to children's development and helps them to practice newly acquired skills and concepts (Piaget, 1976). Hence, playing should be emphasized in the pedagogy and curriculum for teaching preschool children as a useful way to improve the quality of education (Aldhafeeri et al., 2016). Yee et al. (2022) said that children's learning motivation comes through engagement in play activities. The objective of ECDE instruction is to cultivate children's desire for learning. Hence, ECDE curriculum content cannot be separated from play activities, since play and learning are part of the developmental stages of children. If play materials are provided during learning, the learners will receive the required knowledge hence learning goals will be attained. A wealth of research evidence draws upon the impact of play on educational output and children's learning (Agbagbla, 2018; Samuelson et al., 2024). Despite its role in the promotion of learning in preschool, there is scepticism, on the role of technologies in play-based learning for ECDE children an issue that this study examines.

Technology integration in play-based learning

Technology has been applied in various fields, including the education sector (Sulistyaningtyas et al., 2023). The concerns include the application of technology in play-based learning in early childhood

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learning classrooms. Research shows that the usage of technology in an early childhood education environment would significantly enhance children's learning in the areas of social skills, problem-solving, communication and literacy skills (Darling-Hammond et al., 2020). Children with special needs will also benefit from the integration of technological systems in play-based learning (Aina, 2023). This means that technology integration in playing activities in schools would enhance quality teaching in ECDE centres. Therefore, it is important to know how technological devices are utilized and integrated in play-based learning settings. Some of the technological tools that could be utilized and integrated into play-based learning include; computers, tablets, interactive whiteboards, interactive books, motion sensors, mobile devices, e-games, and programmable digital devices among others (Darling-Hammond et al., 2020). This study examines how the integration of technology affects play-based learning in ECDE settings.

Theoretical framework

The paper is supported by the social-cultural theory developed by Lee Vygotsky (1978). The theory indicates that children's learning is dependent on the environment in which they are with the assistance of a knowledgeable person (Raslan, 2024). This area is known as the zone of proximal development (ZPD) and the teacher (known as a more knowledgeable other – MKO) can improve the learning situation by directing them when undertaking classroom activities which are beyond their capacity. In this respect, teachers need to guide learners in play-based learning. As the learners continue to gain knowledge in a task, the teachers will gradually begin withdrawing their assistance so that they can perform play-based activities on their own. Vygotsky (1978) indicates that teachers' role in aiding learners' development of academic competencies is key in the application of ZPD when utilizing play-based methods within classroom settings. Scholars clearly perceive that ZPD and play-based learning enhances the involvement of learners and teachers in education (Selepe, Mahudi & Ndlovu, 2024). Teachers perform various roles at varied phases of developmental stages of play to improve their involvement between classmates and the teacher. Teachers' role in the implementation of play-based learning approaches within the ZPD technique is to enhance an active classroom environment. Vygotsky (1978) states that play is the leading source of preschool years' development, as involvement in spontaneous and fun activities permits learners to enhance their developmental and learning abilities (Bodrova & Leong, 2015). Also, the integration of technology in play activities in preschool improves children's mental development and social skills. Considering that learners could develop their emotional, social, and cognitive capacities through technological-based play activities (Raslan, 2024). Vygotsky believed that forms of children's play were essential for children's academic development including the ones integrated with technology in the present age.

METHODOLOGY

The study is anchored on qualitative research methodology under a desktop review approach. The process involves extensively analyzing, evaluating, and synthesizing research relating to the integration of technology in play-based learning in the early childhood education sector. The process of desktop review involved the following steps as put forward by Galvan and Galvan (2017); searching, scanning, and writing. The initial step was to search literature with articles relevant to the study topic and objectives. The search was conducted from the following sites; Google Scholar, EBSCO, SSCI, Full-TEXT, Scopus and Education in September and October 2024. The following keywords were used 'play-based learning' or 'technology integration' or 'pre-school' or 'early childhood education' or 'technology play–based learning.' The second step involved scanning the literature to omit those that were not relevant. PRISMA flow chart was utilized to visualize, papers that were recognized, included and omitted in addition to presenting reasons for exclusions (Moher, Liberati, Tetzlaff, Altman & PRISMA, 2009). Articles excluded in this stage were those that; were not related to the paper title, duplicate research, papers that were written more than ten years old and papers that focused on technology integration at the primary or secondary school level. After this, a total of 14 articles were chosen and analyzed in the third stage. The articles were categorized into four themes; play-based

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learning, technology integration in early child education, integration of technology on play-based learning and challenges influencing integration of technology-based learning in early childhood education setting.

ANALYSIS AND DISCUSSIONS OF FINDINGS

Technology plays a critical role in the daily experiences of young children. In Australia, Yelland and Gilbert (2018) said that despite nearly three decades of the use of new technologies in education, schools seem to have remained unreceptive to significant change. The conventional curriculum pedagogies continue to be dominant in many schools which were failing to prepare children for their future lives. Anderkin (2015) This research question was "Is technology use appropriate for preschool instruction within a play-based pedagogy and philosophy of education? The results suggested that technology use within a play-based learning environment is possible when technology is used appropriately and with balance, to enhance and extend the curriculum. A balanced approach to technology use requires active and intentional use alongside careful planning on the part of the teacher. The methods, instrumentation, and procedures used are described.

Slutsky et al. (2019) examined the time teachers dedicated to implementing technology in their classes from a survey of eight countries (United States, Denmark., Cyprus, Estonia, Greece, Italy, Turkey & Spain). Findings showed similarities across the countries studied with technology pay being the least utilised form of play by teachers. Outdoor and indoor non-technology play were found to be regularly being used across the eight countries studied. Teachers had similar perceptions of the benefits of technology-based play despite not using it regularly in their classrooms. There were significant differences in the time allocated for technology play and the forms of technological digital devices and materials present to children in each country. The above study shows that technology-integrated play is not being valued compared to other conventional play-based learning despite teachers having the belief that it is an important tool for learning school success. Early childhood education is rooted in developmentally appropriate practice and play-based learning curricula.

Teichert and Salman (2021) said that teachers experience challenges when they are undecided on how to navigate integrating digital tools in learning while being confronted with contradictory data. Whereas the curriculum framework recognizes the need for preschool children to develop literacy skills, medical health professionals recommend that children should be limited in the frequency to which they are accessing digital devices for their health. This means that teachers are left without the best practice guidelines to follow to help them integrate technology in ECDE learning through methods that align with play-based learning.

Technology is one of the applicable tools in early childhood education learning, and its use necessitates the teachers to play important roles in the classroom. Sulistyaningtyas et al. (2023) undertook a systematic review of technology use for learning in ECDE in several Asian countries. It was found that the use of technology in the classroom had a positive effect on children's physical/health abilities, moral (assisting in the development of ethics), social (increasing their communication and interaction with others), children's emotional (helping them control emotions and creativity, overcome fear, shame, and anxiety), children interest in learning, motivation, curiosity, and self-confidence. Despite the immense benefits, the following challenges affected integration of technology in ECDE classrooms; teachers lack understanding in integrating technology into pedagogy, limited school budgets, and the negative impact of technology on children's health.

In Sweden, Samuelsson et al. (2024) reported that technological devices like iPads are present in children's play from an early age. In their research, they examined 98 play activities of children in two preschool settings, featuring 2 and 4 - 5-year-olds playing with iPads and non-digital artefacts. Results showed how play with iPads is characterized as less ludic than play with other artefacts and diverges from the age-typical norms of play. In Kuwait, Aldhafeeri et al. (2016) examined ECDE teachers' attitudes, views, and aptitudes towards technologies

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in their personal lives and classroom practices. Results demonstrated that despite teachers being competent users of digital technologies in their personal lives and classrooms having been digitalized to a large extent, the teachers were still hesitant to embed these in their curriculum practice, especially in play-based learning.

In Sub-Saharan Africa, Aina (2023) explored the provision of quality education using technological tools of the selected ECD centres. Findings revealed that respondents perceived that the use of technology tools would assist the head teachers and teachers in their administrative tasks and the teaching-learning activities, despite that many of the respondents lack skills and tools in technology usage. For example, some respondents indicated that they could not use digital applications to engage learners, maintain accounting records, or connect with parents.

In South Africa, Selepe et al. (2024) indicated that ECD teachers are encouraged to implement play techniques. The research explored the views and beliefs of the teachers about the use of play pedagogy in rural ECD centres. The participants found integrating play pedagogies when planning their lessons and assessing children's progress challenging. Results showed that ECD practitioners in rural centres lacked the skills and material resources to implement play pedagogies. The study suggested that ECD practitioners in rural areas need professional development opportunities in the implementation of play activities as a teaching pedagogy. Further, a study by Lunga et al. (2022) conducted in the Gauteng and North West Provinces on play-based pedagogy to advance young learners' holistic development showed that educators and parents play a significant role in the implementation of play-based pedagogy. They indicated that to support holistic development in young learners, practitioners and parents should maximize the use of a play-based methodology in both social and learning environments. It was further concluded that follow-up should be done to ensure that the pedagogy being used in ECD centres corresponds with requirements for the development of young learners.

CONCLUSIONS

Research in technology education in early childhood education has grown exponentially. This paper has established that technology is here with us and therefore schools have to ensure that all curriculum pedagogies including plays are technology-embedded. Teachers in ECDE especially in developing countries like Kenya have to start considering the use of technology in play-based learning processes in schools. Despite medical health professionals recommending limited exposure of ECDE children to technological devices, the benefits of the integration of technology in play-based learning outweigh their disadvantages. The benefits of integration of technology in play-based learning include; increased learner engagement, learner concentration in class and increased learner participation in schools. Digital technology tools also offer learners information illustration through visuals and graphics that are preferred by young children hence increasing their creativity, innovation, and imagination skills. Nevertheless, teachers need to ensure there is moderation when implementing technology-based play learning to ensure does not harm the child psychologically, or emotionally and distract them from focusing on their studies.

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