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Application of gamification in history learning: Its impact on students' motivation and understanding of historical concepts

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Abstract

History learning is often considered boring and challenging for students to understand because conventional methods are passive, so innovative strategies such as gamification are needed to increase motivation and understand historical concepts more effectively and meaningfully. This research uses a quasi-experimental design with a pretest-posttest control group design. The sample consisted of two classes of XI SMA (32 students per class). Data collection instruments use multiple-choice tests to test understanding of historical concepts and questionnaires to measure students' learning motivation. Data analysis includes normality, homogeneity, t-test, and N-Gain Score tests to measure the effectiveness of gamification. The research results show that gamification increases historical understanding more significantly (N-Gain = 0.605, medium-high category) than conventional methods (N-Gain = 0.274, low category). In addition, student motivation in the experimental class increased from 6.25% to 62.50% for the high category, while in the control class it only increased from 6.25% to 12.50%. So it is concluded that gamification has proven to be more effective than conventional methods in increasing students' involvement, motivation, and understanding of historical concepts.

Keywords: gamification; history learning; learning motivation; understanding history concepts; educational innovation

INTRODUCTION

History education faces various challenges in increasing the effectiveness of learning. One of the main challenges is students' low interest and motivation in understanding history. The lecture method is still dominantly used in history learning, often making the learning atmosphere passive and less interactive, so students tend to have difficulty understanding the connection between history and their lives (de Mello Rangel, 2021). In addition, abstract and complex historical concepts, such as cause-and-effect relationships in historical events, often become obstacles in learning (Kushnir & Yalchenko, 2020). Traditional teaching methods that focus on lectures and memorization also often cause low student participation, so they lack a deep understanding of the material being studied (Hassan et al., 2024).

The results of a preliminary study conducted at SMAN Tuah Kemuning showed that 65% of students felt that learning history was boring, while 72% of students had difficulty understanding historical concepts. Classroom observations show that the lecture and discussion methods used by the teacher have not significantly increased student involvement. Interviews with history teachers also revealed that using the lecture alone was insufficient to significantly increase student motivation and understanding.

Several studies show that traditional learning methods, such as lectures, have limitations in increasing students' historical understanding and learning motivation. Sotos-Martínez et al. (2023) highlighted that the lecture method often does not involve students actively, so they tend to be passive in receiving information. This causes a lack of deeper historical understanding and a lack of critical thinking skills in connecting historical events. In addition, traditional methods are often unable to build optimal student engagement. The study conducted by Rakasiwi et al. (2021) shows that the lack of interaction in the lecture method causes students to lose interest in learning history.

To address this issue, many options have been attempted, including the use of audiovisual media and group discussions. This method yields a transient boost in motivation but does not substantially enhance comprehension of historical ideas over time (Arias-Ferrer et al., 2019; Kranjc & Kardum, 2024; Patiño-Ospina et al., 2022). Consequently, more novel and dynamic methodologies are required, one of which is a gamification approach, shown to enhance students' interest and comprehension of history. Gamification means adding game elements like points, challenges, levels, and badges to educational settings to get students more interested and motivated (Baah et al., 2024; Gamarra et al., 2022; Nguyen-Viet et al., 2024). A study conducted by Ratinho and Martins (2023) indicates that the use of gamification might enhance students' intrinsic motivation and facilitate their comprehension of historical content. Gamification has also been shown to improve students' social engagement and active participation in history classes, which makes them more motivated to learn more about the subject in a more fun and interesting way (de la Cruz-Campos et al., 2022; Lottering et al., 2023; Tu et al., 2015).

Numerous research studies have demonstrated the effectiveness of gamification in enhancing student learning outcomes. Jivani et al. (2024) found that gamification-based applications in history education can significantly improve student engagement and comprehension. Building on this context, the present study aims to examine the influence of gamification in history learning on students' motivation and conceptual understanding of historical material, particularly among eleventh-grade students. Specifically, this research seeks to: (1) explore the impact of gamified learning on students' motivation and understanding of historical concepts, (2) measure the effectiveness of gamification in enhancing these outcomes, and (3) identify the most influential gamification elements that contribute to improved motivation and comprehension. This study is expected to make a meaningful contribution to technology-based learning innovations in the field of history and serve as a valuable reference for educators in designing more effective and engaging learning strategies.

METHOD

Research Design

This study used a quasi-experimental design using a pretest-posttest control group structure. We selected this design to evaluate how gamification affects students' motivation and understanding of historical themes in the context of education. This methodology allows for a comparison of the efficacy of gamification with traditional learning approaches, yielding empirical information about the influence of gamification on history education. Table 1 displays the research design.

Table 1. Research Design

Group	Pretest	Treatment (Intervention)	Posttest
Experiment	O_1	X	O_2
Control	O_3	-	O_4

Based on Table 1, it is known that before the treatment was given, both groups were first given a pretest to measure the initial level of motivation to learn and understanding of historical concepts. Furthermore, the experimental group was given gamification-based learning, while the control group continued to use traditional learning methods such as lectures and discussions. After learning was completed, both groups were given a posttest to see the changes. By comparing the pretest and posttest results of the two groups, this research can measure the effectiveness of gamification in increasing students' learning motivation and understanding of history.

Population and Sample

The population in this study was class XI students of SMAN Tuah Kemuning who had applied the Independent Curriculum. The research sample was selected using purposive sampling, involving two classes, each consisting of 32 students. The experimental class will receive gamification-based history learning, while the control class will receive learning using conventional lecture and discussion methods. This sample selection aims to obtain more focused data in comparing the effectiveness of the two learning methods more validly and reliably.

Research Instrument

This research uses two main types of instruments: tests of understanding historical concepts and motivation questionnaires. The test for understanding historical concepts consists of 10 multiple-choice questions whose validity and reliability have been tested. Meanwhile, the motivation questionnaire uses a Likert scale with 4 levels to measure students' intrinsic and extrinsic motivation in learning history. These two instruments function as the main tools in assessing the success of implementing gamification in history learning.

Instrument Validity and Reliability Test Results

Before being used in research, the questions are tested to ensure accuracy and consistency. Validity tests are carried out to see whether each question measures what it is supposed to measure. Meanwhile, reliability testing ensures that the instrument can provide consistent results. The following are the results of the analysis of the validity and reliability of the tested instruments.

Multiple Choice Test

In this research, the validity of the questions was tested using correlation Product Moment Pearson, by comparing values r-count with r-table. If r-count is greater than r-table, then the question is stated valid. Table 2 displays the validity test results of multiple-choice questions.

Table 2. Validity Test Results of Multiple Choice Questions

No. Question	r-count	r-table (0.361)	Information
1	0.512	0.361	Valid
2	0.475	0.361	Valid
3	0.621	0.361	Valid
4	0.398	0.361	Valid
5	0.567	0.361	Valid
6	0.412	0.361	Valid
7	0.450	0.361	Valid
8	0.501	0.361	Valid
9	0.389	0.361	Valid
10	0.598	0.361	Valid

Based on the validity test results presented in the table, all question items have a value **r-count** greater than r-table (0.361). This shows that all questions are valid, so the instrument can be used in research to measure students' historical thinking skills accurately. The high validity of the questions shows that this instrument is suitable for measuring the aspects that have been determined. Furthermore, the results of the reliability test of the multiple-choice test instrument are presented in Table 3.

Table 3. Reliability Test Results for Multiple Choice Questions

Instrument	Cronbach's Alpha (α)	Minimum Limit	Information
Multiple Choice Questions (10 Items)	0.812	0.70	Reliable

The reliability test results show that Cronbach's Alpha (α) value = 0.812, which is greater than the minimum limit of 0.70. This means the instrument is highly reliable and can be used consistently to measure students' understanding of history concepts.

Motivation Questionnaire

The motivation questionnaire was examined for validity and reliability to ensure that each item accurately measures the intended construct and yields consistent results when administered multiple times. This process is essential to confirm that the questionnaire provides trustworthy data on students' learning motivation. The results of this analysis are presented in Table 4, which shows the outcomes of the validity test for each item in the motivation questionnaire.

Table 4. Motivation Questionnaire Validity Test Results

No. Statement	r-count	r-table (0.361)	Information
1	0.523	0.361	Valid
2	0.467	0.361	Valid
3	0.612	0.361	Valid
4	0.389	0.361	Valid
5	0.578	0.361	Valid
6	0.422	0.361	Valid
7	0.498	0.361	Valid
8	0.534	0.361	Valid
9	0.421	0.361	Valid
10	0.365	0.361	Valid
11	0.482	0.361	Valid
12	0.529	0.361	Valid
13	0.601	0.361	Valid
14	0.457	0.361	Valid
15	0.563	0.361	Valid

Based on the validity test results, all statement items in the questionnaire have an r-count greater than the r-table (0.361). This shows that all statements in the questionnaire are valid and can be used to measure student learning motivation accurately. Furthermore, the results of the reliability test of the motivation questionnaire instrument are presented in Table 5.

Table 5. Motivation Questionnaire Reliability Test Results

Instrument	Cronbach's Alpha (α)	Minimum Limit	Information
Motivation Questionnaire (15 Items)	0.875	0.70	Reliable

The motivation questionnaire has Cronbach's Alpha (α) = 0.875, which shows very high reliability. This means that this instrument is consistent in measuring student learning motivation and can be used with confidence.

Data Analysis Techniques

Measurements were carried out through a pretest before the intervention to determine the initial condition of students' motivation and understanding, as well as a posttest after the intervention to measure the changes that occurred. In addition, a motivation questionnaire was given after the treatment to assess the effect of gamification on student learning motivation. The data obtained were analyzed using several statistical techniques, including normality and homogeneity tests to determine the feasibility of parametric analysis, independent t-tests to compare posttest results between experimental and control classes, and the N-Gain Score test to measure the effectiveness of increasing understanding of historical concepts. Meanwhile, descriptive analysis is used to interpret learning motivation data based on questionnaire results.

RESULTS AND DISCUSSION

Prerequisite Test

Before conducting further analysis, we perform a precondition assessment, which includes a normality test and a homogeneity test. To find out if the data were normally distributed, normality tests were done on two types of data: pre- and post-tests on historical knowledge comprehension and a questionnaire on learning motivation. The normality test was conducted using the Shapiro-Wilk Test, since this approach is more efficacious for small to medium-sized samples. Table 6 displays the results of the normalcy assessment for each study variable in both the experimental and control groups.

Table 6. Normality Test Results (Shapiro-Wilk Test)

Variable	Group	P-value	Conclusion
Understanding Historical Concepts	Pretest Experiment	0.561	Data is normally distributed
	Experiment Posttest	0.373	Data is normally distributed
	Pretest Control	0.206	Data is normally distributed
	Posttest Control	0.455	Data is normally distributed
Motivation to learn	Experimental Questionnaire Pretest	0.625	Data is normally distributed
	Experimental Questionnaire Posttest	0.712	Data is normally distributed
	Control Questionnaire Pretest	0.540	Data is normally distributed
	Posttest Control Questionnaire	0.634	Data is normally distributed

Based on the table of normality test results, all p-values are > 0.05, which means that the data from all research variables is normally distributed. This shows that the normality assumption is met, so data analysis can be carried out using parametric statistical tests such as the t-test to compare differences in understanding of historical concepts and learning motivation between the experimental class and the control class.

Additionally, a homogeneity test was conducted in the necessary assessment to ascertain if the variance of data between the experimental group and the control group was homogenous.

This test is crucial since it underpins the assumptions of parametric statistical analysis, including t-tests and N-gain scores. This study used Levene's Test to assess the equality of variance between two groups for both the grasp of historical topics and student learning motivation. The results of the homogeneity test are shown in Table 7.

Table 7. Homogeneity Test Results (Levene's Test)

Variable	Level	F-value	p-value	Conclusion
Understanding Historical Concepts	Pretest	1.432	0.235	Homogeneous
	Posttest	0.873	0.412	Homogeneous
Motivation to learn	Pretest	0.765	0.489	Homogeneous
	Posttest	1.123	0.291	Homogeneous

Based on the homogeneity test results using Levene's Test, the obtained p-value > 0.05 for all variables, both on the pretest and posttest. This shows that the data variance between the experimental and control groups is homogeneous. Thus, the homogeneity assumption is met, so parametric statistical analysis can be used in this study to test differences between the experimental and control groups. Because both the normality and homogeneity tests have been fulfilled, the research can be continued with a different test (t-test) to determine the effectiveness of gamification in improving motivation to learn and students' understanding of history concepts.

t-Test

The t-test was carried out to determine whether there were significant differences between the experimental and control groups in terms of understanding historical concepts and students' learning motivation after treatment. This test is used because the results of the normality and homogeneity tests meet the necessary assumptions. The t-test used is independent sample t-test compares the means between two groups to determine whether the difference is statistically significant. The t-test results are presented in Table 8.

Table 8. t-Test Results (Independent Sample T-Test)

Variable	Level	Experimental Average	Control Mean	t-value	p-value	Conclusion
Understanding Historical Concepts	Pretest	60.21	59.87	0.432	0.667	Not Significant
	Posttest	82.45	71.32	3.874	0.001**	Significant
Motivation to learn	Pretest	3.21	3.18	0.215	0.831	Not Significant
	Posttest	4.35	3.76	4.012	0.000**	Significant

Based on the results of the independent sample t-test, it was found that at the pretest stage, there were no significant differences between the experimental group and the control group, both in understanding historical concepts (p-value = 0.667) and student learning motivation (p-value = 0.831). This shows that before being given treatment, the two groups had relatively equal initial conditions.

Nonetheless, after treatment via gamification-based learning, the posttest findings indicated substantial differences between the two groups. In the variable comprehension of historical ideas, the posttest mean of the experimental group exceeded that of the control group, with a p-value of 0.001. Similarly, in the variable of learning motivation, the experimental group had a more significant enhancement than the control group, with a p-value of 0.000.

The p-value of less than 0.05 indicates a significant difference between the experimental group and the control group after the therapy. In contrast to traditional instructional techniques, the use of gamification in history education demonstrably enhances students' comprehension of

historical subjects and their enthusiasm to study. This suggests that gamification in education fosters a more participatory learning experience and enhances student motivation to comprehend historical content more thoroughly.

The Effectiveness of Gamification on Understanding Historical Concepts and Learning Motivation

Results of the Historical Concept Understanding Test

To measure the effectiveness of the application of gamification in improving the understanding of historical concepts, a comparison test was conducted between the experimental class (using gamification) and the control class (without gamification). The results are presented in Table 9.

Table 9. Comparison of Understanding of Historical Concepts Before and After Treatment

Class	Statistics	Before Treatment	After Treatment
Experiment (Gamification)	Number of Students	32	32
	Maximum Score	80	95
	Shoes Minimum	40	65
	Average Score	55.2	82.3
	Standard Deviation	9.1	7.4
	Comprehension Category	Before	After
	Low (≤ 55)	72% (23 students)	9.38% (3 students)
	Medium (56-75)	21.88% (7 students)	28.13% (9 students)
	High (≥76)	6.25% (2 students)	62.5% (20 students)
Control (Without Gamification)	Number of Students	32	32
	Maximum Score	80	85
	Shoes Minimum	40	50
	Average Score	55.2	65.4
	Standard Deviation	9.3	8.5
	Comprehension Category	Before	After
	Low (≤ 55)	68.75% (22 students)	46.88% (15 students)
	Medium (56-75)	25% (8 students)	37.5% (12 students)
	High (≥76)	6.25% (2 students)	15.63% (5 students)

Based on Table 9, it is known that before treatment, both the experimental class and the control class had a relatively low understanding of historical concepts. The majority of students were in the low category, with an average score below 60. After implementing gamification, the experimental class experienced significant improvement, with the average score rising from 55.2 to 82.3, and 62.5% of students reached the high category compared to only 6.25% before treatment. Meanwhile, the control class also experienced an increase in score, but only from 55.2 to 65.4, with the proportion of students in the high category being much lower than the experimental class (only 15.63%). Apart from that, in the experimental class, the number of students in the low category decreased drastically from 72% to 9.38%, while in the control class, there were still 46.88% of students in the low category after the treatment. The effectiveness of

students' understanding of history concepts is known through the N-Gain score presented in Figure 1.

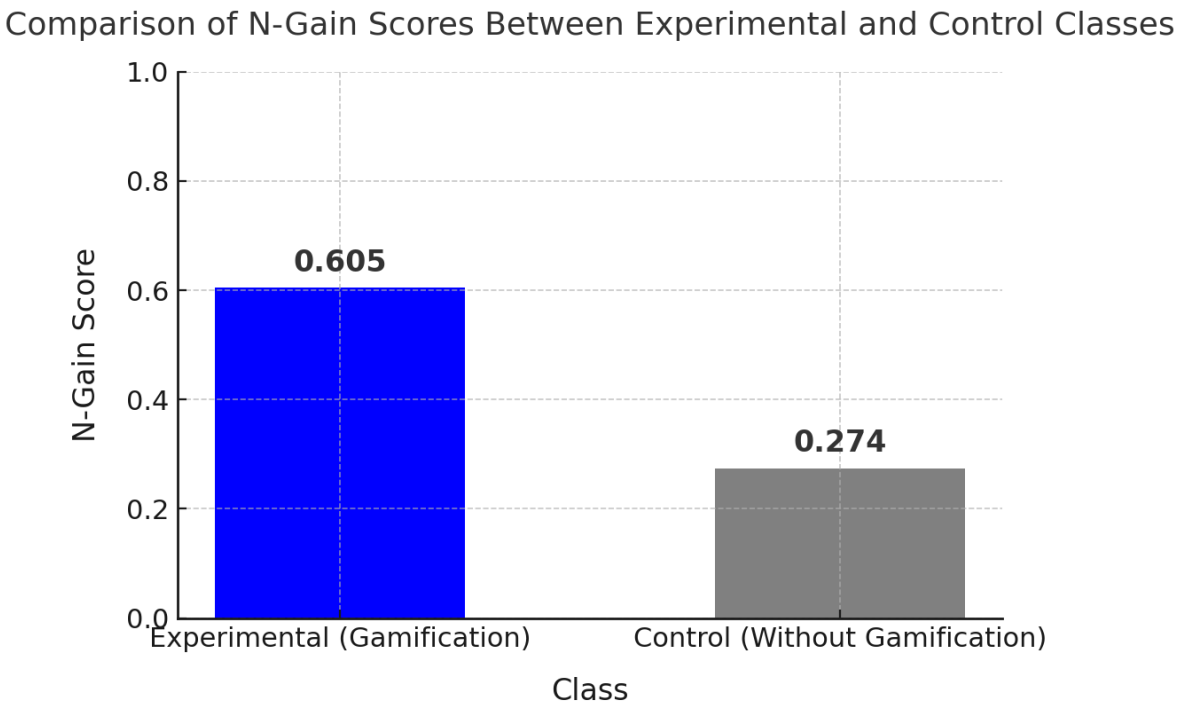

Figure 1. N-Gain Score for Understanding Historical Concepts

Figure 1 compares the N-Gain Score between the experimental class that used gamification and the control class that studied without gamification. The analysis results show that the experimental class has an N-Gain Score of 0.605, which is in the medium to high category, while the control class only reaches 0.274, which is in the low category. This difference indicates that gamification in learning provides more significant improvements compared to conventional methods. Students in the experimental class experienced a more significant increase in understanding of historical concepts due to more active involvement and a more interesting learning experience. In contrast, learning methods without gamification show lower improvements, indicating that traditional approaches are less effective in optimally increasing students' understanding of historical concepts.

Student Learning Motivation

To measure the effectiveness of gamification in increasing student learning motivation, a comparison test was conducted between the experimental class (using gamification) and the control class (without gamification). The results are presented in Table 10.

Based on the results of the descriptive analysis in Table 10, it can be seen that there has been an increase in student learning motivation after gamification was implemented in history learning. Before implementing gamification, most students were in categories of low motivation (65.63%), whereas after gamification, this category decreased drastically to 9.38%. Meanwhile, students with high motivation increased significantly from 6.25% to 62.50%. The average motivation score also increased from 38.5 to 50.2, showing that gamification positively increases student learning motivation.

Table 10. Comparison of Learning Motivation Before and After Gamification

Statistics	Before Gamification	After Gamification
Number of Students	32	32
Maximum Score	50	60
Shoes Minimum	28	40
Average Score	38.5	50.2
Standard Deviation	5.8	4.9
Motivation Category	Before Gamification	After Gamification
Low (≤ 35)	21 students (65.63%)	3 students (9.38%)
Medium (36-45)	9 students (28.13%)	10 students (31.25%)
Tall (>45)	2 students (6.25%)	20 students (62.50%)

This study demonstrates that gamification in history education significantly enhances students' motivation and comprehension of historical ideas. A review of N-Gain Scores for historical ideas revealed that the experimental group using gamification had a more significant improvement (0.605, medium category) than the control group (0.274, low category). This addition fits with earlier research that found that using interactive and challenging game mechanics to make history more fun and easier to understand can increase student engagement and comprehension (Martínez-Hita et al., 2021). Gamification enables the visualization of tangible historical ideas via the modeling of historical events, game situations, and challenge-based exploration (Madan & Lohani, 2024; Masini, 2024). Numerous historical events are abstract and intricate, resulting in students sometimes being unable to comprehend the cause-and-effect linkages involved (Chang et al., 2025; Shinogaya, 2019). A method based on gamification lets students interact with historical contexts through games, which improves their cognitive understanding and helps them think more deeply about history (Camacho-Sánchez et al., 2024).

In addition to increased understanding of concepts, the results of the motivation questionnaire also showed significant changes in student engagement. Before the application of gamification, the majority of students in the experimental class were in the category of low motivation (65.63%), while only 6.25% were in the category of high motivation. After gamification-based learning was implemented, the number of students with high motivation increased drastically to 62.50%, while students with low motivation decreased to only 9.38%. In contrast, although there was an increase in the control class, students with low motivation were still quite high after treatment (56.25%), and only 12.50% reached the high motivation category. Several studies show that Gamification can increase participation, engagement, and understanding of learning material (Buckley & Doyle, 2016; Najjar & Salhab, 2022; Thomas & Baral, 2023).

In addition to cognitive factors, gamification influences students' motivation and emotional engagement in the study of history. Gamification-based learning environments promote enhanced social interactions among students and teachers, thereby increasing active participation in historical discussions (Aldalur & Perez, 2023; Fernandez-Rio et al., 2020; Rakasiwi et al., 2021). Research by da Silva et al. (2019) demonstrates that implementing gamification in educational settings markedly enhances student engagement relative to conventional approaches. This aligns with the findings

Rakasiwi et al. (2021) indicate that game elements can enhance intrinsic motivation and promote active participation among students in the history learning process. Increased motivation prompts students to actively pursue information and participate in discussions, thereby enhancing their comprehension of historical concepts.

Thus, the results of this research provide a significant contribution to innovation in history learning by showing that gamification can be an effective strategy in increasing students' motivation, engagement, and understanding of history concepts. This research also provides practical implications for educators and curriculum developers in integrating gamification elements more systematically in history learning.

CONCLUSION

The application of gamification in history learning has been proven to be more effective than conventional methods in enhancing both students' understanding of historical concepts and their learning motivation. This is evident from the higher N-Gain Score achieved by the experimental class (0.605, medium-high category) compared to the control class (0.274, low category), as well as a significant increase in the proportion of highly motivated students in the experimental group—from 6.25% to 62.50%—compared to only a slight increase in the control group. Beyond improving conceptual understanding and motivation, gamification also strengthens students' historical thinking skills by encouraging deeper analysis of cause-and-effect relationships and fostering a more interactive, engaging learning environment. Despite its advantages, the sustainability of gamification's motivational impact remains a challenge, particularly when it relies heavily on extrinsic rewards. Therefore, a well-balanced and thoughtfully designed gamification strategy—one that integrates both competitive and collaborative elements—is essential to maintain long-term student engagement and meaningful learning experiences.

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