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The influence of gamification learning on students' critical thinking skills at junior high school

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A B S T R A C T

To overcome the issue of limited student participation in classroom learning, teachers are encouraged to develop and apply innovative teaching strategies. In addition, fostering students' 21st-century skills is essential, particularly in alignment with the objectives of the Merdeka Curriculum. This study investigates the influence of a gamification learning strategy in fostering students' critical thinking skills in English learning, specifically among eighth-grade students at Junior High School in Indonesia. The research was conducted by first measuring students' baseline critical thinking skills through a pre-test and then comparing results with a post-test. A quasi-experimental quantitative approach was used, employing a two-group design: the experimental group and the control group. Data analysis was performed using t-test formula. The post-test results indicated that the experimental group scored an average of 85.56, significantly higher than the control group's average of 67.91. The statistical test yielded a sig. (2-tailed) value of 0.001, which is below the 0.05 significance level ($p < \alpha$), leading to the acceptance of the alternative hypothesis. Therefore, these findings confirm that gamification learning, especially utilizing tools like Quizalize can significantly improve students' engagement and critical thinking in English learning.

1. INTRODUCTION

English is a core subject in Indonesia's education system and plays a key role in developing students' competence in the 21st century (Irfani, 2023). Effective English teaching should not only focus on linguistic skills but also incorporate strategies that promote students' critical thinking (Sari, 2022). However, learning in schools is still often book-centered, resulting in student boredom and low engagement (Tanty et al., 2022). In fact, student-centered learning allows learners to connect lessons with their own experiences, increasing motivation and participation (Julaiha, 2022, as cited in Alfiani & Khomarudin, 2024).

In today's 21st century, critical thinking is increasingly recognized as an essential skill. It enables individuals to make informed decisions, identify problems, and communicate effectively across various contexts (Dr. Ranbir, 2024; Yazidi, 2023). Critical thinking goes beyond mere memorization; it involves engaging deeply with content, challenging assumptions, and seeking evidence to support conclusions. By fostering critical thinking, teachers help students become autonomous learners capable of analyzing complex issues, expressing ideas creatively, and communicating clearly (Dr. Ranbir, 2024). Essentially, critical thinking is fundamental not only for academic success but also for life beyond school. Integrating teaching strategies that promote critical thinking throughout the curriculum equips students with the tools to excel academically

and professionally. Cultivating these skills in the classroom is important for several reasons: it can enhance academic performance, improve decision-making in various life areas, and is vital for workplace success. Ultimately, encouraging critical thinking fosters a more dynamic and engaged learning environment (Yazidi, 2023). To create motivated and enthusiastic learners, teachers must emphasize the development of critical thinking skills (Sharma et al., 2022). Education plays a crucial role in nurturing these skills, which bring many benefits, such as better academic outcomes, improved everyday decision-making, and greater career achievements. Therefore, fostering critical thinking through effective teaching is key to preparing students for the demands of the twenty-first century.

Critical thinking is one of the most essential skills in 21st-century education, crucial for problem-solving and decision-making in both academic and social contexts (Davies & Stevens, 2019; Vincent-Lancrin et al., 2019). Unfortunately, this skill remains underdeveloped among Indonesian students (Fatmawati et al., 2019). Schools need innovative strategies that encourage higher-order thinking and deeper learning (Vincent-Lancrin et al., 2019; Abbassyakhrin et al., 2024). Therefore, addressing this gap is critical to prepare students for the complex challenges of modern life and education.

One such innovation is gamification learning, which integrates game elements into instruction to make learning more interactive and enjoyable (Azzouz Boudadi & Gutiérrez-Colón, 2020; Pratama et al., 2021; Budianto et al., 2023). Research shows gamification can enhance motivation and language skills (Armida, 2019; Basuki, 2023; Ndayishimiye et al., 2024). However, most studies focus on basic skills like speaking or reading using platforms like Quizizz. In contrast, this study applies Quizalize, which includes features such as leaderboards and incentives to foster engagement (Widianto et al., 2024). This suggests that leveraging gamification with advanced features can offer new opportunities to deepen student involvement and learning outcomes.

Gamification refers to the integration of game-like features into activities that are not originally games and can be applied in various non-gaming environments (Vlad, 2021). In Indonesia, many students find it difficult to understand English because they lack interest in learning English. It is deeply ingrained in them that English is a difficult and intimidating subject to learn. As an English teacher, it is crucial to find effective ways to spark their interest in English and help them enjoy the learning process. It is widely recognized as an effective approach to enhance motivation, often termed gameful design, which intentionally incorporates game design elements, mechanics, and principles into non-game settings (Christopoulos & Mystakidis, 2023). Likewise, Redy Winatha and Ariningsih (2020, as cited in Irfani, 2023) describe gamification as a learning method that employs game elements outside of games to motivate and engage users in solving problems. Therefore, this study is essential for English language learning activities, as it aims to determine how gamification can not only influence students' interest in learning but also encourage them to think critically.

In the educational context, gamification is defined as the implementation of well-planned and structured learning activities in real situations (Sanjaya, 2007, as cited in Sari, 2022). It transforms routine tasks into game-like experiences by applying game characteristics, making learning enjoyable (Wood & Reiners, 2015, as cited in N. Sari, 2022). Gamification centers on the user, in this case, the students with game mechanics designed to provide an entertaining experience aligned with millennial learners (Schnepp, 2014, as cited in Sari, 2022). These mechanics help learners solve problems in an enjoyable way, thereby increasing motivation and personal satisfaction (Sari, 2022). Previous research has focused on student motivation and

reading comprehension in gamification learning. However, learning English involves more than just reading comprehension but also higher-order thinking skills, such as critical thinking, which are essential for students to analyze, evaluate, and solve problems effectively. Furthermore, there has been limited research examining gamification's role in enhancing students' critical thinking skills in English language learning. Therefore, this study aims to examine the effectiveness of gamification on students' critical thinking skills.

According to Adnan (2013, as cited in Irfani, 2023), gamification offers several benefits in the learning process, including: making studying more enjoyable, encouraging students to complete their assignments, helping students to focus and understand the material better, providing opportunities for active participation, experimentation, and achievement in the classroom. These benefits are expected to motivate students to engage actively in their learning and develop a passion for it, thereby increasing their motivation. On the other hand, Irfani (2023) outlines some drawbacks of gamification in learning, such as: games can sometimes be dull and predictable, the game loses its purpose if learning objectives are unclear or not properly defined, playing games may have psychological effects, while rewards can act as external motivators, it is preferable for students to be intrinsically motivated, games are bound by rules; however, they can still offer personalized learning experiences. Therefore, it is essential to design gamification carefully to keep it engaging, clarify learning goals, consider psychological impacts, and ensure that students' intrinsic motivation remains central.

This research investigates the influence of gamification learning using quizalize in improving the critical thinking skills of eighth-grade students at Junior High School in Indonesia, aiming to address the need for engaging and cognitively rich English instruction aligned with 21st-century educational demands.

2. METHOD

The method in this study used a quantitative. This study employed a quasi-experimental design with a pretest-posttest control group design to investigate the influence of gamification learning on students' critical thinking skills. The experimental group received treatment in the form of gamification English learning using Quizalize, while the control group was taught using conventional book-centered methods. Following the treatment, both groups were administered a post-test to measure the changes in students' critical thinking skills. This design allowed the researcher to compare the influence of gamification learning with traditional teaching methods in promoting critical thinking in the context of English language instruction. In this study, the researcher used purposive sampling. Sugiyono (2012, as cited in Safril Karie & Husain, 2020) stated that purposive sampling is a method to take the information utilized by many writers in a qualitative examination to take a supply of information or pattern primarily based totally on a judgment.

This study involved a total of 67 eighth-grade students from Junior High School at Indonesia divided equally into two groups: 34 students in the experimental group and 33 in the control group. The participants were selected using purposive sampling based on their similar academic backgrounds and English proficiency levels to ensure comparability. The chosen sample size was considered adequate to detect medium to large effect sizes with a statistical power of approximately 0.80 at a 0.05 significance level, as commonly accepted in educational research. To ensure precision, the researcher used standardized pretest and posttest instruments based on Siddiq's (2022) critical thinking framework, which allowed for consistent measurement of students' cognitive performance. The pretest and posttest scores were analyzed using inferential

statistics to determine the significance and effect of the treatment, with confidence intervals applied to support the reliability of the findings.

The data were gathered through a series of assessments administered to students in both experimental and control classes. The primary instrument used was a critical thinking test adapted from Siddiq (2022), which served as a foundation for evaluating students' cognitive abilities. This test was designed to measure five key dimensions of critical thinking and was administered in the form of multiple-choice questions.

The assessments were conducted as both pre-tests and post-tests to evaluate changes in students' critical thinking skills. The data collection process spanned a total of ten sessions. Within this timeframe, three sessions were allocated for treatment in each of the experimental and control groups. One session was dedicated to administering the pretest in each group, and another session was used for the posttest in each group following the treatment phase.

To collect data, the researcher used a pre-test and post-test in the form of a written questionnaire with 30 multiple-choice questions. This assessment was derived from Siddiq (2022) and was specifically designed to assess the five components of students' critical thinking skills, namely: recalling prior knowledge, reasoning, systems thinking, decision-making, and problem-solving. To assess critical thinking growth, both the experimental and control groups were asked the same questions before and after the intervention. This study did not include any additional confounders, such as demographics or prior knowledge level.

The intervention in this study consisted of a game-based English learning exercise aimed at improving students' critical thinking skills. In the experimental group, the researcher used game-based tasks that included English language education and critical thinking problems. These activities were spread over three treatment sessions for ten meetings.

On the other hand, the control group received traditional English teaching without using gamification elements. Both groups received a pretest before the intervention and a posttest afterward to assess changes in critical thinking performance. The comparison of both groups was calculated by comparing the mean scores of the pre-test and post-test results between the control group and the experimental group. The intervention was conducted in a classroom setting, with the researcher personally supervising all sessions to guarantee consistency and fidelity across conditions.

3. RESULTS AND DISCUSSION

3.1 RESULT

The researcher used a quasi-experimental research approach, which included an experimental class and a control class. The two-group design was ideal for this study as it included a baseline test and a final test to get more reliable research results by comparing conditions without gamification learning.

3.1.1 Pre-test Post-test Results of Critical Thinking Skills

Here are the Pre-test and Post-test results for the experimental and control class, including maximum, minimum, and average values.

Table 1. Average score of Experimental and Control Class

Class	Pre-test	Post-test
Experimental	48,82	85,56
Control	52,79	67,91

Based on the table, it shows that gamification improved the critical thinking ability of students in the experimental class by 36.7 points, or 71.8% of their initial score, while in the control class by 15.1 points, or 32% of their initial score. It shows that the increase in the experimental class is greater than that in the control class. The gamification learning model, which incorporates games containing components such as points, badges, leaderboards, and challenges can further increase student engagement and enjoyment in the experimental class.

To find out if there was a significant difference between the experimental and control groups' posttest scores following the application of the treatment, the data was examined using a t-test. In this work, hypothesis testing is done using SPSS version 16.

Table 2. Independent Samples Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil	Equal variances assumed	2.505	.118	11.918	65	.000	17.650	1.481	14.692	20.607
	Equal variances not assumed			11.980	59.230	.000	17.650	1.473	14.702	20.597

To determine if there was statistical data that indicated the mean was significantly different. The researcher employed an independent samples test using SPSS version 16 to determine the different scores from students' engagement with gamification learning (Quizalize) and without gamification learning (Quizalize). The testing criteria were as follows: If the probability or significance (sig.) value, with a two-tailed test, is less than 0.05, the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. Conversely, if the probability or significance value is greater than 0.05, the alternative hypothesis is rejected, and the null hypothesis is accepted.

Table 3. Paired Samples Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	PreEx - PostEx	-36.735	9.665	1.658	-40.108	-33.363	-22.163	33	.000

Also, the paired sample t-test, was carried out. The paired sample t-test with a significant level of $\alpha = 0.05$ is the testing method employed. It can be concluded that there is a significant difference between classes at Junior High School in Indonesia that use gamification learning (experimental group) and classes that do not use gamification learning (control group) based on the results of data processing with SPSS version 16, which yielded a sig (2-tailed) value of $0.000 < 0.05$. In other words, class VIII G students' critical thinking skills are greatly impacted by gamification learning using quizalize.

These findings suggest that gamification in English language learning might considerably improve students' critical thinking skills. The significant gain observed in the experimental class demonstrates that gamification learning environments are more than just entertainment; they provide structured challenges that promote higher-order thinking. Points, badges, and leaderboards entice students to participate while simultaneously encouraging them to analyze, evaluate, and make decisions, all of which are essential components of critical thinking.

Gamification transforms an ordinary classroom into a dynamic and participatory environment. By incorporating learning objectives into game-based tasks, students are exposed

to problem-solving scenarios that require thinking, reflection and collaboration. Leaderboards, for example, can encourage healthy competition and force students to think strategically, while challenges and missions can require students to apply concepts in unexpected circumstances, thus training their ability to think critically under diverse conditions.

In addition, the immersive quality of gamification learning encourages deeper engagement, which is important for cognitive development. When students are emotionally and intellectually committed to their tasks, they are more likely to process and retain information. This increased engagement may explain why the experimental group improved faster than the control group, who received training using a more traditional passive learning methodology.

Finally, the outcomes of this study suggest the use of gamification as an effective educational strategy for promoting critical thinking in language learning environments. The significant difference in score gains between the experimental and control groups highlights the potential of gamification methods to not only improve academic performance but also cultivate essential 21st-century skills like critical thinking, which are critical for students' future academic and professional success.

3.2 DISCUSSION

This research investigated the influence of gamification on students' critical thinking development through the application of Quizalize. The results demonstrate that the integration of gamification learning significantly influenced students' ability to think critically, enhanced their comprehension of English content, and increased their motivation during class activities. The study highlights how gamification, particularly via Quizalize, supports language learners in strengthening their critical thinking skills. This supports the argument by Margetson (Kurniasari, 2018, as cited in Wibisono et al., 2024), who emphasized that game-based learning serves as an educational innovation fostering critical thinking and promoting active engagement. Similarly, Quizalize incorporates various gamification features that enable real-time assessment and personalized instruction to meet diverse learner needs (Widianto et al., 2024). The present findings also align with Dicheva et al. (2019, as cited in Dichev et al., 2020), who noted that gamification learning environments operate as utility systems that employ hedonic design elements to drive user motivation.

In addition, gamification learning influences students' critical thinking by exposing them to trial-and-error processes, which encourage evaluation and problem-solving (Sahito & Sahito, 2024). Landers and Landers (2014, as cited in Sahito & Sahito, 2024) similarly observed that school-based gamification activities improve critical thinking through self-reflection and adaptive strategy use. Feedback mechanisms within gamification, such as earning badges or points, also reinforce motivation and critical engagement (Wibisono et al., 2024). The improvement in students' academic performance, as evidenced by rising pretest and posttest scores, supports Dichev et al.'s (2020) claim that gamification enhances educational behaviors and learning outcomes. Real-time progress tracking further motivates students to persist and pursue their goals (Wibisono et al., 2024). When effectively integrated into classroom activities, gamification can significantly improve student outcomes and cultivate a deeper interest in learning (Adeoye, 2023; Oliveira et al., 2024; , Utami et al., 2024). But this study has several limitations. First, the duration of the gamification implementation was relatively short, so it may not have been sufficient to demonstrate the long-term impact of gamification-based learning. Second, this study was conducted at only one school, so its findings may not be representative of students from different educational settings. Additionally, students had varying levels of English proficiency, learning

interest, and motivation, which could have influenced the students' results. Another limitation is that some students focused more on the game elements than on understanding the English learning material, which may have affected their learning outcomes.

Furthermore, students showed a clear preference for innovative media such as Quizalize, which includes game-like features such as leaderboards, quiz feedback, and humorous content (España-Delgado, 2023). These components make the learning environment more enjoyable and less stressful (Muthmainnah et al., 2024). Gamification through Quizalize increases engagement by incorporating rewards, badges, and competitive elements (Widianto et al., 2024), which in turn motivates students to critically analyze tasks and participate more actively (Wibisono et al., 2024). This study is expected to contribute to English language teaching, particularly regarding the use of gamification as an interactive and meaningful learning strategy. The findings of this study can help English teachers to create more engaging classroom activities and enhance students' motivation in learning English. Additionally, this study can also serve as a reference for future researchers interested in gamified learning in education. Additionally, teachers also benefit from this platform, as Quizalize simplifies personalized instruction and provides accessible, game-based assessment data in real-time (Onasanya et al., 2020).

In conclusion, gamifcation learning using Quizalize positively influenced students' enthusiasm, activeness, and comprehension in English learning. It allowed students to enjoy and engage with the lessons more deeply, helping them to analyze and evaluate material such as expressing opinions and using adverbs of manner. The platform's interactive features created a challenging yet enjoyable environment, making both teaching and learning more effective and meaningful.

4. CONCLUSION

This study looked into the impact of gamification learning with Quizalize in improving students' critical thinking skills at Junior High School in Indonesia. Used a quasi-experimental approach, students were divided into control and experimental groups. Pre-test results showed no significant differences between the two groups. However, after implementing gamified learning in the experimental class, post-test results showed a significant improvement. In this regard, the results indicate that students found the learning experience using gamification more enjoyable and less monotonous compared to traditional teaching methods.

In conclusion, gamification learning through Quizalize effectively improves students' critical thinking and engagement in English learning. Quizalize offers cognitive and motivational benefits, which enables students to express ideas more critically and confidently. But the limitation of this study is students have varying levels of English proficiency, interest in learning, and motivation, which may have influenced their learning outcomes and are difficult to fully control. In short, Quizalize can be an interactive tool that helps teachers create an interactive, student-centered classroom environment.

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