



# Integrating Playful Technology in Teacher Development Programs to Strengthen Early Childhood Learning in Zimbabwe

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**Abstract:** *This qualitative study investigates the role of teacher development programs in supporting the integration of playful technology to strengthen foundational learning in early childhood education. While technology-mediated play is increasingly used to engage young learners, existing research predominantly focuses on children's experiences and learning outcomes, with limited attention to teacher education and professional development. Guided by a sociocultural perspective, the study explores how professional development initiatives in Zimbabwean universities equip teachers with pedagogical and technological competencies to create interactive, socially rich learning environments. The study population comprises Early Childhood Development teachers from ECD centres and schools. Purposive sampling was used to select participants with experience in play-based learning, and maximum variation sampling ensured diverse perspectives on technology integration. Data was collected through semi structured interviews of five teachers, two focus groups of 6–8 teachers each, classroom observations of five teachers, and document analysis of curricula, lesson plans, and professional development materials. Thematic analysis was employed to identify key patterns and themes across data sources. Findings revealed that ongoing professional development, reflective practice, and collaborative support are critical for fostering teacher confidence and competence in integrating playful technology. The study accentuates the significance of contextually responsive, participatory teacher development programs that enhance both technical and pedagogical skills, ultimately supporting improved learning outcomes and meaningful engagement for young learners. By foregrounding teachers' perspectives and triangulating data with documents and observations, this study addresses an under-researched area in early childhood education and provides practical insights for designing effective professional learning initiatives.*

**Keywords:** *Early childhood development, playful-technology, teacher development, technology-mediated play, sociocultural theory.*

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## 1. Introduction

Early Childhood Development is a critical foundation for lifelong learning and development. The integration of playful technology in teacher development programmes to strengthen early childhood learning has emerged as a vital strategy to enhance learning outcomes in Early Childhood Development. In Zimbabwe, the government has emphasized the importance of embracing

Information and Communication Technologies (ICTs) in education, aligning with global technological trends.

Integration of playful technology refers to the use of digital tools and platforms to support learning through play. It promotes natural curiosity and creativity in young children, promoting engagement, motivation, and cognitive development. Examples of playful technology

include interactive whiteboards, educational apps, and games.

Despite the growing adoption of policies that emphasise on playful learning, a considerable disparity persists between policy ideals, research findings, and actual instructional practices. However, the integration of playful technology in Zimbabwe's teacher programmes in colleges and universities is considered as vital. Student teachers have a dual role to play, thus learning through ICTs (Information and communication technologies) as well as learning to teach through them. Surprisingly, schools in Zimbabwe have integrated technology from ECD level yet implementation seems to be an eye sore and teacher education colleges have not been a clear match with an equal effort and hence student teachers are not fully exposed and trained in using and integrating such technologies. This mismatch has caused confusion between the demand for facilitators who are conversant with ICTs and e-learning as well as their availability.

The integration of playful technology in teacher education programmes in Zimbabwe has been growing in leaps and bounds since 2002. The Zimbabwean government developed a national ICT policy in 2005. Isaacs (2007) argues that the policy was informed both by a Harvard University-guided e-readiness survey, which suggested the country was not e-ready, and by a host of preceding general and sector policies that included the Nziramasanga Education Commission Report of 1999, the national science and technology policy of 2002 and vision 2020. The Nziramasanga Commission of 1999 recommended the integration of technology, for example, the use of computers for teaching and learning in educational institutions. The National ICT policy that was adopted in 2005 reflected significant references to the integration of technology in education programmes including their pedagogical use in educational institutions (Isaacs, 2007). The president's office also made an effort by launching a campaign to donate computer related equipment. This benefited most schools in the remote areas of the nation and universities and thus enabled them to integrate technology in the teaching and learning programmes, although research still needs to be done to establish the available relevant ICT skills. Unfortunately, this campaign caused a mismatch in the provision of IT resources. It is the extreme ends of the education sector that were capacitated leaving middle but essential departments, particularly Teacher Education Colleges, as well as Polytechnic Colleges not catered for (Isaacs, 2007). This shows that teacher Education Colleges were the most affected, since they are essentially a service sector that also cannot raise any extra income to help themselves survive. It is precisely for this reason that a nongovernmental organisation, VVOB5 (Vlaamse Vereniging voor Ontwikkelingssamenwerking en Technische Bijstand), carried out a needs analysis survey and identified a gap in the use of ICTs in teaching and learning at Teacher Education Colleges and Polytechnics in Zimbabwe, which it decided to roll out a programme

that came to be known as the CITEP (College IT (information technology) Enhancement (Isaacs, 2007).

The integration of ICTs in the Zimbabwe teacher education curriculum was achieved through the CITEP6. VVOB identified a needs gap in the integration of ICTs in Teacher's Colleges. The programme ran from January 2003 to December 2008. Although the programme involved 10 Polytechnical Colleges and three Secondary Teacher Education Colleges.

The rollout of the programme was in three phases, namely, the development of IT infrastructure, ICT support and staff development. These are partly the same concepts identified by the UNESCO-UIS (2009) in its guide in measuring ICTs in education. In integrating ICT Infrastructure CITEP included various activities that included establishment of an IT unit at each college whose role was to coordinate all IT activities at the institution, establishment of student computer laboratories at colleges where these were not available, networking the various college buildings and departments into a college area network and linking all the participating colleges in to a wide area network and the World Wide Web through broadband connection. ICT Support Capacity building in IT unit members by training them in hardware and software repair and maintenance was initiated (UNESCO, 2009). Standardised training workshops were administered to allow the sharing of ideas and transfer of personnel across the colleges. The aim was to motivate lecturers to utilise ICT skills in their teaching methodologies and hence pass on the same skills to students in their respective departments.

## 1.2 Research Objectives

Observing that Zimbabwean Early Childhood Development (ECD) settings are pivotal to the success of Education 5.0 and the National Development Strategy goals of human capital development and acknowledging that play based learning is a basic or foundational approach for the young children's holistic development and emotional growth, this study is grounded in the need to strengthen teacher preparation for the 21st century classrooms. Also taking into consideration that the rapid increase of low-cost digital tools and mobile technologies in Zimbabwe accompanied with the global evidence that playful technology can promote participation, creativity and foundational literacy as well as numeracy in early childhood, it is therefore very crucial to assess how teacher development programs are responding. Recognising that lecturers and student teachers often complete their studies with limited pedagogical competence to integrate technology in developmentally appropriate, play based methods and also noting that ongoing challenges like infrastructure gaps, rigid curricular and limited professional development is a stumbling block to effective integration. This study aims to generate evidence to inform policy and practice.

1. To investigate the current state of technology integration in teacher development programmes to enhance Early Childhood learning in Zimbabwe.
2. To establish the role of teacher development programmes in supporting playful technology integration to strengthen foundational learning in Early Childhood learning.
3. To identify barriers and opportunities for integrating playful technology in early childhood learning through teacher development programmes.
4. To analyse how professional development initiatives in Zimbabwean universities equip teachers with pedagogical and technological competences to create interactive, socially rich learning environment.

### 1.3 Statement of the Problem

The existing situation in Zimbabwe reflects that there is insufficient teacher training and support in integrating playful technology in teacher programmes (Nziramasanga Commission of 1999). Research studies indicate that there is limited access to technology and digital resources in ECD which calls for contextually responsive teacher development programmes that support teachers in effectively integrating technology in their teaching practices. In teaching and learning situations, the worrying issue is the fact that, how much exposure and skills do these teachers get? There is lack of motivation, infrastructure and skills development programmes which empower ECD teachers to effectively integrate playful technology in teaching programmes. The establishment of policies that promote playful technology at ECD level in Zimbabwe do not match with the practices on the ground, thus the extent to which Zimbabwe has gone in implementing technology integration in its ECD set ups. Alarming cries from a number of stakeholders and media have been heard that the majority of the teachers have technophobia, thus they are not fully benefiting from teacher programmes in regard to playful technology (UNICEF report (2013). Therefore, the research study aimed to find out the effectiveness of integrating playful technology in teacher programmes at ECD level.

## 2. Literature Review

### 2.1 Theoretical Framework and Research Paradigm

The integration of playful technology in teacher development programmes has the potential to strengthen early childhood learning in Zimbabwe. This study is grounded Constructivist Learning Theory. Vygotsky's (1978) constructivist learning theory argues that learners construct knowledge contextually through active engagement with their environment. Playful technology can facilitate this process by providing interactive and immersive learning experiences that promote

exploration, discovery, and creativity (Papert, 2025). Integrating playful technology in teacher development programmes helps educators to develop the skills and confidence needed to effectively integrate technology in their teaching practices.

The sociocultural perspective is particularly relevant to this study, as it acknowledges the cultural and social context of Zimbabwe and the importance of considering the local context in designing teacher development programmes. The sociocultural perspective emphasizes that learning is a collaborative process that occurs through social interactions and is shaped by the cultural context. In the context of this study, the sociocultural perspective suggests that learning is a social process. Teachers learn best through interactions with their colleagues, mentors, and learners. Zimbabwe's cultural contexts need to be considered in designing teacher development programmes (Nsengimana et al, 2020). Playful technology can facilitate social learning through the use of interactive tools and collaborative activities that promote social interaction, creativity, and problem-solving (Resnick, 2017).

### 2.2 Importance of Integrating Playful Technology in Teacher Development Programmes

Integrating playful technology in Early Childhood Development is very important in promoting engagement, motivation, and cognitive development among young learners. Research highlights the benefits of technology integration, including increased learner engagement, concentration, and participation in schools. Integrating digital technology tools in playful technology in teacher development programmes strengthens early childhood learning and also offers opportunities for information illustration, enhancing social skills, problem-solving, communication, and literacy skills.

This paper investigates the role of teacher development programmes in supporting the integration of playful technology to strengthen foundational learning in Early Childhood Development in Zimbabwe. The study is informed by a sociocultural perspective and examines how professional development initiatives equip teachers with pedagogical and technological competencies. A study by Livingstone (2015) on the transformative potential of Information and Communication Technology (ICT) in education, juxtaposed with the slow pace of adoption in schools. Livingstone focused much on how technology is integrated into educational programmes, advocating for more coherent strategies that align technological tools with educational objectives. The study indicated the need for research into effective ICT implementation and called for a more systematic approach to integrating technology into curricula to enhance educational effectiveness.

Kaynar et al. (2020) investigated teachers' views on the use of electronic books (e-books) in early childhood

education to enhance literacy skills. The study generally indicated positive perceptions of e-books, revealing increased student interest in reading and improved reading competencies. Electronic badges integrated into e-books were cited as a factor that motivated students. In contrast, technical issues and limited parental guidance were identified as significant challenges. The study highlighted the reliability of e-books in education programmes to support literacy development while also pointing out areas for improvement in their implementation. Undheim (2022) reviewed empirical studies on young children's and teachers' engagement with digital technologies in early childhood education. He found out that digital play is real, disconnected contexts, teachers' knowledge and beliefs, learning with and from technology, and children as creators. The findings emphasized the importance of defining digital technology broadly and integrating it into pedagogical practice. The review suggested incorporating a more explicit focus on digital technology in national curricula and teacher education programmes to better support early childhood education practices.

However, despite the potential benefits, effective integration of educational technologies in teacher development programmes remains a significant challenge (Loveless, 2007). In Zimbabwe, several researchers note that the use of ICTs as media of instruction involves substantial funding, which is often expensive a limitation in some countries. The lack of a clear framework to guide the integration of technology in play-based learning and insufficient human skills are additional challenges that hinder the effective implementation of playful technology in teacher development programmes to enhance early childhood learning in Zimbabwe.

Teachers need to be exposed to effective use of ICT in their training (Steketee, 2006). Integrating ICT as a learning resource in teacher programmes is very important because it exposes students to innovative ways of learning. Teacher training programmes need to effectively train their prospective teachers in using different ICT materials for lessons and also to be able to direct and have learners effectively benefit from such materials (Osborne & Hennessy, 2003).

### **2.3. International Best Practices on Playful Technology Integration**

Countries that have successfully integrated playful technology in Early Childhood Development include the United States which uses interactive whiteboards and tablets to support literacy and numeracy skills. Implementation in the United Kingdom digital includes the use of games and simulations to enhance learning outcomes while Australia is using tablets and apps to promote STEM education and creativity. Despite the numerous benefits of playful learning, its significance is sometimes overlooked (Cowan, 2020), especially in Early Childhood Development. Many countries have

updated and presented their ECD curriculum as being play-based. In contrast, it is difficult to have seen this idea being implemented in practice.

## **2.4 Current State in Zimbabwe**

In Zimbabwe, there is a growing recognition of the importance of technology in education. However, the integration of playful technology in Early Childhood Development remains limited due to insufficient access to digital devices and internet connectivity. Lack of human resources/ teacher training require professional development for effective integration of technology. Cultural and socio-economic factors are a stumbling block as using playful technology is a challenge in resource-constrained settings.

### **2.4.1 Teacher Development Programmes in Zimbabwe**

Teacher development programmes can play a crucial role in promoting the integration of playful technology. Examples of such programmes include:

1. International programmes: UNESCO's ICT Competency Framework for Teachers provides guidelines for teacher training.
2. Local initiatives: The Ministry of Primary and Secondary Education in Zimbabwe has initiated teacher capacity development programmes in ICT.

## **2.5 Perceptions Towards the Integration of Playful Technology**

People have different views and perceptions about issues pertaining to the integration of technology in teacher programmes to strengthen ECD in Zimbabwe. Its effectiveness is being questioned by many in the society for example, the parents, teachers and school heads. However, it is important that all stake holders collaborate in one accord in complex ways so as to promote the integration of technology in this 21st century. Simi (2008) sees attitudes as thoughts, feelings and actions that human beings contend about other people and things they come across in their daily living, which can guide them in thinking whether they like or dislike someone or something. This means that they can be positive or negative evaluation of something capable of influencing someone to act in a certain manner towards that thing. The government of Zimbabwe recognized the importance of ICT in teacher programmes and introduced several policies to integrate technology into education. However, some people perceive its implementation as a 'white elephant', due to several barriers, which include inadequate teachers' training and infrastructure, technological incompetence, and accessibility of resources. There are inadequate digital competences, inadequate learning materials, no harmonious instructional design as a consequence of these barriers, Zimbabwe is still lagging behind other

countries that have adopted technology efficiently in their education system. Some studies reported low competences and avoiding the behaviour of teachers in integrating technology in their programmes and instructional practices. To overcome these barriers, concerned educational authorities should efficiently formulate effective policies to incorporate ICT in teaching-learning practices and allocate a sufficient budget to attain the policies' objectives (Shah et al, 2020).

## **2.6 Challenges Encountered in Integrating Playful Technology**

Integration of technology in education programmes has increased significantly in recent years around the globe. However, the problems and challenges of integrating them into teaching differ from country to country. Research has revealed that the integration of technology in the teacher programmes increases student achievement, fills achievement gaps, increases motivation, improves access to information, and facilitates communication between students and teachers (Davies & West, 2014; Tosuntaş et al., 2019). In contrast, many educational institutions, instructors face challenges regarding accessing digital technologies, possessing the knowledge and abilities to use them effectively, and receiving adequate administrative and technical support (Bai & Lo, 2018; Basarmak & Hamutoglu, 2020; Francom, 2020). Research that was carried out in Hong Kong revealed that resource availability, specifically the lack of technology, are the most commonly reported barrier to integrating digital technologies into teaching (Bai & Lo, 2018).

Lack of funding for assisting educational institutions with digital technologies is a serious challenge. It is impossible to achieve significant educational results to prepare students for life outside of school if teachers are failing to access or use digital technologies in the teaching and learning process. Digital divide result in many other negative consequences as well. Inadequate national and institutional policies for technology integration will result in the failure of technology adoption and integration into education (Bećirović & Dervić, 2022; Tosuntaş et al., 2019). Technological support influences not only integration possibilities but also teachers' attitudes, motivation, and readiness to use digital technologies in the classroom. The research study that was done by Hébert et al. (2021) revealed that while an educational administration might enthusiastically endorse the integration of digital technologies into teaching, it may be that it lacks relevance to systemic barriers that make implementation difficult or even impossible. Additionally, they emphasize that so-called Bring Your Own Device (BYOD) programmes may be cost-effective but are not feasible in areas where parents cannot buy electronics (Hébert et al, 2021). Francom (2020) confirms that research reveal that teachers working in smaller communities experience even more

difficulty accessing technology than teachers working in larger communities.

Hew and Brush (2007) argue that technology availability, as well as certain resources, such as time and technical support, are the most common barriers to the effective integration of digital technologies into the teaching programmes. Furthermore, integration of technology in some educational institutions promotes inferior, low-cost technology and equipment that cannot adequately respond to modern education needs (Bai & Lo, 2018). A study conducted in 2021 by Hébert et al. (2021) in Ontario, revealed that 70% of teachers have difficulty accessing technologies, while almost half have a problem in loading appropriate software applications.

The coronavirus pandemic has unveiled the imbalances caused by the digital divide. Janssen (2020) points out that globally, half of the students kept out of the classroom by COVID-19 (close to 800 million students) do not have access to a household computer, 43% (some 700 million students) even did not have Internet access at home, and about 56 million students lived in locations that are not served by mobile networks" (Janssen, 2020). The other drawback to effectively integrate technology is technical support to teachers. Learning platforms, hardware, routers for Internet connections, and software applications should be checked regularly (Bai & Lo, 2018; Hamutoglu, 2021). The difference between the operating platforms found on students' personal devices and those used by teachers in school is also a challenge; hence teachers are expected to explain, for instance, how certain software works in both Windows and MAC OSX, Android and IOS, etc. (Hyndman, 2018).

## **2.7 Ways of Addressing Challenges Encountered in the Integration of Playful Technology and Teacher Support**

Singh-Pillary and Naidoo (2020) indicates that during COVID19 teachers lacked expertise on teaching and handling online lessons. This indicates that teachers did not have technical training to conduct online lessons, thus, lack of training was the reason for failing to use or integrate technology. However, in order to reduce these barriers, there is to provide grants for educational institutions so as to assist them to procure the necessary equipment and thus meet the conditions for teaching in accordance with the modern needs of the labour market. The majority of teachers and students do not possess personal computers or Internet access at home, hence, the idea of "one-to-one computing initiatives" should be developed. Each student should be allocated a computer or laptop and access to the Internet, both at school and at home. Grants are also required for the implementation of this initiative (Davies & West, 2014). Ideas like "Close the Gap," "an international social enterprise that aims to bridge the digital divide by offering high-quality, pre-owned computers donated by European companies to

educational, medical, and social projects in developing and emerging countries” (Close The Gap, 2021) can also reduce the digital divide and contribute to the digitalization of education systems

### **3. Methodology**

#### **3.1 Research Design**

A research design is a set of plans and procedures that help the researcher to obtain empirical evidence (data) about isolated variables of interest. McMillan and Schumacher (2010) concur that a research design describes the procedures for conducting a study, when, from whom and what conditions that data would be obtained. Creswell (2019) echoes the same sentiments by saying that a research design allows the smooth flow and workings on many research questions. In this study, the researcher opted for a descriptive research design. In this case, descriptive research is a study designed to depict the participants in an accurate way. This study adopted a qualitative paradigm. A qualitative approach is useful in exploring the meanings and interpretation attached to playful technology. Creswell (2019) argues that a qualitative approach focuses on understanding the phenomena under study as a whole in its natural setting. Silverman (2010) states that qualitative research is an interpretive naturalistic approach to its subject matter. This shows that it is a technique of inquiring with the purpose to have an in-depth understanding of human behaviours involving the researcher’s direct interaction. The researcher opted for a constructivist approach specifically a case study which is more appropriate for this study. Multiple instruments such as interviews, observation and document analysis to gather information on the integration of playful technology in teacher programmes was done to achieve triangulation of information and to enhance its validity and reliability. Using a predominantly qualitative research paradigm enabled the researcher to gather valid data from teachers in terms of their knowledge, practices.

#### **3.2 Samples and Sampling**

Krueger (2011) alludes that a sample is a small portion selected for observation and analysis. It is a true reflection of the whole population from which generalisations can be made since they show similar characteristics. The size of a sample is of great importance because it assists in justifying the reliability of findings. Teddlie & Tashakkori (2016) state that sampling procedures refer to the method used to select a subset of individuals, groups or cases from the larger population for the purpose of research or study. This entails that sampling is a method of selecting some part of a group to represent the total group. The two categories of sampling techniques are probability and non-probability sampling. In this study the researcher opted for purposive sampling technique. Frankel and Wallen (2003) state that purposive sampling is done for

a specific purpose of the research, in which the researcher uses personal judgment to select a sample. The chosen sample suits the specific objectives of the study. Personal judgment to identify the participants in the population was used by the researcher. The researcher chose those who were likely to provide valuable information about the concept the researcher was investigating. Purposive sampling was used to select participants with experience in play-based technology and maximum variation sampling ensured diverse perspectives on technology integration. The study sample comprises Early Childhood Development teachers from ECD centres and schools.

#### **3.3 Data Collection Procedures**

Data collection procedures are a means of gathering data from participants. It is the process of providing a detailed plan clearly showing how the researcher will collect necessary information from the sample (Chakuchichi, 2010:69). Creswell (2015) defines data collection procedure as the answers to who, when and how of the project. Therefore, data collection procedure is how the researcher is going to carry out a research, instruments used, population and sample. In this research, three data gathering instruments were used and these are the observations, interviews and curricular documents. Data was collected through semi structured interviews of five teachers, two focus groups of 6–8 teachers each, classroom observations of five teachers, and document analysis of curricula, lesson plans, and professional development materials. 50 to 60 minutes interviews with educators on how they get prepared for playful technology integration, challenges faced and institutional support. The researcher personally conducted verbal interviews for participants one by one at a chosen venue at school. This assisted the researcher to experience a rich qualitative description of each type of response. The researcher made sure that the collected data from the participants was correctly interpreted. Data was collected over a period of at least two weeks. The structured interviews enabled the researcher to capture and fill in the information that was provided by the participants in the blank gaps on the interview guide. Finally, the teachers and their learners at the settings under study were observed. It was also observed how teachers integrated technology in their ECD programs. Observation was done on different days on teacher-child interactions with technology so that the researcher would get the maximum and adequate data to address the items on the observation guide. After all questions were responded to, the researcher collected the information from the interviews, observation and curricular documents for analysis.

#### **3.4 Data Analysis**

Thematic analysis was employed to identify key patterns and themes across data sources. Observation and analysis of curricular lesson plan documents and professional

development materials was done so as to check for the integration of playful technology.

The collected data was coded into themes as a process of data interpretation. Data items were each analysed after the completion of interviews, observations and analysis of documents. Qualitative data was also used to complement the information where individual participants' comments were cited. Analysis of data was done through the technique of thick descriptive and narrative statistics and themes that were derived from the research questions used in this study. Themes were used to analyse qualitative data thus, it was organised and put into manageable categories, identifying what is important to note. Data was analysed continuously to determine the main themes that emerged from it. Questions were analysed according to their similarities in issues or information they aim to gather from the participants through the use of different data collecting tools. Data from the documents, observations and interviews was comparatively analysed in regard to their similarities and differences that emerged. This ensured the reliability and validity of the information got from the participants' responses, which finally formed the basis upon which the conclusions were drawn.

### 3.5 Ethical Considerations

When conducting research, ethical considerations are essential to ensure the study is respectful, fair, and credible. Informed consent must be obtained from all participants, and they should be fully aware of the purpose of the study, the procedures involved, and their right to withdraw at any time without penalty. Protecting confidentiality and anonymity is equally important; responses from interviews should not reveal the identity of participants, and data must be stored securely. Additionally, the researcher must maintain objectivity and integrity avoiding bias in data collection and reporting. Creswell and Creswell (2023) highlight that ethical research requires respect for participants and honesty in reporting findings. Flick (2022) emphasizes that credibility in qualitative research depends on trustworthiness, while Gray (2019) notes that ethical practice involves applying research responsibly in real-world contexts. By adhering to these principles, the study will not only generate reliable findings but also uphold the values of respect, fairness, and accountability in educational research.

## 4. Results and Discussion

This section discusses the findings in relation to the related literature that guided the study. Five key findings emerged from this study about the integration of playful technology within teacher development programs for Early Childhood development in Zimbabwe. The results indicated that participants appear to have positive attitudes towards the adoption of technology and also provided insights on specific aspects of participants' attitudes towards integrating playful technology in

teacher programs. It was also revealed that ongoing professional development, reflective practice, and collaborative support are critical for fostering teacher confidence and competence in integrating playful technology. Participants raised issues related to a general lack of funding and inadequate resources to support the adoption of playful technology in Zimbabwean Early Childhood programs. Each issue is discussed in detail below.

### 4.1 Benefits of Integrating Playful Technology

Cowan (2020) alludes that although there are numerous benefits of playful learning, its significance is sometimes overlooked especially in early childhood education. A good number of nations have updated and presented their ECD curriculum as being play-based. Surprisingly, the implementation is difficult to have seen this idea being implemented in practice. Participants that were chosen comprised ECD practitioners from centres and school contexts to investigate broad trends and patterns in Zimbabwe in regard to the integration of playful technology.

One of the participants said that 'incorporating digital tools and resources in teacher development programmes equips educators with skills to create interactive and immersive learning experiences incorporating diverse learning styles and abilities.' All participants agreed that technology integration also promotes the development of essential skills such as critical thinking, problem-solving, and digital literacy, equipping learners with the tools they need to succeed in an increasingly digital society. Moreover, technology offers opportunities for collaboration, creativity, and exploration, fostering a love for learning and laying a strong foundation for lifelong learning and academic success.

The responses from participants are consistent with several published research. Vygotsky pioneered a socio-cultural approach to understanding cognitive processes in childhood development as posited by Shaw cited in Karpov (2015). He concurs that the development of mental process in the growth of the child is facilitated by adults in the context of social interactions with other children. This is supported by Thorn, (2015) who claims that the Vygotskian concept is important for problem solving and creating learning possibilities for students. Furthermore, Thorn, (2015) alludes that interactions enable members to construct learning environments, tasks, identities and contexts. Considering the above citations, it can be said that indeed the value of integrating technology in teacher programmes can no longer be undermined. To find out academic benefits of integrating playful technology in teacher programmes to strengthen early childhood learning, the researcher asked the following question: "What can you say about the idea of integrating playful technology in teacher programmes?" Participants who believed that integrating playful technology is of great benefit commented on the

teachers' opportunities saying, 'teachers become more knowledgeable communicators through the use of digital technology.' one participant observed that:

"Teachers are likely to be motivated by integrating playful technology in teacher development programmes to strengthen early childhood learning and they get opportunities for information illustration, enhancing social skills, problem-solving, communication, and literacy skills. The responses from the participants are consistent with several published research, for example, Janssen (2020) notes that using digital technologies strengthens the teachers' role co-creator of knowledge, coach, mentor and evaluator. In the same vein these findings are consistent to what Durff and Carter (2019) highlighted, that 'the administrative support and teachers' professional development play key roles in successfully integrating digital technologies into teaching.'

The integration of technology in teacher programmes offers a multitude of benefits, including enhanced engagement and motivation among students, personalized learning experiences tailored to individual needs and learning styles, opportunities for skill development in areas such as early literacy, numeracy, and problem-solving, access to a vast array of age-appropriate educational content and resources, and strengthened communication and collaboration between educators, parents, and caregivers. Effectively integrating technology enable educators to create dynamic and interactive learning environments that foster creativity, critical thinking, and digital literacy skills essential for success in the 21st century. Educators can harness the benefits of technology while mitigating risks, creating an enriching and supportive learning environment for children in early childhood education settings.

## 4.2 Adoption of Technology in Teacher Programmes

Collected data indicates the increasing use of online platforms for training and the enhanced flexibility as well as accessibility in teacher training. Participants echoed the sentiments that 'over reliance to technology is prone to reducing human interaction. According to Aslam et al (2020), online teaching-learning is different from the traditional ones in several aspects, and teachers encounter challenges in facilitating learners appropriately if they are not competent enough. In this regard, teachers' professional knowledge has been considered a crucial determinant for the effective integration of technology in strengthening their instructional practices. This is in line with the study that was conducted by Asad et al (2020) which described positive responses by the teachers.

Abbasi et al. (2021) and Thaheem et al. (2021) also indicates that teachers are often found improvised to integrate digital instructional approaches into their

curricula effectively (Abbasi et al, 2021). This indicates a need for concerned educational authorities to provide adequate assistance to teachers to enhance their technological and professional competencies. Participants emphasised that 'COVID-19 phase allowed the integration of technologies in teaching and learning at the school level, but its actual integration is yet to be achieved.'

## 4.3 Views on the Integration of Playful Technology

Teachers' attitudes are considered a crucial determinant that reflects their behaviours in applying technologies in their pedagogical practices by responding positively or negatively based on their experiences (Abbasi et al., 2021). In the same vein, in regard to ICT application in pedagogical practices, teachers' attitudes and their professional knowledge were described and examined in various studies. Ahmed et al. (2017) discovered that several teachers view social interaction between students and teachers important, but they do not find online teaching interactive compared to face-to-face teaching. When asked on their opinions, the practitioners emphasized that they preferred to deliver lessons face-to-face and show a negative attitude toward the online teaching mode. Their actions were in line with the findings of a study that was carried out by Afridi and Chaudhry (2019) which revealed an unsatisfactory status of adopting technologies in instructional practices in all universities of Punjab due to several constraints including technophobia by some teachers. The study, therefore, suggests the provision of adequate and relevant assistance to teachers regarding the integration of technology so as to enable them to adopt the latest technologies efficiently and hence strengthen early childhood learning in Zimbabwe.

## 4.4 Challenges Encountered in Integrating Playful Technology in Zimbabwe

The current situation in Zimbabwe's Early Childhood Development sector reveals a gap between policy intentions and practical implementation. Participants echoed the sentiments that while the government has initiated policies to integrate ICTs into education, lack of resources, infrastructure, and teacher capacity building hinders the effective integration of playful technology. One of the participants said there is limited access to technology because of insufficient digital devices and internet connectivity.

These challenges underscore the importance of thoughtful planning, intentional implementation, and ongoing evaluation to maximize the benefits of technology while addressing potential risks in early learning settings.

The gaps raise eyebrow about the preparedness of teachers to integrate technology in play-based learning and the impact on learning outcomes. Teachers require training and support to effectively integrate technology (Unwin, 2005). Lack of relevant skills may cause resistance by teachers thus; some may develop a negative attitude and be hesitant to adopt new technologies. Participants reported that they do not find enough time to make the efficient use of ICT in raising their instructional practices' effectiveness. They expressed their need for professional development and time management programmes, either pre-service or in-service teachers, to combat the prospective constraints affecting them in regards to the integration of playful technology.

Other drawbacks facing the integration of playful technology into the teacher programmes in Zimbabwe are sustainability and replication (Unwin, 2005). Initially, it was established that the gap that existed in teacher education programmes was a need to provide both ICT resources and skills. It becomes a mystery that whilst teacher programmes were viewed as the nerve centre of the whole computerisation programme, teachers fail to assist learners later in schools with their computing when little was being done to expose them to ICTs. The researcher then wonders whether change is guaranteed in such a scenario.

The participants highlighted that the training period is another challenge facing the integration of playful technology at ECD level. The course is two years inclusive of a four month teaching practice period. Experience on the ground has shown that the period is so packed with teaching subjects, professional subjects, research and other ancillary activities (Manyati, 2006). This is a clear indication that, the imparting of ICT skills has not been as effective, as it should be especially if one takes into account that some of the students join the college without any computer skills at all. Furthermore, ICT infrastructure is costly. Besides buying new hardware and software, there is a need to continually upgrade them and yet ensure backward compatibility with the existing system. This has led to the co-existence of various Windows platforms, meaning that both staff and students have to be taught how to operate in each of them effectively. An evaluation, carried out by Manyati (2006), itemised a number of constraints and challenges on the integration of ICTs into Zimbabwe's teacher education curriculum. These constraints include the following among others: (1) Lack of skills in end users on using ICTs; (2) No defined training plan for end users; (3) Inefficient infrastructure affecting the proper ICT maintenance and assistance to end users; (4) Inadequate financial resources to procure the required ICT hardware and software in sufficient quantities to meet institutional needs; (5) No prioritization of ICT budget (Manyati, 2006). Loveless (2007) argues that ICT can be presented as a subject with knowledge, skills and concepts and as a tool to support learning in other curriculum subjects. However, studies have shown that both aspects are lacking in Zimbabwe's teacher education programmes.

Thaheem et al. (2021) carried out a survey to investigate the benefits and challenges confronted by teachers in their online instructional practices, where technological challenges, personal constraints, and Soomro et al. (2020) and Noor et al. (2020) lack of infrastructure were reported as the major challenges. This is in line with the findings by where teachers showed resistance to integrating ICT in their instructional practices due to the lack of adequate infrastructure and technological competencies. This indicates the critical need to endow all teacher programmes with sufficient and contemporary technologies to acquire optimal early childhood learning outcomes.

## 4.5 Solutions to Challenges Faced in the Integration of Technology

Integrating playful technology is usually accompanied with various challenges like high costs, teacher skills gaps and inadequate infrastructure. Therefore, the following solutions are of great consideration:

1. Provision of targeted teacher training, utilising offline/low- bandwidth applications and considering scalable, open-source resources to ensure equitable, engaging and sustainable implementation.
2. Teachers should have a voice in what technologies they prefer to use in their instruction. Because teaching is a deeply personal experience and when teachers feel as though they have lost the ability to teach in a manner that best suits them, they can get frustrated and discouraged. No single educational technology will be perfect for every teacher, and educators should have the ability to select a technology that they feel most comfortable with.
3. Allowing teachers more freedom of choice retains the very important sense of classroom control.
4. Better organization of available technologies because although a typical internet search will turn up thousands of results for educational technology tools, there are very few places that effectively organize and evaluate available technologies.
5. Teachers should easily find and access rigorously tested technologies within a specific learning domain.

## 5. Conclusion and Recommendations

### 5.1 Conclusion

Integrating playful technology in teacher development programmes holds immense potential for enhancing early childhood learning in Zimbabwe. Professional development programmes should provide educators with the necessary skills and knowledge to design

developmentally appropriate activities that leverage technology to promote critical thinking, creativity, and collaboration among young learners. A balanced approach to technology use that is merged with continuous professional development for educators and robust policies supporting equitable access and parental involvement, can maximize the benefits of technology while mitigating risks. Moving forward, future research should focus on longitudinal studies and innovative uses of technology, ensuring evidence-based practices and continual improvement in technology-enhanced early learning. The study recommends that policymakers and educators prioritize teacher development initiatives that promote contextually responsive and participatory approaches.

## 5.2 Recommendations

1. The Ministry of higher and Tertiary Education, Innovation, Science and Technology Development (MHTEISTD) in collaboration with the Ministry of Primary and Secondary Education should develop clear national policies and guidelines for technology integration. The framework should advocate for equitable access to digital resources and internet connectivity, thus, promoting playful technology integration in teacher development programmes to strengthen early childhood learning in Zimbabwe.
2. Universities and teachers' colleges offering ECD programs supported by MHTEISTD and development partners like UNICEF Zimbabwe should provide viable teacher training and support programmes.
3. More-so, The Ministry of ICT, Postal and Courier Services in partnership with MHTEISTD, MoPSE and the Ministry of Finance and Economic Development should invest in digital infrastructure, including devices and internet connectivity which will provide colleges, schools and childcare centres with adequate infrastructure, funding for educational technology tools, and support for broadband connectivity in rural and low-income areas. Policymakers should also advocate for initiatives that address the digital divide, such as providing subsidies for internet access and devices for teachers.
4. Teacher Education Institutions (universities and colleges) should collaborate with local ECD centres, school development committees and community leaders in the development of programmes that include community engagement and awareness about the benefits of playful technology to strengthen early childhood learning in Zimbabwe. This may include offering an ongoing professional development opportunities for teachers, reflective practice, and collaborative support in fostering teacher confidence and competence in integrating playful technology.
5. The Zimbabwe Council of Higher Education (ZIMCHE) in collaboration with the University of Zimbabwe Department of Teacher Education (UZ-DTE)

and the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development (MHTEISTD) should thrive for viable quality assurance mechanisms to ensure the development and dissemination of high-quality digital content and educational technology tools for teacher development programmes from Early Childhood Development level. This may involve setting standards for the design and development of educational apps, websites, and digital learning materials, as well as implementing processes for evaluating their effectiveness and appropriateness for equipping teachers with relevant skills that enable them to add value to early childhood learning.

6. Policymakers should collaborate with educators, researchers, and industry stakeholders to establish guidelines and best practices for the selection and use of educational technology in ECD settings. Cordeiro and Palmeira (2020) emphasize the fact that technology should be seen as an ally of teachers, managers and families, as it expands the capacity to understand the current world. However, the use of technology in early childhood learning faces challenges, which is why the integration of playful technology in teacher training programmes is very important Karsenti, 2009).

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