Gamification Strategies and Their Influence on Students' Motivation and Engagement in Early Childhood Learning: A Comparative Study of Public and Private Schools in Dodoma City

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Abstract: *In Tanzania, many early-grade learners struggle with low levels of engagement and motivation, which hampers their mastery of foundational skills in literacy and numeracy. In response to these challenges, gamification has emerged globally as a promising pedagogical approach; however, its adoption and influence within the Tanzanian context remain under-researched. Therefore, this paper presents a comparative analysis of gamification strategies and their effects on motivation and engagement in early childhood learning within public and private schools in Dodoma City. The study specifically examines how differences in school environments affect the implementation and outcomes of gamified teaching methods, particularly in promoting pupils' motivation and engagement in learning basic skills (3Rs). Using a qualitative multi-case design, data were collected from two public and two private primary schools through interviews, focus group discussions, and classroom observations. Findings reveal that private schools utilize more digital gamification tools due to their better infrastructure, while public schools tend to rely on traditional games. Despite contextual differences, teachers in both settings perceived gamification as an effective approach for increasing pupil engagement and motivation. Challenges included a lack of digital tools in public schools and inconsistent training across all schools. The study recommends increased investment in infrastructure, equitable access to technology, and teacher professional development programs tailored to gamification pedagogy.*

1. Introduction

Gamification has emerged as a promising pedagogical strategy that promotes learner motivation and classroom engagement. Broadly, gamification refers to the application of game design elements such as points, levels, badges, leaderboards, rewards, and challenges into non-game contexts like education (Deterding et al., 2011). Unlike full games, gamification selectively incorporates these playful components into everyday learning activities to make them more engaging and rewarding. In early childhood education, particularly in low-resource settings, gamification offers a playful and learner-centered approach

to developing foundational competencies such as reading, writing, and arithmetic (3Rs) (Kapp, 2012; Subhash & Cudney, 2018). By embedding elements such as rewards, challenges, competition, and feedback into the learning process, teachers aim to enhance students' intrinsic motivation, sustain attention, and foster active participation (Buckley & Doyle, 2016).

In Tanzania, many young learners face challenges in acquiring the 3Rs due to overcrowded classrooms, teacher-centered instruction, and a lack of age-appropriate teaching materials. These issues are more pronounced in public schools, which often experience limited infrastructure, inadequate teacher training, and scarce access to digital tools. On the other hand, private schools, though relatively better resourced, also grapple with challenges in aligning innovative strategies like gamification with the national curriculum and assessment standards.

Previous assessments by institutions such as Uwezo and Twaweza have reported persistent gaps in early grade literacy and numeracy outcomes, particularly in government schools. Despite ongoing efforts by the Ministry of Education and development partners to improve early childhood education, teaching methods remain largely traditional and less interactive. As global attention shifts toward more learner-centered approaches, gamification presents a compelling alternative, but its effectiveness and practicality in Tanzanian classrooms are not well-documented. Furthermore, disparities between public and private school contexts raise questions about equity in access to innovative teaching strategies. While private schools may afford the digital infrastructure necessary for advanced gamified learning, public schools often rely on low-tech or no-tech approaches.

Despite growing interest in learner-centered pedagogies, early childhood education in Tanzania continues to be dominated by traditional teaching approaches that offer limited engagement for young learners. Many pupils, particularly in public schools, struggle to acquire foundational skills in reading, writing, and arithmetic (3Rs), which are critical for their academic progression and future learning success. Studies by Uwezo (2020) and the World Bank (2018) have consistently shown that a significant proportion of Standard Two and Three pupils cannot read or perform basic arithmetic at their grade level, especially in government-funded schools. This learning crisis points to the need for more effective, engaging, and age-appropriate instructional methods.

Although some individual teachers and schools are experimenting with gamified learning techniques, there is a lack of comprehensive research that explores the comparative implementation and impact of gamification

strategies across public and private early childhood classrooms in the Tanzanian context. This gap in knowledge hinders informed policy-making and the development of practical frameworks for effective gamification in low-resource environments.

Therefore, this study seeks to examine the current use of gamification in early childhood education in both public and private schools in Dodoma City, with a particular focus on how these strategies influence learners' motivation and engagement. By exploring these dynamics, the study aims to provide insights that can guide equitable and effective implementation of gamified teaching practices in Tanzania's early learning landscape.

2. Literature Review

2.1 Empirical Studies

Global studies have confirmed that gamification enhances learners' motivation, engagement, and academic performance (Sailer et al., 2017; Hanus & Fox, 2015). Gamification incorporates game-like elements such as points, leaderboards, badges, and instant feedback into the learning environment, making lessons more interactive and enjoyable for young learners. When applied effectively, gamification fosters intrinsic motivation, encourages persistence, and strengthens problem-solving skills (Deterding et al., 2011). In early childhood education, where attention spans are short and learning must be exploratory and play-based, gamification aligns well with developmental needs and learning styles.

However, the successful implementation of gamified learning depends significantly on infrastructure, teacher training, and the availability of digital tools. In well-resourced settings, teachers are better able to adopt gamified approaches using mobile devices, tablets, and internet-enabled platforms. In contrast, in low-income and resource-constrained environments, especially in Sub-Saharan Africa, the potential of gamification remains underutilized due to limited access to ICT infrastructure, lack of training, and rigid curricular structures (UNESCO, 2020).

In Tanzania, few empirical studies have explored the integration of gamification in early childhood education. Yet, the national curriculum emphasizes learner-centered approaches that could benefit from gamification techniques. Public schools, especially in rural and peri-urban areas, face challenges such as overcrowded classrooms, outdated teaching materials, and limited access to digital tools, which inhibit the adoption of innovative pedagogies (MOEST, 2021). On the other hand, private

schools often have greater flexibility in resource allocation, enabling faster adoption of gamified learning strategies and educational technology (World Bank, 2020).

Comparative studies indicate that private schools are more agile in experimenting with gamification because of better infrastructure and fewer bureaucratic restrictions (Alhassan & Habiba, 2018). This digital divide creates disparities in early learning experiences between public and private institutions. Understanding these differences is essential for designing policies and interventions that ensure equitable access to quality education.

While gamification is gaining attention globally, few studies focus on its practical implications in early years' education in Tanzania. This study fills that gap by examining how gamification is currently practiced in both public and private early childhood classrooms in Dodoma City and how these practices influence learner motivation and engagement. It also investigates the challenges teachers face in adopting gamified strategies and the role that school type (public vs private) plays in shaping these experiences.

2.2 Theoretical Framework

This study is guided by Self-Determination Theory (SDT) and Constructivist Learning Theory, both of which are highly relevant to the use of gamification in education. Self-Determination Theory posits that learners are most motivated when three basic psychological needs are met: autonomy, competence, and relatedness (Deci & Ryan, 1985). Gamification supports these needs by offering choice (autonomy), achievable goals with feedback (competence), and social interaction through game elements like collaboration and competition (relatedness). By engaging intrinsically, gamification can foster deeper motivation and sustained learning among young children.

Constructivist Learning Theory emphasizes that children learn best through active engagement and social interaction (Piaget, 1976; Vygotsky, 1978). Gamified activities align with constructivist principles by creating interactive, hands-on experiences where learners construct meaning through exploration, challenge, and feedback. This theory supports the use of games as learning tools, especially in early childhood, where play is central to development.

By grounding the study in these theories, the research explores not only the presence of gamification but also its ability to meet psychological and pedagogical needs in early learning environments, providing a holistic understanding of its impact across different school contexts.

3. Methodology

This study adopted a qualitative multi-case study design to explore the use and impact of gamification tools in early childhood education within Dodoma City. The purpose of this approach was to gain an in-depth understanding of how gamification strategies are implemented and experienced across different school contexts, specifically comparing public and private primary schools. By examining multiple cases, the study aimed to capture the diversity of practices, challenges, and outcomes associated with gamified teaching of the 3Rs (reading, writing, and arithmetic) in early grades.

The research was conducted in four purposively selected primary schools, two public and two private, to provide a balanced perspective on resource availability and pedagogical practices. A total of twelve participants were involved, including eight classroom teachers from Standards One to Three and four head teachers. Purposive sampling was used to ensure that participants had direct experience with gamified teaching methods, allowing the study to focus on knowledgeable informants who could provide rich, relevant data.

Data was collected using semi-structured interviews, classroom observations, and focus group discussions (FGDs). Interviews allowed for in-depth exploration of individual experiences, while classroom observations provided real-time insights into how gamification was applied during teaching. FGDs encouraged collective reflection and helped uncover shared challenges and perceptions. Data collection was carried out over a period of six weeks, with multiple visits to each school to ensure prolonged engagement. All data were audio-recorded (with permission), transcribed verbatim, and cross-checked with field notes to strengthen accuracy.

Thematic analysis was conducted following Braun and Clarke's (2006) six-step framework: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final report. This analytic approach facilitated the identification of key patterns, similarities, and differences in gamification practices across the schools.

To ensure trustworthiness, the study employed methodological triangulation (using interviews, observations, and FGDs), member checking (participants were invited to verify the accuracy of transcripts and interpretations), and the provision of thick, contextual descriptions to enhance transferability.

Ethical approval for this study was obtained from the University of Dodoma Research Ethics Committee. Permission to conduct the study was also secured by the Dodoma City Council and the head teachers of participating schools. Informed consent was obtained from all participants after they were briefed about the study's purpose, procedures, potential risks, and benefits. Participation was voluntary, and participants were informed of their right to withdraw at any stage without consequences. To ensure confidentiality, pseudonyms were used in transcripts and reports, and all audio files and transcripts were securely stored in password-protected devices accessible only to the researcher. Special care was taken to minimize disruption to teaching activities, and findings were reported in a manner that protected both individual and institutional identities.

This methodological approach provided a comprehensive and ethically sound understanding of how gamification influences learner motivation and engagement in diverse educational settings within the Tanzanian context.

4. Results and Discussion

The study revealed significant variations in the implementation and perceived effectiveness of gamification tools across public and private primary schools in Dodoma City. While all participating teachers recognized the value of gamified instruction in promoting early childhood learning, the nature and extent of usage varied considerably based on infrastructural resources, training opportunities, and school leadership support.

4.1 Demographic Characteristics

This study involved participants from four selected primary schools in Dodoma City, including both public and private institutions. The sample included four (4) head teachers, eight (8) standard one classroom teachers, and twenty-four (24) 3Rs teachers of standard one, two, and three, making a total of 36 participants. Classroom observations included children aged 5 to 7 years across Standards One to Three, with representation of both boys and girls. This diverse sample of teachers and learners provides a solid foundation for examining how gamification strategies are applied, highlighting the influence of teacher experience, qualifications, and school resources on the adoption and effectiveness of gamified learning in early childhood classrooms. Table 1 indicates the summary of demographic data obtained during this study.

Table 1: Teacher-Participants (n = 36)

Demographic Variable	Category	Frequency	(%)
Gender	Male	12	33.3%
	Female	24	66.7%
Teaching Experience	1–5 years	6	16.7%
	6–10 years	13	36.1%
	Over 10 years	17	47.2%
Education Level	Diploma	16	44.4%
	Bachelor's Degree	19	52.8%
	Master's degree	01	2.8%

Source: Field Data (2025)

The demographic breakdown of teacher-participants (n = 36) shows a gender imbalance. Sixty-six-point seven percent (66.7%) of teachers are female, while thirty-three-point three percent (33.3%) are male. This trend is common in early childhood and primary education, where teaching is often seen as a nurturing profession linked with women. Kenny and Kogan (2019) pointed out that female dominance in teaching is widespread worldwide, particularly in the early stages of education. UNESCO (2021) also noted that in many sub-Saharan African countries, the primary education workforce is mainly made up of women. This gender distribution can impact teaching styles, classroom interactions, and pupils' socialization. In the early grades, having more female teachers may shape pupils' views on gender roles, affect how they communicate, and offer strong female role models during important developmental years.

In terms of teaching experience, 47.2% of the teachers have over 10 years in the classroom, 36.1% have taught for 6 to 10 years, and 16.7% for 1 to 5 years. This shows that most of the educators are experienced professionals. According to Mtebe and Raisamo (2014), experienced teachers often have strong classroom management skills and consistent teaching practices. However, they might need more organized support and training to confidently use new technologies or methods, such as gamification (Mtebe & Raisamo, 2014). The different experience levels in the sample could affect how quickly schools adopt and

maintain innovation, emphasizing the need for tailored professional development.

The teachers' educational backgrounds are fairly balanced. Forty-four-point four percent (44.4%) have diplomas, while fifty-two-point eight percent (52.8%) hold bachelor's degrees. One participant, representing two-point eight percent (2.8%), has a master's degree. This distribution shows a mix of basic and advanced teacher preparation. Mangen and Støen (2020) say that higher academic qualifications usually lead to more confidence in using technology in teaching. However, the hands-on training in diploma programs might improve classroom effectiveness, especially in schools with limited resources. The mix of qualifications indicates that other factors, like ongoing professional development, school culture, and leadership support, also play a role in teachers' willingness and ability to try new practices (Fullan, 2016; OECD, 2019).

The balanced distribution of teachers by gender, experience, and qualifications offers a solid base for understanding how these factors relate to efforts to introduce gamification. This diversity makes it possible to compare opportunities and challenges in different educational settings. Ultimately, it helps to create better policy and practice recommendations for using gamified learning in Standard One to Three classrooms. This approach supports the findings of UNESCO (2019), which stress the significance of varied educational contexts in shaping effective teaching innovations. It also aligns with Mtebe and Raisamo (2014), who point out how teacher characteristics affect technology adoption in Tanzanian schools.

4.2 Contextual differences in the use of gamification

4.2.1 Digital gamification in private schools

In private schools, the use of digital gamification was both regular and systematically integrated into the curriculum. Teachers reported that approximately 80% of classroom sessions in Standards One to Three incorporated some form of digital gamification, particularly during literacy and numeracy lessons. This percentage reflects a high level of adoption, especially compared to public schools, where digital tool use was often sporadic or absent. One teacher stated:

> I use Duolingo ABC almost every day to help children improve their phonics. It's easy for them to follow, and they enjoy the animations. Even the shy ones participate. (Interview with the Standard

One female teacher from Private School A, 08 April 2025).

Digital gamification in private schools was not only frequent but systematically embedded into everyday learning. The combination of supportive infrastructure, teacher readiness, and parental involvement created a conducive environment where gamification thrived, thereby enhancing both engagement and learning outcomes. This high adoption contrasts with the situation in public schools, where limited resources and irregular integration often constrain the potential of digital gamification.

4.2.2 Educational Apps and Platforms

The most frequently cited applications included Duolingo ABC, ABCmouse, and Khan Academy Kids. These tools were used to strengthen phonemic awareness, vocabulary development, spelling, and number recognition. For example, ABCmouse was used for interactive phonics games, while Duolingo ABC provided engaging tasks focused on letter sounds and early reading skills. In mathematics, Khan Academy Kids offered modules for number sequencing and basic addition/subtraction, presented through games and characters that motivated learners to proceed through levels at their own pace. These tools supported self-paced learning, a feature highly valued by teachers. As one head teacher explained:

> Gamified apps allow children to progress at their own speed. Some finish faster and move on, while slower learners can repeat tasks without feeling left behind." (Interview with the Standard One female teacher from Private School B, 08 April 2025).

These findings suggest that the integration of educational apps and platforms in private schools provided a structured yet flexible approach to foundational learning. By combining gamification with self-paced progression, tools like Duolingo ABC, ABCmouse, and Khan Academy Kids not only enhanced literacy and numeracy skills but also fostered inclusivity in classrooms with diverse learning abilities. Teachers valued these apps for their ability to sustain student engagement through interactive features, while simultaneously allowing individualized learning pathways. Consequently, educational apps served as both instructional aids and motivational tools, reinforcing private schools' broader strategy of embedding digital gamification into daily teaching and learning.

4.2.3 Enhanced Engagement and Feedback

Teachers noted that these platforms provided instant feedback, which improved students' motivation and confidence. The audio-visual rewards, such as stars, badges, or celebratory sounds, encouraged students to try harder and stay focused. Classroom observations revealed that students remained engaged for extended periods up to 30 minutes without disruption, which is significantly longer than the typical attention span for children of that age group in traditional lessons.

This finding supports Sailer et al. (2017), who emphasized that immediate feedback and reward mechanisms in gamification enhance learner autonomy and intrinsic motivation. Additionally, this aligns with Vygotsky's social constructivist theory, which suggests that learning is maximized when children interact with tools and scaffolds tailored to their developmental level.

4.2.4 Technology Infrastructure and Support Systems

The success of digital gamification in these private schools was also attributed to infrastructure and support. All private schools visited had dedicated ICT rooms, stable internet, projectors, and interactive whiteboards. Moreover, they employed ICT support staff who assisted with technical issues and ensured smooth operation during lessons. This contrasts sharply with public schools, where such infrastructure was either minimal or nonexistent. A private school teacher noted:

> We have strong internet and a technician who sets everything up for us. If something fails, it's fixed quickly, so our lessons aren't disrupted. (Interview with the Standard One female teacher from Private School A, 08 April 2025).

The presence of technical support and reliable connectivity made it easier for teachers to plan lessons around gamified tools, ensuring consistent integration rather than one-off experiments. These findings align with World Bank (2020) insights, which indicate that resource-rich schools, especially in urban areas, are better positioned to implement technology-enhanced learning due to administrative and financial flexibility.

In contrast to their counterparts in private institutions, public school teachers primarily relied on traditional and low-tech gamification strategies due to limited access to digital resources. However, these methods were creatively applied to promote engagement, enhance learning retention, and foster active participation among early learners. The findings revealed that despite the technological gap, teachers in public schools demonstrated strong innovation and pedagogical adaptability.

The use of low-tech, culturally embedded gamification strategies in public schools reflects the adaptive resilience of teachers operating in resource-constrained environments. This supports the argument by Serdyukov (2017) that innovation in education does not always require digital technology but rather creativity and contextual responsiveness. Compared to private schools, where digital gamification is supported by infrastructure and external resources, public schools rely on community-driven and experiential learning techniques. However, both approaches successfully promote engagement and active learning, albeit through different means.

4.2.5 Singing and Rhythm-Based Games

One of the most common gamification strategies observed in public schools was the use of songs and rhythm-based chants to teach basic literacy and numeracy. For example, teachers used songs such as "One, Two, Buckle My Shoe" or localized Swahili versions to teach number sequences and pronunciation patterns. A teacher from Public School A explained:

> We sing almost every morning. It wakes them up and helps them remember numbers, especially for the younger ones. The melodies stick in their heads. (Interview with the Standard One female teacher from Private School A, 08 April 2025).

These rhythmic games served a dual purpose: they stimulated auditory learning and improved classroom participation. Observation data showed that students were more engaged and enthusiastic during lessons that incorporated music and movement. This echoes findings from Bruscia (2014), who suggested that music enhances memory and promotes language development in young children.

4.2.6 Handmade Flashcards and Posters

Due to the absence of smartboards or tablets, handmade teaching aids such as flashcards, alphabet charts, and number posters were essential tools in public school classrooms. Teachers used locally available materials, including manila paper, cardboard, and marker pens, to create visual aids for phonics and number recognition. One teacher remarked:

> I make my flashcards. The children love turning them over during question-and-answer games. It's a simple way to gamify the lesson. (Interview

with the Standard One female teacher from Public School C. 09 April 2025).

Findings from classroom observations indicated that these visual aids were often used in competitive team games or individual challenges, where learners would race to match letters with sounds or numbers with quantities. These low-tech resources helped foster visual recognition skills and allowed learners to engage with the content in an interactive, tactile manner. Similar results have been reported in previous studies, which highlight the effectiveness of visual and game-based learning tools in strengthening early literacy and numeracy skills. For example, Piaget's theory of cognitive development emphasizes the importance of hands-on, concrete experiences in the early stages of learning (Piaget, 1972), while Vygotsky underscores the role of social interaction and play in knowledge construction (Vygotsky, 1978). Empirical studies, such as those by Hanus and Fox (2015) and Sung, Chang, and Liu (2016), also demonstrate that gamified approaches, whether digital or non-digital, promote motivation, active participation, and retention of knowledge among young learners. Thus, the use of flashcards and similar tactile aids in classroom settings aligns with broader evidence that game-based learning strategies enhance both engagement and comprehension.

4.2.7 Role-Playing and Storytelling

Teachers also incorporated role-playing games and storytelling techniques to make lessons more dynamic and relatable. For example, during reading sessions, children acted out parts of a story or mimicked animal sounds from storybooks. Teachers guided students to "become the characters" as a way to enhance comprehension and memory**.

A teacher shared:

> We don't have projectors or computers, but we become the animals in the story. If the lion roars, they roar back. It makes them remember the plot easily. (FGD participant, P9, 09, April 2025).

Storytelling also allowed for the integration of cultural narratives, which made learning more relevant and meaningful. This aligns with Vygotsky's (1978) theory that emphasizes learning through social and cultural interactions, where knowledge is co-constructed through shared experiences. By engaging learners in role-play and narrative-based activities, teachers not only enhanced comprehension and recall but also fostered imagination, empathy, and communication skills. The use of local stories and familiar cultural references further strengthened the connection between classroom learning and students'

everyday lives, making abstract concepts more concrete and relatable. Previous studies (e.g., Isbell et al., 2004; Nicolopoulou, 2019) also highlight that storytelling promotes language development, critical thinking, and socio-emotional growth in early childhood. Therefore, the findings indicate that role-playing and storytelling served as powerful low-cost pedagogical strategies that compensated for the absence of digital resources in public schools, while still supporting active engagement and deeper learning.

4.2.8 Physical Games and Movement-Based Activities

Another prevalent strategy was the use of physical movement games such as number races**,** object sorting**,** hopscotch, and Simon Says to reinforce counting, sorting, and gross motor skills. In one observed lesson, children were tasked to jump to numbered boxes in the correct sequence, effectively combining physical activity with mathematical practice.
Observation notes:

> Students eagerly lined up to participate in number-hop races. They shouted the numbers aloud as they jumped, reinforcing both verbal and physical memory of the sequence. (Interview with the Standard One female teacher at public school C, 09 April 2025).

These movement-based games were especially effective for learners with short attention spans or those struggling in sedentary environments. They promoted kinesthetic learning, enhanced engagement, and improved overall classroom energy. According to Jensen (2005), movement increases oxygen flow to the brain and boosts concentration in young learners, which supports both cognitive processing and memory retention. In addition, such active learning strategies align with Gardner's (1983) theory of multiple intelligence, particularly bodily-kinesthetic intelligence, emphasizing that some children learn best through physical activity and hands-on experiences. Empirical studies also show that integrating movement into lessons can enhance motivation, reduce disruptive behaviors, and reinforce academic concepts through experiential practice (Ma, 2020; Norris & Loprinzi, 2019). Therefore, movement-based games not only made learning enjoyable but also provided a practical means of addressing diverse learning needs, particularly in classrooms with high student variability.

4.3 Similarities in Both Contexts

Despite differences in technological resources and platforms, gamification was positively perceived and effective in both public and private school contexts. The shared benefits heightened motivation, better participation, and enhanced social interaction—highlighting gamification's pedagogical potential in early childhood education, regardless of context, provided it is well-aligned with learners' developmental needs and cultural environment. Furthermore, several teachers observed that gamification contributed to better behavioral outcomes. Children were less likely to exhibit disruptive behaviors when they were actively engaged in enjoyable tasks. Structured game routines helped maintain discipline and focus, with one public school teacher noting, "When we play counting games, the whole class pays attention, even the restless ones."

4.3.1 Increased enthusiasm for learning

Across both public and private school contexts, teachers consistently affirmed the motivational impact of gamification on learners. Regardless of the availability of digital tools, all observed teachers and interviewed participants reported that pupils exhibited increased enthusiasm for learning when lessons incorporated game elements. One private school teacher remarked:

> Whenever I introduce a math lesson as a competition or game, even the quietest students want to participate. They become very active. (interview with the Standard One female teacher at private school B, 08 April 2025)

Similarly, a public-school teacher shared:

> The moment I say 'let's play a game,' the class lights up. They know learning will be fun, and they pay attention more. (interview with the Standard One female teacher at private school D, 09 April 2025)

Classroom observations confirmed this trend. In both settings, gamified lessons saw higher participation rates, with students volunteering more readily, engaging in peer collaboration, and displaying improved task completion. In particular, students who were previously disengaged became more responsive and confident when academic tasks were embedded in game structures such as quizzes, races, or role-playing activities.

For example, in one private school, a digital quiz using Kahoot prompted all students to actively engage, with 100% participation recorded, and in a public school, a Swahili song-based vocabulary game resulted in 85% of students responding correctly and joyfully repeating the words, even without visual aids.

This reflects an intrinsic motivational shift, where learners viewed education not as a chore but as an enjoyable and rewarding experience. Teachers in both contexts also reported a reduction in classroom behavior issues, attributing it to the engagement power of play. These findings align with Self-Determination Theory (Deci & Ryan, 2000), which argues that autonomy, competence, and relatedness, all of which are fostered by gamification, enhance learner motivation. These local findings are supported by numerous studies internationally. Zainuddin et al. (2020) found that gamified learning environments increased student motivation, particularly when learners received immediate feedback and points for achievement. Similarly, Hamari et al. (2014) concluded that game elements such as competition, progression, and social interaction positively impacted learner engagement and satisfaction.

4.3.2 Teachers' Ability to be Creative in the Learning Environment

Notably, this study highlights that the motivational benefits of gamification transcend the availability of digital tools. While private schools implemented digital gamification tools such as tablets, apps, and online quizzes, public schools utilized traditional and locally inspired games (e.g., bottle top puzzles, movement games, cultural storytelling) with comparable motivational effects. This suggests that the core power of gamification lies not in the technology itself, but in its ability to create challenges, play, and engagement within learning environments (Kapp, 2012).

Therefore, while the methods of gamification differed between the two school types, the outcomes is almost similar which enhanced motivation, participation, and enjoyment, were remarkably consistent. This finding supports the argument that gamification is a flexible pedagogical tool that can be effectively adapted to diverse educational contexts, provided it aligns with the learners' cultural background, interests, and developmental stage.

4.3.3 Active Participation

Across both private and public-school settings, teachers consistently reported that gamification significantly enhanced learners' motivation, engagement, and participation. Classroom observations revealed that when instructional content was delivered through games or structured challenges, pupils were more eager to attend

school and participated more actively during lessons. In both contexts, most teachers (10 out of 12, or 83%) emphasized that children responded with visible excitement during gamified sessions. As one public school teacher explained:

> Even with simple games like number races or role plays, you can see the joy in their eyes. They want to answer, they want to win, they want to try. (interview with the head teacher at School C, 9th April 2025).

Similarly, a private school teacher highlighted:

> Apps like Khan Academy Kids keep them focused longer. They cheer when they complete a level and always want to do more." (interview with the Standard One female teacher at private school A, 08 April 2025).

These findings mirror those of Sailer et al. (2017) and Hamari et al. (2016), who argue that gamified learning environments promote intrinsic motivation by providing elements such as achievement, competition, and fun. Additionally, pupils in both school types exhibited improved retention and enthusiasm for learning tasks when games were involved, reinforcing previous research that shows gamification supports active and meaningful learning (Hanus & Fox, 2015).

4.3.4 Peer Interaction and Social Skill

Beyond motivation, teachers across both settings reported notable improvements in peer interaction and social skills. Many gamified activities required students to work in pairs or groups, fostering cooperation, turn-taking, sharing, and verbal communication. For instance, games involving storytelling or object sorting often require team-based collaboration, particularly in public schools using physical and oral-based games. Observation notes from Public School B documented that pupils were seen cheering and encouraging peers during a Swahili word relay. Even quiet children were laughing and contributing. In private schools, digital tools also facilitated group interaction, with children taking turns using tablets or participating in group challenges on smartboards.

These outcomes align strongly with Constructivist Learning Theory, which emphasizes that learners actively construct knowledge through meaningful, hands-on engagement. Gamification provides this by transforming lessons into lived, experiential events that allow for exploration, feedback, and immediate relevance. The theory's emphasis on scaffolding and learner-centered environments also supports the structure of gamified lessons, especially when learners progress through levels of difficulty at their own pace. Revision

Furthermore, Vygotsky's Sociocultural Theory of Learning provides an important theoretical lens for understanding these dynamics. Vygotsky (1978) underscored the critical role of social interaction in cognitive development and argued that play is a central mechanism through which children internalize new knowledge. The study's findings, particularly the collaboration, use of culturally relevant games, and child-to-child teaching moments, demonstrate how gamification supports learning within the Zone of Proximal Development (ZPD) by engaging peers and teachers as more knowledgeable others (MKOs).

4.3.5 Motivational Impact of Gamification

Across all four schools (two public and two private), teachers unanimously reported a noticeable increase in learners' motivation and enthusiasm toward classroom activities that were gamified. In private schools, 100% of teachers (4 out of 4) observed that using digital platforms like *ABCmouse* and *Khan Academy Kids* significantly boosted attendance and class participation. One private school teacher noted:

> When we use Khan Academy Kids, children ask for more. Even those who were shy now raise their hands. (interview with the Standard One female teacher at private school A, 08 April 2025).

In public schools, 3 out of 4 teachers emphasized that games like number races and storytelling had a similar effect. A public-school teacher stated:

> When we sing counting songs, no child wants to miss class. They enjoy singing and learning at the same time. (interview with the Standard One female teacher at private school A, 08 April 2025).

Gamification strategies, whether digital or traditional, are powerful tools to enhance engagement and classroom participation. Motivation was not dependent on technology access but on the structure and delivery of the activity. This supports Sailer et al. (2017), who emphasized gamification's role in increasing learner engagement. Similar findings were reported by Hanus and Fox (2015), indicating that motivation increases when learning is interactive and fun.

4.3.6 Improved Peer Interaction and Collaboration

All teachers noted that gamified activities encouraged cooperation, particularly in tasks that involved group challenges or partner games. In private schools, collaborative digital activities (e.g., completing app-based challenges in pairs) improved peer-to-peer communication. In public schools, role-playing and storytelling were found to promote turn-taking and respectful dialogue among learners. *A teacher in a public school shared:*

> Even children who rarely spoke began interacting more when we did storytelling in groups. (FGD female participant, P7 from Public School C, 09 April 2025)

Games structured for group participation promote not only academic engagement but also critical social-emotional skills. For young learners, structured play builds a foundation for empathy, listening, and respectful collaboration. Research by Hwang et al. (2019) similarly shows that gamified environments foster collaboration and peer learning. Al-Azawi et al. (2016) emphasize the role of educational games in building teamwork and interpersonal communication among children.

4.3.7 Constructivist Learning Theory Alignment

Constructivist theory (Piaget, 1973; Bruner, 1996) argues that learners actively construct knowledge through meaningful interactions and experiences. Findings from the study revealed that Gamified lessons in both contexts supported learner-led exploration and discovery. In private schools, children explored concepts at their own pace through app-based content. In public schools, learners engaged in hands-on exploration using physical materials like flashcards, bottle tops, and sand trays. One head teacher remarked:

> We allow pupils to make mistakes during the game and then reflect. That process helps them to understand. (interview with the Standard One female teacher at private school A, 08 April 2025)

Gamified approaches align well with constructivist principles by promoting exploration, problem-solving, and critical thinking. Teachers shift from direct instruction to facilitators of learning, enabling students to own the process. This aligns with Bruner's advocacy for discovery learning and supports Deterding et al. (2011), who suggest that gamification allows for experiential and contextual learning.

4.3.8 Socio-Cultural Learning Theory – Vygotsky's Emphasis on Play

Vygotsky (1978) highlighted that children learn best through social interaction and play, especially when scaffolded by adults or more capable peers. Findings from the study show that in both settings, play-based learning was a daily feature, either via technology or traditional games. Teachers intentionally used group work and role-play to create opportunities for social interaction and peer support. A teacher from a public school said:

> We use group games so they can help each other. Some pupils learn better when another child explains it." (FGD female Participant, P1 from Private School A, 08 April 2025)

Gamification fosters the social construct of learning, making Vygotsky's Zone of Proximal Development (ZPD) achievable in early childhood classrooms. Play is not just entertainment; it's a structured, pedagogical tool promoting both cognitive and social development. The findings reinforce Bodrova & Leong's (2007) work on the power of play in early learning contexts. Studies by Fleer (2011) in similar socio-cultural settings affirm the value of culturally relevant play as a learning scaffold.

4.4 Challenges Observed

However, despite these benefits, multiple challenges were identified, especially in public schools. These findings strongly support the view that context is a determining factor in the success of gamification. While the pedagogical potential of gamification is evident in both public and private schools, its implementation must be aligned with the realities of the classroom, including available infrastructure, teacher competencies, and learner needs.

4.3.1 Lack of Formal Training

Several public-school teachers in the study openly acknowledged their willingness to adopt gamified teaching strategies but expressed a lack of formal training in integrating technology or even non-digital gamification techniques into their pedagogical approaches. While some had learned to improvise using traditional methods, such as

storytelling and rhythm games, others felt inadequately prepared to structure lessons using gamified principles. For instance, a teacher stated:

> Even if we had apps or the internet, we wouldn't know how to use them well without someone showing us. (FGD female Participant from Public School D, P10, 09, April 2025).

This gap in teacher preparedness can lead to underutilization of even the few resources available. It also limits the scalability of successful gamification practices observed in private schools. Teachers who lack professional development in digital pedagogy may struggle to transform curriculum objectives into engaging, game-based formats, leading to a missed opportunity in boosting learning outcomes. Similar findings were reported by Kafyulilo et al. (2015), who emphasized that in Tanzania, the successful adoption of ICT in education is hindered by limited teacher training and inadequate integration in teacher preparation programs. Ertmer and Ottenbreit-Leftwich (2010) also stress that teachers' confidence and training are pivotal for technology integration, especially in low-resource environments.

4.3.2 Lack of Facilities

Beyond training, public-school teachers cited the lack of essential facilities as a significant barrier. This includes not only the absence of digital devices like tablets or computers but also basic teaching resources such as chalk, charts, and storage for learning aids. One teacher poignantly remarked:

> We want to use games and apps, but we don't even have enough chalk, much less tablets. (FGD female participant, P7 from Public School C, 09 April 2025).

This quote highlights the disparity in infrastructure between public and private schools and the severity of resource constraints faced by public educators. The absence of digital infrastructure limits exposure to innovative teaching tools and reinforces educational inequality. Students in such environments are deprived of interactive, engaging, and student-centered learning experiences. It also hampers inclusive education efforts, as gamification has proven potential in catering to diverse learning needs.

The findings underscore that even motivated teachers require both capacity and tools. Private school teachers in the study, who had both elements, effectively integrated apps like Khan Academy Kids and ABCmouse into phonics, spelling, and math instruction, with observable improvements in learner engagement and outcomes. In contrast, public teachers compensated through improvisation using bottle tops, sticks, and storytelling. Their adaptability demonstrates potential but also exposes the limits imposed by systemic constraints.

The Tanzania Education Sector Development Plan (2016/17–2020/21) acknowledges infrastructural inequality as a key challenge in ensuring equitable quality education. Studies such as Ngussa and Mwale (2019) found that rural and public schools in Tanzania often lacked access to electricity, let alone internet and devices necessary for digital learning. UNESCO (2020) further underlined that without equitable access to educational technology, digital learning innovations risk widening the education gap between the rich and the poor. This requires a holistic policy response, which means investment in teacher training (pre-service and in-service) and digital infrastructure. Without these, the full benefits of gamification and digital tools already evident in better-resourced contexts will remain inaccessible to the majority of learners in Tanzania's public education system.

4.3.3 Lack of structured policies and standardized guidelines

The findings indicate that the absence of structured policies and standardized guidelines creates a significant barrier to the consistent and effective use of gamification in early childhood education. Without formal directives, teachers are compelled to rely on their own creativity, experience, or available resources, resulting in a highly variable implementation of gamified learning activities. This situation is particularly evident in public schools, where limited resources compound the challenge, and where teachers may lack both training and institutional support to integrate digital or low-tech gamification strategies effectively.

Research supports these observations, showing that the presence of clear policies, curricula integration frameworks, and teacher training programs is critical for the successful adoption of educational innovations (Ertmer & Ottenbreit-Leftwich, 2010; OECD, 2020). Policies provide a structured approach, ensuring that gamified activities are pedagogically aligned, age-appropriate, and consistently applied across classrooms. Standardized guidelines also facilitate monitoring and evaluation, allowing schools to assess the effectiveness of gamification in improving learning outcomes and to make evidence-based adjustments.

The absence of such frameworks leads to disparities among students. While some may benefit from motivated and

resourceful teachers who can creatively implement gamification, others may receive little to no exposure, reinforcing educational inequities. Moreover, inconsistent practices can limit professional collaboration among teachers, as there is no common reference point for best practices or expected learning outcomes. Therefore, establishing clear policies and guidelines is essential not only for promoting equitable access to gamified learning but also for maximizing its educational potential across diverse school contexts.

4.3.4 Inequitable distribution of resources and training opportunities

The findings highlight that inequitable access to resources and training significantly affects the implementation of gamification in early childhood education. Private schools benefit from better technological infrastructure, educational software, and learning devices, which enable teachers to integrate gamified activities more seamlessly into the curriculum. In contrast, public schools particularly those in rural or under-resourced areas face significant limitations, including insufficient teaching materials, lack of internet connectivity, and minimal access to digital devices. These disparities not only restrict the use of gamified learning but also exacerbate educational inequities, as students in under-resourced schools receive fewer opportunities to benefit from interactive, engaging instructional methods.

In addition, the lack of formal professional development in gamification compounds these inequities. Most teachers, irrespective of school type, reported relying on self-directed learning, such as online tutorials, workshops, or peer discussions, to acquire the necessary skills. Research indicates that without structured training programs, teachers are less confident in designing and facilitating gamified lessons, which can lead to inconsistent application and reduced effectiveness (Hattie, 2012; Ertmer & Ottenbreit-Leftwich, 2010). Consequently, students' experiences with gamification vary widely, with some receiving rich, interactive learning opportunities while others have minimal exposure. Addressing this issue requires targeted investment in teacher training and equitable allocation of educational resources, ensuring that all students can benefit from innovative, technology-enhanced learning strategies.

5. Conclusion and Recommendations

5.1 Conclusion

Overall, the findings of this study affirm that gamification strategies play a crucial role in enriching early childhood

learning experiences, particularly in the acquisition of basic skills, reading, writing, and arithmetic (3Rs). Teachers in both public and private schools in Dodoma City reported that gamified learning approaches led to improved pupil engagement, heightened motivation, and more meaningful participation in classroom activities. These benefits were especially notable among learners who typically struggle with traditional instructional methods.

In private schools, the availability of digital infrastructure such as tablets, internet connectivity, and interactive applications enabled the use of advanced gamification tools. This facilitated individualized learning experiences, immediate feedback, and greater interactivity. In contrast, public schools, despite facing limitations in digital access, demonstrated notable creativity and adaptability through the use of locally available, traditional gamification tools like flashcards, singing games, role-playing, and number-based physical activities.

However, the study highlights critical disparities in the implementation of gamification strategies between the two school types. Public schools are disproportionately affected by a lack of digital tools, insufficient teacher training, and minimal institutional support. These challenges risk deepening educational inequalities and undermining the potential benefits of gamification in early childhood education. In summary, the results underscore that gamification, whether through digital platforms or traditional games, can be a powerful driver of engagement, social learning, and foundational skill acquisition in early childhood. However, without strategic investments in training, infrastructure, and policy, its benefits will remain uneven and limited to a privileged few.

Gamification is not a one-size-fits-all solution, but when strategically implemented, it can transform early childhood education in Tanzania by making learning engaging, participatory, and meaningful. The study calls upon educational leaders to embrace gamification as a mainstream pedagogical approach, one that complements national education goals and prepares young learners for the demands of a 21st-century knowledge society.

5.2 Recommendations

Policy Support: The Ministry of Education should ensure equitable access to gamification tools across all early childhood education settings, with particular attention to resource-constrained public schools.

Teacher Training: Schools and teacher training institutions should implement structured pre-service and in-service programs to equip teachers with practical skills

in both digital and non-digital gamified teaching techniques.

Culturally Relevant Resources: The Ministry of Education, in collaboration with curriculum developers, should invest in locally relevant, culturally responsive resources—such as digitized stories, language materials, and numeracy exercises—aligned with the Tanzanian curriculum to enhance learning outcomes.

Public-Private Partnerships: Educational stakeholders should foster public-private partnerships to support infrastructure, teacher training, and the development of gamified learning content.

Monitoring and Evaluation: Schools and education authorities should establish monitoring and evaluation mechanisms to assess the effectiveness of gamification initiatives and guide continuous improvement.

Parental Engagement: Teachers and schools should actively engage parents and caregivers to use simple, low-cost learning games at home, reinforcing school-based instruction and fostering a culture of playful, interactive learning

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