

Digital Education for Sustainable Development in Early Childhood Classrooms of Zimbabwe

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Abstract: Since the onset of COVID-19, education systems around the world have increased investment in digital learning from primary schools to universities. Several governments have prioritized their education agendas and adapted strategies and policies for digital teaching and learning to support sustainable development. In Zimbabwe, the heritage-based education 5.0 philosophy, recently introduced by the Minister of Higher Education, promotes digital education to transform the economy for sustainable growth. With the growing government and ministry emphasis on digital education, it is crucial to critically examine current teacher practices in digital education within early childhood classrooms (ECD). The study adopted an interpretive paradigm and a multiple case study design involving three teachers from three different schools. Data were collected from these three ECD teachers through face-to-face semi-structured interviews and document analysis. Despite teachers' significant efforts to implement digital education in ECD classrooms, the process faced numerous challenges. On a positive note, exposing young learners to digital education helped develop well-rounded skills relevant to their future careers and personal lives. Additionally, sustainable development provides learners with the knowledge, values, and skills needed to tackle global challenges and contribute to a more sustainable future.

Keywords: Digital Tools, Digital Resources, Digital Technology, Digital Education, Sustainable Development, Early Childhood Teacher, Early Childhood Learners.

INTRODUCTION

Generally, education is seen as the primary strategy people use to expose themselves to new experiences and practices that transform their lives. More specifically, digital education can be implemented in schools to equip people with knowledge and competencies that increase their productivity (Haleem *et al.*, 2022). Since the advent of COVID-19, education systems worldwide have increased their investment in integrating information and communication technology (ICT) (Fernández-Gutiérrez *et al.*, 2020). Currently, developing countries are prioritising their educational agendas to adapt strategies or policies around digital teaching and learning (European Commission, 2020; Timotheou *et al.*, 2022). During the pandemic, teaching across education levels, including ECD, was forced to move online (Daniel, 2020). Online teaching and learning accelerated the use of digital technologies, prompting questions about the process, nature, extent, and effectiveness of digitalization in schools (Timotheou, 2022). Whilst digitalization offers great possibilities for fundamental improvement in schools (OECD, 2021) and touches many aspects of a school's development (Delcker & Ifenthaler, 2021; Timotheou, 2022), research suggests that it is a complex process that requires the technical aspects of technology and infrastructure (Pettersson, 2021; Timotheou, 2022). Recent studies have shown that, despite investments in introducing digital education in schools, particularly in ECD classrooms, the

results have not been promising, and the intended outcomes have not yet been achieved (Timotheou *et al.*, 2022; Haleem *et al.*, 2022). Against this background, the study was carried out to determine the implementation of digital education for sustainable development in ECD classrooms of Zimbabwe.

Research Questions

The study was guided by the following research questions:

1. What are the current teacher practices in the implementation of digital education in ECD classrooms?
2. How are ECD teachers implementing digital education for sustainable development in ECD classrooms?
3. Are there any benefits of implementing digital education for sustainable development in ECD classrooms?

LITERATURE REVIEW

This section aims to provide a clear understanding of the current state of knowledge on digital education for sustainable development, organized under the following subheadings: digital education in early childhood classrooms, ways of using digital technology in children's learning, and sustainable development in ECD classrooms.

Digital Education in Early Childhood Classrooms

The existing literature offers different meanings

and explanations of digital education. These include: digital technology, digital tools, digital resources, and ICT (Information and Communication Technology). These are interactive books. Digital technology includes digital tools and devices as well as digital resources and media (Haleem, 2022). Digital tools include various types of computers and tablets, interactive screens, cameras, programming equipment, and other digital production tools. Digital resources refer to the digital content used with children, including online content and apps or software that can be installed (Undheim, 2022). Digital education is the process of using digital resources and tools for teaching and learning. Examples of digital resources are educational apps, interactive e-books, and virtual manipulatives. Educational apps like Endless Alphabet help children learn letters, phonics, and vocabulary. The app uses games, puzzles, and songs to teach foundational skills such as listening, reading, and speaking. Interactive e-books include: audiobooks and learning videos which capture the interests of young children. It helps them to learn the letters of the alphabet. Virtual manipulatives help young children develop number sense and mathematical skills through games and activities.

ICT in education refers to the use of tools and services that handle and communicate information for supporting learning and instruction. It can include: computers, networks, software, mobile phones, televisions, and other electronic media. It assists teachers and learners in communicating, creating, disseminating, storing, and managing information. In essence, digital education has changed the nature and scope of education (Edwards *et al.*, 2020; Fielding *et al.*, 2023) and can complement more traditional resources to support children's investigations and explorations in early learning contexts (Johnston, 2019). However, with the increasing use of digital technology in society, it is important to critically examine and reconsider the ways in which children use and engage with the technology, at home and in early childhood centres (Undheim, 2022).

Ways of Using Digital Technology in Children's Learning

With the rise of technology and its pervasive presence in young children's lives, it is important to establish how teachers can integrate it in teaching and learning. In fact, today's children are referred to as "digital natives" because they have grown up in a world where technology is ubiquitous (Coban *et al.*, 2022). On the same note,

a study by Flear (2020) found that children used digital technology in distributed ways across various activities in ECEC settings. It is therefore important to explore the various ways of using digital technology, because for many children growing up today, it is as natural as any other artifact or tool (Edwards *et al.*, 2020).

Flear (2020) identified exploratory learning through the project method as the best way of implementing digital technology. Flear's study, using Hedegaard's model of child development, found that teachers encouraged the children to observe and discover their surroundings using tablets, digital microscopes, and trail cameras, as well as to engage in collaborative meaning-making with their peers. The digital microscope enabled the children to examine soil samples from the compost bin and water samples from their outdoor play area (Flear, 2020), while the trail camera captured images of wildlife in the local forest. Through the use of digital technology, the teachers empowered the children to be actors in their inquiry by giving them time and space to explore (Flear, 2020).

Technology can be used as a tool for investigation, enabling ECD teachers to present images of different aspects of space, such as information on planet names, to verify and complement children's ideas, and to provide information from other reference materials (Fielding & Murcia, 2020). Children develop conceptual scientific knowledge through using their senses in everyday experiences (Hamlin & Wisneski, 2012). Stephen and Plowman (2003) conclude that digital technology can be a valuable addition to teachers' practices, but this depends on teachers' pedagogical knowledge and expertise.

There is a plethora of interactive educational apps available for various subjects (Ulum, 2022). These apps often use gamification to make learning more engaging and effective. For example, platforms like Khan Academy and Coursera for Kids offer interactive lessons, videos, and quizzes across a wide range of subjects and age groups (Ulum, 2022; Undheim, 2022). By incorporating these apps in teaching and learning, digital technology can be seen as supporting children's achievement and engagement in complex activities. During these lessons, teachers provide proximal support and guidance when children explore, create, play, and learn with the technology (Undheim, 2022).

The use of technology provides children with a vast array of information at their fingertips. This can be incredibly beneficial for education and learning, as it helps foster curiosity and encourages children to explore new topics and ideas. On the one hand, technology can support learning and provide access to educational resources and information (European Commission, 2022). The integration of technology in the curriculum allows children to learn about their world and various other subjects.

Digital education in schools has made communication easier and more accessible for children and teachers. For example, children who struggle with social skills are provided with a platform to build relationships and practice their communication skills. During the preschool years, young children are developing a sense of initiative and creativity (Kalati & Kim, 2022). They are curious about the world around them and about learning. They are exploring their ability to create and communicate using a variety of media. Against this background, it is important to note that technology has opened up new avenues for creativity and self-expression among children (Timotheou *et al.*, 2022). For example, children can create digital art, music, and videos, or participate in virtual worlds where they can build, create, and explore.

Digital tools offer interactive and engaging learning experiences, making education more enjoyable and encouraging active participation among young learners (Su & Yang, 2022). Young children's concentration span is very low, so they need tools and resources that are interesting and engaging. Digital tools offer hands-on learning. The interactive nature of digital tools allows young learners to connect with peers and educators globally, fostering cross-cultural understanding and collaboration. With digital tools and resources, parents and caregivers support their child's learning journey and promote positive digital behaviors at home (Johnston *et al.*, 2018). The engagement empowers young learners to actively participate at home and in local initiatives, contributing to positive change. Interactive community engagement enhances empathy and compassion among young learners as they understand the challenges faced by their communities.

Sustainable Development in ECD Classrooms

The Brundtland Commission's goal and definition of sustainable development is: "the development

that meets the needs of the present generations without compromising the ability of future generations to meet their own needs" (Shumba, 2018 pp89). The goal aligns with the 2030 Agenda for Sustainable Development, which comprises the 17 Sustainable Development Goals (SDGs) in an integrated and indivisible framework. The fourth sustainable development goal (SDG4), i.e., quality education, is intended to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, and has been appointed as the universal education goal (UNESCO, 2017b). The study focused on target 4.7, which emphasizes education for sustainable development (ESD). Within the SDG framework, the ESD target is to ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, human rights and gender equality (UNESCO, 2016; Jetly & Singh, 2020). In this regard, digital education for sustainable development is an appropriate educational program to educate people from an early age to meet the demands of the evolving technological landscape.

Integrating sustainable development principles into education systems helps to create awareness, develop skills, and foster attitudes that support the long-term well-being of both people and the planet (Shumba, 2018). Similarly, integrating sustainable development into ECD classes raises learners' awareness of the environmental, social, and economic challenges facing the world. Teaching digital literacy in schools is one of the economic and social challenges that most countries are facing in the 21st century. Sustainable development encourages the development of critical thinking, problem-solving, and decision-making skills in learners. The skills are essential for addressing complex sustainability challenges. Several authors advocate that these digital literacy skills linked to sustainable development must be taught from an early childhood level (Keane *et al.*, 2023; Luo *et al.*, 2021; Al Abdullatif, 2022). As mentioned earlier, integrating sustainability into education promotes creativity and innovation. Through effective implementation of digital education, learners develop new technologies, processes, and systems that contribute to sustainable development (Zhukova *et al.*, 2020; Shumba, 2018).

METHODOLOGY

The section was divided into six segments: research approach, research design, data collection

methods, research participants, and data analysis.

Research Approach

The interpretive design was chosen for its emphasis on studying social phenomena within their specific cultural, historical, and social contexts (Creswell & Poth, 2018). Interpretivism emphasizes the subjective nature of human experiences and the importance of understanding social phenomena through the meanings and interpretations that individuals attach to them (Marshall & Rossman, 2016). The philosophy enabled the researcher to understand individual ECD teachers' experiences, beliefs and values in implementing digital education for sustainable development in ECD classrooms.

The design involves studying multiple cases to gain insights into a particular phenomenon, issue, or problem. This approach allowed the researcher to compare and contrast three different schools, identify patterns, and develop a deeper understanding of digital education in ECD classrooms (Creswell & Poth, 2018). Rich, detailed descriptions of each case were provided, and the complexity and uniqueness of individual experiences were captured. The researcher studied three schools focusing on ECD learning centers, and, according to Algozzine & Hancock (2016), the evidence generated from a multiple case study is strong and reliable.

Three ECD teachers from three different schools were purposively sampled to take part in the study (Creswell & Poth, 2018). In this study, the researcher's interest was to understand how teachers were teaching digital education in ECD classrooms. The three qualified teachers with over 5 years' experience were selected. The study considered factors such as ability to recall facts, understand and relate to real-life experiences as well as the capacity to logically reason and communicate thoughts in an appropriate scholarly language (Mukherji & Albon, 2015).

Data Collection Methods

Data were collected from three ECD teachers across three schools through face-to-face semi-structured interviews and document analysis.

Face-To-Face Semi-Structured Interviews

These types of interviews were most germane to research seeking to address questions that demanded in-depth, individual responses (Marshall & Rossman, 2016). Semi-structured interviews were most useful as they gave insight into how ECD teachers were implementing digital education

in their lessons. Semi-structured interviewing was most useful for gaining an in-depth understanding of the study, as it enabled the identification of different insights, behaviors, approaches, and practices of the three teachers (Yin, 2017). In addition, semi-structured interviews were conducted to elicit information from ECD teachers to achieve a holistic understanding of their views on the relationship between digital education and sustainable development. Before the interview, the participants were briefed thoroughly and reassured of their rights and responsibilities in the research (Miles, Huberman & Saldana, 2014). The interviews with ECD teachers were conducted in the classrooms after the learners.

Document Analysis

The study analysed the documents that ECD teachers used in the teaching and learning process, which include: ECD syllabi, the Curriculum Framework, and the schemes of work. The ECD syllabi were important because they set forth the topics, concepts, and key ideas to be taught during the course. The syllabus contains the suggested pedagogy and the assessment to be done to determine achievement of both aims and objectives of the course. The rationale for using document analysis is that it provides background information on the implementation of digital education in the teaching and learning of ECD learners (Tight, 2017). In this study, document analysis served to ensure the study was critical and comprehensive, as it identified questions that needed to be asked and situations that needed to be observed (Bowen, 2009).

Data Analysis

The thematic approach and content analysis were adopted as methods of analysing and interpreting data. Data from semi-structured interviews were thematically analysed. Thematic analysis was chosen because it provided a way to identify patterns in the data and connect them into meaningful categories and themes that capture the topic under study (Yin, 2017). The data analysis process involved reading the collected data several times, taking note of common ideas, and coding them throughout the text (Bartlett & Vavrus, 2016). It involved "identifying, coding, categorizing, classifying, and labelling the primary patterns in the data" to "determine what is significant" (Ridder, 2016, p. 71). Finally, the codes were grouped together into similar clusters to create a meaningful theme. The three major themes were predetermined because they corresponded to the subsidiary questions.

Content analysis assisted in exploring large amounts of textual information from schemes of work and syllabuses to determine trends and patterns in the words used, including their frequency, relationships, and structures (Marks & Yardley, 2004). Analysed textual data from the syllabi and schemes of work were systematically coded. Content analysis helped select relevant codes that ultimately fit the themes and discard those that did not relate to the research questions. The final research report reflected primary evidence generated from the identified documents.

FINDINGS AND DISCUSSION

The main objective of the study was to explore how teachers in ECD classrooms implement digital education for sustainable development. The analysis and discussion of the findings are presented in the following sections, organized around the emerging themes that were also predetermined by participants' narratives and related literature. Data were presented under the following themes: current practices in implementing digital education in ECD classrooms, ways to implement digital education for sustainable development in ECD classrooms, benefits of implementing digital education in ECD classrooms, and the relationship between digital education and sustainable development.

Current Practices in the Implementation of Digital Education in ECD Classrooms

Research findings suggest that the current curriculum advocates for the teaching of technology from early childhood development (The Curriculum Framework for Primary and Secondary Education, 2015-2022). The Curriculum Framework clearly spells technological skills as one of the learner exit profiles that learners should possess as a result of their learning experiences (pp 17). In addition, the curriculum framework identifies digital literacy as a cross-cutting theme in Zimbabwe's education system. One of the aims of the curriculum is to embrace ICT (information and communication technology) and e-learning in order to foster lifelong skills. According to the curriculum framework, ICT is one of the learning areas in infant (ECD–grade 2), which exposes learners to the manipulation of ICT tools and the development of skills through games (pp. 32). Learners also learn about the purposes and care of electrical appliances. Guided by the curriculum frameworks' aims and goals, teachers are obliged to implement digital literacy in early childhood development.

Teachers agreed that they are implementing digital education in their lessons as guided by the Curriculum framework. Teacher C said she created a WhatsApp group for all learners' parents. She sends homework on the platform so that parents can assist their children at home. According to her, parents communicate effectively on WhatsApp, except for a few who do not have smartphones. She added that effective communication between the teacher and parents encourages teamwork, collaboration and improves interaction. She narrated that parents can share ideas and knowledge on learners' needs and upbringing.

Teacher B explained that she integrates technology into all her lessons. For example, when teaching languages, she downloads the videos on letter sounds of the alphabet and saves them on the computer (laptop). She will play the videos during the lesson. According to her report, such lessons are lively and interesting and are enjoyed by learners. In science lessons, she shows learners actual images from the computer rather than models. For example, in the landforms topic, learners viewed pictures of mountains, hills, and the ocean on the computer. Computer lessons were live, interesting, and motivating. Young children have low attention spans, but teaching with computers improves learners' concentration spans. However, she stated that frequent power cuts disrupt most of her lessons because the school lacks a backup power supply.

At Teacher D's school, ICT is taught as a separate subject. She teaches about the electrical appliances like laptops, stoves, and cell phones, among others. She was quick to narrate the challenges she is facing during the implementation due to inadequate appliances at the school. According to her, teaching concepts becomes difficult because learners share computers, with a learner-to-computer ratio of 1:6.

Data gathered suggests that teachers were implementing the digital education as guided by the curriculum framework. The study found that digital education had numerous names. These include: ICT, digital literacy, or digital education. The different names refer to the teaching of technology using digital tools in schools. However, implementing digital education seems to be coupled with challenges, such as inadequate computers and insufficient power, among others. Teachers were putting effort into teaching lessons using technology as guided by the curriculum framework. The findings suggest that online

teaching using computers was interesting and motivating, and seems to develop learners' concentration span. Furthermore, online collaboration tools, discussion forums, and shared documents enabled children and parents to work together on assigned assignments (homework), solve problems collaboratively, and exchange ideas with classmates in virtual environments.

Curriculum documents indicated that technology fosters lifelong learning. Technology enables learners to continue learning even outside the classroom throughout their lives. Secondly, manipulation of ICT tools enhances skills such as hand-eye coordination, gross and fine motor skills. In addition, Zhukova *et al* (2020) reiterate that digital tools provide platforms for creativity and innovation, allowing young learners to express themselves through digital art, storytelling, coding, and other creative endeavors. Teachers reported that, in addition to skills development, teaching with computers was interesting and motivating for learners. During observations, technology lessons were always live and participatory.

Teachers argued that, despite assisting learners' homework, digital education encouraged collaboration between them and parents. Both parties worked together to assist learners in reading. According to Undheim (2022), online learning platforms encourage parents and teachers to collaborate, experiment, and bring their ideas to fruition, driving economic growth and innovation. In addition, digital education facilitates global collaboration, knowledge sharing, and exchange of best practices among teachers and parents of young children.

It has also emerged that teachers are implementing digital education in schools differently. The difference may be due to different interpretations of the framework's syllabus. It can be mentioned that teachers need training in syllabus implementation. To fill this gap, Roofe, *et al* (2021) advocate for appropriate training incorporating practical classroom experience. Planning is important to help teachers plan their lessons effectively. It therefore implies that teachers need staff development workshops and training on syllabus interpretation and the implementation of digital education in teaching.

Ways of Implementing Digital Education for Sustainable Development in ECD Classrooms

Implementing digital education in early childhood development enriches the teaching process. It also

supports child development and enhances young children's learning experiences. The three teachers echoed that they were employing different ways in teaching using technology in the classrooms. The ways include: using WhatsApp platforms for communication, creating ICT learning areas, among others.

During the interviews, Teacher D alluded that she had created an ICT learning area in the classroom. In that area, there were models of digital devices, such as tablets, computers, electric stoves, cell phones, and laptops. She added that some of the toy materials were bought by parents in support of digital learning. Learners visited the learning area during ICT lessons and performed various activities. However, she reiterated that the learning materials were inadequate considering the number of learners in the classroom, leading to learners scrambling for the few materials.

Teacher B, who integrates technology in all the subjects in the curriculum, explains that play incorporates digital tools into lesson plans and activities across different subject areas. She added that using computers for literacy, numeracy, and science in teaching young children encouraged collaborative learning. Technological tools allowed learners to learn in groups and pairs. In addition, Teacher C highlighted that teaching with computers accommodated learners from diverse backgrounds.

Teacher C reported that, in addition to creating WhatsApp groups for communication with parents, she also used an observation app to record anecdotal notes and observations of children's behavior, interactions, and developmental milestones. According to her, the tool can streamline the documentation process and provide a comprehensive view of each child's strengths, interests, and areas for growth. In addition, the app allowed her to track learners' individual performance, identify learning gaps, and tailor instruction to meet each child's needs effectively. The process of integrating digital education into the classroom made teaching and learning easier. She noted that the major challenge is that resources are not being provided by the school, citing that teachers, including her, use personal laptops and tablets for assessing learners' work. She narrated that this lack of support by school administrators is hindering the implementation process. She identified a lack of adequate knowledge of using digital tools or apps for assessment as a challenge in fulfilling her

professional teaching duties.

The findings indicated that digital education can be implemented by establishing an ICT area within the classroom. Learners visited the area during lessons to manipulate the various gadgets displayed there. The creation of this area requires the teacher's creativity and innovation in developing relevant, age-appropriate models. On the same note, digital education exposes learners to a vast array of educational resources, including e-books, interactive websites, educational apps, and multimedia content, enriching the learning experience (Tang, 2022). Introducing digital education at an early age helps prevent technological disparities by ensuring that all learners, regardless of background, have access to digital tools and opportunities (Kalati & Kim, 2022). The use of digital tools supports flexible learning environments, allowing young learners to access educational content anytime, anywhere, and on various devices (Ulum, 2022). Digital education can be adapted to meet the needs of learners with diverse abilities and learning styles, fostering inclusivity in the learning environment.

Benefits of Implementing Digital Education for Sustainable Development in ECD Classrooms

Implementing digital education in teaching young children offers various benefits that can enhance their learning experiences and support their overall development. The study gathered that Teacher D, who developed the ICT learning area in the classroom, had this to say:

The ICT learning area in this classroom offers interactive learning experiences among learners. Learners visit the area to manipulate objects, share ideas and make discoveries in a hands-on, immersive environment. During the interaction process, learners develop gross and fine motor skills, language, and vocabulary skills.

Teachers C reported that digital education makes the teaching and learning process easy if the teachers are well-trained. She added that the process paved the way for personalized learning experiences tailored to meet each child's unique needs, interests, and learning styles. Individualized learning allows learners to stay engaged and focused on their studies when learning through digital media. Teacher C advocated that all ECD teachers should be trained to integrate ICT tools into the teaching and learning process.

Teacher B supported the implementation of digital education in ECD classrooms, citing that it develops learners' skills. She said:

Children learn basic digital literacy skills, which include operating tablets, computers, and phones. This foundational skill is crucial as technology becomes increasingly integrated into their everyday life. In addition, interactive digital tools, such as computers, enhance cognitive development through activities that promote critical thinking, problem-solving, and decision-making. For example, games require learners to follow instructions, recognize patterns, and solve puzzles. Using touch screens, keyboards, and mice helps improve fine motor skills and hand-eye coordination. These physical interactions with digital devices are important for developing dexterity and precision in young learners.

The study found that integrating digital education into early childhood classrooms is a balanced approach that supports learners' overall development. Implementing digital education in early childhood classrooms fosters a variety of skills in young learners. Skills identified by teachers included critical thinking, problem-solving, collaboration, and fine and gross motor skills, among others. The skills are developed as young learners navigate and analyze information, evaluate online content, and engage in interactive activities. For example, critical thinking skills are developed as learners analyse complex activities and evaluate different perspectives during class activities designed by the teacher. Learners develop problem-solving skills as they explore solutions to real-world sustainability challenges, fostering creativity and innovation. With the skills, learners are furnished with lifelong skills which will enable them to solve real-life problems in the future (Haleem *et al.*, 2022; Petterson, 2021). In addition, learners will be able to contribute to developing a foundation for future career readiness in fields that increasingly require technological proficiency (Su & Yang, 2022).

The Relationship between Digital Education and Sustainable Development

The study found a relationship between digital education and sustainable development. During interviews, Teacher C was quick to say that digital education is a welcoming development in the primary school. Children will not be limited to books alone; they will expand their horizons and learn what is happening in other countries or worldwide by accessing the internet. The teacher

further noted that digital education provides young children with opportunities to access quality education regardless of their geographical location or socioeconomic status. The digital learning platforms enable learners to access educational resources and opportunities that may not be available locally, thereby promoting inclusive and equitable education, which is a key component of sustainable development.

Teacher B responded that teaching learners with computers is a lifelong endeavor. Through technology, children acquire skills or information they might need in the future. She added that nowadays learners encounter technology daily. Therefore, planning interesting lessons with hands-on activities is a sustainable approach because learners are unlikely to forget what they have done.

Teacher A said:

Some people make a living through social media, e.g., Facebook and Twitter. We need training and knowledge on using social media to earn money as teachers. Digital education should be taken seriously in schools so that it can be our side hustle. If we are well-trained, we can use social media to earn extra money and teach young learners. We need the skills and expertise during this era, where everything has gone digital.

Teachers agreed that both sustainable development and digital education are relevant themes in early childhood development. It is important to introduce learners to digital education to achieve sustainable development goals (Johnston, 2019; Johnston *et al.*, 2018). In addition, participation on online apps equips learners with the knowledge, skills, and competencies needed to participate effectively in the workforce and contribute to economic growth and development (Vuorikari *et al.*, 2020; Zhukova *et al.*, 2020). Digital resources like assessment apps reduce paper use, lowering environmental impact and promoting sustainable consumption and production patterns.

CONCLUSION

The implementation of digital education for sustainable development aligns with the Sustainable Development Goals (SDGs). Goal 4: Quality education aims to ensure that every child receives a free, equitable, and high-quality education. Quality education encompasses the teaching and learning of sustainable development, including digital education. In addition, current goals and aims of early childhood education in

Zimbabwe embrace digital literacy as a cross-cutting theme in the curriculum (The Curriculum Framework for Primary and Secondary Education (2015-2022); UNESCO, 2020; Fielding & Murcia, 2022). Digital education and sustainable development are also contemporary themes in the 21st century. Contemporary scholars on education in the post-COVID-19 era advocate that schools be digitally compliant from an early age (Daniel, 2020; Delker & Ifenthaler, 2021; Kalati & Kim, 2022) to enhance the development of skills in young learners.

Despite being interesting and motivating, digital education offers numerous advantages. These include equipping learners with the knowledge, values, and ideas necessary to address global challenges and contribute to a more sustainable future. Digital education is an inclusive approach that caters to learners from diverse backgrounds and different learning styles. To maintain quality education, schools must increase their investment in integrating digital education (European Commission, 2020). As such, there is a need to establish policies, infrastructure, and teachers' digital competence to support the effective integration of technology into teaching and learning practices.

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