

The Effectiveness of Gamification in Learning on Increasing Students' Engagement of Fifth Grade Elementary Students

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ABSTRACT

This study examines the effectiveness of gamification in learning to increase student engagement among fifth-grade elementary school students. Gamification, the integration of game elements such as points, badges, leaderboards, and rewards into non-game learning contexts, has gained growing attention as a pedagogical strategy to foster motivation and active participation. This research employed a quasi-experimental design with a pre-test and post-test control group, involving 60 fifth-grade students from two classes. The experimental group received gamified instruction using digital platforms over six weeks, while the control group followed conventional learning. Data were collected through student engagement questionnaires, observation checklists, and learning outcome tests. Results indicated a statistically significant improvement in student engagement in the experimental group ($p < 0.05$), with higher scores in behavioral, emotional, and cognitive dimensions. Students demonstrated increased enthusiasm, persistence, and collaborative behaviors. These findings suggest that gamification is an effective strategy for enhancing student engagement in elementary education, offering implications for curriculum design and classroom practice.

INTRODUCTION

Student engagement is widely recognized as a central factor shaping academic achievement, especially during elementary schooling. It includes behavioral, emotional, and cognitive components that together indicate the degree to which students take part in and derive meaning from classroom activities (Balalle, 2024; Rivera & Garden, 2021). For fifth-grade pupils, who occupy a transitional stage between early childhood and adolescence, maintaining consistent engagement is particularly challenging. At this age, learners experience cognitive and social changes that affect attention, motivation, and self-regulation, so instructional strategies must adapt to meet those evolving needs. Conventional teaching methods, however, frequently struggle to hold the focus of today's students, who are more familiar with fast-paced, interactive digital formats; as a result, educators often find it difficult to sustain the motivation and active participation required for deep learning (David & Weinstein, 2023; Nadeem et al., 2023).

Gamification, the use of game design elements and mechanics in non-game settings, has gained traction as an instructional approach aimed at overcoming

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engagement challenges in classrooms (Manzano-León et al., 2021; Zeng et al., 2024). Typical gamification features, such as points, badges, leaderboards, levels, immediate feedback, and storytelling, recast routine learning tasks as purpose-driven, interactive experiences that encourage sustained effort and progression (Oliveira et al., 2022; Hellín et al., 2023). Evidence indicates that these elements can stimulate students' intrinsic motivation by supporting the core psychological needs of autonomy, competence, and relatedness described in Self-Determination Theory, thereby fostering greater persistence, enjoyment, and meaningful participation in learning activities (Li et al., 2024; Aldalur & Pérez, 2023).

The effectiveness of gamification in education has been reported across grade levels and disciplines, with multiple syntheses and empirical studies pointing to measurable benefits. Meta-analyses show that game-based approaches can improve academic achievement, boost critical thinking skills, and elevate both motivation and engagement (Barz et al., 2023; Mao et al., 2021; Zeng et al., 2024). In primary schools, research further indicates that gamified activities tend to increase students' intrinsic motivation, extend time-on-task, and promote collaborative behaviors that support peer learning (Guan et al., 2022; Bang et al., 2022; Alotaibi, 2024). Despite these encouraging findings, there remains a shortage of systematic investigations that isolate how gamification influences the multiple dimensions of student engagement, behavioral, emotional, and cognitive, specifically for fifth-grade learners in Indonesian elementary settings, leaving an important gap for context-sensitive research and practice.

This study responds to the identified gap by examining whether gamification-based learning interventions can meaningfully increase engagement among fifth-grade elementary students. By situating the research within K–12 gamification literature, the study seeks both to expand theoretical understanding and to offer concrete guidance for teachers and curriculum designers working in elementary classrooms. Concretely, the investigation pursues three primary objectives: (1) to assess the impact of gamified instructional strategies on students' behavioral, emotional, and cognitive engagement; (2) to compare engagement outcomes between learners exposed to gamified versus conventional teaching approaches; and (3) to determine which specific gamification elements most strongly predict increases in engagement. Together, these aims are intended to produce evidence that can inform classroom practice and help educators select and design gamification features that effectively support younger learners' attention, motivation, and deeper learning.

METHODOLOGY

This study used a quasi-experimental pre-test–post-test control group design because random assignment of individual students to different classrooms was not feasible in the natural school setting. Two intact fifth-grade classes were selected and then randomly designated as the experimental and control groups (Ruiz et al., 2024). Over a six-week intervention period, the experimental class experienced gamified instruction while the control class continued with conventional classroom practices, enabling comparison of engagement changes attributable to the instructional approach rather than to time or maturation alone.

A total of 60 fifth-grade students (ages 10–11) from a public elementary school in Yogyakarta, Indonesia, participated in the study. Each group included 30 students: the experimental group comprised 16 males and 14 females, and the control group comprised 15 males and 15 females. Parental informed consent was obtained for all participants, and

the same classroom teacher taught both groups to reduce instructor-related variability and better isolate the effects of the gamified versus traditional instructional conditions (Sun et al., 2023a).

The gamification intervention was implemented using a digital learning platform integrated with Kahoot!, Quizizz, and Classcraft. Core gamification elements applied in the intervention included: (1) a point-based reward system where students earned points for completing tasks and participating in class activities; (2) digital badges awarded for academic achievements and behavioral milestones; (3) a class leaderboard updated weekly to promote healthy competition; (4) level progression from 'Apprentice Explorer' to 'Master Scholar'; and (5) immediate feedback delivered after each formative assessment (Zhang & Crawford, 2023; Hellin et al., 2023).

Student engagement was measured using three instruments: (1) a 30-item Student Engagement Questionnaire (SEQ) adapted from Fredricks et al. covering behavioral, emotional, and cognitive dimensions; (2) a structured classroom observation checklist completed by two trained observers; and (3) learning outcome tests administered before and after the intervention. The SEQ demonstrated acceptable reliability (Cronbach's $\alpha = 0.87$). Inter-rater reliability for observations was computed using Cohen's Kappa ($\kappa = 0.82$), indicating strong agreement (Taskin & Kiliç-Çakmak, 2022).

Data analysis was conducted using IBM SPSS version 26. First, descriptive statistics—means and standard deviations were calculated for each engagement dimension to summarize baseline and outcome patterns. To evaluate differences in engagement between the experimental and control groups, independent samples t-tests compared pre-test and post-test scores. Statistical significance was determined at the $p < 0.05$ level. In addition to significance testing, effect sizes were computed using Cohen's d to quantify the practical magnitude of observed changes and provide a clearer interpretation of educational relevance (Jaramillo-Mediavilla et al., 2024).

RESULTS AND DISCUSSION

Table 1 presents the pre-test and post-test engagement scores for the experimental group across three engagement dimensions: behavioral, emotional, and cognitive. The results indicate statistically significant improvements across all dimensions following the six-week gamification intervention.

Table 1. Pre-Test and Post-Test Engagement Scores of the Experimental Group (n = 30)

Dimension	Pre-Test (Exp.)	Post-Test (Exp.)	p-value
Behavioral Engagement	61.4 ± 8.2	83.7 ± 6.5	0.001
Emotional Engagement	58.9 ± 9.1	80.2 ± 7.3	0.002
Cognitive Engagement	60.1 ± 7.8	81.5 ± 6.9	0.001
Overall Engagement	60.1 ± 7.1	81.8 ± 5.9	< 0.001

Source: Primary data analysis, 2025

As shown in Table 1., behavioral engagement showed the greatest mean improvement, rising from 61.4 (SD = 8.2) to 83.7 (SD = 6.5), a gain of 22.3 points ($p = 0.001$). Emotional engagement improved from 58.9 to 80.2 ($p = 0.002$), while cognitive engagement improved from 60.1 to 81.5 ($p = 0.001$). The overall engagement score

improved significantly from 60.1 to 81.8 ($p < 0.001$), representing a Cohen's d of 2.94, indicating a very large practical effect. By contrast, the control group showed negligible changes across all dimensions (overall pre-test $M = 59.6$, $SD = 7.4$; post-test $M = 62.1$, $SD = 7.9$; $p = 0.183$).

Figure 1. below provides a visual representation of the mean engagement scores before and after the intervention, illustrating the magnitude of improvement in the experimental group relative to baseline.

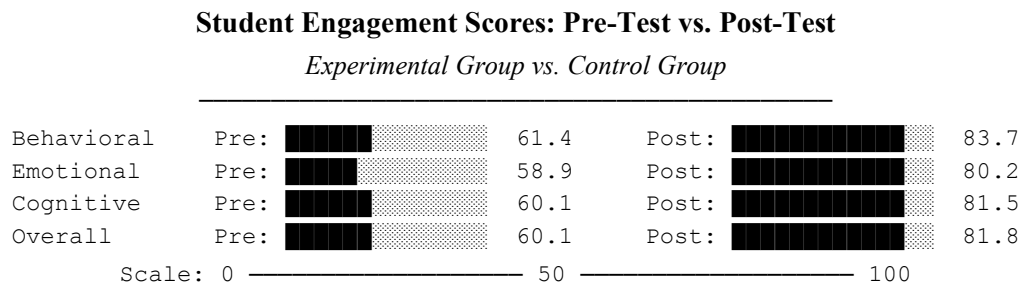


Figure 1. Comparison of Student Engagement Scores Before and After Gamification Intervention

Note. Higher scores indicate greater engagement (scale 0–100). ■ = Experimental Group scores.

To provide a deeper insight into the specific gamification components that drove these improvements, Table 2 details the alignment between each intervention element and its corresponding engagement indicator, along with their respective mean improvement percentages.

Table 2. Gamification Elements and Their Corresponding Engagement Indicators

Gamification Element	Engagement Indicator	Mean Improvement (%)
Points & Rewards	Behavioral Engagement	36.2%
Badges & Achievements	Emotional Engagement	36.2%
Leaderboards	Cognitive Engagement	35.6%
Levels & Progression	Motivation	38.1%
Immediate Feedback	Participation	33.7%

Source: Observation checklist and post-intervention survey, 2025

The results of this study indicate that gamification produced a substantial and statistically significant increase in engagement among fifth-grade elementary students. These findings align with an expanding empirical literature that links game-based and gamified instructional approaches to improvements in motivation, classroom participation, and learning outcomes (Barz et al., 2023; Zeng et al., 2024; Jaramillo-Mediavilla et al., 2024). Notably, the very large effect size observed in this research (Cohen's $d = 2.94$) highlights that the impact of gamification goes beyond mere statistical detectability and represents a practically meaningful change in how students engage with learning tasks.

Behavioral engagement showed particularly strong gains, a pattern consistent with prior work pointing to specific game mechanics, such as leaderboards and reward systems, as powerful drivers of observable participation (Hellín et al., 2023; Taskin & Kiliç-Çakmak, 2022). When learners could monitor progress visually and receive immediate digital rewards, they more frequently stayed on task, volunteered to participate, and completed assigned activities (Alsadoon et al., 2022; Rivera & Garden, 2021). This evidence supports earlier conclusions by Manzano-León et al. (2021), who identified reward structures among the most reliably effective gamification elements in K–12 contexts, suggesting that well-designed incentive mechanisms can translate design features into measurable classroom behaviors.

Emotional engagement improvements were particularly notable, with students reporting greater enthusiasm, curiosity, and a sense of belonging in the gamified environment. This is consistent with David and Weinstein (2023), who found that intrinsically motivating technological interventions that combine fun with appropriate challenge levels produce optimal engagement outcomes. The emotional dimension of engagement is crucial in primary education, as positive emotional experiences with learning during the formative years establish durable attitudes toward school and academic work (Ratinho & Martins, 2023; Byusa et al., 2022).

Cognitive engagement improvements suggest that gamification not only captures attention but also deepens students' intellectual investment in their learning. The immediate feedback feature proved particularly impactful in this regard, a finding corroborated by Zhang and Crawford (2023) who demonstrated that formative assessment gamified through platforms like Quizizz significantly enhanced EFL learners' motivation to persist with cognitively demanding tasks. Sun et al. (2023b) further note that game-based features in intelligent learning environments, particularly adaptive challenge levels and progress visualization, optimize cognitive engagement by maintaining students within their zone of proximal development.

The present results are consistent with meta-analytic evidence indicating that gamification reliably strengthens intrinsic motivation, autonomy, and relatedness (Li et al., 2024). In particular, the social features of gamified designs, such as leaderboards, team-based challenges, and collaborative quests, appeared to bolster peer interactions and foster positive interdependence, which in turn contributed to increased cooperative behaviors in the classroom (Park & Kim, 2021). This social function is especially important for fifth-grade students, whose peer relationships and social identity within school become more salient and influential on learning engagement at this developmental stage.

Nonetheless, several limitations temper the conclusions and suggest directions for future research. The intervention was implemented in a single school and lasted six weeks, restricting the generalizability and long-term inference of the findings; larger samples drawn from diverse school contexts and extended intervention periods are needed to determine whether these effects persist over time (Xiao & Hew, 2024; Ruiz et al., 2024). Moreover, because this study evaluated gamification as a combined instructional package, it does not isolate the specific contributions of individual game elements to distinct engagement dimensions. Prior work suggests that adaptive and personalized gamification, tailoring challenges and rewards to individual learners, may yield stronger or more targeted outcomes than one-size-fits-all implementations (Zourmpakis et al., 2023), a hypothesis that should be tested explicitly in elementary settings.

CONCLUSION

This study demonstrates that gamification-based learning significantly increases student engagement among fifth-grade elementary students across behavioral, emotional, and cognitive dimensions. The experimental group showed large, statistically significant improvements compared to the control group following a six-week intervention. The findings support gamification as an effective and feasible instructional strategy for elementary educators seeking to enhance engagement in diverse classroom contexts. Practitioners are encouraged to integrate evidence-based gamification elements, particularly reward systems, immediate feedback, and progression structures into their instructional designs. Future research should explore long-term sustainability of effects, personalized gamification approaches, and the moderating role of individual student characteristics.

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