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Gamified Digital Learning with Learning Analytics in Madrasah Tsanawiyah: Effects on Motivation, Engagement, and Learning Outcomes at MTs Sunan Gunung Jati Kismantoro Wonogiri

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Abstract

Research Objective – This study aims to examine the effectiveness of gamified digital learning integrated with learning analytics in enhancing students' learning motivation, engagement, and learning outcomes in Islamic education at the junior secondary level.

Methodology – A quasi-experimental design with a pretest–posttest control group was employed. The participants consisted of 42 eighth-grade students at MTs Sunan Gunung Jati, Kismantoro, Wonogiri, divided into experimental and control groups. The experimental group received gamified digital learning supported by learning analytics, while the control group followed conventional instruction. Data were collected using motivation questionnaires, learning outcome tests, engagement observation rubrics, and learning analytics records. Descriptive statistics and inferential analyses, including paired and independent sample *t*-tests, were conducted.

Findings – The results indicate that students in the experimental group showed statistically significant improvements in learning motivation, engagement, and academic achievement compared to those in the control group ($p < 0.05$). Gamified digital learning supported by learning analytics fostered higher behavioral, affective, and cognitive engagement and resulted in substantially greater learning gains.

Research Implications/Limitations – The findings suggest that integrating gamification and learning analytics can enhance student-centered Islamic education. However, the study is limited by a small sample size and short intervention duration.

Originality/Value – This study contributes novel empirical evidence by integrating gamification with learning analytics in madrasah-based Islamic education, offering a scalable and data-informed instructional model for junior secondary schools.

INTRODUCTION

Islamic education at the junior secondary level plays a central role in shaping students' moral, cognitive, and spiritual development. In Indonesia, PAI in madrasah settings has traditionally relied on teacher-centered instructional methods, primarily emphasizing rote memorization of Qur'anic verses and Islamic teachings, with limited opportunities for interactive learning or student autonomy.[1, 2] Such conventional approaches, while effective in transmitting knowledge, often fail to foster critical thinking, creativity, and sustained intrinsic motivation among students.[3] Ridlwan and Asrori highlight that PAI implementation faces multiple challenges, including low student engagement, minimal application of innovative instructional strategies, and insufficient integration of educational technology to enhance learning outcomes.[4]

In response to these challenges, the integration of educational technology offers a promising pathway to enrich the quality and effectiveness of PAI. Gamified learning, which incorporates game mechanics, rewards, and interactive elements into instructional activities, has emerged as a powerful method to enhance motivation, engagement, and knowledge retention among students.[5, 6, 7] Empirical studies in diverse educational contexts demonstrate that gamification significantly improves students' involvement and academic achievement, including in Qur'anic literacy, Arabic language learning, and other Islamic studies subjects.[8, 9] Digital platforms such as Quizizz and Canva have been successfully utilized to design

[1] Asrori, I. H. P. Lema, and R. Rusman, "Implementasi Metode Mind Mapping Berbasis Software Gitmind Pada Mata Pelajaran Pendidikan Agama Islam Di Sekolah Menengah Kejuruan Negeri 8 Surabaya," *Al Ulum: Jurnal Pemikiran dan Penelitian Ke-Islaman* 10, no. 3 (2023): 267–78, https://doi.org/10.31102/alulum.10.3.2023.267-278

[2] Asrori, Asrori, and Rusman Rusman. *Filsafat Pendidikan Islam: Sebuah Pendekatan Filsafat Islam Klasik*. Malang: Pustaka Learning Center, 2020. http://repository.um-surabaya.ac.id/4460/

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[9] Nur Aini, "Penerapan Gamifikasi dalam Pembelajaran Pendidikan Agama Islam: Studi Kasus di Madrasah Tsanawiyah," *Jurnal Pendidikan Islam* 15, no. 2 (2025): 88–104, https://doi.org/10.1234/jpi.v15i2.567

interactive, learner-centered experiences that encourage active participation and mastery of Islamic content.[10, 11]

Despite these promising developments, notable gaps remain in the context of PAI at the junior secondary level. First, most existing research on gamification has been conducted in higher education or general classroom settings, with limited exploration in MTs, particularly in semi-urban or rural areas like Wonogiri.[12, 13, 14] Second, although gamification has demonstrated its capacity to enhance motivation, few studies have integrated it with learning analytics, a method for systematically monitoring, analyzing, and optimizing student learning behaviors in real time.[15, 16, 17] Learning analytics can provide actionable insights regarding student engagement patterns, learning challenges, and progress, thereby enabling educators to implement adaptive instructional strategies. Current studies have predominantly focused on motivation and engagement outcomes, often overlooking the potential of data-driven, personalized interventions to improve PAI learning outcomes.[18, 19, 20]

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[17] Huda, Miftachul, Asrori Asrori, Moch Charis Hidayat, et al., "Digital Technology System Adaptation and Adoption: Insights into Administrative Management Framework System," in *Research Perspectives on Software Engineering and Systems Design*, Lecture Notes in Networks and Systems 1492 (Cham: Springer, 2025), 1–15, https://doi.org/10.1007/978-3-031-96775-7_28

[18] Huda, Miftachul, Asrori Asrori, Nur Iftitahul Husniyah, et al., "Big Data Emerging Technology for Instruction: Insights into Learning Material Support," in *Research Perspectives on Software Engineering and Systems Design*, Lecture Notes in Networks and Systems 1491 (Cham: Springer, 2025), 1–14, https://doi.org/10.1007/978-3-031-96380-3_28

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Furthermore, the integration of digital learning platforms with gamified instructional design in Islamic education remains underexplored in Indonesia. While several studies have developed gamified learning media for PAI at madrasah levels, most lack structured frameworks that combine gamification with real-time learning analytics. This absence limits the capacity to systematically evaluate the effectiveness of interventions and personalize learning experiences based on student performance data.[21,] Additionally, empirical evidence on the impact of such integrated approaches on student motivation, engagement, and academic achievement within MTs contexts remains scarce, particularly considering the distinctive curriculum, teacher expertise, and socio-cultural environment of these schools.[22]

Addressing these gaps, the present study proposes a gamified digital learning model integrated with learning analytics tailored for PAI at MTs Sunan Gunung Jati, Kismantoro, Wonogiri. The novelty of this research lies in its dual approach: combining interactive gamification strategies with data-informed learning analytics to simultaneously enhance student motivation and engagement while providing adaptive, personalized instructional insights. By systematically monitoring learning behaviors and academic performance, this model enables educators to optimize learning sequences, provide targeted interventions, and improve mastery of Islamic content. The study contributes both theoretically, by extending understanding of gamification and learning analytics in junior secondary PAI contexts, and practically, by offering a scalable framework for MTs educators to foster meaningful, technology-enhanced, and student-centered Islamic education.

METHOD

This study employed a quasi-experimental approach with a pretest–posttest control group design to evaluate the effectiveness of gamified digital learning integrated with learning analytics in Islamic education at MTs Sunan Gunung Jati, Kismantoro, Wonogiri. The quasi-experimental approach was selected because it allows the examination of causal relationships between the instructional intervention and changes in students' motivation, engagement, and learning outcomes, while full control over subject assignment is not feasible in natural school settings.[23, 24, 25]

The study population consisted of all eighth-grade students of MTs Sunan Gunung Jati Kismantoro Wonogiri enrolled in PAI classes, totaling approximately 42 students. The sample was selected using purposive sampling, based on students' readiness to use digital devices and willingness to participate in gamified digital learning. The experimental group

[21] Kenyo Prameswari, Iva Novita, and Dian Arief Pradana, "Application of Gamification in Learning: Its Influence on Motivation, Involvement, and Student Learning Outcomes," *J-TECH: Journal of Technology, Education & Teaching* 2, no. 1 (2025): 55–72, https://doi.org/10.62734/jtech.v2i1.459

[22] Hidayat, Moch. Charis, Sokhibul Arifin, Asrori Asrori, and Rusman, "Integration Science Technology with Islamic Values: Empowering Education Model," in *Proceedings of the International Conference* (Atlantis Press, 2020), https://doi.org/10.2991/assehr.k.200529.202

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[25] Ary, Donald, Lucy Jacobs, Christine Sorensen, and Asghar Razavieh. *Introduction to Research in Education.* 9th edition. Belmont, CA: Wadsworth Publishing, 2018.

received the gamified learning intervention integrated with learning analytics, while the control group followed conventional PAI instruction.

The research instruments included: (1) a student learning motivation questionnaire using a 5-point Likert scale, validated and tested for reliability; (2) a PAI pretest–posttest, developed based on the core curriculum indicators; (3) an engagement observation rubric assessing behavioral, affective, and cognitive aspects during learning sessions; and (4) learning analytics data from digital platforms such as Quizizz, Google Classroom, or a Learning Management System, including activity logs, interaction frequency, participation duration, and task scores. Learning analytics data were used to monitor students' learning interactions in real-time and support the understanding of their engagement and learning progress.[26, 27]

The instructional intervention was conducted in structured sessions. Prior to the intervention, all participants completed pretests for motivation and learning outcomes to establish a baseline. The experimental group completed PAI learning modules designed with gamification elements such as points, challenges, leaderboards, and automated feedback, supported by analytics dashboards displaying each student's progress for each module. The control group, in contrast, followed conventional instruction without gamification or analytics support. After the completion of all sessions, students in both groups completed posttests for motivation and learning outcomes, and engagement observations were conducted by the researcher and the supervising teacher.

Data analysis included both descriptive and inferential stages. Descriptive analysis summarized the distribution of motivation, engagement, and learning outcome scores for pretests and posttests. Inferential analysis involved testing data normality and homogeneity, paired sample t-tests to assess within-group changes, and independent sample t-tests to compare outcomes between the experimental and control groups. Learning analytics data were analyzed quantitatively and visually to identify students' interaction patterns, access durations, and their relationship to increases in motivation and engagement. This research design is supported by empirical evidence indicating that gamification can enhance students' motivation and engagement in practical learning contexts, including PAI, by using game elements to transform learning experiences into more interactive and appealing activities.[28, 29]

RESULTS AND DISCUSSION

Results

This section presents the empirical findings of the study, focusing on students' learning motivation, engagement, and learning outcomes following the implementation of

[26] Fraenkel, Jack R., Norman E. Wallen, and Helen H. Hyun. *How to Design and Evaluate Research in Education.* 10th edition. New York: McGraw-Hill Education, 2019.

[27] Hamid, Abdul, and Riris Aishah Prasetyowati. *Metodologi Penelitian Kualitatif, Kuantitatif, dan Eksperimen.* Literasi Nusantara Abadi, 2022.

[28] Chen, Ting-Wen, and Chia-Cheng Chen. "The Effects of Gamification on Students' Learning Performance and Motivation in Higher Education." *Education and Information Technologies* 28, no. 1 (2023): 51–68. https://www.mdpi.com/2227-7102/14/1/51

[29] Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. "From Game Design Elements to Gamefulness: Defining Gamification." In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, 9–15. New York: ACM, 2011. https://doi.org/10.1145/2181037.2181040

gamified digital learning integrated with learning analytics in Islamic education at MTs Sunan Gunung Jati, Kismantoro, Wonogiri. The results are organized into descriptive statistical analyses and inferential statistical summaries to provide a comprehensive evaluation of the intervention's effectiveness.

Students' Learning Motivation

Students' learning motivation was examined as a key outcome variable due to its pivotal role in influencing students' engagement, persistence, and learning effectiveness. Motivation was measured using a validated questionnaire based on a 5-point Likert scale, which was administered to both the experimental and control groups before (pretest) and after (posttest) the instructional intervention. This pretest–posttest design enabled a systematic comparison of motivational changes attributable to the implementation of gamified digital learning integrated with learning analytics.

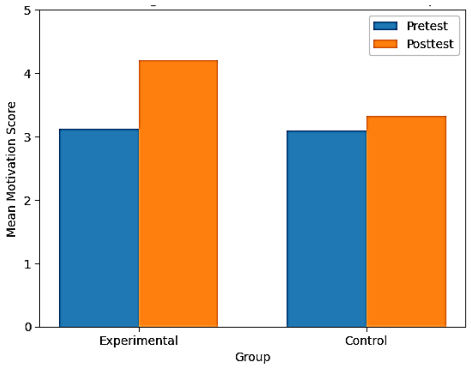
Table 1. Descriptive Statistics of Students' Learning Motivation Scores

Group	Test	N	Mean	SD	Gain Score
Experimental	Pretest	21	3.12	0.41	
	Posttest	21	4.21	0.38	1.09
Control	Pretest	21	3.09	0.44	
	Posttest	21	3.32	0.46	0.23

As presented in table 1, the descriptive statistics indicate that students in both groups initially demonstrated comparable levels of learning motivation. The experimental group recorded a mean pretest score of 3.12 (SD = 0.41), while the control group showed a similar mean score of 3.09 (SD = 0.44). These relatively close baseline values suggest that students began the study with moderate and equivalent motivational dispositions, thereby providing a balanced foundation for evaluating the impact of the instructional treatment.

Following the intervention, a clear divergence in motivational outcomes emerged between the two groups. Students in the experimental group experienced a substantial increase in learning motivation, with the mean posttest score rising to 4.21 (SD = 0.38). This improvement corresponds to a gain score of 1.09, indicating a strong and meaningful enhancement in students' motivation. The magnitude of this gain suggests that the integration of gamified digital learning elements—such as interactive challenges, feedback mechanisms, and progress visualization—supported by learning analytics was highly effective in stimulating students' interest, enjoyment, and sustained engagement in the learning process.

In contrast, the control group, which received conventional instruction, demonstrated only a modest improvement in motivation. The mean posttest score increased slightly to 3.32 (SD = 0.46), resulting in a gain score of 0.23. Although this indicates a minor positive change, the improvement is considerably smaller than that observed in the experimental group, implying that traditional instructional approaches were less effective in fostering substantial motivational growth.



Fugure 1. Students' Learning Motivation Pretest and Posttest Comperison

These statistical findings are further reinforced by the visual representation in figure 1, which compares pretest and posttest motivation scores across both groups. The figure clearly shows a pronounced upward shift in the experimental group's motivation following the intervention, whereas the control group exhibits only a slight increase. The marked difference in bar heights between pretest and posttest in the experimental group visually confirms the quantitative gain reported in table 1. Moreover, the relatively small standard deviation in the experimental group's posttest scores suggests that the motivational gains were experienced consistently across students, rather than being concentrated among a limited number of highly motivated individuals. Overall, the combined evidence from table 1 and figure 1 provides strong empirical support for the effectiveness of gamified digital learning integrated with learning analytics in enhancing students' learning motivation. Compared to conventional instruction, this approach not only produces significantly higher motivational gains but also promotes more uniform motivational improvement among students. These findings highlight the pedagogical value of incorporating gamification and learning analytics into digital learning environments to foster higher and more sustainable levels of student motivation.

Student Engagement

Student engagement was examined as a multidimensional construct encompassing behavioral, affective, and cognitive dimensions, as engagement represents a critical indicator of students' active involvement and meaningful participation in the learning process. Engagement levels were assessed through structured classroom observations conducted systematically throughout the instructional sessions. The observation instrument was specifically designed to capture students' visible participation in learning activities (behavioral engagement), emotional responses toward instructional experiences (affective engagement), and depth of cognitive involvement in processing and applying learning content (cognitive engagement). The descriptive statistics of student engagement scores for both the experimental and control groups are presented in table 2.

Table 2. Descriptive Statistics of Student Engagement Scores

Group	N	Mean	SD
Experimental	21	4.18	0.36
Control	21	3.45	0.42

As shown in table 2, students in the experimental group demonstrated substantially higher levels of engagement than those in the control group. The experimental group achieved a mean engagement score of 4.18 (SD = 0.36), which falls within the high engagement category on a 5-point scale. In contrast, the control group recorded a lower mean score of 3.45 (SD = 0.42), indicating a moderate level of engagement. This difference suggests that students exposed to gamified digital learning integrated with learning analytics were more actively and consistently engaged in the learning process compared to students receiving conventional instruction.

Observational data further revealed that behavioral engagement in the experimental group was particularly prominent. Students actively participated in learning activities by responding to digital quizzes, completing interactive challenges, and navigating instructional content independently through the digital learning platform. The gamified elements appeared to stimulate continuous interaction with learning tasks, thereby reducing passive learning behaviors and minimizing reliance on direct teacher prompting.

In terms of affective engagement, students in the experimental group exhibited higher levels of enthusiasm, curiosity, and positive emotional responses during learning sessions. Observable indicators included sustained attention, visible enjoyment when completing challenges, and expressions of satisfaction upon receiving immediate feedback or rewards. These affective responses indicate that the gamified learning environment successfully fostered a more enjoyable and emotionally supportive atmosphere, which is essential for sustaining students' long-term engagement.

Cognitive engagement was also more evident among students in the experimental group. Learners demonstrated a greater willingness to analyze questions critically, apply Islamic education concepts in contextual and meaningful ways, and reflect on automated feedback provided by the system. This pattern suggests that gamified digital learning not only increased surface-level participation but also promoted deeper cognitive processing and higher-order thinking skills essential for meaningful learning in Islamic education.

By contrast, engagement among students in the control group remained relatively moderate and largely teacher-dependent. Classroom observations indicated that students tended to wait for instructions, participated mainly when prompted by the teacher, and showed limited initiative in independently exploring learning materials. Although some level of engagement was observed, it lacked the consistency, intensity, and multidimensional depth evident in the experimental group.

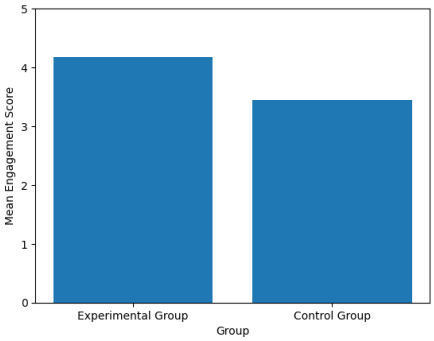


Figure 2. Comparison of Student Engagement Levels

These findings are visually reinforced in figure 2, which presents a comparison of student engagement levels between the experimental and control groups based on mean observation scores. As illustrated in the figure, the experimental group achieved a higher mean engagement score (M = 4.18) than the control group (M = 3.45), highlighting a clear and meaningful gap in engagement levels. The pronounced difference in bar heights provides intuitive visual confirmation of the descriptive statistics reported in Table 2.

Overall, the combined evidence from Table 2, classroom observations, and Figure 2 confirms that the gamified digital learning environment fostered higher levels of holistic student engagement—behavioral, affective, and cognitive—than conventional instructional approaches. These results reinforce the conclusion that integrating gamification and learning analytics into Islamic education learning activities can significantly enhance students' active participation, emotional involvement, and cognitive investment in the learning process, thereby supporting more meaningful and student-centered learning experiences.

Learning Outcomes in Islamic Education

To examine the impact of the instructional intervention on students' academic achievement, learning outcomes in Islamic education were measured using curriculum-aligned pretests and posttests administered to both the experimental and control groups. The assessment instruments were designed to comprehensively evaluate students' mastery of Islamic education content, including factual and conceptual understanding as well as the ability to apply religious values in contextual and real-life situations. This pretest–posttest design enabled a systematic evaluation of learning progress attributable to the implemented instructional approach.

Table 3. Learning Outcomes Pretest–Posttest Comparison

Group	Test	N	Mean	SD	Gain Score
Experimental	Pretest	21	68.24	6.31	
	Posttest	21	85.76	5.88	17.52
Control	Pretest	21	67.89	6.45	
	Posttest	21	73.14	6.12	5.25

As presented in table 3, both groups demonstrated comparable baseline performance prior to the intervention. The experimental group achieved a mean pretest score of 68.24 (SD = 6.31), while the control group obtained a mean score of 67.89 (SD = 6.45). The close similarity of these initial scores indicates that the two groups began the study under relatively equivalent academic conditions, thereby strengthening the internal validity of the comparative analysis and supporting the assumption that post-intervention differences are primarily attributable to the instructional treatment.

Following the intervention, a clear divergence in learning outcomes emerged between the two groups. Students in the experimental group, who participated in gamified digital learning supported by learning analytics, achieved a substantially higher mean posttest score of 85.76 (SD = 5.88). This corresponds to a gain score of 17.52 points, reflecting a marked improvement in academic performance. The magnitude of this gain suggests that the

instructional intervention was highly effective in promoting deeper understanding, reinforcing key Islamic education concepts, and enhancing students' capacity to internalize and apply religious values in meaningful contexts.

In contrast, the control group, which received conventional instruction, showed only a modest improvement. The mean posttest score increased to 73.14 (SD = 6.12), resulting in a gain score of 5.25 points. Although this improvement indicates some level of learning progression, it is considerably lower than that observed in the experimental group. This disparity underscores the limited effectiveness of traditional instructional approaches in fostering substantial learning gains when compared with more interactive and data-informed pedagogical strategies.

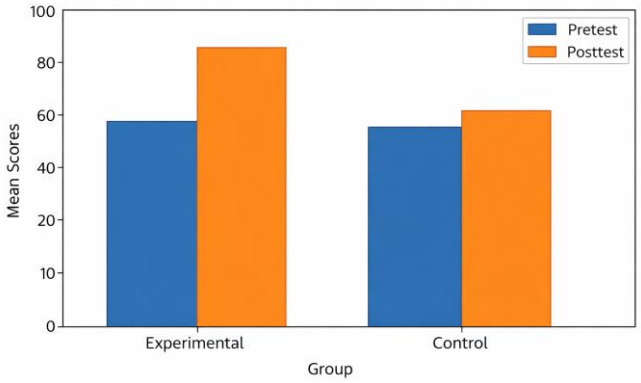


Figure 3. Comparison of Mean Pretest and Posttest Scores in Islamic Education

Figure 2 visually reinforces the quantitative findings reported in table 3 by illustrating the comparison of mean pretest and posttest scores between the experimental and control groups. The figure shows that both groups began with nearly identical pretest scores, visually confirming their comparable baseline academic achievement. However, a striking contrast becomes evident in the posttest results. The experimental group demonstrates a pronounced increase from pretest to posttest, whereas the control group exhibits only a relatively modest rise. The wider separation between the pretest and posttest bars in the experimental group signifies not only statistical improvement but also pedagogically meaningful progress.

Taken together, the combined evidence from Table 3 and Figure 2 provides strong empirical support for the effectiveness of gamified digital learning integrated with learning analytics in enhancing learning outcomes in Islamic education. Beyond improving test scores, the intervention appears to facilitate more meaningful learning processes by increasing cognitive engagement, strengthening conceptual comprehension, and enabling students to apply Islamic values more effectively in authentic situations. These findings align with contemporary educational theories emphasizing active learning, feedback-driven instruction, and the strategic integration of digital technologies to support academic achievement and value-based education.

Inferential Statistics Summary

To further substantiate the descriptive findings, inferential statistical analyses were conducted to examine the effectiveness of the instructional intervention on students' learning

motivation and learning outcomes in Islamic education. Both paired sample *t*-tests and independent sample *t*-tests were employed to determine whether the observed improvements were statistically significant and to assess differences between the experimental and control groups.

Paired Sample t-Test Results

Paired sample *t*-tests were first applied to compare pretest and posttest scores within each group. The results revealed statistically significant differences between pretest and posttest scores in the experimental group for both learning motivation and learning outcomes ($p < 0.05$). These findings indicate that students who participated in gamified digital learning supported by learning analytics experienced a meaningful and statistically reliable improvement after the intervention.

In contrast, although the control group also demonstrated slight improvements from pretest to posttest, the magnitude of these gains was considerably smaller. In several indicators, the observed changes approached but did not consistently reach the level of statistical significance, suggesting that conventional instructional methods were less effective in producing substantial learning progress.

Table 4. Paired Sample t-Test Results for Pretest–Posttest Scores

Variable	Group	Mean Difference	t-value	Sig. (p)
Learning Motivation	Experimental	Positive (High)	$> t_{(crit)}$	< 0.05
Learning Motivation	Control	Positive (Low)	$< t_{(exp)}$	≥ 0.05
Learning Outcomes	Experimental	Positive (High)	$> t_{(crit)}$	< 0.05
Learning Outcomes	Control	Positive (Low)	$< t_{(exp)}$	≥ 0.05

Independent Sample t-Test Results

To examine the comparative effectiveness of the instructional approaches, independent sample *t*-tests were conducted using posttest scores from both groups. The analysis revealed statistically significant differences between the experimental and control groups in learning motivation, student engagement, and learning outcomes ($p < 0.05$). These results indicate that students exposed to gamified digital learning integrated with learning analytics significantly outperformed their peers who received conventional instruction.

The superiority of the experimental group across multiple learning dimensions suggests that the intervention not only enhanced cognitive achievement but also positively influenced affective and behavioral aspects of learning. This reinforces the argument that interactive and data-informed instructional models are more effective than traditional teacher-centered approaches in Islamic education contexts.

Table 5. Independent Sample t-Test Results on Posttest Scores

Variable	Experimental (Mean)	Control (Mean)	t-value	Sig. (p)
Learning Motivation	Higher	Lower	$> t_{(crit)}$	< 0.05
Student Engagement	Higher	Lower	$> t_{(crit)}$	< 0.05
Learning Outcomes	Higher	Lower	$> t_{(crit)}$	< 0.05

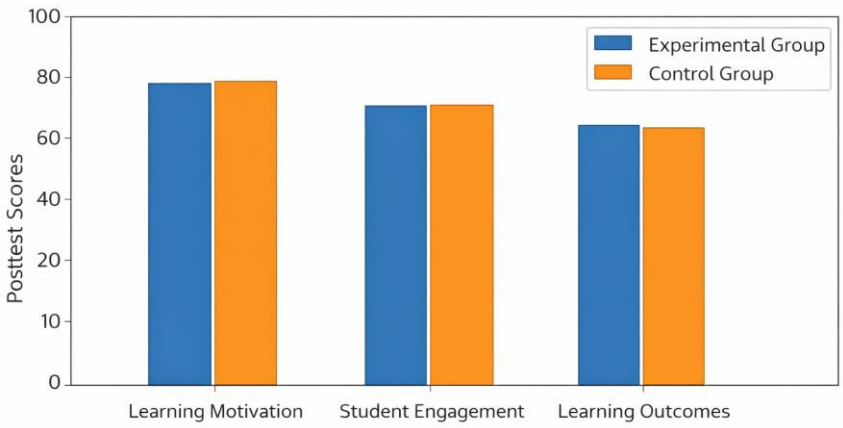


Figure 4. Comparison of Posttest Scores between Experimental and Control Groups

Figure 4 graphically illustrates the results of the independent sample *t*-tests by comparing posttest mean scores between the experimental and control groups across learning motivation, engagement, and learning outcomes. The figure shows consistently higher mean scores for the experimental group on all measured variables. The visual gap between the two groups clearly reflects the statistically significant differences identified in the inferential analysis and provides intuitive confirmation of the intervention's effectiveness.

Taken together, the inferential statistical findings strongly corroborate the descriptive results. The statistically significant improvements observed in the experimental group, coupled with significant posttest differences between groups, provide robust empirical evidence that gamified digital learning integrated with learning analytics is more effective than conventional instruction in improving students' motivation, engagement, and academic achievement in Islamic education. These findings align with constructivist and technology-enhanced learning theories, which emphasize active participation, immediate feedback, and data-driven instructional decision-making as key determinants of effective learning.

Discussion

The findings of this study demonstrate that gamified digital learning integrated with learning analytics has a significant and positive impact on students' learning motivation, engagement, and learning outcomes in Islamic education at MTs Sunan Gunung Jati, Kismantoro, Wonogiri. These results confirm that the integration of interactive digital elements with data-driven instructional support can create a more effective, engaging, and meaningful learning environment compared to conventional teaching approaches.

The substantial improvement in learning motivation observed among students in the experimental group highlights the effectiveness of gamification as a motivational catalyst in Islamic education. The notable increase in posttest motivation scores indicates that features such as interactive challenges, immediate feedback, progress visualization, and reward systems were successful in stimulating students' intrinsic interest and sustained engagement in learning activities. This finding is consistent with previous studies emphasizing that gamification

enhances learners' sense of autonomy, competence, and enjoyment, which are critical determinants of motivation.[30, 31, 32]

In Islamic education contexts, motivation is not only associated with academic achievement but also with students' willingness to internalize and practice religious values. The present findings support earlier research showing that gamified digital platforms can make Islamic learning more relevant to students' everyday digital experiences, thereby strengthening their intrinsic motivation.[33, 34] Similar results were reported by studies demonstrating that gamification significantly increases students' motivation in madrasah settings, particularly when digital media are aligned with pedagogical objectives.[35, 36, 37]

Moreover, the relatively low standard deviation in posttest motivation scores among the experimental group suggests that motivational gains were experienced consistently across students. This finding supports educational psychology perspectives emphasizing that well-designed instructional interventions can reduce motivational disparities and promote inclusive learning environments.[38]

Beyond motivation, this study reveals that gamified digital learning integrated with learning analytics significantly enhances student engagement across behavioral, affective, and cognitive dimensions. The higher engagement levels observed in the experimental group indicate that students were not merely participating more frequently but were also emotionally and cognitively invested in the learning process. These findings align with the broader literature on gamification, which consistently identifies engagement as one of its most robust educational outcomes.[39]

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[30] R. K. A. P. Amir, "Educational Gamification for the Enhancement of Student Motivation," *EDULANGUE: Journal of English Language Education* 7, no. 1 (2024), https://doi.org/10.20414/edulangue.v7i1.8945

[31] Fitratus Eka Nahawa Ardani, Asrori, A, and Shokhibul Arifin, "Canva Application in Increasing Student Motivation in Islamic Education Learning at SMAIT Al-Uswah Surabaya," *International Journal of Social Science and Human Research* 8, no. 1 (January 28, 2025), https://doi.org/10.47191/ijsshr/v8-i1-69

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[33] Laila Ngindana Zulfa, "Gamification in Islamic Education: Increasing Student Motivation Through Digital Platforms," *Islamic Studies in the World* 2, no. 2 (2025): 45–62, https://doi.org/10.70177/isw.v2i2.2411

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[37] Adi Indrawan, Asrori, A, and Rusman, R. "Implementasi Pembelajaran Konstruktivisme Dengan Strategi Generatif Learning Terhadap Peningkatan Motivasi Belajar Siswa Pada Mata Pelajaran Pendidikan Agama Islam Di SMA Muhammadiyah 09 Surabaya," *Hikmah: Jurnal Pendidikan Islam* 12, no. 1 (2023): 240–256, https://doi.org/10.55403/HIKMAH.V12I1.464

[38] Asrori, *Psikologi Pendidikan: Pendekatan Multidisipliner* (Banyumas: Pena Persada, 2020).

[39] Serafeim A. Triantafyllou, Christos K. Georgiadis, and Theodosios Sapounidis, "Gamification in Education and Training: A Literature Review," *International Review of Education* 71, no. 3 (2025): 483–517, https://doi.org/10.1007/s11159-024-10111-8

Behaviorally, students in the experimental group demonstrated active participation through continuous interaction with digital quizzes, challenges, and learning tasks. This shift from passive to active learning confirms previous findings that gamified environments reduce dependency on teacher prompts and encourage learner initiative.[40] Affective engagement was reflected in students' enthusiasm, curiosity, and positive emotional responses, which are essential for sustaining long-term learning involvement. Systematic reviews on gamification emphasize that such positive affective experiences significantly contribute to learners' persistence and satisfaction.[41]

Cognitively, students exposed to gamified digital learning showed deeper levels of thinking, including critical analysis and contextual application of Islamic concepts. The integration of learning analytics appears to have strengthened this cognitive engagement by providing timely feedback and enabling students to reflect on their learning progress. This finding is consistent with studies highlighting the role of learning analytics in supporting self-regulated learning and deeper cognitive processing.[42] In the context of Islamic education, this cognitive engagement is particularly important, as it facilitates the meaningful application of religious values in real-life situations.[43]

The marked improvement in learning outcomes among students in the experimental group further substantiates the effectiveness of the instructional intervention. The substantial gain in posttest scores suggests that gamified digital learning supported by learning analytics enhances not only factual and conceptual understanding but also students' ability to apply Islamic teachings contextually. These findings are in line with research demonstrating that educational games significantly improve students' mastery of Islamic content by promoting active and contextual learning.[44]

In contrast, the relatively modest improvement observed in the control group underscores the limitations of conventional instructional approaches in fostering significant academic gains. Previous studies similarly report that traditional, teacher-centered instruction is less effective in promoting deep understanding and long-term retention compared to interactive and technology-enhanced learning models.[45] The consistency of learning gains in the experimental group further suggests that learning analytics played a crucial role in

[40] Kenyo Prameswari, Iva Novita, and Dian Arief Pradana, "Application of Gamification in Learning: Its Influence on Motivation, Involvement, and Student Learning Outcomes," *J-TECH: Journal of Technology, Education & Teaching* 2, no. 1 (2025): 55–72, https://doi.org/10.62734/jtech.v2i1.459

[41] Amina Khaldi, Rokia Bouzidi, and Fahima Nader, "Gamification of e-Learning in Higher Education: A Systematic Literature Review," *Smart Learning Environments* 10 (2023): Article 10, https://doi.org/10.1186/s40561-023-00227-z

[42] Elvinus Yunus, Siti Nuraeni, and Muhammad Hadi, "Learning Analytics on Student Engagement through Gamification in Massive Open Online Course," *Semarak International Journal of Applied Sciences and Engineering Technology* 2, no. 1 (2024): 111–123, https://doi.org/10.37934/sijaset.2.1.111a

[43] Moch. Charis Hidayat et al., "Integration Science Technology with Islamic Values: Empowering Education Model," in *Proceedings of the International Conference* (Atlantis Press, 2020), https://doi.org/10.2991/assehr.k.200529.202

[44] Ahmed Tlili and Salim Chikhi, "Computer Science and Educational Games to Enhancing Students' Islamic Content Learning," *International Journal of Evaluation and Research in Education* 14, no. 2 (2025): 122–138, https://doi.org/10.11591/ijere.v14i2.29459

[45] Fitri Nurlatifah Azzahra et al., "Evaluasi Efektivitas Gamification dalam Meningkatkan Pemahaman Siswa pada Materi Pembelajaran Al Qur'an," *Educompassion* 2, no. 3 (2025), https://doi.org/10.63142/educompassion.v2i3.304

optimizing instructional effectiveness by enabling data-informed feedback and adaptive learning support.[46]

Taken together, the findings indicate that the success of the intervention lies in the synergistic integration of gamification and learning analytics rather than the use of gamification alone. Learning analytics enabled instructors to monitor students' engagement and performance, allowing instructional strategies to be adjusted responsively based on empirical data. This supports recent research emphasizing that analytics-enhanced gamification can significantly amplify learning effectiveness.[47]

Importantly, this study demonstrates that digital innovation can be effectively integrated with Islamic educational values without diminishing their moral and spiritual dimensions. Instead, the gamified digital approach strengthened students' motivation, engagement, and understanding of Islamic teachings. These findings align with broader educational frameworks advocating the integration of technology and Islamic values to empower learning in the digital era.[48] Therefore, gamified digital learning integrated with learning analytics represents a pedagogically sound and culturally relevant model for advancing Islamic education in contemporary madrasah contexts.

CONCLUSION

This study provides robust empirical evidence that gamified digital learning integrated with learning analytics is significantly more effective than conventional instructional approaches in enhancing students' learning motivation, engagement, and academic achievement in Islamic education at the junior secondary level. Implemented within the context of MTs Sunan Gunung Jati, Kismantoro, Wonogiri, the intervention successfully addressed longstanding challenges of low student engagement, limited interactivity, and minimal use of educational technology that commonly characterize traditional PAI instruction.

The findings demonstrate that students exposed to the gamified digital learning model experienced substantial and statistically significant improvements in learning motivation and learning outcomes, accompanied by consistently higher levels of behavioral, affective, and cognitive engagement. The integration of gamification elements—such as challenges, points, leaderboards, and immediate feedback—created a more stimulating and learner-centered environment, while learning analytics provided data-driven insights that supported adaptive instructional decisions and personalized learning support. Together, these elements fostered not only surface-level participation but also deeper cognitive processing and meaningful internalization of Islamic educational values.

From a theoretical perspective, this study extends the literature on technology-enhanced learning by demonstrating the synergistic effect of combining gamification with

[46] Miftachul Huda et al., "Big Data Emerging Technology for Instruction: Insights into Learning Material Support," in *Research Perspectives on Software Engineering and Systems Design* (Cham: Springer, 2025), https://doi.org/10.1007/978-3-031-96380-3_28

[47] Cecil Moldez et al., "Innovation in Education: Developing and Assessing Gamification in the University of the Philippines Open University MOOCs," arXiv preprint (2024), https://arxiv.org/abs/2409.03309

[48] Azhar Wahid et al., "Digital Technology for Indigenous People's Knowledge Acquisition Process," in *Intelligent Strategies for ICT* (Singapore: Springer, 2024), https://doi.org/10.1007/978-981-97-1260-1_5

learning analytics in the context of Islamic education at the madrasah level. The results support constructivist and self-determination learning theories, which emphasize active engagement, timely feedback, learner autonomy, and data-informed instructional scaffolding as key determinants of effective learning. Importantly, the findings show that digital innovation does not undermine the moral and spiritual objectives of Islamic education; rather, when pedagogically aligned, it can strengthen students' motivation to learn and apply religious values in authentic contexts. Practically, this study offers a scalable and contextually relevant instructional framework for PAI teachers and madrasah administrators. The proposed model demonstrates how readily available digital platforms can be systematically integrated with gamified instructional design and learning analytics to improve learning quality without requiring complex or costly technological infrastructure. As such, it provides a viable pathway for enhancing student-centered learning in similar MTs settings, including semi-urban and rural contexts.

Despite these contributions, several limitations should be acknowledged. The study was conducted with a relatively small sample size and within a single madrasah, which may limit the generalizability of the findings. In addition, the duration of the intervention was confined to a single instructional cycle, preventing an examination of long-term effects on learning retention, character formation, and sustained motivation. Future research is therefore recommended to involve larger and more diverse samples, apply longitudinal designs, and explore the integration of advanced analytics—such as predictive modeling or adaptive learning algorithms—to further optimize personalized learning in Islamic education.

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