

# Rural-Urban Digital Divide Discourse: Exploring the Efficacy of Game-Based Learning in Early Childhood Development in Zimbabwe

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## ABSTRACT

This qualitative study explores the impact of Game-Based Learning (GBL) on the holistic development of young learners within the framework of a game-based spiral Early Childhood Development (ECD) curriculum. Focusing on the rural-urban internet divide in Zimbabwe, the research involved 80 participants from 16 ECD centres, including administrators, learners, and classroom practitioners. Data were collected through interviews, focus groups, and in-situ observations. Thematic analysis revealed that the effectiveness of GBL varied based on the suitability of games for specific developmental domains. Findings indicate that modern educational games were significantly more effective in urban ECD centres, where internet access was available as compared to ECD centres in rural areas, which often struggled with poor connectivity. Consequently, the study recommends the use of low-cost offline games in internet-constrained rural schools. Implementing these games as teaching aids can enhance the holistic development of ECD learners, bridging the gap created by the rural-urban internet divide. This research contributes valuable insights to the ongoing discourse surrounding internet adoption in the field of education, particularly relating to the implementation of GBL in digitally underserved ECD settings.

**Keywords:** Game-based pedagogics, Internet access, holistic development, early childhood development

## INTRODUCTION

In recent years, integrating technology into educational approaches has gained significant traction in promoting learning outcomes and holistic development for both seasoned and young learners. Among these approaches, game-based learning (GBL) has emerged as a captivating method to engage learners and encourage active participation in their educational experiences. GBL involves utilising internet technologies to deliver educational content through interactive games, harnessing the inherent appeal of gaming to facilitate knowledge and skill acquisition. Significantly, GBL extends beyond Internet platforms, incorporating both Internet and non-internet games as educational tools (Alotaibi, 2024).

Historically, educational games including board games, puzzles, and other hands-on manipulatives, focused on teaching essential concepts and skills. These analogue games targeted the development of early literacy, numeracy, and problem-solving abilities by capitalizing on physical play's tactile and collaborative nature (Behnamnia et al., 2023; Zolkiplin et al., 2023). The 21st century has ushered in a new era of game-based learning, driven by technological advancements and the development of innovative educational software. The

rise of educational video games, interactive applications, and immersive virtual environments has provided learners with diverse internet-based gaming experiences tailored to achieve specific educational objectives (Fadhli et al., 2023). While integrating non-internet and internet games creates a dynamic and engaging learning environment that reinforces various subject areas, these pedagogical approaches have not been fully exploited. Significant untapped potential remains to nurture the holistic development of early childhood development (ECD) learners in both rural and urban settings in Zimbabwe (Magpusao, 2024).

## BACKGROUND

Game-based learning (GBL) is not a novel concept in educational settings. Instead, it is an ancient pedagogical approach employed for centuries. The roots of game-based learning can be traced back to ancient civilisations. During that era, play-based activities and interactive experiences were used to impart knowledge and develop skills. Although this teaching and learning method has experienced periods of neglect and waning popularity throughout history, it has enjoyed a resurgence in recent years and gained increasing attention across all educational levels, including in ECD. This study traces GBL to the works of influential educational theorists and philosophers such as Friedrich Froebel, Maria Montessori and Jean Piaget. These scholars illuminated the inherent value of play and hands-on experiences in the learning and development of young children. (Sudhakaran, 2023). According to Sakr and Kaur (2024), Froebel, the founder of the kindergarten movement, developed a structure of educational toys and activities designed to foster children's sensory exploration, problem-solving skills and holistic growth. Conversely, Montessori emphasised using carefully designed, self-correcting materials that allowed children to engage in purposeful, self-directed activities that promote their development (Kiran et al., 2021; Zhao, 2024).

Building on these foundational ideas, the mid-20th century saw a surge of interest in GBL's potential to support children's development. Jean Piaget and Jerome Bruner irradiated the importance of play in constructing knowledge and developing cognitive, social, and emotional competencies. (Piaget, 1972; Thompson, 2021). The 1970s and 1980s witnessed the advent of educational games. These games were designed to enhance learning by promoting various skills, including problem-solving, critical thinking, decision-making, and collaborative learning, among other aspects of child development. In the 1990s and 2000s, the rapid advancement of Internet technologies and the widespread adoption of personal computers and mobile devices further fueled the growth of game-based pedagogies (Johnson, 2022; Sun et al., 2023). The arrival of educational video games, virtual reality experiences and interactive internet-based media opened new frontiers for engaging children in immersive and exploratory learning experiences.

In contemporary times, the potential of game-based approaches in teaching and learning a wide range of skills and competencies has been recognised by both researchers and educators (Sharma, 2020; Behnamnia et al., 2023; Guan et al., 2024). In the internet age, game-based pedagogies leverage various internet-based educational games and virtual simulations to create hybrid learning environments that seamlessly enhance holistic ECD. This study argues that as GBL approaches evolve and experience wide adoption for their worth in educational settings, the rural-urban internet-access gap should be bridged to allow seamless utilisation of GBL methods for its potential to promote the holistic development of learners in ECD settings, regardless of their varied geographical settings.

## Conceptual Framework

The study employed the Game-based Spiral ECD curriculum as the guiding conceptual framework. This framework pivots on harnessing the power of games and interactive learning experiences to support the holistic development of young children. The tenets of this approach include a focus on play-based learning, a spiral progression of concepts and skills, the integration of multiple developmental domains and the adaptive incorporation of internet technologies in learning settings. The game-based spiral ECD curriculum leverages games and internet resources to increase learner engagement and motivation and ensure contextual relevance for children in rural and urban settings. This framework is adaptable to different geographical settings, making the Game-based Spiral ECD curriculum framework a promising avenue for exploring the efficacy of GBL in the context of the rural-urban internet divide in Zimbabwe's early childhood education system.

## LITERATURE REVIEW

The intersection of internet technology and early childhood education (ECE) is a burgeoning field of research. While recent studies show that game-based learning (GBL) provides new opportunities for learners' active engagement in their education (Johnson, 2022; Alotaibi, 2024; Guan et al., 2024), the rural-urban internet divide presents significant challenges and disparities. The reviewed studies in this section provide profound insights into the impact of GBL on holistic ECD while highlighting the rural-urban internet divide. A comprehensive search was conducted across academic databases, including PubMed, JSTOR, Google Scholar, and ERIC. The study used keywords such as holistic development, rural-urban internet divide, game-based learning and early childhood development to filter relevant studies. Over 30 peer-reviewed articles, books and conference papers were reviewed for their relatedness to this study. The reviewed sources were evaluated based on methodological rigour, the relevance of the findings to the research topic, and their contributions to our understanding of the internet divide and its impacts on the practicality of applying GBL across different areas with different internet access levels. Studies with large sample sizes, robust statistical analyses, and comprehensive reviews of developmental outcomes were prioritised.

Literature shows that GBL has garnered significant attention in educational research for its potential to improve learning outcomes. The positive impacts of game-based learning on early childhood cognitive and social development have been well-documented. The reviewed literature sources comprise research studies, theoretical papers and empirical investigations on GBL. Prensky (2001), Behnamnia et al. (2023), Gee (2003), and Guan et al. (2024) provide evidence on the use of games in education to emphasise the intrinsic motivation and engagement they offer to learners. Their studies concur that GBL significantly increases student motivation and engagement due to its interactive and immersive nature. Wouters et al. (2009), Papastergiou (2009), and Hussein et al. (2022) present empirical evidence on the effectiveness of GBL in enhancing student learning in specific disciplines such as mathematics. Moreover, Fletcher (2011) and Kavak (2022) offer a thorough meta-analysis of instructional games, while Squire (2006) discusses the contextual application of video games in educational settings. Their studies endorse the efficacy of using GBL in pedagogical settings to enhance the learners' overall academic outcomes. Other studies (Papastergiou, 2009; Mao, Cui, Chiu & Lei, 2022; Mikrouli et al., 2024) reveal that GBL can enhance various skills, including critical thinking, problem-solving and creativity. In their recent study, Qibtiyah et al. (2023) found that GBL positively supports learning processes, particularly in helping learners retain information and apply knowledge in practical scenarios.

Studies focusing on internet resources and infrastructure accessibility highlight significant gaps between rural and urban settings (Anderson, 2018; Sharma, 2020). Anderson (2018) examined the internet divide in access to technology. He found that rural learners often lack the internet infrastructure and resources required to support GBL compared to their urban counterparts. Similarly, Sharma (2020) reported on the disparities in internet connectivity between rural and urban areas in India, noting that a large segment of the rural population remains underserved and unable to access online educational resources and e-learning services due to poor network coverage and associated high costs.

Disparities in access to internet resources and infrastructure affecting many ECD settings in rural areas significantly undermine the extent to which internet GBL leverages the holistic development of young learners in rural settings (Anderson, 2018; Sharma, 2020). Without access to the necessary hardware, software and reliable internet, internet GBL methods cannot be effectively integrated into the ECD curriculum. In the study, Yeh & Ting (2023) compared the creativity performance between elementary school learners in rural and urban areas and found that learners in internet resource-constrained environments remain deprived of the opportunity to engage with stimulating, multisensory games and activities that can foster cognitive, social, emotional and physical growth. The internet divide between urban and rural areas exacerbates this issue, as learners in underserved communities lack exposure to some effective learning games, further widening the gaps in the use of practical pedagogical approaches and developmental outcomes (Anderson, 2018; Sharma, 2020). Other scholars query whether rural children suffer more from a lack of internet resources or the quality of available resources (Heo et al., 2021).

Attitudes towards adopting internet learning tools between rural and urban parents and teachers exacerbated the rural-urban internet divide (Hohlfeld et al., 2010). The argument is that technology alone cannot bridge the

gap without the meaningful engagement of parents, teachers and policymakers (Selwyn, 2016). The long-term benefits of GBL on academic performance and knowledge retention are still debated, with mixed results reported in the literature. There is also ongoing debate about the effectiveness of GBL across different subjects and educational levels. Some researchers argue that the benefits of GBL are confined to specific fields (e.g., STEM) and age groups. Squire (2006) points out the potential of GBL to foster collaborative learning through multiplayer games and team-based challenges. Given these mixed viewpoints from the reviewed studies, questions about the scalability and practicality of integrating GBL into the ECD curriculum without considering the rural-urban internet divide can perpetuate educational inequalities against learners in rural settings.

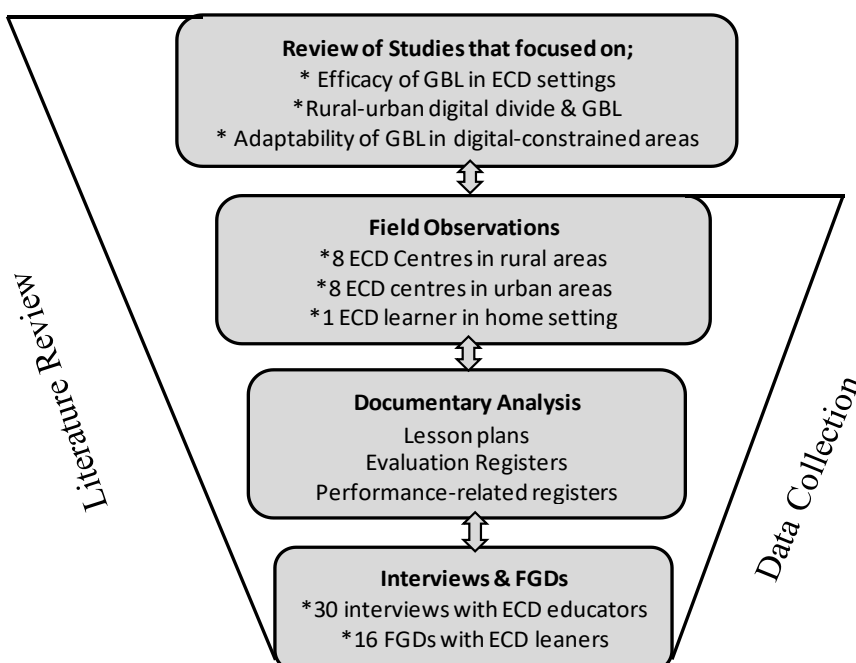
While the reviewed literature provides profound insights into the significant pedagogical benefits of using GBL, particularly in increasing engagement, improving learning outcomes and enhancing skill development, gaps in the existing literature indicate the need for further studies to establish the practicability of GBL methods across the rural-urban divide and its impact on holistic ECD. Furthermore, most review studies focused on cognitive outcomes associated with GBL. There is a dearth of literature examining the efficacy of GBL on other dimensions of childhood development, including moral, social and emotional developmental metrics in different internet environments. This study, therefore, analysed the impact of GBL on holistic ECD in the context of the rural-urban internet divide in Zimbabwe.

## METHODOLOGY

This study used a qualitative approach based on participatory action learning and action research. The choice of a qualitative approach was driven by the need to explore Game-Based Learning (GBL) holistically, understanding the experiences and perceptions of the participants. This approach was particularly suitable for bridging the rural-urban internet divide and supporting Early Childhood Development (ECD) learners. A blended data collection method was employed, including a literature review, field observations, documentary analysis, interviews, and focus group discussions. This strategy provided a clear understanding by integrating theoretical frameworks with real-world experiences as elaborated by Harley and Cornelissen (2022), Islam and Aldaihani (2022), and Pratt et al. (2022).

Figure 1 below visualises the methodological process for data review and collection, as Zishiri (2024) outlined. This diagram summarises the research steps taken.

**Figure 1: Methodology Hierarchy**



Source: Zishiri (2024)



## Literature Review

A comprehensive and meticulous literature review was integral to the study, synthesising scholarly articles, books, and educational resources illuminating the relationship between GBL and the holistic development of young learners. Special attention was given to studies addressing the rural-urban internet divide and GBL's adaptability in digitally underserved areas (Islam & Aldaihani, 2022; Harley & Cornelissen, 2022).

## Field Observations

Observations were conducted in 16 ECD centres, comprising a diverse mix of eight rural and eight urban contexts. One participant was purposefully selected from each centre based on their engagement with GBL, focusing on their interactions and learning experiences over six months within their home environment. This method provided rich, contextual insights into the practical application of GBL in diverse settings (Clark, 2019; Creswell & Clark, 2023).

## Documentary Analysis

Data was gathered through a thorough documentary analysis of performance-related registers from all participating ECD centres. This phase involved critically reviewing relevant scholarly articles, books, and educational resources discussing GBL and its implications for holistic learner development. The literature served as a foundational framework for understanding the intersection of GBL and ECD, particularly in the rural-urban internet divide (Flick, 2022; Gray, 2014).

## Expert Semi-structured Interviews

Semi-structured interviews were conducted with 30 practicing ECD educators, selected through purposive sampling from the participating centres. This method facilitated in-depth discussions about their experiences with GBL and its perceived effectiveness in enhancing learner outcomes. The interviews were meticulously transcribed and coded, allowing for thematic analysis highlighting key patterns and insights (Lochmiller, 2021).

## Focus Group Discussions (FGDs)

The study included 16 FGDs, one from each participating ECD centre, formed through a participatory and inclusive convenience sampling of ECD learners. This method encouraged the sharing of diverse perspectives on the challenges and successes the ECD learners experience as they interfaced with GBL in ECD settings, further enriching the data collected (Fusch et al., 2022; Mulisa, 2022).

## Data Management and Analysis

Data management procedures were tailored to each method while maintaining an integrated approach. Thematic data analysis was employed across all data types, involving systematic coding, categorisation, and theme identification. This process was guided by the recommendations of Flick (2022) and Denzin et al. (2023), ensuring a rigorous and systematic approach to data analysis. Measures such as member checking, peer review, and audit trails were implemented to enhance rigour and address potential biases throughout the research process (Carcary, 2020; Fusch et al., 2022).

## Ethical Considerations

This study adhered to stringent ethical standards, particularly concerning participants under 18, as Zimbabwean law requires. Informed consent was obtained from parents and guardians for all minors who participated in this study, ensuring their rights and welfare were prioritised throughout the research. Confidentiality of information was maintained through anonymising data, respecting the privacy and integrity of all participants (Carcary, 2020; Mulisa, 2022).

## Presentation and Discussion of Findings

The study collected primary and secondary data using documentary analysis, in-depth interviews, focus groups and observations, as alluded to in the methodology section above. This data has shown the promise of GBL in early childhood education, with both the empirical evidence (Kavak, 2022; Fadhli et al., 2023; Magpusao, 2024; Mikrouli et al., 2024) and participants' accounts indicating moderate to substantial positive influence on cognitive, social, emotional, moral and physical development in addition to motivational outcomes. However, the rural-urban internet divide presents challenges in implementing GBL effectively in internet resource-constrained contexts. This section presents data and discusses the key findings under the themes that emerged from the data.

### Theme 1: Efficacy of GBL in Holistic Early Childhood Development

This study shows that age-appropriate GBL positively influences early childhood development across multiple domains. GBL, both internet and non-internet, referred to in this paper as traditional games, promotes positive learning behaviours and prosocial skills in ECD learners. Data from the four sources (document analysis, interviews, focus groups and observations) show that several games influence the holistic development of young learners. Data collected from the 16 participating ECD centres in rural and urban settings indicates a moderate to significant influence on the learners' cognitive, social, emotional, moral and physical development depending on the specificity of the game to the targeted developmental domain. Traditional games, primarily folklore-based and non-internet, were more effective in promoting social, moral and other culturally relevant competencies that are sustainable in everyday life. These traditional games were taught mainly in rural-based ECD centres.

On the other hand, data showed that modern internet-based educational games positively influence ECD learners' developmental areas, including their numeracy skills, mathematical literacy, knowledge representation and higher-level thinking abilities such as problem-solving, critical thinking, reasoning and creative thinking, increasing their cognitive horizon. The study also observed that age-appropriate GBL increases learners' enthusiasm and motivation, leading to more active engagement in learning activities as play and learning are integrated into a complementary activity. The following verbatim extract from one of the participants, an ECD teacher, echoes our observation on the nexus between GBL and overall positive progress across all developmental domains.

*Initially, I used games to occupy learners when I had to attend to other tasks at the school. I realised they were excited and profoundly absorbed in the games. Eventually, I noticed significant improvements in their problem-solving skills after constant exposure to educational games (Participant Jane during interviews in February 2024).*

A 3-year-old ECD learner, Chanel, was observed for 3 months at her natural home setting. This child was attending an urban-based ECD centre. The observer noticed that Chanel was engrossed in educational games for prolonged periods, navigating from one game to another on her ingenuity. She could recall, act, repeat, sing, and narrate most key concepts she heard and saw in the games she played and watched on different gadgets, including toys, television, smartphones, and laptops. Her educational psychologist grandfather explained that;

*Chanel is always absorbed in playing with her toys and educational games on her smartphone when not at school. She also watches dramas and educational cartoons on television for hours in a run. Her concentration and attention span are just excellent. For a 4-year-old child, her intra-personal, interpersonal, numerical, and language competencies are intriguing, and she is well above her peers in this neighborhood. She performs above expectations at school, as shown by reports from the ECD centre where she attends. I attribute her outstanding developmental milestones to her prolonged interaction with educational games (Participant Zee during interviews in June 2024).*

The study recognises the impact of various factors, including intelligence quotient (IQ) and a supportive home environment that promotes learning. However, enhanced progress across Chanel's developmental domains is

attributed to prolonged exposure to game-based learning (GBL), as indicated in the verbatim account from a participant observer. Analysis of Chanel's homework books, reports from her early childhood development (ECD) center, and discussions with her confirmed her grandfather's observations. Following home observations of Chanel's engagement with learning games, an interview was conducted with her teacher at the ECD center she attended. Her teacher elaborated that;

*It is fascinating to see how quickly children like Chanel can learn and apply concepts from these educational games. Integrating play and learning through online games sparks a child's enthusiasm for learning (Chanel's ECD teacher during interviews in May 2024).*

The study further noted that specific games were effective for learning areas in rural and urban ECD settings. Therefore, considering its effectiveness in supporting a particular developmental domain, each game's appropriateness must be ensured.

### **Discussion of Findings from Theme 1**

Based on the data addressing the first theme, findings were mixed regarding the efficacy of game-based learning (GBL) as a teaching and learning method for holistic early childhood development (ECD). The study revealed that, despite significant differences in GBL implementation between rural and urban ECD settings, this pedagogical approach yielded encouraging results across various game types.

For instance, educational games like Minecraft were found to foster creativity and problem-solving skills as children build virtual worlds and explore limitless possibilities. Similarly, programs like Sesame Street and Elmo's World offered interactive educational games that enhance cognitive development and social skills through engaging activities featuring familiar characters. Puzzles also proved effective in developing critical thinking and decision-making skills among learners.

These games, among others, provide motivating and active methods for children to learn and grow, contributing significantly to their holistic early childhood development across the rural-urban divide. However, the effectiveness of these games varied depending on the specific educational setting. In rural-based ECD centres, traditional (non-internet) games were an effective pedagogical method for cultivating various developmental domains, mainly physical, social, emotional and moral development. The study also found that traditional games, compared to modern internet-based games, were more effective in teaching and learning Ubuntu's societal rules, norms and many other values. The study also found that traditional games effectively accelerated ECD learners' local language development and proficiency.

While the researchers found that games were being used as teaching and learning methods in ECD centres in both rural and urban settings, the questions about the design of the games, both traditional and digital-based games, their features of the game, how their rules affect the relationships between players in the game and how their themes align with ECD curriculum, remain debatable. The issues of curriculum alignment and ecological validity of some of the games remain grey areas. Given these observations, the study argues that using GBL in ECD settings should focus on how learning objectives can be tied to games targeted to enhance ECD learners' specific developmental domains. The rationale behind our proposition is that GBL can leverage play fundamentals to create a solid link between the learners' engagement and fun as they enjoy gameplay and structured learning to produce measurable developmental and educational outcomes. The basic tenet is that if GBL is designed to generate ECD learners' engagement and motivation to learn, this method can promote holistic ECD across the rural-urban divide.

The study also found that while games influenced holistic ECD, our study data did not support sustaining this desirable developmental trajectory beyond the ECD stage. This could require prolonged studies to observe the sustainability of holistic development experienced in early childhood to later stages.

### **Theme 2: Impact of the Rural-Urban Digital Divide on GBL**

Data under the second theme relates to the effects of the rural-urban digital divide on the use of GBL. Under this theme, the study focused on how internet access disparities impacted the adoption of practicality and

effectiveness of educational games in rural versus urban areas. Significant internet access issues were noted, affecting 7 of the eight participating ECD centres compared to their urban counterparts. Data addressing this theme also show a persistent digital divide between rural and urban Internet users, despite the improvements in critical ICT infrastructure, mostly boosters installed in high places in rural areas across the country. The study noted that the digital divide was more profound in "deep rural" areas, where little to low-speed connections were the norm. An ECD teacher stationed at an ECD centre in a deep-rural area narrated their internet predicament.

*There is always poor internet connectivity in this area; when it is available, it is just for voice calls and WhatsApp messaging. You cannot download or watch games online, so we do not use modern games for teaching and learning, although we know they suit our learners (ECD teacher during interviews in June 2024).*

In this case, as captured in the verbatim extract above, the study found that the urban-rural internet challenge extended beyond mere internet connectivity issues. The lack of reliable internet negatively impacted all usage patterns and impeded the utilisation of GBL methods in the affected ECD centres. As a result of the internet access disparities, GBL activities were less frequently employed in teaching and learning of ECD learners.

Most ECD educators recognised the power of GBL in promoting holistic development in young learners. This recognition was evident even in rural-based ECD settings, where all eight rural-based ECD centres that participated in this study incorporated one game or another in their instructional methods. It was observed that these rural ECD centres relied on traditional games to teach folklore stories, cultural values, moral values and gender roles, among other desirable behaviours. The use of games designed for educational purposes was limited due to the inadequate completion of digital infrastructure and poor network connectivity challenges. A participant explained that;

*There is no internet connectivity in this area, the network is inferior, and internet-based games are not a feasible teaching and learning method here. However, we use traditional games such as tag of war, '...raka raka, nhodo...', beam bag race, pada, egg race, and many others to promote physical, moral, social, and other desirable behaviours among our young learners (Participant Teddy, during interviews in June 2024).*

In comparison, only one urban-based ECD centre incorporated traditional games into their teaching methods. In the other centres, learners who played traditional games were doing so outside classrooms, unsupervised. We observed that most urban-based ECD centres had no adequate space to set up playgrounds where physical games such as races, swings and other space-demanding games could be played. As a result, games that are effective for physical and social development were restricted by the limited spaces within urban-based centres. A participant who was a teacher at one of the ECD centres elaborated that:

*We do not have facilities such as swings, sliders and climbers to implement GBL for the physical development of our learners. However, our learners play several games outside classrooms, during breaks and whenever they are not engaged in formal lessons. The games are primarily unmonitored by the teachers. These traditional games are just part of our learners' socialisation and entertainment rather than for learning purposes (Participant Romeo, during interviews in July 2024).*

Although an urban-based participant echoed previous observations, unsupervised gaming was prevalent in rural and urban early childhood development (ECD) centres. Learners were frequently seen playing various games in small groups without teacher supervision. The study found that unsupervised gaming can negatively impact ECD learners, particularly with games that promote physical development, often including disruptive elements. These games may encourage undesirable behaviours through imitation, observational learning, and idolisation of role models. To address this issue, ECD educators should be reflective and analytical when selecting games for controlled teaching environments.

The study also highlighted significant disparities between rural and urban ECD centres. Eight participating urban centres benefitted from reliable high-speed internet and modern technology, while rural centres struggled with unreliable connections. Despite the availability of internet access, game-based learning (GBL)



was not consistently implemented across all urban centres, and variations in GBL usage were observed within different classes at the exact centre. This indicates that GBL was not fully leveraged to facilitate holistic ECD, raising questions about its adoption across diverse contexts.

By nature, educational games require implementers to possess various interdisciplinary skills to enhance acceptance and usage rates. Educators need competencies in pedagogical gamification, information systems, computer science, and socio-technical systems to adopt GBL as a complementary teaching method effectively. This aligns with earlier studies (Behnamnia et al., 2023; Sudhakaran, 2023; Alotaibi, 2024; Mikrouli et al., 2024) that emphasise the necessity of equipping educators with GBL skills to maximise the educational potential of games.

Furthermore, the study underscores the vital role of teachers in selecting, introducing, facilitating, and assessing educational games within their instructional designs. By aligning the developmental benefits of specific games with the needs and ages of ECD learners, educators can harness the potential of games to promote holistic development, considering the digital resources available in their specific contexts.

## Discussion of Findings from Theme 2

The study found that gamified learning activities in all 16 participating ECD centres positively impacted learners' motivation, attention, performance and engagement. However, the impact was more pronounced for learners in urban-based ECD centres. Mobile educational games, leveraging gamified mobile applications, were prevalent in urban settings. These games were found to be effective GBL methods. They enhanced the development of critical thinking and decision-making skills, among other cognitive development aspects. On the other hand, non-digital games were commonly used in ECD centres in rural settings, where their effectiveness was observed in physical, social and moral development. While GBL holds profound promise for laying a strong foundation for ECD, the study noted that this method can negatively impact young learners in rural and urban settings. Suppose careful considerations are not given in the design and use. In that case, GBL can result in the development of undesirable behaviours that may be learnt through observations, as explained by proponents of behaviorism psychology (Skinner, 1953; Bandura, Ross & Ross, 2007; Watson, 2017; Moore, 2017).

Significant internet-access issues were found in 7 of the eight rural ECD centres, compared to their urban counterparts that enjoyed internet access, enhancing the integration of GBL in their teaching and learning methods. The digital divide was more pronounced in 'deep rural' areas with little to low-speed internet connections. The study found that lack of reliable internet access negatively impacted the usage patterns and utilisation of GBL methods in the affected rural ECD centres. As a result, GBL activities were less frequently employed in teaching and learning of ECD learners in rural areas. Additionally, rural ECD centres relied more on traditional games to teach various concepts, such as folklore stories, cultural values, moral values and gender roles. In rural-based ECD centres, educational games designed for digital platforms were limited due to inadequate digital infrastructure and poor network connectivity. In contrast, urban-based ECD centres had better internet connectivity and access to modern technological devices. However, the use of GBL was not universal across all urban ECD centres; it varied within different classes in the exact centre, pointing to the adoption of GBL challenges among ECD educators.

The data analysis under our second theme shows that GBL holds profound potential to cultivate holistic development among ECD learners across the geographic gulf of ECD in Zimbabwe. The study revealed that as a teaching and learning method, GBL delivers a playful and interactive medium for acquiring knowledge by heightening the learners' motivation, attention and retention of information. We further observed that the collaborative and competitive elements inherent in many games, both digital-based and non-digital-based (traditional), cultivate valuable skills, including cognitive, behavioral, moral, communication, teamwork and problem-solving, among many other desirable aspects of child development as elaborated by various scholars (Thompson, 2021; Maree, 2021; Cherry, 2022; Zishiri & Mugadza, 2024). The study also found that the immersive engagement fostered by game-based learning contributes to self-regulation, empathy and a positive attitude towards learning.

However, the study noted that learners in urban ECD centres benefit more from GBL practices than their rural counterparts. This methodological gap exacerbated the educational inequalities experienced by learners in resource-scarce areas, particularly those attending schools in 'deep rural' environments in Zimbabwe. Our finding showing GBL disparities between the rural and urban ECD centres in Zimbabwe confirms earlier findings by Yeh and Ting (2023), who noted that GBL's effectiveness depended on the learner's geographic setting about the availability of digital infrastructure and internet resource access. Based on this finding, this study argues that it aligns with the dictates of Education 5.0, which advocates for transformative educational approaches that promote innovation. In that regard, increased investment in rural digital infrastructure and associated digital resources can increase the adoption of GBL in ECD centres. Such investments can bridge the rural-urban digital divide gap and enable digital-underserved ECD centres access to innovative environments where gameplay and learning are integrated to nurture the holistic development of learners.

### **Theme 3: Adapting GBL for Internet-Constrained Contexts**

Findings from the first two themes indicate that game-based learning (GBL) is a promising pedagogical approach across all educational levels, including early childhood development (ECD) settings. However, data from these two reveal significant disparities in the use of digital GBL between rural and urban ECD centres. To understand these inequalities, the study referenced technology adoption theories (Davis, Bagozzi & Warshaw, 1989; Rogers, 1995; Venkatesh & Davis, 2000; Venkatesh & Bala, 2008) to explain the rural-urban digital divide affecting GBL implementation.

Although many rural areas in Zimbabwe experience intermittent internet connectivity, entertainment games have been widely adopted and used, even with the existing limited internet access. In contrast, digital-based educational games have not seen the same level of adoption. Personal enjoyment, monetary considerations, and various perceived and actual benefits drive the popularity of entertainment games in rural settings. Conversely, the adoption of interactive digital educational games has been hindered by utilitarian needs, budget constraints, and the perception of high costs. Based on these observations, the study found that while entertainment games were embraced for their social enjoyment and utility, educational games were often overlooked due to perceived financial implications in rural contexts. As Granic (2022) noted, technology adoption is influenced by necessity and the perceived potential for positive outcomes.

Adapting GBL for internet-constrained environments is essential for bridging the digital divide, particularly in Zimbabwe's rural ECD centres facing infrastructural challenges. Field observations, interviews, and focus group discussions highlighted a stark contrast between rural and urban settings regarding internet connectivity, digital resources, and the capacity to implement GBL. In rural ECD centres, access to internet services remains sporadic, mainly due to issues such as lack of electricity and unreliable network coverage. One educator noted,

*We hear about these digital games but we cannot use them without the internet and training (Participant Chris, during interviews in June 2024).*

These challenges create a reliance on traditional pedagogical methods, where digital GBL tools are mainly absent. Educators in rural areas described their inability to access or integrate digital platforms, emphasising barriers such as high data costs and the lack of suitable devices. In contrast, urban ECD centres demonstrated a more remarkable ability to incorporate digital GBL tools due to better internet access, infrastructure, and digital literacy among educators. However, even in these contexts, challenges such as insufficient funding and sharing of devices among learners were observed. The analysis underscores the necessity of adapting GBL to function effectively in environments with limited or no internet access. During the FGDs, participants suggested offline alternatives such as preloaded games on low-cost tablets, mobile phones, or memory cards, which do not require internet connectivity. While not eliminating infrastructural issues, these offline digital solutions present a practical step toward bridging the digital divide by allowing children to access interactive learning tools without relying on constant internet access.

In addition to offline digital tools, educators in rural and urban settings highlighted the importance of hybrid models that blend non-digital GBL methods, such as songs, storytelling, physical role-playing games and puzzles, with simplified offline digital games. Observations revealed that these hybrid models were effective in

rural contexts, where educators creatively employed locally relevant, culturally embedded games to engage children. Such adaptations leverage community knowledge and traditional play methods to achieve cognitive and social development goals, aligning GBL strategies with the realities of internet-constrained environments.

### Discussion of Findings from Theme 3

The findings reveal that adapting GBL for internet-constrained contexts requires a multifaceted approach involving technological, pedagogical and cultural considerations. The study highlights that reliance on internet-based GBL tools is impractical in rural Zimbabwe, where infrastructural challenges such as unreliable power supply and high data costs render such tools inaccessible. Interviews with rural educators revealed their scepticism about GBL adoption, stemming from a lack of familiarity with digital tools and limited professional development opportunities. In urban centres where better infrastructure exists, digital GBL tools were more successfully implemented. However, educators reported that technical issues and limited resources, such as insufficient devices and inconsistent funding, hindered widespread adoption. Despite these challenges, GBL remains vital for enhancing child engagement and learning outcomes, particularly in foundational areas like literacy and numeracy. Thus, low-cost solutions, including preloading educational games on affordable devices, become viable in internet-constrained contexts.

Moreover, the findings highlight the significance of hybrid GBL approaches, particularly in rural settings. Observations revealed that non-digital games rooted in local culture, such as traditional songs, storytelling and physical games, were already effectively used to foster collaboration and problem-solving skills. Integrating these non-digital strategies with simplified offline GBL tools can enhance learning experiences without reliance on internet connectivity. For instance, a rural teacher shared how preloaded alphabet games on a shared tablet complemented traditional singing games to teach phonics, demonstrating a successful adaptation of GBL methods. Data also points to the critical need for educator capacity building. We found that educators in rural and urban centres required targeted training to help them integrate offline GBL tools into their teaching practices. In rural areas, basic digital literacy training and access to low-cost offline tools could empower teachers to adopt GBL effectively. On the other hand, urban educators require further training to maximise available digital resources.

The study findings suggest that adapting GBL for internet-constrained contexts requires tailored strategies that combine offline digital tools, hybrid models, and teacher training. Introducing Starlink satellites can address some fundamental connectivity challenges in internet-constrained contexts. With its high-speed and low-latency internet globally, Starlink has the potential to provide seamless access to Game-Based Learning tools that require bandwidth, real-time responsiveness, and multimedia capabilities. This can foster greater inclusion, enhance engagement, and transform education for learners in underserved and remote areas. The potential held by Starlink internet services can complement local cultural knowledge and traditional games alongside preloaded digital tools to offer a sustainable and inclusive approach to addressing the rural-urban digital divide in Zimbabwe's ECD sector. This hybrid strategy can ensure that GBL remains accessible and relevant, even in digital resource-constrained environments, ultimately contributing to improved early learning outcomes.

## RECOMMENDATIONS

The following recommendations were drawn from the key findings of this study.

- Governments in developing countries should accelerate investment in rural digital infrastructure to address the disparities in access to game-based learning (GBL) between learners in urban and rural ECD settings. Priority investment areas should include enhancing internet connectivity and providing access to modern technological devices to foster a more equitable educational experience that nurtures holistic development among all learners.
- Schools should implement Hybrid Game-Based Learning (HGBL) approaches to effectively adapt GBL in internet-constrained contexts, particularly in rural areas. A hybrid model that combines non-digital games rooted in local culture with low-cost offline digital tools should be developed to leverage existing

cultural practices, such as storytelling among a variety of other local traditional games while integrating simplified digital resources like preloaded educational games on shared devices. Training educators to blend these strategies can enhance engagement and learning outcomes without relying heavily on internet connectivity.

- Educators in ECD environments should tailor GBL strategies to local contexts to optimise engaging learning experiences. Given the varying effectiveness of GBL across different settings, the development of strategies that are contextually relevant to both urban and rural ECD settings becomes pertinent. This entails designing GBL activities that utilise available resources including traditional games in rural areas and mobile educational games in urban areas.
- The government through the Departments responsible for primary education should continuously improve teacher capacity to optimise the effectiveness of GBL in both rural and urban settings. Targeted professional development programs should be established for ECD teachers. In rural areas, training should focus on basic digital literacy and the effective use of low-cost offline GBL tools while advanced training to optimize use of available digital resources should focus on teachers in urban settings. This will boost the educators' confidence and skills in integrating GBL into their teaching practices to promote better engagement and learning outcomes across various contexts.

## REFERENCES

1. Al-Emran, M., & Griffy-Brown, C. (2023). The role of technology adoption in sustainable development: Overview, opportunities, challenges, and future research agendas. *Technology in Society*, 73, 102240.
2. Alotaibi, M. (2024). Game-based Learning in Early Childhood Education: A Systematic Review and Meta-analysis. *Frontiers in Psychology*, 15, 1307881.
3. Alsaigh, R., & Coyne, I. (2021). Doing a hermeneutic phenomenological research underpinned by Gasdamer's philosophy: A framework to facilitate data analysis. *International Journal of Qualitative Methods*, 20.
4. Anderson, M. (2018). Digital divide persists even as lower-income Americans make gains in tech adoption. Pew Research Center.
5. Bandura, Ross & Ross. (2007). Observational Learning and the Bobo Doll. Online submission.
6. Behnamnia, N., Kamsin, A., Ismail, M.A.B & Hayati, S.A. (2023). Review of Using Digital Game-based Learning for Preschoolers. *Journal of Computers in Education*, 10(4), 603-636.
7. Braun, V., Clarke, V., & Rance, N. (2014). How to use thematic analysis with interview data (process research). Retrieved 12 14, 2023, from <https://uwe-repository.worktribe.com/output/810331>
8. Carcary, M. (2020). The research audit trail: methodological guidance for application in practice. *Electronic Journal of Business Research Methods*, 18(2), 166-177.
9. Cherry, K. (2022). Erikson's Stages of Development: A Closer Look at the Eight Psychosocial Stages. *Psychosocial Development Guide*.
10. Choy, L. (2014). The strength and weakness of research of research methodology: comparison and complimentary between qualitative and quantitative approaches. *Journal of humanities and Social Sciences* , 19(4), 99-104.
11. Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research*. NY: Sage Publications.
12. Denzin, N. K., & Lincoln, Y. S. (2018). *The Sage handbook of qualitative research* (5th ed). Thousand Oaks, CA: Sage.
13. Fadhli, M., Kuswandi, D., Utami, P.S., Sartika, S.B. & bin Barawi, M.H. (2023). Game-Based Learning and Children's Digital Literacy to Support Pervasive Learning: A Systematic Reviews. *JTP- Jurnal Teknologi Pendidikan*, 25(3), 386-393.
14. Flick, U. (2022). *AN introduction to qualitative research*. New York: Sage.
15. Fusch, P., Fusch, G.E., & Ness, L.R. (2018). Denzin's paradigm shift: Revisiting triangulation in qualitative research. *Journal of Social Change*, 1(2), 10.



16. Granic, A. (2022). Educational technology adoption: A systematic review. *EdJournal of Education and Information Technologies*, 7, 9725-9744.
17. Gray, D. (2014). *Doing Research in the Real World*. New York: Sage.
18. Guan, X., Sun, C., Hwang, G.J., Xue, K. & Wang, Z. (2024). Applying game-based learning in primary education: A systematic review of journal publications from 2010 to 2020. *Journal of Interactive Learning Environments*, 32(2), 534-556.
19. Guy-Evans, O. (2020). Bronfenbrenner's ecological systems theory. [https://www. simplypsychology](https://www.simplypsychology).
20. Harding, J. (2019). *Qualitative data analysis: From start to finish*. London: Sage.
21. Harley, B., & Cornelissen, J. (2022). Rigor with or without templates? The pursuit of methodological rigor in qualitative research. *Organizational Research Methods*, 25(2), 239-261.
22. Heo, M., Lee, S., & Zo, H. (2021). Effects of online interaction on the exploration of behavioral intention to use mobile games: The moderating role of perceived enjoyment. *Information Systems Frontiers*.
23. Hussein, M.H., Ow, S.H., Elaish, M.M. & Jensen, E.O. (2022). Digital game-based learning in K-12 mathematics education: A systematic literature review. *Education and Information Technologies*, 27(2), 2859-2891.
24. Islam, M.A., & Aldaihani, F.M.F. (2022). Justification for adopting qualitative research method, research approaches, sampling strategy, sample size, interview method, saturation, and data analysis. *Journal of International Business and Management*, 5(1), 1-11.
25. Johnson, E. &. (2022). *Playful pedagogy in the pandemic: Pivoting to game-based learning*. London: Routledge.
26. Kavak, S. (2022). Digital game-based learning model as an educational approach. *Prizren Social Science Journal*, 6(2), 62-70.
27. Kiran, I., Macun, B., Arğin, Y., & Ulutaş, İ. (2021). Montessori method in early childhood education: A systematic review. *Cukurova University Faculty of Education Journal*, 50(2), 1154-1183.
28. Lawrence, D. 2. (2022). *Urie Bronfenbrenner. ScholarlySnapshots: The Importance of Child Play as a Human Right*. NY: Springer.
29. Magpusao, J. R. (2024). Gamification and Game-based Learning in Primary Education: A bibliometric Analysis. *Computers and Children*, 3(1).
30. Mao, W., Cui, Y., Chiu, M.M., & Lei, H. (2022). Effects of game-based learning on students' critical thinking: A meta-analysis. *Journal of Educational Computing Research*, 59(8), 1682-1708.
31. Maree, J. (2021). The psychosocial development theory of Erik Erikson: critical overview. *Journal of Early Child Development and Care*, 191(7), 1107-1121.
32. Mikrouli, P., Tzafilkou, K., & Protogeros, N. (2024). Applications and Learning Outcomes of Game Based Learning in Education. *International Educational Review*, 2(1), 25-54.
33. Moore, J. (2017). John B. Watson's classical S-R behaviorism. *The Journal of Mind and Behavior*, 1-34.
34. Papastergiou, M. (2009). Digital Game-Based Learning in high school Computer Science education: Impact on educational effectiveness and student motivation. *Journal of Computers & Education*, 52(1), 1-12.
35. Piaget, J. (1972). *The psychology of the child*. Basic Books. Basic Books.
36. Pratt, M.G., Sonenshein, S. & Feldman, M.S. (2022). Moving beyond templates: A bricolage approach to conducting trustworthy qualitative research. *Organizational research methods*, 25(2), 211-238.
37. Qibtiyah, S.M., Solikah, U., Fauzi, A. & Rahardjanto, A. (2023). Application of Game-Assisted Problem-Based Learning to Improve Critical Thinking Skills and Learning Motivation of Students. *Jurnal Eksakta Pendidikan (JEP)*, 7(1), 126-134.
38. Sakr, M., & Kaur, V. (2024). Re-imagining the Froebelian influence on early childhood education as a dynamic and ever-changing web of encounter. *Pedagogy, Culture & Society*, 1-18.
39. Sharma, R. (2020). Bridging the Digital Divide: Technology, Education, and Equity. *Education and Information Technologies*.
40. Skinner, B. F. (1953). *Skinner-Operant Conditioning*.
41. Sudhakaran, A. (2023). *Early Childhood Educational Toys through an Architectural Perspective*.

42. Sun, L., Kangas, M., Ruokamo, H., & Siklander, S. (2023). A systematic literature review of teacher scaffolding in game-based learning in primary education. *Journal of Educational Research Review*, 40, 100546.
43. Thompson, M. (2021). Piaget's Stages of Cognitive Development and Erikson's Stages of Psychosocial Development. In *Child and adolescent mental health* (pp. 55-59). CRC Press.
44. Watson, J. (2017). *Behaviorism*. Routledge.
45. Yeh, Y.C., & Ting, Y.S. (2023). Comparisons of creativity performance and learning effects through digital game-based creativity learning between elementary school children in rural and urban areas. *British Journal of Educational Psychology*, 93(3), 790.
46. Zhao, Y. (2024). Exploring the Dual Subjectivity of Kindergarten's Self-made Play and Teaching Aids Activities: Based on the Perspective of Children's Play Development in China. *Journal of Educational Technology and Innovation*, 6(1).
47. Zishiri, C., & Mugadza, S. (2024). Conceptualising Maslow's Self-Actualisation Concept for Application in Higher Education: An African Ubuntu Perspective. *International Journal of Research and Innovation in Social Science*, 8(3), 2833-2843.
48. Zolkipli, N.Z., Rahmatullah, B., Mohamad Samuri, S., Arva, V. & Sugiyo Pranoto, Y.K. (2023). Leave No One Behind: A Systematic Literature Review on Game-Based Learning Courseware for Preschool Children with Learning Disabilities. *Southeast Asia Early Childhood*, 12(1), 79-97.