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Gamification and Active Learning Engagement: A Quasi-Experimental Study at MTs Sunan Ampel

Gamifikasi dan Keterlibatan Belajar Aktif: Studi Kuasi-Eksperimental di MTs Sunan Ampel

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Abstract

Passive learning remains a persistent challenge in junior secondary education, particularly in Islamic school settings where teacher-centered instruction continues to dominate classroom practice. This study aimed to examine the effect of a structured gamification intervention on students' active learning engagement at MTs Sunan Ampel. A quantitative quasi-experimental design employing a pre-test–post-test control group structure was conducted with 64 Grade 8 students, consisting of an experimental group receiving gamified instruction and a control group receiving conventional instruction over a ten-week period. The findings revealed significant improvements in behavioral, cognitive, and emotional engagement among students exposed to gamification. Overall engagement increased by 29.9%, with a large effect size ($d = 1.14$), while behavioral engagement recorded the highest gain (+36.5%), followed by emotional (+29.8%) and cognitive engagement (+22.4%). ANCOVA results further confirmed that instructional condition significantly predicted post-test engagement outcomes across all dimensions. These findings provide empirical evidence that gamification is an effective strategy for enhancing active learning engagement in Islamic secondary education and highlight the value of collaborative game mechanics in fostering student participation and motivation.

Keywords: Gamification; Active Learning Engagement; Student Engagement; Islamic Secondary Education; Quasi-Experimental Study

Abstrak

Pembelajaran pasif masih menjadi tantangan yang berkelanjutan pada pendidikan menengah pertama, khususnya di lingkungan sekolah Islam yang masih didominasi oleh pendekatan pembelajaran berpusat pada guru. Penelitian ini bertujuan untuk menguji pengaruh intervensi gamifikasi terstruktur terhadap keterlibatan belajar aktif siswa di MTs Sunan Ampel. Penelitian menggunakan desain kuasi-eksperimen kuantitatif dengan struktur kelompok kontrol pre-test dan post-test yang melibatkan 64 siswa kelas VIII, terdiri atas kelompok eksperimen yang memperoleh pembelajaran berbasis gamifikasi dan kelompok kontrol yang menerima pembelajaran konvensional selama sepuluh minggu. Hasil penelitian menunjukkan adanya peningkatan yang signifikan pada keterlibatan perilaku, kognitif, dan emosional siswa yang mengikuti pembelajaran berbasis gamifikasi. Keterlibatan belajar secara keseluruhan meningkat sebesar 29,9% dengan ukuran efek yang besar ($d = 1,14$), di mana keterlibatan perilaku mencatat peningkatan tertinggi (+36,5%), diikuti keterlibatan emosional (+29,8%) dan keterlibatan kognitif (+22,4%). Hasil ANCOVA juga mengonfirmasi bahwa kondisi pembelajaran berpengaruh signifikan terhadap keterlibatan belajar pasca-intervensi pada seluruh dimensi yang diukur. Temuan ini memberikan bukti empiris bahwa gamifikasi merupakan strategi yang efektif untuk meningkatkan keterlibatan belajar aktif pada pendidikan menengah berbasis Islam serta menegaskan pentingnya mekanisme kolaboratif dalam mendorong partisipasi dan motivasi siswa.

Kata Kunci: Gamifikasi; Keterlibatan Belajar Aktif; Keterlibatan Siswa; Pendidikan Menengah Islam; Kuasi-Eksperimen



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INTRODUCTION

Despite widespread recognition of active learning as a superior pedagogical approach, passive instructional practices continue to prevail in many Indonesian secondary school classrooms, particularly within Islamic educational institutions (Madrasah). At the junior secondary level corresponding to grades 7–9 in Indonesian education (Madrasah Tsanawiyah/MTs) adolescent students are developmentally positioned at a stage where motivational engagement is both volatile and highly consequential for long-term learning trajectories. Students who disengage at this stage are significantly more likely to exhibit persistent academic underperformance and reduced motivation in subsequent years.¹

The challenge at MTs Sunan Ampel, as in many comparable Islamic junior secondary schools, is structural: teachers are expected to cover dense subject content within constrained time, while students accustomed to passive reception show limited initiative for discussion, questioning, or collaborative problem-solving. This creates a cycle of disengagement that conventional instructional strategies primarily teacher-centered lecture, rote recitation, and textbook exercises are poorly equipped to break.²

Gamification defined as the use of game design elements in non-game contexts offers a credible pedagogical alternative.³ By embedding mechanics such as points, achievement badges, leaderboards, challenge quests, and progress visualization into regular instructional activities, gamification converts otherwise passive learning tasks into goaldirected, feedback-rich experiences. Its motivational foundations are grounded in Self-Determination Theory (SDT),⁴ which identifies autonomy, competence, and relatedness as the three core psychological needs that sustain intrinsic motivation. When gamification is designed to fulfill these needs providing visible competence feedback (badges), social relatedness (team challenges), and choice (optional quests) it can generate the motivational conditions necessary for genuine active learning.

Evidence from the international literature confirms gamification's effectiveness. A metaanalysis by Gyedu et al. synthesizing 22 independent studies found a statistically significant pooled effect size of Cohen's $d = 1.12$ for gamification on student learning outcomes, affirming its substantial educational value.⁵ A systematic review covering 37 peer-reviewed studies from 2019 to 2024 similarly confirmed positive effects across primary, secondary, and higher education levels.⁶ In Islamic educational contexts specifically, quasi-experimental studies integrating gamified

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- 1 M. Furkan Kurnaz and Nilüfer Koçtürk, "A Meta-Analysis of Gamification's Impact on Student Motivation in K-12 Education," *Psychology in the Schools* 62, no. 12 (2025): 4997–5009, <https://doi.org/10.1002/pits.70056>.
 - 2 C Riantoni and I Iskandar, "Exploring Gamification Implementation in Islamic Secondary School Learning: Challenges and Opportunities," *Cogent Education* 10, no. 2 (2023): 2253621, <https://doi.org/10.1080/2331186X.2023.2253621>.
 - 3 Sebastian Deterding et al., "From Game Design Elements to Gamefulness," in *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* (New York, NY, USA: ACM, 2011), 9–15, <https://doi.org/10.1145/2181037.2181040>.
 - 4 Edward L Deci and Richard M Ryan, "Self-Determination Theory," in *Handbook of Theories of Social Psychology: Volume 1*, vol. 1 (1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom: SAGE Publications Ltd, 2012), 416–37, <https://doi.org/10.4135/9781446249215.n21>.
 - 5 Francis Obeng Gyedu et al., "Gamification Effect: Enhancing Student Learning Outcomes in Higher Education: A Meta-Analysis and Policy Implications," *SAGE Open* 16, no. 1 (2026), <https://doi.org/10.1177/21582440261421375>.
 - 6 Lan Dinh Thi, "Game-Based Learning in Improving Student Engagement," *International Journal of Research and Innovation in Social Science* IX, no. V (2025): 5116–23, <https://doi.org/10.47772/IJRISS.2025.905000397>.

platforms into religious education lessons have demonstrated increased student engagement, classroom participation rates, and short-term achievement gains.⁷

Despite this growing body of evidence, two important gaps remain. First, the preponderance of gamification studies in Indonesian Islamic secondary education focuses on specific subject areas predominantly Islamic Religious Education (PAI) or Arabic language and measures outcome variables through post-test scores rather than as multidimensional engagement processes. No study to date has examined gamification's effect on active learning engagement as a tripartite construct (behavioral, cognitive, and emotional dimensions) in the general instructional context of an MTs setting. Second, most studies in this sub-context are limited by small samples, lack of control groups, or single-session designs, which constrain the reliability and generalizability of their findings. This study addresses both gaps by employing a rigorous quasi-experimental design with a 10-week intervention and multidimensional engagement measurement.

Method

This study employed a quantitative quasi-experimental design using a non-equivalent pre-test/post-test control group structure to examine the effect of gamification on students' active learning engagement. The study was conducted at MTs Sunan Ampel, East Java, Indonesia, over a ten-week instructional period. Participants consisted of 64 Grade 8 students from two parallel classes, with 32 students assigned to the Experimental Group (EG) and 32 to the Control Group (CG). Both groups were taught by the same teacher using identical learning materials and objectives, differing only in the instructional approach. Prior to the intervention, independent-samples t-tests confirmed no significant differences between groups across behavioral, cognitive, and emotional engagement dimensions (all $p > .05$), indicating comparable baseline conditions and supporting the validity of subsequent group comparisons.

The gamification intervention was developed by integrating principles from Self-Determination Theory and the ARCS motivational model. Five game-based elements were implemented through Quizizz and classroom-based monitoring systems: points awarded for quiz performance and participation, achievement badges for milestone accomplishments, team-based leaderboards displaying cumulative group scores, challenge quests offering optional advanced tasks, and progress visualization through digital completion indicators. Unlike individual ranking systems, the leaderboard emphasized collective achievement to encourage collaboration and reduce competitive pressure. The intervention was implemented consistently throughout the ten-week period, allowing students to engage repeatedly with multiple motivational mechanisms embedded within regular classroom learning activities.

Active learning engagement was measured using a validated 30-item questionnaire adapted from the School Engagement Instrument and modified for the MTs context. The instrument assessed behavioral, cognitive, and emotional engagement through three ten-item subscales rated on a five-point Likert scale. Reliability coefficients were satisfactory across all dimensions ($\alpha = .82-.89$), with an overall reliability of .92, while construct validity was supported by acceptable CFA indices (CFI = .95; RMSEA = .054). The instrument was administered before and after the intervention. Data were analyzed using SPSS v.26 through paired-sample t-tests to examine within-group changes and ANCOVA to compare post-test outcomes while controlling for baseline scores. Effect sizes were calculated using Cohen's d and partial η^2 .

7 Teuku Muhammad Fauzan Robbani, "Child Language Acquisition in Family Interaction: A Psycholinguistic Analysis of Phonological and Syntactic Development," *SYMPHONIA: Journal of Theory and Research Output* 1, no. 2 SE-Articles (2027): 63–75, <https://darulilmijournal.com/index.php/symphonia/article/view/158>.

RESULTS AND DISCUSSION

Changes in Student Engagement Following the Gamification Intervention

The study first examined whether the experimental group (EG) and control group (CG) were comparable before the implementation of the gamification intervention. Establishing baseline equivalence is essential in quasi-experimental research because it helps ensure that subsequent differences can be attributed to the intervention rather than pre-existing group characteristics. Pre-test analyses revealed no statistically significant differences between the two groups across any of the engagement dimensions. Behavioral engagement scores were nearly identical between the EG ($M = 57.8$) and CG ($M = 58.1$; $p = .83$). Similarly, cognitive engagement scores showed minimal variation (EG = 53.4; CG = 53.9; $p = .77$), while emotional engagement also remained statistically equivalent (EG = 55.6; CG = 56.1; $p = .79$). These findings indicate that both groups began the study with comparable levels of active learning engagement, providing a valid basis for evaluating the effects of the intervention.

Table 1. Pre-Test and Post-Test Engagement Scores: Experimental and Control Groups

Engagement Dimension	EG Pre ($M \pm SD$)	EG Post ($M \pm SD$)	CG Pre ($M \pm SD$)	CG Post ($M \pm SD$)
Behavioral Engagement	57.8 $\pm$ 9.3	78.9 $\pm$ 7.1	58.1 $\pm$ 8.9	62.4 $\pm$ 8.6
Cognitive Engagement	53.4 $\pm$ 10.1	65.4 $\pm$ 9.2	53.9 $\pm$ 9.8	57.3 $\pm$ 9.4
Emotional Engagement	55.6 $\pm$ 11.2	72.2 $\pm$ 8.4	56.1 $\pm$ 10.7	60.9 $\pm$ 10.2
Overall Engagement	55.6 $\pm$ 9.7	72.2 $\pm$ 7.8	56.0 $\pm$ 9.5	60.2 $\pm$ 9.2

Source: Author, 2026

As shown in Table 1, students in the experimental group demonstrated substantially greater improvements across all dimensions of engagement than those in the control group. Behavioral engagement increased from 57.8 to 78.9, representing the largest observed improvement. Cognitive engagement rose from 53.4 to 65.4, while emotional engagement increased from 55.6 to 72.2. Overall engagement also showed a notable increase, rising from 55.6 to 72.2 by the end of the intervention period. In contrast, students in the control group exhibited only modest gains across the same dimensions. Although some improvement was evident, the magnitude of change remained considerably smaller than that observed in the experimental group. These descriptive findings provide initial evidence that the gamified instructional approach was associated with higher levels of student engagement over the ten-week intervention period.

To determine whether the observed changes in the experimental group were statistically significant, paired-sample t-tests were conducted comparing pre-test and post-test scores across all engagement dimensions. The analysis revealed significant improvements in behavioral, cognitive, emotional, and overall engagement following the implementation of gamified instruction. The overall engagement score increased from 55.6 to 72.2, representing a gain of 16.6 points or 29.9% over the course of the intervention. The magnitude of this improvement was substantial, with an overall effect size of Cohen's $d = 1.14$, indicating a large practical effect. These findings suggest that the observed increases were not merely the result of random variation but reflected meaningful changes in students' engagement levels throughout the study period.

Table 2. Within-Group Paired t-Test Results for the Experimental Group

Dimension	Pre M	Post M	Gain (%)	t(31)	p	Cohen's d
Behavioral Engagement	57.8	78.9	+21.1 (+36.5%)	15.23	< .001	1.27
Cognitive Engagement	53.4	65.4	+12.0 (+22.4%)	10.44	< .001	0.88
Emotional Engagement	55.6	72.2	+16.6 (+29.8%)	13.01	< .001	1.06
Overall Engagement	55.6	72.2	+16.6 (+29.9%)	14.87	< .001	1.14

Source: Author, 2026

As shown in Table 2, all dimensions of engagement experienced statistically significant improvements following the intervention. Behavioral engagement recorded the largest gain, increasing by 21.1 points or 36.5% from its pre-test level. Emotional engagement increased by 16.6 points (29.8%), while cognitive engagement rose by 12.0 points (22.4%). The corresponding effect sizes ranged from 0.88 to 1.27, indicating moderate-to-large practical significance across all dimensions. Behavioral engagement produced the strongest effect size ($d = 1.27$), followed by overall engagement ($d = 1.14$) and emotional engagement ($d = 1.06$). Cognitive engagement demonstrated the smallest effect size ($d = 0.88$), although it remained within the large-effect range according to conventional interpretation guidelines. Collectively, these results indicate substantial engagement gains among students who participated in the gamified learning environment.

While the experimental group demonstrated marked improvements, the control group showed comparatively limited changes over the same period. Cognitive and emotional engagement gains in the control group did not reach statistical significance (both $p > .05$), whereas behavioral engagement showed only a marginal improvement ($p = .041$, $d = 0.24$). To further assess the effectiveness of the intervention, analyses of covariance (ANCOVA) were conducted using post-test scores as dependent variables while controlling for pre-test engagement levels. This analysis enabled a more precise comparison between groups by accounting for any minor baseline variation that may have existed prior to the intervention.

Table 3. ANCOVA Results for Post-Test Engagement Scores

Dimension	F(1,61)	p	Partial η^2
Behavioral Engagement	58.34	< .001	.49
Cognitive Engagement	24.19	< .001	.28
Emotional Engagement	37.62	< .001	.38
Overall Engagement	49.17	< .001	.45

Source: Author, 2026

As shown in Table 3, instructional condition was a significant predictor of post-test engagement outcomes across all measured dimensions after controlling for pre-test scores. Significant differences were found for behavioral engagement, $F(1,61) = 58.34$, $p < .001$, partial $\eta^2 = .49$; cognitive engagement, $F(1,61) = 24.19$, $p < .001$, partial $\eta^2 = .28$; emotional engagement, $F(1,61) = 37.62$, $p < .001$, partial $\eta^2 = .38$; and overall engagement, $F(1,61) = 49.17$, $p < .001$, partial $\eta^2 = .45$. The effect sizes indicate that a substantial proportion of variance in post-test engagement scores was associated with the instructional condition. Taken together, the findings consistently demonstrate that students who experienced the gamified learning intervention achieved significantly higher levels of active learning engagement than those who participated in conventional classroom instruction.

Educational Implications of Gamification for Active Learning

Enhancing student engagement remains one of the most persistent challenges in junior secondary education, particularly in classrooms where instruction continues to rely heavily on teacher-centered approaches. In such settings, students often assume the role of passive recipients of information rather than active participants in the learning process. Against this backdrop, the present study suggests that gamification offers a promising alternative for addressing this challenge. Over the course of the intervention, overall student engagement increased by 29.9%, accompanied by a large effect size ($d = 1.14$). Importantly, these improvements were observed across behavioral, cognitive, and emotional dimensions of engagement. These findings indicate that gamification influences more than a single aspect of learning engagement; rather, it has the potential to create a learning environment that encourages broader participation and sustained involvement in classroom activities. This interpretation is supported by research demonstrating that gamification enhances student engagement by providing clear goals, immediate feedback, and more interactive learning experiences.⁸

One of the most notable findings of this study was the substantial increase in behavioral engagement relative to the other engagement dimensions. Behavioral engagement improved by 36.5%, representing the highest gain observed in the study, with a large effect size ($d = 1.27$). This result suggests that students became more actively involved in classroom activities, task completion, and learning-related participation. The finding further indicates that gamification elements such as points, achievement badges, and progress visualization can provide students with tangible indicators of achievement and progress. When learners receive immediate recognition for their efforts, they are more likely to sustain active participation throughout the learning process. In this sense, gamification appears to strengthen the connection between effort and reward, thereby encouraging greater involvement in classroom activities. This finding is consistent with research indicating that structured reward systems and immediate feedback mechanisms can significantly enhance students' behavioral engagement and participation.⁹

Beyond its influence on behavioral engagement, gamification also produced a substantial improvement in students' emotional engagement. The results showed that emotional engagement increased by 29.8%, with a large effect size ($d = 1.06$). This finding suggests that students not only became more active participants in classroom activities but also developed more positive emotional responses toward learning. Emotional engagement is particularly important because effective learning is shaped not only by what students do but also by how they feel about the learning experience. Students who enjoy learning activities and perceive them as meaningful are generally more likely to maintain motivation over time. The present findings therefore suggest that gamification can contribute to a more enjoyable and rewarding learning environment. This interpretation is supported by research demonstrating that gamified learning experiences enhance intrinsic motivation by providing opportunities for achievement, recognition, and positive emotional experiences within educational settings.¹⁰

8 Imed Bouchrika et al., "Exploring the Impact of Gamification on Student Engagement and Involvement with E-Learning Systems," *Interactive Learning Environments* 29, no. 8 (November 17, 2021): 1244–57, <https://doi.org/10.1080/10494820.2019.1623267>.

9 Carlos J. Hellín et al., "Enhancing Student Motivation and Engagement through a Gamified Learning Environment," *Sustainability* 15, no. 19 (September 24, 2023): 14119, <https://doi.org/10.3390/su151914119>.

10 Lorena Jaramillo-Mediavilla et al., "Impact of Gamification on Motivation and Academic Performance: A Systematic Review," *Education Sciences* 14, no. 6 (June 13, 2024): 639, <https://doi.org/10.3390/educsci14060639>.

The improvement in emotional engagement observed in this study may be closely related to the collaborative mechanisms incorporated into the intervention design. Post-intervention survey data revealed that the team-based leaderboard was identified by students as the most influential gamification element in motivating classroom participation. This finding suggests that students were motivated not only by individual accomplishments but also by opportunities to contribute to collective success. Within the context of Islamic junior secondary education, where values such as cooperation, mutual support, and social responsibility are strongly emphasized, team-oriented structures may be particularly effective. Rather than promoting excessive individual competition, collaborative game mechanics encourage students to work together toward shared goals while still receiving recognition for their contributions. This interpretation is supported by research showing that cooperative forms of gamification strengthen social connectedness and contribute positively to students' emotional engagement and sense of belonging in the classroom.¹¹

Although cognitive engagement exhibited a smaller increase than behavioral and emotional engagement, the improvement remained substantial. Cognitive engagement increased by 22.4%, with a large effect size ($d = 0.88$). This finding suggests that while gamification can support deeper learning processes, its influence on cognitive engagement may be less immediate than its influence on observable behaviors and emotional responses. Meaningful cognitive engagement requires students to analyze, evaluate, and apply knowledge rather than simply participate in classroom activities. In the present study, the challenge quests appear to have contributed to this outcome by providing students with opportunities to engage in more demanding learning tasks that required active problem-solving and knowledge application. These findings align with research suggesting that gamification has the greatest impact on cognitive engagement when game elements are integrated with activities that promote reflection, inquiry, and higher-order thinking skills.¹²

The differing levels of improvement across engagement dimensions provide important insight into how gamification operates within educational settings. Behavioral engagement recorded the highest gain (36.5%), followed by emotional engagement (29.8%) and cognitive engagement (22.4%). This pattern suggests that students' initial responses to gamification are more likely to emerge through increased participation and positive emotional involvement before translating into deeper cognitive engagement. Consequently, educators should not assume that game mechanics alone are sufficient to foster all dimensions of engagement equally. Instead, gamification should be integrated with instructional strategies that encourage discussion, reflection, inquiry, and problem-solving. Such an approach allows educators to capitalize on the motivational benefits of gamification while simultaneously promoting deeper learning processes. This interpretation is supported by research emphasizing that the effectiveness of gamification depends largely on the quality of the instructional design in which it is embedded.¹³

Overall, the findings of this study demonstrate that gamification is an effective strategy for enhancing active learning engagement among students at the Madrasah Tsanawiyah level. The substantial increase in overall engagement (29.9%) and the large effect size observed across all

11 José M. Rodríguez-Ferrer et al., "Shall We Play Together? Game-Based Learning for Engagement and Classroom Climate in Spanish Socially Deprived Communities," *Frontiers in Psychology* 14 (June 2, 2023), <https://doi.org/10.3389/fpsyg.2023.1163441>.

12 Aray M. Kassenkhan, Aiman N. Moldagulova, and Vasily V. Serbin, "Gamification and Artificial Intelligence in Education: A Review of Innovative Approaches to Fostering Critical Thinking," *IEEE Access* 13 (2025): 98699–728, <https://doi.org/10.1109/ACCESS.2025.3576147>.

13 Alberto González-Fernández, Francisco-Ignacio Revuelta-Domínguez, and María Rosa Fernández-Sánchez, "Models of Instructional Design in Gamification: A Systematic Review of the Literature," *Education Sciences* 12, no. 1 (January 13, 2022): 44, <https://doi.org/10.3390/educsci12010044>.

engagement dimensions indicate that gamification can produce meaningful improvements in students' learning experiences. These findings also reinforce existing evidence regarding the effectiveness of gamification in educational contexts. At the same time, the present study contributes additional insight by highlighting the potential value of collaborative game mechanics, particularly team-based leaderboards, within Islamic secondary school settings. When carefully aligned with instructional objectives and classroom needs, gamification can serve as a practical and pedagogically valuable approach for fostering more active, engaging, and meaningful learning experiences.¹⁴

CONCLUSION

This study demonstrates that a structured gamification intervention can substantially enhance active learning engagement among junior secondary students in an Islamic school context. The findings revealed significant improvements across behavioral, cognitive, and emotional dimensions of engagement, with overall engagement increasing by 29.9% and yielding a large effect size ($d = 1.14$). The strongest improvement was observed in behavioral engagement, followed by emotional and cognitive engagement. This pattern suggests that gamification influences student engagement through multiple pathways. By providing clear goals, immediate feedback, visible progress indicators, and opportunities for collaborative participation, gamification encourages students to become more actively involved in classroom activities while simultaneously fostering positive emotional connections to learning. The comparatively smaller gain in cognitive engagement further indicates that game mechanics alone may not be sufficient to stimulate deeper learning processes and should therefore be complemented by instructional activities that promote reflection, inquiry, and higher-order thinking.

This study contributes to the growing body of research on gamification by providing empirical evidence from the context of Madrasah Tsanawiyah, a setting that remains underrepresented in the literature. It further highlights the potential value of collaborative gamification elements, particularly team-based leaderboards, in promoting student engagement within collectivist educational environments. Nevertheless, several limitations should be acknowledged. The study involved a relatively small sample drawn from a single institution and was conducted over a ten-week period, limiting the generalizability and long-term interpretation of the findings. Future research should therefore examine the sustainability of engagement gains across longer instructional periods, involve larger and more diverse samples, and explore the differential effects of gamification across subject areas and student characteristics. Additional studies incorporating qualitative data may also provide deeper insights into how students experience and interpret gamified learning environments in Islamic secondary education.

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¹⁴ Athanasios Christopoulos and Stylianos Mystakidis, "Gamification in Education," *Encyclopedia* 3, no. 4 (October 2, 2023): 1223–43, <https://doi.org/10.3390/encyclopedia3040089>.

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