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Traditions and New Beginnings
for Knowledge and Impact

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CHAPTER 13

A 'play way' method for developing digital literacy among pupils in primary schools in Nandi sub-county, Kenya

Sarah Jemutai

Introduction

Play has been recognised as a fundamental factor in early learning and its implications for subsequent academic achievement. As such, play has gained global awareness and prominence (Ansari et al., 2019). A report by UNICEF underscored the significant role of play in a child's learning process, emphasising that play enables learners to engage in day-to-day activities, paving the way for learning (UNICEF, 2018). According to Donald et al. (2010, p. 53), "development does not just happen to pupils. It is also based on their active engagement with and exploration of their physical and social world". Thus, through play, pupils learn to engage analytically with each other's ideas (Ansari et al., 2019; Lipsey et al., 2018). Play also contributes to the development of various domains, including cognitive, intellectual, linguistic, physical, socio-emotional, creative, and visual perception (Jemutai & Webb, 2019; Smith & Pellegrini, 2013). Furthermore, play is directly related to children's development, as it promotes the acquisition of pre-academic skills necessary for early education and academic achievement (Whitebread et al., 2017). Its connection to early literacy and numeracy acquisition, as well as later academic achievement, has gained widespread recognition (Whitebread et al., 2017).

Play actively encourages the acquisition of a wide range of knowledge and abilities, such as verbalization, vocabulary development, language comprehension, attention span, creativity, focus, impulse management, visuo-spatial abilities, scepticism, problem-solving techniques, collaboration, compassion, and cooperation (NAEYC, 2020; Jemutai & Webb, 2019; Hassinger-Das et al., 2017; Whitebread et al., 2017; Linder et al., 2011; Kimbell-Lopez et al., 2016; Nath & Szücs, 2014). While substantial evidence exists regarding learning through play, there is a relative dearth of evidence on teaching digital literacy through play. This study aims to explore the utilization of play-based approaches using tablets provided by the Government of Kenya, as a teaching strategy to enhance digital literacy. The government's expectation is to integrate digital literacy into teaching and learning starting from Grade 1 (Republic of Kenya, 2017, as cited in Kerkhoff & Makubuya, 2021).

In this context, the study employs play as a means to develop digital literacy in order to meet the expectations of a competency-based curriculum. Play is recognised as an engaging way for learners to acquire and display their potential and cognitive development (Piaget, 1962; Vygotsky, 1978). Play is a universal phenomenon, deeply rooted in children's development (Csikszentmihalyi, 1990; Smith & Pellegrini, 2013). The United Nations Convention on the Rights of the Child (1989) acknowledges play as a fundamental right of children. The International Play Association (2016) recognises play as a recreational activity inherent in children's lives. Play is a serious, thought-provoking process that encompasses aspects of knowledge, growth, and advancement (Gauntlett et al., 2010).

Digital play, according to Saloni-Pasternak and Gelfond (2005), represents a fundamentally distinct type of learning. Digital play is important as it offers interactive and engaging experiences, providing immediate feedback to reinforce concepts. Its adaptability tailors learning to individual needs, while fostering collaboration and social interaction. Simulations allow for real-world application in a safe environment, and intrinsic motivation is enhanced through game elements like rewards and competition. Digital play employs multimodal learning, incorporating various media types, and offers continuous learning opportunities beyond traditional settings. It possesses specific qualities that can be cultivated, such as promoting the discovery of passions, collaboration, independence, motivation, sincere praise, autonomy, patience, respect, choice, and decision-making. When used effectively, play opens up new avenues for research and discovery, providing a unique approach to learning (Mudra, 2020).

Play and digital literacy: A path to enhancing learning

The integration of information and communication technology (ICT) in education and training is essential for enhancing learning experiences. It provides innovative methods for teaching and learning, promotes student engagement, and fosters critical thinking skills. Moreover, ICT can help bridge educational gaps and ensure access to quality education for all students. By incorporating technology into the curriculum, educators can create more dynamic and interactive learning environments that cater to diverse learning needs (Ministry of Education, Kenya, 2021). Despite the acknowledgement of digital literacy's importance, there is limited knowledge about the development of digital literacy skills in primary schools (Kennedy et al., 2012; Kerkhoff & Makubuya, 2021). What is known is that digital literacy enhances the effectiveness of instruction, improve learning outcomes, self-efficacy, and learner capabilities (Aslan, 2021; Erwin & Mohammed, 2022), making it a critical component of contemporary education.

However, a notable gap exists in understanding how teachers and educational institutions are expected to actively integrate digital literacy into their teaching

methods. Given these considerations, it becomes evident that educational institutions should incorporate digital literacy tools and resources into their teaching practices for learners to thrive in the digital era. In alignment with this vision, Ntorukiri et al. (2022) assert that every learning institution, teacher, and learner should be equipped with the necessary digital skills and relevant infrastructure. Nevertheless, the integration of digital literacy into the Kenyan school curriculum presents challenges, as only a fraction of students has access to digital devices. This study explores a specific approach to the integration of digital literacy through digital play activities, with a focus on perceptions, experiences, skills development, and challenges faced by teachers and learners.

The primary school syllabus in Kenya proposes the development of digital literacy competence, with teachers taking the lead in utilizing technology to emphasise specific concepts during teaching. For instance, in Grade 1, where digital literacy is supposed to commence, there are programmes installed in digital devices covering subjects such as mathematics, English, Kiswahili, science, and social studies for both Grades 1 and 2, along with different play programmes. Although these learning areas contain topics that can be effectively taught electronically, school visits suggest that in schools that have been provided with computers by the Kenyan Education Ministry, teachers have been slow to embrace technology for teaching and learning.

The incorporation of digital literacy into classrooms is believed to offer numerous benefits for students. It promotes individual-centred learning, allowing students to choose, organize, and assess information, while also providing easy access to electronic information and concept comprehension (Mudra, 2020). Furthermore, digital literacy enhances the effectiveness of instruction and learning and enhances learning outcomes and learner competences (Buabeng-Andoh, 2012). Consequently, digital literacy is indispensable for contemporary teaching and learning.

The use of computers in small groups fosters collaboration and teamwork, enhancing peer relationships (Freeman & Somerindyke, 2001). Tablets empower learners, allowing them to perform tasks autonomously and make choices. Pupils view these devices as under their control, offering a safe space for learning, free from criticism. Tablets encourage pupils to inspect their achievements, receive immediate feedback, and build independence (Bolstad, 2004; Anderson, 1997). In this approach, learners' autonomy and independence are increased, and they gain the ability to evaluate their accomplishments immediately. For teachers to guide learners effectively in this digital environment, they must be well-versed in digital media.

The integration of digital play activities into teaching practices offers a promising approach to accelerating the implementation of digital literacy in primary schools. This study aims to explore the perceptions, experiences, and skills development associated with this approach, shedding light on the challenges faced by both teachers and learners. The digital era requires educators to embrace innovative teaching

methods that utilize digital resources and technologies, ultimately equipping pupils with the digital skills needed for the future.

The intervention used in this study

The 'play way' approach, often referred to as 'play-based learning' or 'learning through play,' is an educational method that promotes the use of playful activities, games, and hands-on experiences as a primary way to teach various subjects (Hirsh-Pasek et al., 2009). This approach is particularly popular in early childhood education, where young learners engage in activities that resemble play but are designed to foster the development of skills and concepts in a fun and interactive manner (Clements & Sarama, 2008).

This study focused on digital literacy using 'play way' mathematical and language games that are available to the participating schools. Play way is based on the idea that children learn best through direct experiences. It emphasises active engagement and interaction with mathematical concepts and language competence rather than rote memorization (Dewey, 1938).

In the context of this study, play-based learning used interactive computer-based activities games, puzzles, and playful activities that present learning as fun (Benesch, 2010) while requiring digital literacy. The play approach is child-centred, meaning that it tailors learning activities to the interests and developmental level of each child (Vygotsky, 1978). Play-based learning also helps children develop social and emotional skills, such as cooperation, communication, problem-solving, and perseverance (Bodrova & Leong, 2007), skills that promote digital learning.

While the play way approach has been shown to be effective in promoting a deep and lasting understanding of mathematical concepts, it has not been used to explore children's natural curiosity in terms of fostering digital literacy. It is for this reason that a digital play way approach was used to explore the development of digital literacy.

Research design and methods

This study employed a case study research design, which incorporates multiple data collection methods. Data were gathered through interviews, observations, and teacher reflective journals. The researcher conducted classroom observations to examine how digital literacy was promoted within the classroom. This approach aimed to analyse and describe the events, actions, pupil activities and institutional strategies (Thomas, 2011; Yin, 2014) while providing an understanding of specific occurrences (Yin, 2018; Rashid et al., 2019). The hermeneutic tradition of research, emphasising viewing situations through participants' perspectives, was widely followed in this case study (Cohen et al., 2018).

The objectives of this study were to examine the classroom promotion of digital skills, observe teachers' and pupils' engagement in digital play, gather teachers' experiences with digital devices, and record their views on digital play within reflective journals. A case study design offers the advantage of exploring how various elements influence a specific phenomenon (Hyett et al., 2014), providing detailed insights into the experiences of participants (Aggarwal et al., 2019). However, case studies are often criticised for their reliance on specific cases, limiting generalisability (Hyett et al., 2014; Cohen et al., 2018).

Nonetheless, in the context of technology-based cases, such as the one in this study, the emphasis is on understanding how technology can be used to transform education practices (Kozma & Anderson, 2002). The aim is not to generalise but to gain an in-depth understanding of the situation under study to improve teaching methods and teacher training. Although generalisation is challenging in case studies, the results are relevant to the specific case and other similar contexts.

The study included participants from various schools, which allows for cross-case verification and the identification of variations or inconsistencies related to specific aspects (Yin, 2014; 2018). The study was a single case study that aimed to explore play-based strategies for developing digital literacy in primary schools and the challenges faced in developing digital literacy through this method.

Sample and setting

The research was conducted in the peri-urban Mutwot zone of the Chesumei constituencies near Eldoret, located in Nandi County, Kenya. Twelve public schools were selected for the study due to their geographic proximity to one another, which facilitated the researcher's movement within the area. Importantly, initial investigations showed that the promotion of digital literacy in teaching and learning was relatively limited in this region, making it a suitable context for investigation.

The decision to work with a small sample size in this qualitative research was deliberate, as it enables a more in-depth exploration of the primary concept or phenomenon under study (Creswell & Creswell, 2018). Moreover, this particular study area was chosen to optimise the efficient use of time and available human resources. It is noteworthy that research of this nature had not been previously conducted in Nandi County.

As noted earlier, the study encompassed 12 public primary schools in Nandi County, including one officer responsible for quality assurance at the sub-county level, the head teachers at these schools, 24 Grade 1 teachers and a total of 480 pupils. The selection of Grade 1 teachers was purposive, focusing on existing classes and ensuring that the chosen population was reliable for the research (Campbell et al., 2020). To protect the privacy and anonymity of the schools and individuals involved, pseudonyms were assigned to the selected schools, and the teachers' names were not disclosed. All Grade 1 pupils from the participating schools were considered

for inclusion in the study and all volunteered to be part of the process. All of the participating schools were equipped with functional computer laboratories and had received government-provided tablets.

The intervention

The participating schools were visited, the study was introduced to the school principals, and letters of introduction and permission to conduct the study were handed to them. The Grade 1 teachers were informed about the research and the digital play activities and invited to participate in the intervention that they would be expected to conduct in their classrooms.

All of the Grade 1 teachers who were invited volunteered to participate (none refused) and were introduced to the objectives of the study and the research instruments that the researcher would use as part of the research process. They then underwent a one-day training session on the play way method using the tablets and activities on them at their disposal. To introduce the concept of digital guided play, all the participating Grade 1 teachers were trained to use the available tablets in the schools. School tablets featuring play programmes were utilized during the study to explore the impact of this teaching approach on digital literacy development.

The school administrators provided access to the tablets that were gathering dust in the cupboards. Some of the teachers had not switched on a tablet before. The devices were brought to a classroom/laboratory and charged. Once the tablets were charged, the group was guided through activities to be able to guide their pupils, including switching on and shutting down, how to get to the plays installed and how to search for a game on the search bar. After the teachers had fully familiarized themselves with the tablets, they began play activities with the children in class.

Together the researcher and the Grade 1 teachers created a scheduled timetable for digital play activities. The schools that retained afternoon remedial work time used these sessions for digital play, while other schools used one lesson per week for the intervention for a period of four months (August to November 2021). These interventions were scheduled into a regular timetable, with some schools incorporating digital play during afternoon remedial sessions and others dedicating one English lesson per week to the intervention.

Data collection procedure

Classroom observations were conducted, and open-ended field notes were recorded during visits and transcribed. Observations focused on how pupils followed instructions, completed tasks, sought clarification when needed, and shared ideas with classmates. These observations provided first-hand data from within naturally occurring social settings.

Additionally, semi-structured interviews were conducted with teachers, the officer responsible for quality assurance at the sub-county level, the head teachers at

these schools, to gather data on how digital play activities were conducted. Interviews offered insights that could not be obtained through observations alone. Open-ended questions were used to enable participants to express their views and experiences without researcher bias. Teacher reflective journals were also used to capture the teachers' thoughts, feelings, experiences, and challenges regarding computer use.

Data analysis

Data from all sources were transcribed, coded, and categorised into themes. The coding process utilized participants' or researchers' exact words to create phrases (Creswell & Plano, 2011). Teacher reflective journals were also analysed, and themes were developed from them. Data collection and analysis were concurrent, with each phase building on the other in this qualitative study. The researcher used thematic analysis to organize the data systematically, identify recurring patterns, and produce meaningful, in-depth analyses (Watts, 2014). Thematic analysis was chosen for its flexibility, capacity to handle complex and extensive data, and emphasis on understanding participants' perspectives.

Ethical considerations

Prior to the commencement of data collection, the researcher visited the participating schools to engage in discussions with school principals and Grade 1 teachers. These discussions covered the study's objectives, research design, and methodology. It was made clear to the teachers that their participation in the study was entirely voluntary, and they were assured that the information they provided would be used solely for the purpose of this research.

To ensure ethical standards and informed consent, both teachers and parents of the learners involved in the study were required to sign consent forms. This step helped to ensure that all participants, including the children, had their rights and privacy respected. Throughout the study, the anonymity of the participants was rigorously maintained. Their identities and personal information were kept confidential to protect their privacy and rights.

This research was conducted with the necessary ethics approval from the National Commission for Science, Technology, and Innovation (NACOSTI), which permitted the researcher to conduct the research within the school setting. Ethics approval ensures that research is conducted in an ethical and responsible manner, upholding the rights and well-being of the participants.

Results

Qualitative data were obtained from the journal reflection sheets, observation schedule, and semi-structured interviews.

“This is a different form of play where the children use the tablets to play. They share ideas together and play together in turns in a collaborative manner. Pupils learn to search and scroll. What pleased me the most is the fact that learners enjoyed the play sessions so much and they were very cooperative and enthusiastic every time I entered the classroom! This method led to collaborative learning and enjoyment on the side of the learners.”

Quotes such as the one above represent the type of data generated by teachers. Commentary like this resonates with other findings that, during play, pupils became engaged actors, aligning with the expectations of educators (Fluck et al., 2020). The integration of digital play into the learning process empowers students, contributing to their development as conscientious and compassionate individuals (Abu Zahra, 2020).

More examples of teachers' responses to the play way method can be found in the author's doctoral thesis on the topic and her paper on teachers' perceptions of the 'play way' method (Jemutai et al., 2023).

Themes were derived from the study findings related to three objectives: teachers' perceptions of play-based strategies for developing digital literacy in primary schools, primary school children's digital literacy competencies demonstrated through play-based learning, and the challenges faced in developing digital literacy through this method.

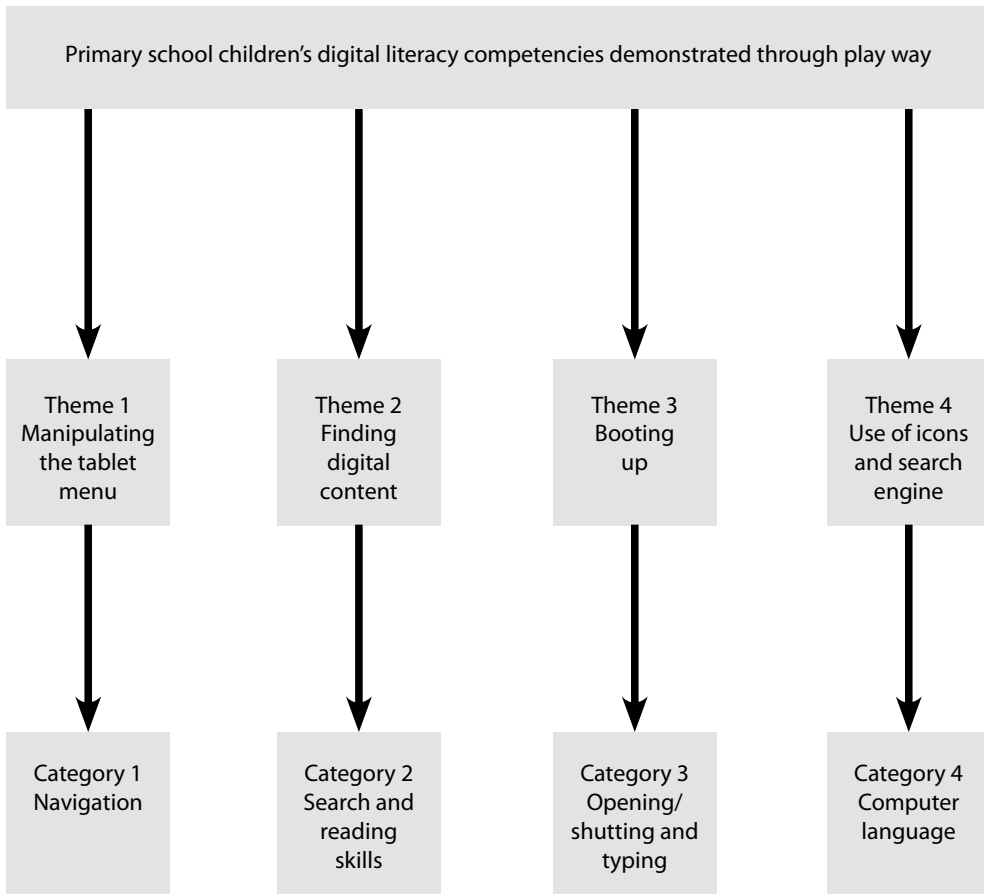
The findings highlight three key themes in response to teachers' perceptions of play-based learning strategies for developing digital literacy:

- Participants in this study perceived play-based learning as a means for learners to acquire digital skills through enjoyable interactions with digital devices. This approach is believed to lead to knowledge creation (Erwin & Mohammed, 2022).
- Teachers regarded digital play as a child-centred method that placed pupils at the core of the educational process. This is seen to be a departure from traditional teaching methods, fostering high levels of learner motivation (Mudra, 2020).
- The teachers felt that their role had been transformed into that of a facilitator of the learning process. Many researchers note that this method challenges existing educational beliefs and emphasise the influence of educators' ideas on their professional decisions (Rubach & Lazarides, 2021).

The second objective of the study aimed to examine primary school children's digital literacy competencies demonstrated as they went through the play-based learning strategy. The resulting themes are presented in Figure 1. This figure reveals a theme around manipulating the tablet menu leading to better navigation of the activities. A second theme developed around finding digital content which included improvement in search and reading skills. A third theme included booting up the devices and the ability to switch on and shut down the devices safely, with the third

theme highlighting the use of icons and search engines, in other words developing an understanding of computer language usage.

Figure 1: Primary School Digital Literacy Competencies as Developed through the 'Play Way' Process



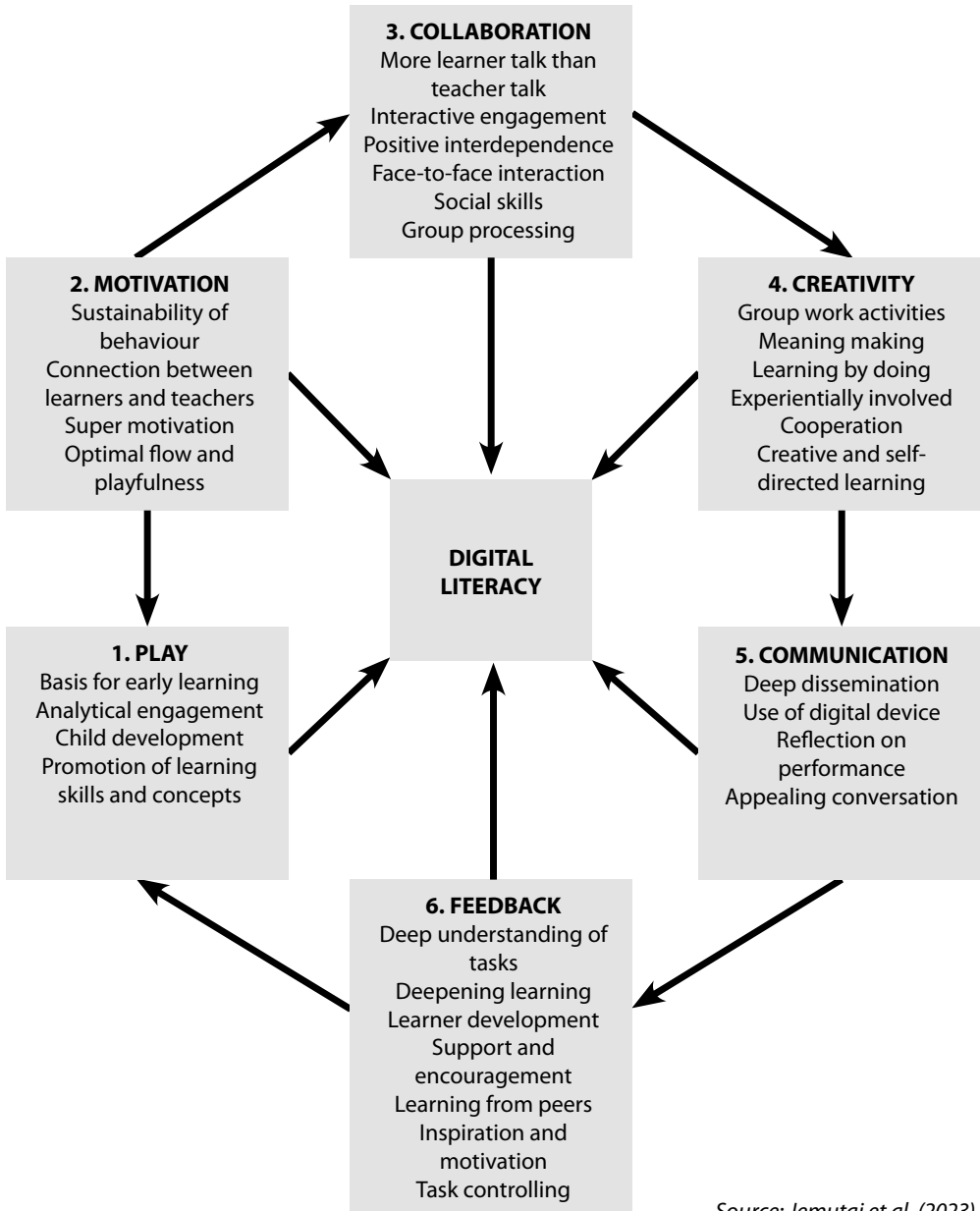
Source: Jemutai et al. (2023)

Four major themes of the challenges faced by teachers in developing digital literacy through play-based methods were:

- Improper storage and handling led to some tablets malfunctioning.
- Schools received digital resources without clear usage guidelines and limited administrative support (Kristiawan & Muhaimin, 2019).
- Pupils initially lacked confidence in using tablets.
- The curriculum did not allocate time for teaching digital literacy, leading to its neglect.

Based on these findings, the researcher devised a model that connects play-based learning strategies with the development of digital literacy competencies among primary schools learners (Figure 2).

Figure 2: Pupils' Digital Play Model for Digital Literacy Development



Source: Jemutai et al. (2023)

This model, called the ‘pupils’ digital play model for digital literacy development’, positions the learner at the centre of the learning process, a departure from models that predominantly focus on the teacher’s role. Moreover, this model underscores the essential role of hands-on, experiential learning in technology acquisition (Sefton-Green et al., 2016).

As digital literacy remains a critical challenge, especially in the field of education, the pupils’ digital play model seems to be able to address some of these challenges by promoting a learner-centred approach to digital literacy. This model shifts the focus from memorization to experiential learning, challenging pupils and teaching them how to acquire knowledge through active participation in class. A move aimed at fostering peer collaboration, critical thinking, leadership, digital skills, communication, and creativity—qualities vital for 21st-century learning.

In this way the study may contribute to the development of a framework that emphasises six key aspects of teaching digital literacy, as illustrated in Figure 2. These components, informed by literature, case study analysis, and classroom experience, have the potential to inform basic education and enhance the acquisition of digital literacy, a critical competency for the 21st century. Basic education, which aims to cultivate self-regulation, self-criticism, and goal attainment, plays a pivotal role in this transformation (Jansen & Grance, 2011).

Discussion

The pupils’ digital play model appears to significantly enhance motivation among learners. This heightened motivation necessitates responsive teaching and the creation of a respectful and supportive learning environment in which both teachers and pupils feel included in the learning process. As part of this, pupils usually receive rewards when they excel in their digital play-based activities. Establishing a safe learning environment through teachers engaging with their pupils in a manner that respects their backgrounds, viewpoints, and skill levels (Wlodkowski & Ginsberg, 1995; Wlodkowski, 1999) leads to motivation which leads to optimal flow, super motivation, ideal flow, and playfulness (Csikszentmihalyi, 1990). Optimal flow refers to the state in which individuals become deeply absorbed in a task, finding it pleasurable and engaging, even at the expense of other activities.

During this intervention, pupils displayed high levels of collaboration, with participants helping each other navigate their zones of proximal development (ZPD) as they learned and grew together (Vygotsky, 1978). Group activities on the tablets provided a creative context, enabling pupils to read, search, navigate, discuss, share, and solve problems collaboratively. The fundamental tenet of the pupils’ digital play model is that pupils are guided to generate, acquire, and apply knowledge through engaging activities, sparking their curiosity and encouraging deep thought. When

teachers facilitate this process, pupils evolve into active evaluators of their own learning.

The play-based approach also appeared to sharpen communication skills as it fostered engaging conversations that unveiled hidden thoughts and ideas within each individual's mind. Furthermore, feedback was provided involving constructive criticism during or after a thorough examination of the pupils' work on the tablets. Pupils had opportunities to express their tacit knowledge, experiences, triumphs, and aspirations within groups or in front of the entire class. Feedback is a powerful tool for promoting deep understanding of tasks, focusing on the learning objectives and success criteria. The teachers played a supportive role, viewing pupils as individuals who need guidance to progress. When peers are seen as valuable sources of knowledge, learners are more likely to seek assistance from one another.

Vygotsky's (1978) insights into the role of play as a leading activity in cognitive and imaginative development was evident, as the children interacted with content in an enjoyable and constructive way (Rahman & Yunus, 2020). Teachers' perceptions of the digital play strategy revealed that they understood that information can be found not only in books but also in digital devices, where knowledge can be imparted in an enjoyable manner. This perspective aligns with Rahman and Yunus (2020), who emphasise that the implementers of an activity are the beneficiaries when the activity is performed. As such, the 'play way' intervention might be seen to an extent as a teacher development programme.

The fact that the Grade 1 pupils appeared to benefit from technology by playing on their tablets supports Tan's (2019) notion that a computer serves as a mind-extension cognitive tool, with learners contributing intelligence (Erbas et al., 2021). Active participation, such as successfully using icons, signified that learning took place, and that it evolved into a process of active construction of content and concepts (Jonassen, 2002; Sailin & Mahmor, 2018). The digital play learning strategy also promoted interactions between pupils as well as between pupils and the teachers (Sabiri, 2020).

Conclusion and recommendations

In conclusion, this study underscores the effectiveness of the play-based method of learning as a catalyst for the development of digital literacy skills among primary school pupils. This approach, characterised by its child-centred and hands-on nature, should contribute to the acquisition of digital literacy competencies. However, a notable challenge to this goal is the inadequate supply of digital devices in many schools in Kenya and the absence of a comprehensive integration strategy for digital content in school curricula.

Based on the findings of this study, the following recommendations can be made:

- Teachers should be encouraged to embrace digital play strategies. The pupils' digital play model proposed in this study could help attain this goal. This model, designed to enhance the acquisition of digital literacy competencies, positions learners at the centre of the learning process. By implementing this model, educators can foster a more interactive and engaging digital learning environment.
- The consistent supply of digital devices to schools should be prioritized and curricula should provide more focus on the integration of a wide range of digital content for educational purposes. By providing a diverse and comprehensive array of digital resources, teachers will be more inclined to incorporate technology into their teaching methods.
- Curriculum designers should consider allocating time within curriculum designs specifically dedicated to teaching digital skills. Including digital literacy as an integrated subject will ensure that the development of these skills is prioritized and formally recognised within the educational framework.

By implementing these recommendations, educators, policymakers, and curriculum designers could work together to foster a more technologically proficient generation of learners. This, in turn, will better equip students to meet the challenges of the digital age, promoting digital literacy as a core competency in the 21st century.

References

- Abu Zahra, H. (2020). *The management of digital technology towards equipping students with 21st century skills: Its implementation in lower primary pedagogy* [Unpublished doctoral dissertation]. The British University in Dubai (BUiD).
- Aggarwal, R., & Ranganathan, P. (2019). Study designs: Part 2 – Descriptive studies. *Perspectives in Clinical Research*, 10(1), 34–36. https://doi.org/10.4103/picr.PICR_154_18
- Anderson, H. (1997). *Conversation, language, and possibilities: A postmodern approach to therapy*. Basic Books.
- Ansari, A., Pianta, R. C., Whittaker, J. V., Vitiello, V. E., & Ruzek, E. A. (2019). Starting early: The benefits of attending early childhood education programs at age 3. *American Educational Research Journal*, 56(4), 1495–1523.
- Aslan, S. (2021). Analysis of digital literacy self-efficacy levels of pre-service teachers. *International Journal of Technology in Education (IJTE)*, 4(1), 57–67. <https://doi.org/10.46328/ijte.47>
- Benesch, J. (2010). Mathematics through play in the early years. In A. Anning, J. Cullen, & M. Fleer (Eds.), *Early childhood education: Society and culture* (2nd ed., pp. 93–106). SAGE Publications.
- Bodrova, E., & Leong, D. J. (2007). *Tools of the mind: The Vygotskian approach to early childhood education* (2nd ed.). Pearson.
- Bolstad, R. (2004). *The role and potential of ICT in early childhood education: A review of New Zealand and international literature* – Prepared for the Ministry of Education. Ministry of Education, New Zealand.
- Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International*

- Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 8, 136–155.
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://journals.sagepub.com/doi/10.1177/1744987120927206>
- Clements, D. H., & Sarama, J. (2008). Experimental evaluation of the effects of a research-based preschool mathematics curriculum. *American Educational Research Journal*, 45(2), 443–494.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge. <https://doi.org/10.4324/9781315456539>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage.
- Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Sage Publications.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.
- Dewey, J. (1938). *Experience and education*. Kappa Delta Pi.
- Donald, D., Lazarus, S., & Lolwana, P. (2010). *Educational psychology in social context*. Oxford University Press.
- Erbas, İ., Çipuri, R., & Joni, A. (2021). The impact of technology on teaching and teaching English to elementary school students. *Linguistics and Culture Review*, 5(S3), 1316–1336.
- Erwin, K., & Mohammed, S. (2022). Digital literacy skills instruction and increased skills proficiency. *International Journal of Technology in Education and Science (IJTES)*, 6(2), 323–332. <https://doi.org/10.46328/ijtes.364>
- Fluck, A. E., Ranmuthugala, D., Chin, C. K. H., Penesis, I., Chong, J., Yang, Y., & Ghous, A. (2020). Transforming learning with computers: Calculus for kids. *Education and Information Technologies*, 25(5), 3779–3796.
- Freeman, N. K., & Somerindyke, J. (2001). Social play at the computer: Preschoolers scaffold and support peers' computer competence. *Information Technology in Childhood Education Annual*, 12, 203–213.
- Gauntlett, D., Ackermann, E., Whitebread, D., Wolbers, T., & Wekstrom, C. (2010). *The future of play*. LEGO Learning Institute.
- Hassinger-Das, B., Toub, T. S., Zosh, J. M., Michnick, J., Golinkoff, R., & Hirsh-Pasek, K. (2017). More than just fun: A place for games in playful learning. *Infancia y Aprendizaje: Journal for the Study of Education and Development*, 40(2), 191–218.
- Hirsh-Pasek, K., Golinkoff, R. M., Berk, L. E., & Singer, D. G. (2009). *A mandate for playful learning in preschool: Presenting the evidence*. Oxford University Press.
- Hyett, N., Kenny, A., & Dickson-Swift, V. (2014). Methodology or method? A critical review of qualitative case study reports. *International Journal of Qualitative Studies on Health and Well-Being*, 9, 23606. <https://doi.org/10.3402/qhw.v9.23606>
- International Play Association. (2016). *Children's right to play and the environment: A discussion paper prepared for the UN Committee on the Rights of the Child Day of General Discussion*. International Play Association: Promoting the Child's Right to Play. <chrome-extension://efaidnbmninnbpcajpcgclefindmkaj/https://ipaworld.org/wp-content/uploads/2016/05/IPA-Play-Environment-Discussion-Paper.pdf>
- Jansen, W., & Grance, T. (2011). Guidelines on security and privacy in public cloud computing. *NIST Technical Report-SP-800-144*.
- Jemutai, S., Kemboi, M., & Nabwire, V. (2023). Teachers' perceptions of play way strategies of learning in developing digital literacy among pupils in primary school. *European Journal of Education Studies*, 10(11). <https://doi.org/10.46827/ejes.v10i11.5090>

- Jemutai, S., & Webb, P. (2019). Effects of a 6 Brick Duplo block guided play intervention on pre-literate learners' visual perception. *South African Journal of Childhood Education*, 9(1), a634. <https://doi.org/10.4102/sajce.v9i1.634>
- Jonassen, D. H. (2002). Engaging and supporting problem solving in online learning. *Quarterly Review of Distance Education*, 3, 1–13.
- Kennedy, E. L., Greene, J., & Cameron, R. J. (2012). Transitions in the early years: Educational and child psychologists working to reduce the impact of school culture shock. *Educational and Child Psychology*, 29(1), 19–31.
- Kerkhoff, S., & Makubuya, T. (2021). Professional development on digital literacy and transformative teaching in a low-income country: A case study of rural Kenya. *Reading Research Quarterly*, 57(1), 287–305.
- Kimbell-Lopez, K., Manning, E., & Cummins, C. (2016). Developing digital literacy in the middle school classroom. *Computers in the Schools*, 33(4), 211–226.
- Kozma, R., & Anderson, R. E. (2002). Qualitative case studies of innovative pedagogical practices using ICT. *Journal of Computer Assisted Learning*, 18, 387–394.
- Kristiawan, M., & Muhaimin, M. (2019). Teachers' obstacles in utilizing information and communication technology. *International Journal of Educational Review*, 1(2), 56–61.
- Linder, S. M., Powers-Costello, B., & Stegeline, D. A. (2011). Mathematics in early childhood: Research-based rationale and practical strategies. *Early Childhood Education Journal*, 39(1), 29–37.
- Lipsey, M. W., Farran, D. C., & Durkin, K. (2018). Effects of the Tennessee Prekindergarten Program on children's achievement and behavior through third grade. *Early Childhood Research Quarterly*, 45, 155–176. <https://doi.org/10.1016/j.ecresq.2018.03.005>
- Ministry of Education, Kenya. (2021). *Information and communication technology in education and training*. Ministry of Education.
- Mudra, H. (2020). Digital literacy among young learners: How do EFL teachers and learners view its benefits and barriers? *Teaching English with Technology*, 20(3), 3–24.
- NAEYC. (2020). *Developmentally appropriate practice (DAP) position statement*. NAEYC. www.naeyc.org/resources/position-statements/dap
- Nath, S., & Szücs, D. (2014). Construction play and cognitive skills associated with the development of mathematical abilities in 7-year-old children. *Learning and Instruction*, 32, 73–80.
- Ntorukiri, T. B., Chun, X., & Boudouaia, A. (2022). Influence of teachers' competencies on ICT implementation in Kenyan universities. *Education Research International*, 2022(3), 1–11.
- Piaget, J. (1962). The stages of the intellectual development of the child. *Bulletin of the Menninger Clinic*, 26(3), 120–128.
- Rahman, Q., & Yunus, T. (2020). Role of students learning through education technology in the communication process. *Journal of Education and Development*, 10(20), 56–68.
- Rashid, Y., Rashid, A., Warraich, M. A., Sabir, S. S., & Waseem, A. (2019). Case study method: A step-by-step guide for business researchers. *International Journal of Qualitative Methods*, 18. <https://doi.org/10.1177/1609406919862424>
- Rubach, C., & Lazarides, R. (2021). Addressing 21st-century digital skills in schools: Development and validation of an instrument to measure teachers' basic ICT competence beliefs. *Computers in Human Behavior*, 118(1). <https://doi.org/10.1016/j.chb.2020.106636>
- Sabiri, K. A. (2020). ICT in EFL teaching and learning: A systematic literature review. *Contemporary Educational Technology*, 11(2), 177–195.
- Sailin, S. N., & Mahmor, N. A. (2018). Improving student teachers' digital pedagogy through meaningful learning activities. *Malaysian Journal of Learning and Instruction*, 15(2), 143–173.

- Salonius-Pasternak, D. E., & Gelfond, H. S. (2005). The next level of research on electronic play: Potential benefits and contextual influences for children and adolescents. *Human Technology*, 1(1), 5–22.
- Sefton-Green, J., Marsh, J., Erstad, O., & Flewitt, R. (2016). *Establishing a research agenda for the digital literacy practices of young children: A white paper for COST Action IS1410*. <https://www.lse.ac.uk/media-and-communications/assets/documents/research/projects/p4df/COST-2016.pdf>
- Smith, P., & Pellegrini, A. (2013). Learning through play. In *Encyclopedia on early childhood development*. <http://www.child-encyclopedia.com/documents/Smith-PellegriniANGxp2.pdf>
- Tan, S. C. (2019). Learning with computers: Generating insights into the development of cognitive tools using cultural historical activity theory. *Australasian Journal of Educational Technology*, 35(2).
- Thomas, G. (2011). A typology for the case study in social science following a review of definition, discourse, and structure. *Qualitative Inquiry*, 17, 511–521.
- UNICEF. (2018). *Learning through play: Strengthening learning through play in early childhood education programs*. UNICEF Education Section, Programme Division.
- United Nations Convention on the Rights of the Child, November 20, 1989, <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press.
- Watts, S. (2014). User skills for qualitative analysis: Perspective, interpretation, and the delivery of impact. *Qualitative Research in Psychology*, 11(1), 1–14.
- Whitebread, D., Neale, D., Jensen, H., Liu, C., Solis, S. L., Hopkins, E., Hirsh-Pasek, K., & Zosh, J. M. (2017). *The role of play in children's development: A review of the evidence (Research Summary)*. The LEGO Foundation.
- Wlodkowski, R. J. (1999). *Enhancing adult motivation to learn*. Jossey-Bass Publishers.
- Wlodkowski, R. J., & Ginsberg, M. B. (1995). A framework for culturally responsive teaching. *Educational Leadership: Journal of the Department of Supervision and Curriculum Development*, 53(1), 17–21.
- Yin, R. (2014). *Case study research: Design and methods* (5th ed.). Sage Publications.
- Yin, R. (2018). *Case study research: Design and methods* (6th ed.). SAGE.