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The Power of Play: Effects of Gamification Strategies on the Academic Achievement of Learners in Kenyan Public Primary Schools: A Survey of Primary Schools in Kiambu Sub-County, Kenya

By

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Abstract
This study investigated the effect of gamification strategies on the academic achievement of learners in public primary schools in Kiambu Sub-County, Kenya. Despite curriculum reforms in Kenya, academic achievement in many public primary schools remains inconsistent, largely due to a reliance on traditional pedagogical methods that fail to engage learners. Gamification, the use of game-design elements in non-game contexts, presents a promising learner-centered approach to enhance motivation and performance. Anchored in Constructivist Learning Theory and Student Involvement Theory, the study employed a descriptive survey design with a mixed-methods approach. Data were collected from a stratified random sample of 377 participants, including 340 pupils, 22 teachers, and 7 head teachers, using structured questionnaires and interviews. Quantitative data were analyzed using descriptive statistics and Chi-Square tests, while qualitative data underwent thematic analysis. The findings reveal a significant positive perception of gamification, with 68.8% of pupils having been exposed to gamified learning. Rewards (41.8%) and points (26.2%) were identified by pupils as the most effective elements for enhancing performance. A significant majority of pupils (80.8%) reported that gamification positively impacted their learning, and 95.6% enjoyed learning more when games were included. However, the study also identified significant barriers to sustainable implementation, including lack of resources (cited by 72.4% of educators) and time constraints (65.5%). The study concludes that while gamification is a highly effective and well-regarded tool for improving academic achievement, its long-term success is contingent on systemic support, including targeted teacher training and resource allocation.

Keywords: Gamification, Academic Achievement, Student Engagement, Primary Education, Constructivist Learning Theory, Kenya.

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1. Introduction

In an era of rapid technological and social change, educational systems worldwide are under increasing pressure to evolve beyond traditional, teacher-centered models of instruction. The global shift towards fostering 21st-century competencies such as critical thinking, collaboration, and creativity has catalyzed a search for innovative pedagogical approaches that can actively engage learners. Among the most prominent of these is gamification, defined by Kapp (2016) as the strategic use of game-based mechanics, aesthetics, and game-thinking to motivate action, promote learning, and solve problems in non-game contexts. This approach, which often incorporates elements like points, badges, and leaderboards, is gaining global traction as a powerful tool to transform passive learning environments into dynamic, interactive experiences (Manzano-León et al., 2021).

Internationally, the adoption of gamified learning is accelerating. In Western nations like the United States, it is increasingly leveraged to boost engagement in STEM fields (Hartt et al., 2020), while in Asian education powerhouses like China, it is being embraced to foster student interest and creativity as part of long-term reform plans (Zhao et al., 2021). Within the African context, nations such as Nigeria and Ghana have begun integrating game-based strategies into their basic education curricula to curb over-reliance on rote memorization and promote a more learner-centered pedagogy (Adewunmi, 2020; Brakopowers, 2022).

In Kenya, the recent rollout of the Competency-Based Education (CBE) system has created a fertile ground for such pedagogical innovations. The CBE framework, with its emphasis on practical skills, problem-solving, and learner autonomy, is philosophically aligned with the principles of gamification. Early adoption of tools like TIZI Games has demonstrated the potential for gamification to simplify complex topics and provide the instant feedback that reinforces learning (Matheka, 2021; Obura, 2021). However, despite this potential, the implementation of gamification in Kenya's public primary schools remains sporadic and faces significant barriers, including a lack of teacher training, limited resources, and a prevailing cultural preference for traditional instructional methods (Kussa, 2017). This study investigates the effects of these strategies in the specific context of Kiambu Sub-County, a region characterized by this tension between pedagogical potential and practical constraints.

2. Statement of the Problem

Academic achievement in public primary schools within Kiambu Sub-County has shown persistent inconsistency, with a significant number of pupils underperforming in core subjects despite national curriculum reforms (Ministry of Education, 2021). This underperformance is largely attributed to the continued dominance of traditional, didactic teaching methods that often fail to capture pupils' interest or foster deep conceptual understanding. Gamification offers a promising, evidence-based alternative to enhance learner engagement and

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motivation, yet its application and effects within the Kenyan primary school context are not well understood.

While a growing body of international research demonstrates a positive correlation between gamification and academic achievement (Kim et al., 2018; Yıldırım & Şen, 2021), there is a significant gap in the literature specific to the public primary school setting in Kenya. Most local studies have focused on secondary or tertiary levels, leaving primary education, the foundational stage of learning, largely unexplored. Furthermore, little empirical evidence exists regarding the practical challenges that teachers in resource-constrained public schools face when attempting to implement these strategies, nor on the long-term sustainability of such initiatives. This study seeks to fill these critical gaps by systematically examining the effect of gamification strategies on academic achievement in the public primary schools of Kiambu Sub-County, identifying which strategies are most effective, and assessing the key challenges that hinder their successful implementation.

3. Literature Review

The efficacy of gamification is deeply rooted in established theories of human motivation and learning. At its core, gamification leverages psychological principles to foster intrinsic motivation, the internal drive to engage in an activity for its own sake. Self-Determination Theory (SDT), developed by Deci and Ryan (1985), is central to this understanding. SDT posits that intrinsic motivation is nurtured when three basic psychological needs are met: competence (a sense of mastery), autonomy (a sense of control and choice), and relatedness (a sense of belonging). Gamification directly addresses these needs by providing clear goals, instant feedback, and a sense of progression (competence); offering choices in how to tackle challenges (autonomy); and creating collaborative or competitive social environments (relatedness) (Hamari et al., 2016).

This motivational framework is complemented by Constructivist Learning Theory, which argues that learners are not passive recipients of information but active constructors of their own knowledge through experience and social interaction (Piaget; Vygotsky). Gamification aligns perfectly with this theory by creating interactive, problem-based environments where pupils must actively experiment, make decisions, and collaborate to succeed (Oboko, 2023). It transforms learning from a passive act of listening into an active process of doing, thereby fostering deeper understanding and better knowledge retention.

A substantial body of international empirical research has validated the positive impact of gamification on academic achievement. A meta-analysis by Yıldırım and Şen (2021), which synthesized data from 45 experimental studies involving over 3,400 students, found a moderate but significant positive effect size, concluding that gamification increased academic attainment by an average of 7.2%. Similarly, a study in the Philippines reported that pre-intervention test scores averaging 65.4% rose to 78.9% after the integration of gamified elements (International Journal of Research in Social Sciences, 2024).

The mechanisms for this improvement are multi-faceted. Research by Yu et al. (2022) indicates that beyond simple performance metrics, gamification fosters critical thinking skills and collaboration. In a Kenyan context, a study by Ng'ang'a et al. (2023) found that primary school pupils using a gamified reading application showed substantial improvements in comprehension and engagement compared to a control group using traditional methods. The key components of effective gamification often include immediate feedback, a sense of progression, and a clear narrative or challenge. Studies consistently show that extrinsic

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motivators like points and rewards are particularly effective with younger learners, as they provide tangible and immediate reinforcement (Dichev & Dicheva, 2017).

Despite its proven benefits, the successful implementation of gamification is not without significant challenges, particularly in public school systems in developing contexts. The most frequently cited barrier is the lack of resources, including insufficient access to digital devices and reliable internet, which are often central to modern gamification platforms (Kalogiannakis et al., 2021). This is compounded by time constraints, as designing and managing effective gamified lessons can be significantly more time-consuming for teachers than traditional instruction (Subhash & Cudney, 2018).

A further critical challenge is the need for sufficient teacher training. Many educators lack the pedagogical and technical knowledge to design game-based learning experiences that are effectively aligned with curriculum objectives (Alsawaier, 2018). Without proper training, gamification can devolve into a system of superficial "pointsification" that fails to foster deep learning, or teachers may struggle to manage the classroom dynamics of a more competitive environment (Sailer et al., 2017).

Finally, the long-term sustainability of gamification is a key concern. The initial motivational boost can wane over time if the gamified elements become repetitive or lose their novelty, a phenomenon known as "motivation decay" (Looyestyn et al., 2017). This highlights the need for dynamic and evolving strategies rather than a static implementation. While the literature provides a strong case for the potential of gamification, it also underscores the critical need for research that examines these challenges within specific, resource-constrained contexts like Kiambu Sub-County.

4. Methodology

This study employed a descriptive research design with a mixed-methods approach to provide a comprehensive analysis of the research problem. The study was conducted in Kiambu Sub-County, a region chosen for its diverse mix of urban and rural public primary schools. The target population included all head teachers, teachers, and pupils in the sub-county's 22 public primary schools, as well as the local Curriculum Support Officer (CSO).

A multi-stage sampling process was used to select a final sample of 398 participants. First, seven of the 22 public primary schools were selected to represent the diversity of the sub-county. Within these schools, all seven head teachers and 24 teachers were included. A sample of 359 pupils was selected using stratified random sampling to ensure representation across lower (Grades 1-4) and upper (Grades 5-6) primary levels. The CSO was purposively selected as a key informant. The final response included 340 pupils, 22 teachers, 7 head teachers, and 1 CSO, yielding an overall response rate of 94.7%.

Data were collected using two primary instruments. A structured questionnaire, featuring both closed-ended and open-ended questions, was administered to pupils and teachers to gather quantitative data on the prevalence, effectiveness, and challenges of gamification. A semi-structured interview schedule was used to conduct an in-depth interview with the CSO to gain insights into policy and systemic issues.

Quantitative data were coded and analyzed using SPSS. Descriptive statistics (frequencies, percentages) were used to summarize the data, and Chi-Square tests were used to examine associations between demographic variables and gamification experiences. Qualitative data from the interview and open-ended questions were analyzed thematically.

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5. Findings

The study found that gamification is a widely adopted, if inconsistently applied, pedagogical strategy in Kiambu's public primary schools. A significant majority of pupils (68.8%) reported having participated in gamified learning activities. There was no statistically significant gender difference in exposure ($p = .144$), suggesting equitable access for boys and girls. However, a significant difference was found across grade levels ($\chi^2 = 18.73$, $p = .001$), with pupils in intermediate and upper grades having significantly higher exposure than those in lower grades.

The most common gamification elements experienced by pupils were extrinsic motivators, as shown in Table 1.

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Table 1: Game Elements Interacted With by Pupils (N=234)

Game Element	Frequency (f)	Percentage (%)
Points	187	79.9
Rewards	172	73.5
Badges	156	66.7
Challenges	149	63.7
Levels	134	57.3
Leaderboard	128	54.7

Source: Field Data 2025

Points, rewards, and badges were the most prevalent, suggesting that teachers primarily use simple, direct reinforcement mechanisms.

Both pupils and educators perceived a strong positive relationship between gamification and academic achievement. A significant majority of educators (72.4%) either agreed or strongly agreed that gamification had positively influenced pupils' academic performance. This was mirrored by the pupils themselves, of whom 80.8% reported that gamification strategies had a positive impact on their learning performance.

When asked to identify the most effective elements for enhancing performance, pupils overwhelmingly chose tangible rewards, as detailed in Table 2.

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Table 2: Most Effective Game Elements for Enhancing Performance (Pupil Perception, N=340)

Gamified Element	Frequency (f)	Percentage (%)
Rewards	**142**	**41.8**
Points	89	26.2
Challenges	54	15.9
Badges	28	8.2
Levels	18	5.3
Leaderboard	9	2.6

Source: Field Data 2025

Rewards (41.8%) and points (26.2%) were seen as the most powerful motivators, while competitive elements like leaderboards were perceived as least effective. Beyond performance, the impact on engagement was even more pronounced. A massive **95.6%** of all pupils surveyed agreed or strongly agreed with the statement, "I enjoy learning more when games are part of the lesson." This indicates that gamification is highly effective at improving the affective dimension of learning, making school more enjoyable and engaging.

Despite the positive perceptions, the study identified significant challenges that threaten the sustainability of gamification. While 68.8% of pupils had experienced gamification, only 26.2% reported that their teachers use games *consistently*, with the majority (45.9%) stating they are used only *sometimes*. This inconsistency points to underlying implementation barriers.

Educators identified these barriers clearly, as shown in Table 3.

Table 3: Educator-Reported Challenges in Implementing Gamification (N=29)

Challenge Noticed	Frequency (n)	Percentage (%)
Lack of resources	**21**	**72.4**
Time constraints	19	65.5
Limited training	17	58.6
Negative pupil behavior	8	27.6

Source: Field Data 2025

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Lack of resources (72.4%) was the most significant challenge, followed closely by the **time-consuming** nature of preparing and implementing gamified lessons (65.5%). A lack of formal **training** (58.6%) was also a major concern. The interview with the Curriculum Support Officer confirmed these systemic issues, noting that "curriculum rigidity" and a "lack of specific policy guidance" leave teachers unsupported in their efforts to innovate. Despite these obstacles, the educators' commitment remained high, with 82.8% expressing a willingness to continue using gamification.

6. Discussion

The findings of this study provide compelling evidence that gamification strategies have a significant positive effect on the academic achievement and engagement of pupils in Kiambu Sub-County's public primary schools. The high rate of exposure (68.8%) suggests that gamification has moved beyond a niche concept to become a widely adopted pedagogical tool in the region. The strong preference among both pupils and teachers for tangible, immediate rewards like points and prizes aligns with the principles of Self-Determination Theory, which emphasizes the need for feedback and a sense of competence, particularly for younger learners (Deci & Ryan, 1985).

The overwhelming consensus (95.6%) that gamification makes learning more enjoyable validates Astin's (1984) Student Involvement Theory. By increasing the quality of the learning experience, gamification fosters deeper psychological and behavioral involvement, which in turn leads to the improved academic outcomes reported by 80.8% of pupils and 72.4% of educators. This study empirically confirms that creating an engaging and motivating classroom environment is a direct pathway to enhanced academic performance.

However, the findings also illuminate a critical disconnect between the perceived effectiveness of gamification and its sustainable implementation. The inconsistency of use, as reported by pupils, is directly explained by the challenges cited by educators. The lack of resources, time, and training are classic systemic barriers that prevent the full potential of innovative pedagogies from being realized, a phenomenon widely documented in developing educational contexts (Subhash & Cudney, 2018). This study contributes by demonstrating that even in a relatively well-resourced area like Kiambu, these barriers remain formidable. The high level of teacher commitment despite these challenges is a powerful indicator of a grassroots desire for pedagogical change, but it also highlights the urgent need for top-down systemic support. Without addressing these structural issues, gamification risks remaining an ad-hoc, teacher-dependent initiative rather than a sustainable, integrated component of the educational system.

7. Conclusion and Recommendations

This study concludes that gamification is a highly effective and positively perceived strategy for enhancing academic achievement and student engagement in the public primary schools of Kiambu Sub-County. Its successful application is evident in the strong agreement from both pupils and educators on its benefits. However, its long-term sustainability is severely threatened by systemic challenges, primarily a lack of resources, insufficient teacher training, and the time-intensive nature of implementation. The will to innovate exists at the classroom level, but the structural support required to sustain it is lacking.

Based on these conclusions, the following recommendations are proposed:

1. For the Ministry of Education and Curriculum Developers: It is recommended that gamification be formally integrated into the Competency-Based Curriculum

framework as a recognized instructional strategy. Furthermore, teacher training colleges and in-service professional development programs (like those offered by the TSC) must embed practical, hands-on modules on designing and implementing curriculum-aligned gamification.

2. For School Administrators: Head teachers should prioritize the allocation of resources for low-cost gamification tools and create a school-wide policy that supports and encourages teachers to experiment with these strategies. This includes building time for collaborative planning and sharing of best practices into the school schedule.
3. For Future Research: A longitudinal study is recommended to track the effects of consistent gamification on a cohort of pupils over several years to measure its long-term impact on academic retention and motivation decay. Additionally, a comparative study between public and private schools could provide valuable insights into how resource levels affect the quality and sustainability of gamification implementation.

By addressing the systemic barriers and empowering educators with the necessary skills and resources, the powerful potential of gamification can be harnessed to create more engaging, effective, and equitable learning environments for all pupils in Kenya.

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