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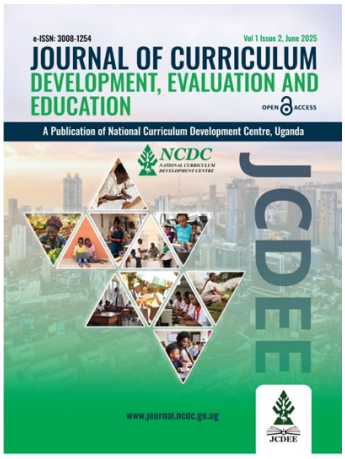
Strategic Implementation of Gamification in Education: Enhancing Learner Engagement amid Curriculum Reforms in Uganda



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Abstract

As education systems grapple with persistent challenges in learner motivation and active participation, gamification, the application of game-design elements in non-game contexts, has emerged as a promising pedagogical strategy. This paper critically examines the alignment between gamification and the Competency-Based Curriculum (CBC), with a focus on its potential to enhance learner engagement within Uganda's educational context. Drawing on a comprehensive review of existing literature, the study synthesized current findings to construct a coherent framework for strategic gamification implementation. The results from secondary data indicate that gamification can be effectively integrated into Ugandan schools to support ongoing curriculum reforms. Gamified learning fosters active participation and the acquisition of practical skills, aligning well with the CBC's emphasis on learner-centred and competency-driven education. Moreover, gamification has been found to significantly foster learner motivation, engagement, and academic performance. Though recognised as a complex process, several strategies for integrating gamification into curriculum delivery and teacher development have been identified. However, contextual barriers such as limited infrastructure, overcrowded classrooms, and inadequate teacher preparation hinder the effective adoption of gamification in education. The study identifies three key educational theories, Constructivist Learning Theory, the Diffusion of Innovation Theory, and the Self-Determination Theory, as foundational to the pedagogical and strategic integration of gamification. Nonetheless, addressing contextual challenges is essential to translating theoretical potential into practice. The study recommends the adoption of low-tech gamification approaches, inclusive frameworks, increased funding, and targeted teacher training as critical enablers of success. Future research should explore the long-term impact and scalability of gamification as Uganda's education system continues to evolve.

Keywords: *Competency-Based Curriculum, Curriculum Reforms, Education, Gamification, Learner Engagement, Learner Motivation.*

Introduction

Learner engagement and motivation remain a global challenge in education as traditional pedagogical approaches often fail to keep pace with digital distractions and evolving learner expectations. The inability of traditional approaches to compete with digital overload and meet the changing demands of modern learners undermines learning outcomes and retention rates, which may contribute to increased dropout rates, with some learners failing to complete their education. The disengagement of modern learners calls for strategic interventions, prompting the exploration of innovative approaches such as gamification. According to Rivera and Garden (2021), gamification refers to an instructional method that increases

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learner motivation and engagement. Rather than converting the classroom into a full-scale game, it integrates game mechanics into existing curricula to make learning more interactive, enjoyable, and goal-driven. As Chans and Portuguez (2021) argue, this strategy holds promise for transforming the classroom into a dynamic space where learners are more likely to remain motivated and invested in their learning journey.

However, the effectiveness of gamification in the classroom depends on how thoughtfully it is implemented. Poorly designed or hastily adopted gamified activities often fail to achieve the intended outcomes, especially when done superficially or without a clear pedagogical rationale (Kapp, 2013). Meaningful implementation requires careful selection of game elements that are aligned with specific learning goals and the needs of learners.

In Uganda, the introduction of the Competency-Based Curriculum (CBC) in 2020, followed by the ongoing reforms in Uganda Certificate of Education (UCE) grading system and the rollout of an integrated advanced-level curriculum, emphasises practical, learner-centred approaches. In this context, gamification aligns well with national educational priorities by supporting experiential learning and improving learners' knowledge retention through interactive content delivery (Favour, n.d.).

Despite its potential, many Ugandan secondary schools still lack the training resources and frameworks to implement gamification effectively. This creates uncertainty around its implementation in the CBC curriculum delivery and the impact on learner engagement, motivation, and performance. The identified gap presents a critical problem that this study seeks to investigate by examining the strategic implementation of gamification within Ugandan secondary schools, assessing its role in enhancing learner engagement, motivation, and performance under the CBC framework.

Background of the Study

Globally, gamification has gained attention across various fields, though with less applicability in the education sector (Kanagwa et al., 2024). Nonetheless, it is increasingly being explored as an innovative strategy to address the persistent challenge of sustaining student-learner interest and interactivity (Yadav et al., 2022; Bouchrika et al., 2021). Kapp (2013) emphasises that the integration of game elements into everyday activities is a logical progression, even though scepticism around gamification in formal learning still exists. The emerging body of literature has highlighted gamification's potential to improve educational systems, aimed at increasing learners' concentration, motivation, engagement, and overall learning experiences (Oliveira et al., 2023; Bouchrika et al., 2021). Deterding et al. (2011) define gamification as the use of video game elements in context to enhance user experience and engagement. The study positioned gamification as an emerging trajectory in game and technology research. Rivera and Garden (2021) argue that gamification is not entirely new; effective teachers have long employed similar strategies in low-technology and high-technology settings to enhance learning.

Studies, however, suggest that the effectiveness of technology-based gamification is significantly greater in developed, resource-rich contexts than in low-resource educational environments. Zainuddin and Keumala (2021) for instance note that most studies on gamification focus on digital applications in technologically advanced environments, with limited attention given to non-digital educational settings. Despite the global rise in the use of artificial intelligence (AI) and other digital tools, many low-technology environments continue to face barriers, making the implementation of gamification particularly difficult. Zainuddin and Keumala (2021), however, challenge this assumption by demonstrating how non-technological gamification elements such as stamps, stickers, and rubric-based rewards can be effectively used. This underscores the need to explore context-appropriate gamification strategies, especially in under-resourced environments like most Ugandan secondary schools. While much of the existing literature emphasizes global trends, it is equally important to consider local perspectives and practices to understand how gamification is being adapted in specific educational settings.

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Building on this, Kanagwa et al. (2024) observe that teachers in Uganda have employed non-digital gamification strategies, including small rewards, star-rating systems, and classroom leader boards, particularly in lower primary levels. These practices demonstrate the relevance of context-specific approaches to gamification. Notably, such innovations are emerging within the broader frameworks of educational reforms in Uganda, where the introduction of the competency-based-curriculum (CBC) in lower secondary schools in 2020 has shifted the focus toward practical, skill-based learning away from rote memorization. Nonetheless, the transition to the CBC has encountered some obstacles on the ground.

The implementation of the CBC in Ugandan secondary schools continues to face challenges, including overcrowded classes, inadequate teacher training, high dropout rates, and insufficient technological infrastructure (Jefferson, 2023). A study by Betty et al. (2025) on stakeholders' perceptions on implementation of the competence-based curriculum in selected secondary schools in Rubaga division, Kampala city, Uganda, found that there was limited clarity in the implementation of CBC by the different stakeholders, including teachers in Uganda. Gamification, if adapted and tailored to match individual learners' preferences, needs, and characteristics, could bridge this gap by making learning more engaging, motivating, and relevant. While global studies continue to demonstrate gamification's potential in enhancing educational outcomes, its application within Uganda's reforming education system remains underexplored. This study seeks to address this gap by providing a localised analysis of gamification's implementation, benefits, and limitations within the context of CBC reforms. It builds on international insights while focusing on Uganda-specific challenges and opportunities, intending to inform more strategic context-sensitive integration approaches.

Research Question

How can gamification be strategically implemented in Ugandan schools to enhance learner engagement, motivation, and performance within the context of the competency-based curriculum reforms?

Objectives of the Study

1. To examine how gamification aligns with the principles and competencies emphasised in the lower competency-based curriculum in Uganda.
2. To assess the effectiveness of gamification in enhancing learner engagement, motivation, and academic performance in secondary schools in Uganda.
3. To recommend strategic approaches for integrating gamification into curriculum delivery and teacher training practices.

Methodology

The study employed an integrative review. Secondary data was used in the study to evaluate the strategic implementation of gamification in secondary schools and its contribution to learner engagement, motivation, and performance within the context of the lower Competency-Based Curriculum (CBC). The review drew upon a wide range of peer-reviewed journal articles, case studies, educational reports, and policy documents, to reinterpret existing findings to generate context-specific insights relevant to Uganda's educational reforms.

Relevant studies were identified through targeted searches on academic databases, including Google Scholar, ResearchGate, ScienceDirect, JSTOR, as well as through the examination of the Ministry of Education and Sports and NGO reports on lower competence-based curriculum. Sources were selected based on empirical rigor and relevance to the following key areas: Gamification in education, learner engagement and motivation, CBC implementation, and applicability to Uganda's curriculum reform efforts. The review focused primarily on literature published between 2017 and 2025, while a limited number of foundational studies, particularly those addressing the theoretical underpinnings of gamification, dated back to 2003. A thematic analysis was conducted to extract recurring patterns, theoretical insights, and practical implications related to the use of gamification in Ugandan schools.

The analysis process involved: (1) examining how gamification aligns with CBC's competency-based goals; (2) coding themes related to learner engagement, motivation, and performance as presented in the

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reviewed literature; (3) identifying and recommending strategic approaches for integrating gamification into curriculum delivery and teacher training practices. This interpretive synthesis informed the development of a localised gamification framework tailored to Uganda's ongoing educational reforms. Findings were synthesized narratively to highlight the alignment of gamification with the CBC principles and to outline strategic implementation factors critical for enhancing learner learning outcomes in Ugandan schools.

Findings and Discussion

The analysis set to explore how gamification can be strategically implemented to support the lower Competency-Based Curriculum (CBC) as implemented among secondary schools in Uganda. The analysis of secondary data suggests that gamification, when thoughtfully embedded within lesson design, can significantly enhance learner engagement, motivation, and academic performance. However, its successful application depends on the ability to navigate local challenges, including limited technological infrastructure and consistent pedagogical adoption. The findings are presented thematically, aligned with the study's objectives.

1. Gamification and Its Alignment with CBC Competency Principles

The analysis reveals that gamification aligns well with the core principles of the lower CBC, particularly its emphasis on learner-centred pedagogy, critical thinking, knowledge retention, and holistic development. While not yet fully institutionalized in classroom practice, literature shows an increasing number of instances where gamification is used to support CBC-aligned teaching approaches. The findings of this study strengthen Kanagwa et al. (2024)'s study on gamified instruction in science and mathematics in Ugandan upper primary schools whose findings demonstrated that computer-based gamification activities targeting subject content led to more active learning and significantly improved learner motivation and engagement. Notably, 62% of teachers reported using mobile devices and tablets in the delivery of gamified lessons, indicating a gradual shift towards integrating ICT tools in the curriculum.

The findings further resonate with Favour (n.d.)'s study whose research in higher education contexts found that gamification enhances both cognitive and behavioural engagement outcomes that align with CBC's learner-centred learning model. Similarly, Yadav et al. (2022) emphasised the value of game-based strategies in simplifying complex subjects, improving conceptual understanding, and supporting real-time formative assessment, critical for CBC implementation.

Beyond content mastery, gamification also supports the development of practical knowledge and skills. Ngaruiya and Atinda (2023) found that gamified activities contributed to performance improvement through experiential learning and better retention. The study showed that gamification leads to active learning, which increases student interactions, making learning enjoyable. Likewise, Micheni et al. (2023) highlighted that gamification makes learning more interactive, enjoyable, and hands-on features which firmly grounds it within CBC's experiential learning mandate.

Moreover, gamification fosters pedagogical shifts from a teacher-centred to a learner-driven environment. Halloluwa et al. (2018) noted that gamified classrooms promote collaboration, peer interaction, and learner autonomy, thereby improving educational achievement. This mirrors CBC's principle that teachers should facilitate rather than dominate the learning process.

Inclusion and personalisation also emerged as key themes. Ghoulam et al. (2024) found that culturally adapted gamification improved learner motivation, particularly in digital learning environments. Kanagwa et al. (2024) similarly emphasised that personalised game challenges in science and mathematics helped teachers design meaningful learning, learner-specific experiences. Baumuratova et al. (2024) further reinforced this by showing that gamification can support differentiated instruction by addressing individual learner needs, although they acknowledged that research on inclusive gamification in resource-constrained contexts remains limited.

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Despite these positive findings, implementation gaps persist. Kailo et al. (2025) reported that interactive strategies like gamification remain underutilised in CBC classrooms. They recommended stronger institutional support and systematic planning to ensure these methods are not merely add-ons but integral to daily teaching practices. This underscores the need for a strategic, well-supported approach to integrating gamification into CBC-aligned pedagogy.

2. **Effectiveness of Gamification in Enhancing Learner Engagement, Motivation, and Performance.**

The analysis confirmed that gamification has the potential to significantly foster learner engagement, motivation, and academic performance when implemented thoughtfully in classroom contexts. A growing body of literature supports this claim across both high-tech and low-tech educational environments.

For instance, Dahalan and Shaharom (2024) found that gamification and game-based learning strategies meaningfully increased learners' motivation and engagement in vocational school settings. Similarly, Bouchrika et al. (2021) reported that more than 77% of learners in e-learning environments that integrated gamified elements demonstrated increased participation and interaction. These findings resonated with Kapp's (2012) foundational work, which emphasised that gamification, if properly designed, can inform, engage, and educate by transforming passive learning into an active, motivational experience. In this regard, gamification aligns well with CBC's focus on keeping learners engaged and at the centre of the learning process.

In addition to improving engagement, several studies show positive links between gamification and academic performance. For instance, Chans and Portuguez (2021), using the Digital Flexible Model, observed a rise in average learner test scores from 57% to 79% after the introduction of gamified learning activities. Likewise, Ngaruiya and Atinda (2023) found statistically significant performance differences in computer science classes between learners taught using gamification and those exposed to traditional instruction methods. Their study reported a p-value of 0.000, indicating a highly significant improvement in performance for learners engaged in gamified learning. In a related study, Garrigós and Fernández-Herrero (2024) recorded gains in both motivation (from 14.71 to 23.41 on a 30-point scale) and academic performance (from 6.35 to 8.47 on a 10-point scale) among primary learners. The researchers recommended a broader adoption of gamification in classrooms to maximise its instructional value, an implication that carries particular relevance for Ugandan schools, especially in under-resourced areas aiming to leverage CBC more effectively.

Gamification was also found to increase learners' enthusiasm and willingness to learn. Nabangi (2021), in a study on grammar instruction, highlighted that gamified strategies encouraged learner participation by making lessons more enjoyable and accessible. Given that 21st-century learners are increasingly attuned to digital and interactive experiences, gamification offers a medium through which complex content can be delivered engagingly. Jefferson (2023) supports this by calling for the integration of AI-powered tools such as gamification into Uganda's educational system to enhance knowledge retention and deeper learning, key objectives of CBC reforms.

However, the literature also cautions against a one-size-fits-all approach. Zahedi et al. (2021) investigated gender differences in gamified computer science education and found that elements such as leader boards and virtual points had limited motivational impact on female learners. Moreover, the study reported that gamification had no significant influence on self-efficacy and little effect on the identity development of women in computing fields. While it concluded that gamification can benefit all learners equally when well-designed, the findings suggest that gender-sensitive adaptation is necessary for inclusive classroom engagement.

These insights underscore the need for capacity building among teachers. Teachers must be trained not only in the design and application of gamified content but also in how to adapt these strategies to diverse learner needs, including those of female learners who may engage differently with competitive game

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elements. Such professional development is critical in ensuring that gamification supports, not undermines, the equity and inclusiveness goals embedded within Uganda's CBC framework.

Table 1. Summary of Statistical Metrics on Gamification's Effectiveness

Study / Source	Context / Country	Gamification Tool / Strategy	Key Metrics	Results / Outcome
Garrigós & Fernández-Herrero (2024)	Spain, primary education	Digital tablets in a gamified math course	Motivation scores	Increased from 14.71 to 23.41 /30
			Academic performance	Improved from 6.35 to 8.47 /10
Kanagwa et al. (2024)	Uganda, upper primary	Use of mobiles/tablets by teachers	Teacher adoption rate	62 % of teachers are integrating ICT/gamified activities
Ngaruiya & Atinda (2023)	Kenya, secondary schools	Gamification pedagogy in computer science	Learner performance (test scores)	Statistically significant improvement ($p = 0.000$)
Bouchrika et al. (2021)	Algeria, e-learning	Online "question board"	Learner engagement	77 % of respondents reported increased participation
Chans & Portuguez (2021)	Mexico, higher education	Digital Flexible Model	Academic performance	Test scores rose from 57 % to 79 % (verify source)

3. *Table 1. Effectiveness metrics of gamification in educational settings (2012–2024). Source: Garrigós & Fernández-Herrero (2024); Kanagwa et al. (2024); Ngaruiya & Atinda (2023); Bouchrika et al. (2021); Chans & Portuguez (2021).*

Strategic Pathways for Integrating Gamification in Curriculum Delivery and Teacher Development

Integrating gamification in curriculum delivery and teacher training practices calls for a holistic approach. Several strategic pathways were identified to support the all-inclusive approach, though the analysis reveals that integrating gamification into curriculum delivery is a complex process that requires careful planning and execution (Dudok, 2024), with a deep understanding of the content knowledge, context, and learner differences.

Mårell-Olsson (2021) further supports the study findings when noted that teachers, while designing for online gamification teaching, experienced concern about how to ensure that the designed lesson and tasks effectively assessed an individual learner's knowledge in collaborative assignments, even when they perceived gamification teaching designs as a catalyst for motivating and engaging students' learning to a high extent.

Several studies highlight the need for intentional curriculum redesign that embeds gamified learning experiences aligned with key competencies. Mårell-Olsson (2021) pointed out that for effective integration of gamification, the teachers should design school content to be taught as a gaming experience, not using

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existing games, but designing teaching as a playful learning experience. According to Wang and Rose (2020), gamification is necessary for successful course design for teachers, making it a prime opportunity for redesigning their training programs using badges, points, leader boards, and feedback elements, which are common to games.

Involving learners in designing gamified curriculum delivery approaches was yet another identified theme. A study by Lopes et al. (2024) on developing competencies through flow, gamification, and cultural integration: an analysis of the potential of games in teaching/learning, found that virtual games designed by learners could be easily used in the teaching-learning process to enhance their knowledge, guide teachers in understanding learner behaviours, and learning. However, they identified the need for guided design objectives and immediate feedback for effective integration.

The analysis also advocates for contextual customization of gamified content. Findings emphasized that the adaptation of gamification to specific educational contexts, individual learner traits, preferences, and needs, and localization of game narrative, enhanced learner motivation and relevance (Dahalan et. al. 2024; Oliveira et al. 2023; Zahedi et al. 2021), as failure to customize the strategies may lead to failed gamification initiatives. This is supported by Dudok (2024) and Favour (n.d), who pointed out that gamification is effective if tailored to the unique learning needs and preferences of the learners.

The central role of teachers as implementers of gamification is highlighted in the analysis. This is because teachers are responsible for designing the process from the first idea to the actual classroom operations (Mårell-Olsson, 2021). Thus, the successful integration of gamification in curriculum delivery depends heavily on teacher training programs that equip them with both pedagogical and technological skills to implement game-based strategies. In support, Wang and Rose (2020) stated that gamification of learning is not only for children but also for adults. It is, however, essential that the teacher training programs effectively align the gamified elements with educational objectives.

Similarly, Dudok (2024) identified the need for institutions to leverage gamification to enhance teacher training programs for better-prepared teachers, ready for future generations. The study notes that various teacher training programs have begun to integrate gamification techniques into their curricula, which has led to increased teacher motivation, collaboration, and understanding of complex concepts. This finding aligns with Kapp (2012), who reported that, in organizations, gamification is used to design professional development programs for their professionals to improve their performance.

Barriers to Effective Implementation of Gamification in Education

Despite its promising benefits, gamification faces several significant barriers that limit its effectiveness in enhancing learner engagement, motivation, and academic performance. Both global and local studies highlighted multiple constraints, particularly within the Ugandan educational context.

One major challenge is large classroom sizes, a common feature in many Ugandan schools (Uzorka & Odebiyi, 2025). The effectiveness of gamified approaches, especially those that are digital-based, is significantly reduced when applied in overcrowded classrooms. Such tools are often designed for smaller groups where individual monitoring, interaction, and management are feasible. This finding aligns with Zahedi et al. (2021), who observed that gamification elements such as leaderboards tend to work best in smaller settings where familiarity and classroom community foster constructive competition and self-confidence among learners.

Resource limitations also present a major obstacle. Jefferson (2023) reported that many schools lack essential infrastructure, including power, internet connectivity, and digital devices necessary for implementing gamification. These deficiencies are particularly pronounced in rural areas. Although gamification does not always require high-end technology, the emphasis on computer-based strategies often excludes schools with limited resources. Nabangi (2021) similarly noted that time constraints, inadequate electricity supply, and lack of access to digital tools, especially among learners from low-income

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households, pose persistent challenges. Egorkina (2024) added that although gamification increased teacher motivation, its widespread adoption was hindered by minimal financial and technical support.

Another critical constraint is the shortage of technologically skilled teachers and limited familiarity with gamification strategies (Uzorka & Odebiyi, 2025; Jefferson, 2023). Most teachers in Uganda have limited digital literacy and are only familiar with basic, offline gamification approaches, which are often implemented inconsistently (Kanagwa et al., 2024). This skills gap hinders both the innovation and sustainability of gamified teaching strategies. As such, professional development programmes focused on both low-tech and digital gamification strategies are urgently needed.

Additionally, negative teacher attitudes toward gamification hinder its uptake. Some teachers view it as time-consuming, preparation-intensive, or potentially distracting to the learning process. Ghoulam et al. (2024), in a study on gamification in e-learning within developing countries, observed that gamified methods may lead to distractions and overemphasis on extrinsic motivation. Resistance to change, often rooted in comfort with traditional methods, further compounds this issue. Teachers may hesitate to alter their lesson plans to accommodate new pedagogical models that seem unfamiliar or unproven.

Lack of personalisation in game-based learning is another challenge. As Oliveira et al. (2023) point out, gamified learning often fails to account for individual learner needs, preferences, and learning styles, thereby reducing its effectiveness across different learner populations. This concern is echoed in Rivera and Garden (2021), who noted a lack of empirical evidence on how specific gamification attributes impact engagement and learning outcomes. Ideally, gamification should support learner autonomy and differentiation by allowing learners to engage with content at their own pace using tools adapted to specific learning objectives.

In light of these challenges, there is a need for school administrations and policy-makers to address these barriers through context-sensitive strategies. Tailored professional development programmes can help shift negative perceptions and build capacity for both low-tech and high-tech gamification. Moreover, adapting inclusive gamification models, adapted to resource constraints and classroom realities, can make this pedagogical approach more effective and sustainable across Ugandan schools.

Theoretical and Practical Alignment

The integration of gamification into Uganda's education system is grounded in well-established educational theories, namely Constructive Learning Theory, Diffusion of Innovation Theory (DOI), and Self-Determination Theory (SDT). This theoretical alignment ensures that gamification not only rests on sound pedagogical foundations but also addresses the practical demands of curriculum reform under Uganda's Competency-Based Curriculum (CBC).

Constructivist Learning Theory, championed by Piaget and Vygotsky (Efgivia et al., 2021), posits that learners construct knowledge through experiences, reflections, and interaction. His theory emphasises contextualized, learner-centred processes where learners build upon prior knowledge through collaborative problem-solving and exploration (Machmud & Samat, 2023; Ahmad et al., 2019). The CBC, with its focus on critical thinking, problem-solving, knowledge construction, and collaboration, is well-aligned with these principles. Gamification instruction, through elements such as storytelling, challenge-based tasks, simulations, and interactive problem-solving, creates experiential learning environments where learners engage actively rather than passively receive information.

Empirical evidence supports this connection. For instance, Andini (2024) reports that constructivist approaches, including gamified techniques, significantly improve learner engagement, collaborative, and oral communication skills. Awandu (2023) further supports the findings when found that the use of constructivist pedagogies, particularly group work, contributed to the successful implementation of a competency-based mathematics curriculum. This suggests that gamification, grounded in constructivism, promotes peer learning and social negotiation, key components of meaningful learning. As such, gamified

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strategies enhance conceptual understanding by enabling learners to explore, experiment, and reflect in authentic contexts.

Diffusion of Innovation (DOI) Theory, proposed by Rogers (2003), offers a practical framework for understanding how gamification implementation can be introduced and scaled within Uganda's diverse education landscape. According to this theory, innovation adoption occurs in five stages: knowledge, persuasion, decision, implementation, and confirmation (Dehghan et al., 2021). It also recognises that adopters fall into categories (innovators, early adopters, early majority, late majority, and laggards), and that adoption depends on the perceived attributes of the innovation (Chen, 2024).

This stage diffusion model is particularly relevant to Uganda, where disparities in ICT infrastructure, teacher capacity, and socioeconomic conditions impact the uptake of educational technologies. Applying the DOI framework to gamification, the implementation process may unfold as follows:

1. Raising awareness and building understanding of gamification among stakeholders (knowledge);
2. Promoting successful local and international case studies (persuasion);
3. Institutional decision-making to pilot gamified instructional approaches (decision);
4. Training teachers and integrating gamified strategies into lesson planning (implementation); and
5. Monitoring outcomes and refining practices based on evidence (confirmation).

This process-oriented approach enables policymakers, curriculum developers, and teacher trainers to adopt gamification in a structured, context-sensitive manner that supports CBC objectives.

Self-Determination Theory (SDT) also underpins gamification's psychological effectiveness by addressing three basic human needs: competence, autonomy, and relatedness (Botte et al., 2020). Gamified environments fulfil these needs through mechanisms such as earning points or badges (competence), enabling learner choice (autonomy), and fostering collaboration (relatedness). These psychological drivers are strongly associated with increased intrinsic motivation and improved academic performance. Studies by Garrigós & Fernández-Herrero (2024), Jefferson (2023), Bouchrika et al. (2021), and Nabangi (2021) relatedly report positive outcomes in learner engagement and achievement following the implementation of gamification strategies. Kam and Umar (2018) further emphasise that gamification is most effective when game elements are consciously designed to address psychological needs.

In essence, gamification enhances motivation, participation, and emotional engagement, hallmarks of effective CBC pedagogy. When aligned with SDT, gamified learning creates spaces where learners feel confident, in control of their learning journeys, and connected to both their peers and the subject matter.

In conclusion, the integration of gamification within Uganda's curriculum reforms demonstrates both strong theoretical alignment and practical feasibility. Constructivist theory supports the design of gamified learning environments that promote active knowledge construction. DOI theory provides a roadmap for strategic, phased implementation across varying school contexts. SDT explains the motivational benefits that sustain learner engagement. Together, these frameworks affirm that gamification is not merely a pedagogical trend but a viable, theory-informed strategy for transforming education in line with the lower CBC.

Conclusion

This study explored the strategic implementation of gamification within the context of Uganda's ongoing Competency-Based Curriculum (CBC) reforms, with a specific focus on enhancing learner engagement. The findings underscore gamification's promise as an instructional innovation that fosters active, learner-centered learning experiences, closely aligned with the aims of the CBC. Evidence suggests that gamification can significantly improve learner motivation, engagement, and performance, even within resource-constrained environments, when designed and deployed thoughtfully.

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Moreover, the study found that gamification can be effectively implemented through low-tech, context-sensitive models, offering practical solutions for schools with limited infrastructure. It also aligns with key educational theories: Constructivist Learning Theory, Diffusion of Innovation (DOI) theory, and Self-Determination (STD) theory. These theoretical frameworks collectively support experiential learning, highlight the importance of stakeholder preparedness for innovation diffusion, and emphasize intrinsic motivation rooted in autonomy, competence, and relatedness, all central to the CBC's learner-focused orientation.

In conclusion, gamification presents a practical and theoretically grounded approach to advancing the CBC goals. However, its successful institutionalization requires deliberate strategic planning, inclusive instructional design, sustained teacher professional development, and robust policy support. Moving gamification from isolated experimentation to systematic adoption will necessitate collaborative efforts among educators, policymakers, and development partners. Further research should examine the long-term effects of gamification to assess its sustained impact and scalability within Uganda's evolving education system.

Study Implications

The theoretical coherence between gamification and the CBC framework demonstrates its pedagogical value**.** However, translating this potential into practice depends largely on adapting gamification models to local realities, especially in under-resourced schools. This reinforces the need for low-tech and hybrid gamification approaches that can function effectively within infrastructural and financial constraints.

The findings suggest that gamification must be clearly linked to specific CBC competencies, such as practical knowledge application, creativity, collaboration, and critical thinking, to yield meaningful learning outcomes. Gamified activities simulating real-life challenges not only improve knowledge retention but also support the development of these essential competencies in relevant ways. While such activities may appear time-consuming and complex to prepare, their alignment with the CBC's learner-centred and skill-oriented focus justifies their integration.

Furthermore, strategic implementation must be culturally responsive and inclusive. Uganda's socioeconomic and cultural diversity demands gamification models that are adaptable to different learning contexts. Evidence from Ghoulam et al. (2024) and Baumuratova et al. (2024) emphasises the importance of culturally relevant content and flexible design that accommodates individual learner needs and realities.

Teacher capacity emerged as a critical determinant of successful gamification integration. Without adequate training and ongoing support, gamification risks becoming another inaccessible innovation, particularly in low-tech, rural, and under-resourced environments. The study highlights the need for tailored teacher preparation programs that address both pedagogical and practical dimensions of gamified learning.

Finally, policy-level investment is essential to ensure the sustainability of gamification initiatives. Despite growing recognition of its potential, gamification remains underfunded and poorly institutionalised. Policymakers must move beyond caution and commit to structured, system-wide planning that supports the integration of gamification within the broader education reform agenda. Its full potential lies not in fragmented efforts but in coordinated action that makes learning more relevant, equitable, and enjoyable for all learners.

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Recommendations

1. Design Competency-Focused Gamified Activities: Teachers and curriculum designers should develop gamified activities directly targeting specific CBC competencies. For example, a "story chain challenge" in which learners collaboratively build a narrative can enhance creativity, vocabulary development, coherence, and speaking and listening skills. This aligns with Taiwo and Adande's (2024) recommendation to integrate gaming and gamification into curricula to promote teamwork, collaboration, and critical thinking.
2. Promote inclusive and personalised gamification: Teachers and policymakers should prioritize inclusive gamification models that accommodate learners' individual needs and preferences. Activities should allow for flexible, learner-customised experiences to enhance engagement and relevance, promote collaboration, and personalization. Thus, gamified activities should be designed to accommodate students' personal differences, needs, and preferences. As shown in Ghoulam et al. (2024), culturally appropriate characters, content, and narratives enhance relatability and effectiveness across diverse learner populations.
3. Develop structured teacher training programmes: Teacher training institutions should implement structured pre-service and in-service development programmes focused on low-tech gamification methods suitable for under-resourced schools. A "train-the-trainer" model can help scale these efforts quickly. Ongoing mentorship, access to gamified content (e.g., educational videos, microlearning modules), and peer support systems will reinforce practical application in real classrooms.
4. Allocate dedicated funding and build partnership: Sustainable adoption of gamification requires dedicated funding for resources, training, and implementation support. The government, in collaboration with NGOs and development partners, should invest in low-tech gamification initiatives, particularly for rural and underfunded schools. Donor-funded grants and aid programmes, as noted in studies by Kanagwa et al. (2024) and Jefferson (2023), can help overcome initial financial barriers.
5. Integrate gamification into national assessment: The Uganda National Examinations Board (UNEB) should explore integrating gamified elements such as interactive assessments and scenario-based tasks into both formative and summative evaluations. This will better reflect the CBC's emphasis on skills-based, learner-centred education and enhance learner engagement with the assessment process.

References

Ahmad, T. S., Hussin, A., Yusri, G., Sembilan, U. T. M. N., & Campus, K. P. (2019). A review of learning theories for gamification elements in instructional games. In *Conference: Malaysian International Conference on Academic Strategies in English Language Teaching (MyCASELT). At: Sutera Harbour Resort, Kota Kinabalu, Sabah* (pp. 1-14). https://www.researchgate.net/publication/336701970_A_review_of_learning_theories_for_gamification_elements_in_instructional_games

Andini, D. (2024). Gamification in Education: How Game-Based Learning Transforms Student Engagement. *Innovative Journal of Educational Research and Insights*, *1*(2 December), 98-108. https://ojs.bustanilmu.com/index.php/IJERI/article/view/53

Awandu, M. (2023). *Influence of Constructivist Pedagogical Approaches on Implementation of Grade Three Competency-Based Mathematics Curriculum in Public Primary Schools in Kisumu Central Sub-County, Kenya* (Doctoral dissertation, University of Nairobi).

Baumuratova, D., Zhukabayeva, T., & Rakhimzhanova, M. (2024, October). Gamification as a Tool for Personalized Learning in Inclusive Education. In *2024 9th International Conference on Computer Science and Engineering (UBMK)* (pp. 1024-1029). IEEE.

Volume 1. Issue 2. June 2025 e-ISSN: 3008-1254

Betty, S. D. N., Bweyale, J., & Oscar, M. (2025). Stakeholders' Perceptions on Implementation of the Competence-based Curriculum in Selected Secondary Schools in Rubaga Division, Kampala City, Uganda. *IJSAT-International Journal on Science and Technology*, *16*(1).

Bond, M., Bergdahl, N., Mendizabal-Espinosa, R., Kneale, D., Bolan, F., Hull, P., & Ramadani, F. (2021). Global Emergency Remote Education in Secondary Schools During the COVID-19 Pandemic: A Systematic Review. https://doi.org/10.1080/10494820.2019.1623267

Botte, B., Bakkes, S., & Veltkamp, R. (2020). Motivation in gamification: Constructing a correlation between gamification achievements and self-determination theory. In *Games and Learning Alliance: 9th International Conference, GALA 2020, Laval, France, December 9–10, 2020, Proceedings 9* (pp. 157-166). Springer International Publishing. https://doi.org/10.1007/978-3-030-63464-3_15

Bouchrika, I., Harrati, N., Wanick, V., & Wills, G. (2021). Exploring the impact of gamification on student engagement and involvement with e-learning systems. *Interactive Learning Environments*, *29*(8), 1244-1257. https://doi.org/10.1080/10494820.2019.1623267

Chans, G. M., & Portuguez Castro, M. (2021). Gamification as a Strategy to Increase Motivation and Engagement in Higher Education Chemistry Students *Computers*, *10*(10), 132.

Chen, R. (2024). A study applying Rogers' innovation diffusion theory on the adoption process of new teaching methods in secondary education. *Research and Advances in Education*, *3*(2), 6-10.

Dahalan, F., Alias, N., & Shaharom, M. S. N. (2024). Gamification and game-based learning for vocational education and training: A systematic literature review. *Education and Information Technologies*, *29*(2), 1279-1317.

Dehghan Salmasi, N., Kazerani, M., Shekofteh, M., & Jambarsang, S. (2021). Acceptance of evidence-based nursing databases by educational nurses using Rogers' model. *Journal of Librarianship and Information Science*, *53*(2), 321-327. https://doi.org/10.1177/0961000620938201

Deterding, S., Sicart, M., Nacke, L., O'hara, K., & Dixon, D. (2011). Gamification. using game-design elements in non-gaming contexts. In *CHI'11 extended abstracts on human factors in computing systems* (pp. 2425-2428). https://doi.org/10.1145/1979742.1979575

Dudok, F. (2024). Gamification in sustainability education: Introducing new methodological elements in Teacher training programmes. https://publicatio.bibl.u-szeged.hu/35791/1/MellearnDudok.pdf

Efgivia, M. G., Rinanda, R. A., Hidayat, A., Maulana, I., & Budiarjo, A. (2021, October). Analysis of constructivist learning theory. In *1st UMGESHIC International Seminar on Health, Social Science and Humanities (UMGESHIC-ISHSSH 2020)* (pp. 208-212). Atlantis Press. https://doi.org/10.2991/assehr.k.211020.033

Egorkina, A. (2024). The Impact of Gamification Elements in Educational Videos on the Engagement of School Teachers in Kazakhstan. https://www.theseus.fi/handle/10024/865392

Favour Ali, U. (n.d). Gamification in Higher Education: Enhancing Student Engagement and Learning Outcomes.

Garrigós Aunión, A., & Fernández-Herrero, J. (2024). Enhancing Motivation and Performance in Mathematics: The Impact of Gamification and Digital Technologies in Primary Education.

Ghoulam, K., Bouikhalene, B., Babori, A., & Falih, N. (2024). Gamification in E-learning: Bridging Educational Gaps in Developing Countries. *International Journal of Advanced Corporate Learning*, *17*(1), 85. https://doi.org/10.3991/ijac.v17i1.47631

Halloluwa, T., Vyas, D., Usoof, H., & Hewagamage, K. P. (2018). Gamification for development: a case of collaborative learning in Sri Lankan primary schools. *Personal and Ubiquitous Computing*, *22*, 391-407.

Jefferson, M. J. (2023). The Disruptive Impact of AI Tools on Uganda's New Education System: Addressing Challenges and Opportunities for Adoption, no.

Kailo, M., Njagi, L., Kalai, J. M., & Mutegi, R. G. (2025). The Influence of Training Approaches in In-Service Teacher Training on the Implementation of the Competence-Based Curriculum in Public Primary Schools in Kilifi County, Kenya.

Kam, A. H., & Umar, I. N. (2018). Fostering authentic learning motivations through gamification: A self-determination theory (SDT) approach. *Journal of Engineering Science and Technology*, *13*(Special Issue), 1-9.

Kanagwa, B., Kahiigi, E. K., Semwanga, A. R., Siminyu, S., & Lubowa, P. (2024). Towards Gamification of Science and Mathematics in Upper Primary Schools in Uganda.

Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. John Wiley & Sons.

Kapp, K. M. (2013). *The gamification of learning and instruction field book: Ideas into practice*. John Wiley & Sons.

Lopes, L., Schreurs, S., Licour, C., & Soares, S. (2024). Developing competencies through flow, gamification, and cultural integration: an analysis of the potential of games in teaching/learning. *Radiation Effects and Defects in Solids*, *179*(1-2), 3-13. https://www.tandfonline.com/doi/abs/10.1080/10420150.2024.2318700

Machmud, M. T., Wattanachai, S., & Samat, C. (2023). Constructivist Gamification Environment Model Designing Framework to Improve Ill-structured Problem Solving in Learning Sciences. *Educational Technology Research and Development*, *71*(6), 2413-2429. https://doi.org/10.1007/s11423-023-10279-0

Mårell-Olsson, E. (2021). Using gamification as an online teaching strategy to develop students' 21st-century skills. *IxD&A: Interaction Design and Architecture (s)*, (47), 69-93. https://www.diva-portal.org/smash/record.jsf?pid=diva2:1543488

Micheni, E., Murumba, J., & Machii, J. (2023). Educational Technology and Competency-Based Education in Kenya: Does Technology Matter? In *A paper presented during the IST-Africa 2023 Conference Proceedings, Miriam Cunningham and Paul Cunningham (Eds)* (pp. 1-12).

Nabangi, L. N. (2021). Exploring the use of gamification in the teaching and learning of English grammar in a private secondary school classroom in Mombasa County.

Ngaruiya, B., & Atinda, K. R. (2023). Effect of Gamification on Secondary School Students' Performance in Computer Studies. *International Journal of Pedagogy, Policy and ICT in Education*, *11*, 24-54.

Oliveira, W., Hamari, J., Shi, L., Toda, A. M., Rodrigues, L., Palomino, P. T., & Isotani, S. (2023). Tailored gamification in education: A literature review and future agenda. *Education and Information Technologies*, *28*(1), 373-406. https://doi.org/10.1007/s10639-022-11122-4

Rivera, E. S., & Garden, C. L. P. (2021). Gamification for student engagement: a framework. *Journal of further and higher education*, *45*(7), 999-1012.

Rogers, E. M. (2003). Diffusion of Innovations (5th ed). London. *UK: Free Press. [Google Scholar]*.

Taiwo, A. B., & Adande, A. D. (2024). Gaming and gamification in physical and health education: problems and prospects. *Faculty of Natural and Applied Sciences Journal of Mathematics, and Science Education*, *5*(4), 78-84.

Velaora, C., Dimos, I., Tsagiopoulou, S., & Kakarountas, A. (2022). A game-based learning approach in a digital design course to enhance students' competency. *Information*, *13*(4), 177.

Uzorka, A., & ODEBIYI, O. A. (2025). Impact of Digital Learning Tools on Student Engagement and Achievement. *Journal of Digital Learning and Distance Education, 4(1)*, 1436-1445.

Wang, C. W., & Rose, G. L. (2020). Teaching Case—Gamified tech integration coach pathway for AEL teachers and staff. *New Horizons in Adult Education and Human Resource Development*, *32*(4), 82-88. https://journals.sagepub.com/doi/full/10.1002/nha3.20300

Waruingi, D., Hamza, H., & Babuya, J. (2023). A brief review of online education resources on gamification in addressing antimicrobial resistance. *JAC-Antimicrobial Resistance*, *5*(4), dlad094.

Yadav, A., Mala, R. D., Padmasree, D., Yadav, N. K. L., & Manaswini Yadav, G. A. (2022). Real-Time Reflection by Gamification as Teaching-Learning-Assessment Tool in Competency-Based Medical Education. *Future of Medical Education Journal*, *12*(3). https://doi.org/10.22038/fmej.2022.61699.1443

Zahedi, L., Batten, J., Ross, M., Potvin, G., Damas, S., Clarke, P., & Davis, D. (2021). Gamification in education: A mixed-methods study of gender on computer science students' academic performance and identity development. *Journal of Computing in Higher Education*, *33*, 441-474. https://doi.org/10.1007/s12528-021-09271-5

Zainuddin, Z., & Keumala, C. M. (2021). Gamification concept without digital platforms: A strategy for parents on motivating children to study at home during the COVID-19 pandemic. *PEDAGOGIK: Jurnal Pendidikan*, *8*(1), 156-193. https://doi.org/10.33650/pjp.v8i1.2174