

## Utilizing Gamification Applications to Improve Students' Critical Thinking Skills

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### ABSTRAK

Kemampuan berpikir kritis merupakan keterampilan penting yang perlu dikembangkan sejak pendidikan dasar, namun pada praktiknya kemampuan tersebut belum berkembang secara optimal. Di SD Raudlatul Ulum Bojonegoro, pembelajaran masih didominasi metode konvensional sehingga siswa cenderung pasif dan kurang terlatih dalam menganalisis serta memecahkan masalah. Penelitian ini bertujuan untuk mendeskripsikan pemanfaatan aplikasi pembelajaran berbasis gamifikasi dalam meningkatkan kemampuan berpikir kritis siswa. Penelitian ini menggunakan pendekatan kualitatif dengan teknik pengumpulan data berupa observasi, wawancara, dan dokumentasi. Data dianalisis secara deskriptif melalui tahap pengumpulan, pengelompokan, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa penggunaan aplikasi gamifikasi mampu meningkatkan keterlibatan siswa, keberanian mengemukakan pendapat, kemampuan menganalisis permasalahan, serta refleksi terhadap jawaban yang diberikan. Pembelajaran menjadi lebih interaktif dan menantang, sehingga mendorong perkembangan kemampuan berpikir kritis siswa. Implikasi penelitian ini menunjukkan bahwa aplikasi gamifikasi dapat dijadikan alternatif strategi pembelajaran inovatif yang efektif apabila didukung oleh peran guru, perencanaan pembelajaran yang matang, dan fasilitas yang memadai.

### ABSTRACT

Critical thinking skills are important abilities that need to be developed from elementary education, but in practice, these skills have not developed optimally. At SD Raudlatul Ulum Bojonegoro, learning is still dominated by conventional methods, causing students to tend to be passive and less trained in analyzing and solving problems. This study aims to describe the use of gamification-based learning applications in improving students' critical thinking skills. This study uses a qualitative approach with data collection techniques in the form of observation, interviews, and documentation. The data were analyzed descriptively through the stages of collection, grouping, and drawing conclusions. Research results show that the use of gamification applications can increase student engagement, the courage to express opinions, the ability to analyze problems, as well as reflection on the answers given. Learning becomes more interactive and challenging, thereby encouraging the development of students' critical thinking skills. The implications of this research indicate that gamification applications can be used as an alternative innovative learning strategy that is effective if supported by the role of teachers, careful learning planning, and adequate facilities.

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## **INTRODUCTION**

Critical thinking skills are one of the essential 21st-century skills that must be developed in the field of education (Akbar & others, 2023; Dilekçi & Karatay, 2023; Thornhill-Miller et al., 2023). Critical thinking enables students to analyze information, evaluate arguments, solve problems, and make rational and logical decisions (Adhikari et al., 2025; Hitchcock, 2017). In the context of elementary education, critical thinking skills need to be cultivated from an early age so that students become accustomed to reflective and systematic thinking. Learning processes that merely emphasize memorization and the transfer of knowledge tend to be less effective in developing students' critical thinking abilities (Muhammad et al., 2025; Siregar & others, 2025). Therefore, teachers are required to design learning activities that are active, creative, and challenging. The utilization of educational technology is one relevant alternative to support the development of critical thinking skills. One technological learning innovation that has recently developed is the use of gamification-based learning applications.

Gamification in education is an approach that integrates game elements into the teaching and learning process (Christopoulos & Mystakidis, 2023; Duggal et al., 2021; Hikmayana, 2025). Elements such as points, levels, challenges, and feedback are designed to enhance students' motivation and engagement. Gamification-based learning applications are capable of creating a fun and interactive learning environment (Dahalan et al., 2024; Saleem et al., 2022; Thurairasu, 2022). Through gamification, students do not merely act as passive recipients of information but become active participants in the learning process. Challenging and contextual learning activities encourage students to think, analyze, and make decisions. Thus, gamification has great potential in developing students' critical thinking skills. The use of gamification applications represents an innovative strategy that aligns with the characteristics of today's learners.

Despite the importance of critical thinking skills, in reality, these skills have not yet developed optimally at SD Raudlatul Ulum Bojonegoro. Based on preliminary observations, learning activities are still dominated by lecture methods and written assignments. Students tend to be passive and only follow teachers' instructions without actively asking questions or expressing opinions. When faced with tasks requiring analysis and problem solving, many students experience difficulties. This condition indicates that students' critical thinking skills remain relatively low. In addition, the use of educational technology is still limited and has not been optimally integrated into classroom instruction. This situation affects the low level of student engagement in learning. Therefore, innovative learning approaches are needed to enhance students' critical thinking skills at SD Raudlatul Ulum Bojonegoro.

Research conducted by Thurairasu indicates that gamification-based learning has strong potential as the future of language learning. The study highlights that integrating game elements

into language instruction can enhance learner motivation, engagement, and overall learning effectiveness(Thurairasu, 2022). Research conducted by Al-Hafdi and Alhalafawy shows that gamification-based learning has experienced significant growth over the past decade across various educational contexts. The bibliometric analysis and systematic review reveal that gamification positively impacts learner engagement, motivation, and learning outcomes, while also highlighting emerging research trends and gaps in the field(Al-Hafdi & Alhalafawy, 2024).

Research conducted by Dahalan, Alias, and Shaharom indicates that gamification and game-based learning are effective approaches in vocational education and training. The systematic literature review highlights that these approaches enhance learners' motivation, engagement, and skill development, while also identifying challenges and best practices for implementation(Dahalan et al., 2024). Research conducted by *Ishaq et al.* proposes a framework for course design that integrates project-based learning with gamification to enhance student engagement and learning outcomes. The study suggests that combining authentic projects with game elements can foster collaboration, motivation, and deeper learning experiences(Ishaq et al., 2025).

Based on the review of previous studies, it can be concluded that there is still a research gap regarding the use of gamification applications to enhance elementary students' critical thinking skills. Most studies tend to focus on learning motivation and cognitive learning outcomes. Research that specifically addresses critical thinking skills as the main focus remains limited. Furthermore, studies conducted in the context of SD Raudlatul Ulum Bojonegoro are rarely found. The novelty of this study lies in its focus on examining the use of gamification applications in developing students' critical thinking skills within a specific educational context. This study also emphasizes the learning process and students' active engagement. Therefore, this research is expected to contribute new insights into the development of gamification-based learning in elementary education.

Based on this background, this study aims to describe the use of gamification applications in improving students' critical thinking skills at SD Raudlatul Ulum Bojonegoro. This study also aims to analyze how gamification-based learning processes are implemented in the classroom. In addition, this study seeks to identify students' responses and engagement during the use of gamification applications. The findings of this study are expected to provide an overview of the effectiveness of gamification in learning. The results are expected to serve as reflective input for teachers in developing innovative learning strategies. Furthermore, this study is expected to serve as a reference for schools in utilizing educational technology. Thus, the objectives of this study are both academic and practical in improving the quality of education.

## **METHOD**

This study was conducted at SD Raudlatul Ulum Bojonegoro using a qualitative research approach. The research focused on the process of utilizing gamification-based learning applications in classroom instruction to improve students' critical thinking skills. The study was carried out during the learning process in accordance with the schedule determined by the school. The researcher was directly involved in observing classroom learning activities (Nugroho, 2021). During the study, the researcher recorded students' activities, responses, and the ways teachers used gamification applications in the learning process. The main focus of the research was how gamification applications were implemented and how students demonstrated critical thinking skills during learning activities.

The research subjects consisted of classroom teachers and students at SD Raudlatul Ulum Bojonegoro who participated in learning activities using gamification-based applications. Teachers served as the primary data sources because they played a key role in designing and implementing the learning process. Students became data sources to examine their responses, engagement, and manifestations of critical thinking behavior during the learning activities. The selection of research subjects was conducted purposively by considering their direct involvement in the learning process. The researcher did not apply any special treatment but observed the learning process as it naturally occurred. Therefore, the data obtained reflect the real conditions of classroom learning.

Data were collected through classroom observation, interviews, and documentation. Observations were conducted by monitoring students' activities while using the gamification application, such as how they answered questions, participated in discussions, and completed challenges within the application. Interviews were conducted with teachers to obtain information regarding the objectives of using the application, instructional steps, and challenges encountered during implementation. Interviews were also conducted with several students to explore their experiences and perceptions while using the gamification application. Documentation in the form of lesson plans, application screenshots, photographs of learning activities, and students' work results was used to strengthen the data obtained from observations and interviews (Nurfajriani et al., 2024; Rukajat, 2018).

Data analysis was carried out gradually during and after the data collection process. Data from observations, interviews, and documentation were collected and then categorized according to the research focus (Purwanto, 2022). Relevant data were organized into descriptive narratives to illustrate the learning process and students' critical thinking skills. The researcher compared data from multiple sources to ensure the accuracy and credibility of the findings. Conclusions were drawn based on patterns that emerged from the field data. To ensure data validity, the researcher conducted member checking by confirming interview results and observational

findings with the teacher. Through this process, the research findings are expected to accurately reflect the practice of utilizing gamification-based applications in classroom learning.

## **RESULT AND DISCUSSION**

### **Result**

#### **A. Initial Condition of Students' Critical Thinking Skills**

The research findings indicate that the initial condition of students' critical thinking skills at SD Raudlatul Ulum Bojonegoro was still relatively low. Prior to the implementation of gamification-based learning applications, most students tended to be passive during learning activities. Students mostly received information from the teacher without showing efforts to ask questions, analyze information, or express opinions. When given open-ended questions, students often experienced difficulties in explaining reasons or presenting arguments logically. Their responses tended to be brief and based on memorization. This condition indicates that students' critical thinking skills had not yet developed optimally.

Classroom observations revealed that previous learning activities were dominated by lecture methods and written exercises. Learning activities rarely involved discussion or in-depth problem solving. Students were accustomed to waiting for teacher instructions and showed limited initiative in the learning process. When faced with questions requiring analysis, students often waited for sample answers from the teacher. This situation caused students to be less accustomed to independent and critical thinking. Student engagement in learning activities was also limited. As a result, students' activeness and critical thinking skills remained low.

Observations also showed that students were not accustomed to facing learning challenges involving problem solving. One-way learning processes rarely trained students to compare, evaluate, or make decisions. Some students appeared hesitant and lacked confidence when asked to express their opinions. Students tended to be afraid of making mistakes and preferred to remain silent. This indicates that the learning environment had not fully encouraged critical thinking. These conditions became a major challenge in developing students' critical thinking skills.

Interview results with teachers supported these findings. Teachers stated that students were still accustomed to following instructions without asking many questions. One teacher stated, "Students usually wait for answers from the teacher; when asked to explain their reasons, they are still confused." This statement indicates that students were not yet accustomed to expressing reasoning or engaging in analytical thinking. Teachers also acknowledged that previous learning practices had not provided sufficient opportunities for students to develop critical thinking skills. Therefore, teachers felt the need to implement more interactive and challenging learning approaches.

Based on the research findings, it can be concluded that the initial condition of students' critical thinking skills still needs improvement. Low levels of activeness, confidence in expressing opinions, and analytical ability were the main indicators. This condition served as an important foundation for the implementation of gamification-based learning applications. Gamification was expected to create a more challenging and interactive learning environment. Thus, the application of gamification-based learning became a strategic step to enhance students' critical thinking skills and formed the focus of the following discussion.

## **B. The Process of Utilizing Gamification Applications in Learning**

The research findings indicate that gamification-based learning applications were used by teachers as the primary learning media. Teachers utilized applications containing interactive quizzes, challenges, and problem-solving-based questions. Before the learning process began, teachers explained how to use the application to students. Students were given opportunities to explore the application features directly. This process made students appear enthusiastic and interested in participating in the learning activities. The application was used gradually according to the learning material. As a result, learning became more structured and engaging.

During the learning process, students were required to complete challenges available in the application. These challenges consisted of questions that required students to think, analyze, and determine appropriate answers. Students could immediately see the results of their responses through feedback provided by the application. This feedback helped students understand their mistakes and improve their thinking processes. Students appeared more focused and active compared to previous learning sessions. This process indicates that gamification applications can enhance student engagement. Learning activities became more dynamic and less monotonous.

Teachers played the role of facilitators during the use of gamification applications. Teachers guided students when they encountered difficulties and provided additional explanations when necessary. Small group discussions were conducted after students completed challenges within the application. Teachers encouraged students to discuss the reasons behind their chosen answers. These activities motivated students to express opinions and engage in critical thinking. Teachers also reinforced logical and well-reasoned answers. Thus, gamification applications were not only used as evaluation tools but also as instruments for active learning.

Interview results with teachers showed that the use of gamification applications provided a different learning experience. One teacher stated, "When using the application, students are more enthusiastic and willing to try answering questions, even engaging in discussions with their peers." This statement indicates that gamification applications

increased student participation. Teachers found it easier to encourage students to think critically because students were attracted to the application's design and challenges. Teachers also observed that students became more confident and less afraid of making mistakes. This served as a positive indicator in the learning process.

Based on the research findings, the process of utilizing gamification applications was implemented effectively and aligned with learning objectives. The application successfully created an interactive, challenging, and enjoyable learning environment. The teacher's role as a facilitator was crucial in guiding the learning process. Collaboration among teachers, students, and the application became the key to successful learning. With a well-directed process, gamification applications can be optimally utilized to support learning and enhance students' critical thinking skills.

### **C. Development of Students' Critical Thinking Skills after Using Gamification Applications**

The research findings indicate that students' critical thinking skills developed after the use of gamification applications. Students began to show greater confidence in answering questions and expressing opinions. They no longer solely waited for answers from the teacher but attempted to find solutions independently. In completing challenges, students appeared more focused and attentive. Improvements in students' analytical abilities were evident from the way they explained the reasons behind their chosen answers. Thus, students' critical thinking skills gradually developed.

Classroom observations showed that students became more active in discussions after using gamification applications. Students exchanged opinions and compared answers with peers. These discussions encouraged students to think more deeply and consider various possible solutions. This process helped students develop analytical thinking skills. In addition, students learned to respect different perspectives. Such interactions strengthened both students' critical thinking and social skills.

The development of critical thinking skills was also reflected in increased student confidence. Students became more willing to answer questions in front of the class. Mistakes were no longer perceived as embarrassing but as part of the learning process. Gamification applications provided feedback that encouraged students to try again. This process helped students develop reflective thinking attitudes. As a result, students became more open to learning and thinking processes.

Interview results with students indicated changes in learning attitudes. One student stated, "Learning is more fun because we can think first before answering and then know where our mistakes are." This statement indicates that students became aware of their thinking processes. Students felt challenged and motivated to solve problems. This served as

an indicator of the development of critical thinking skills. Enjoyable learning experiences supported this development.

Based on the research findings, it can be concluded that gamification applications had a positive impact on the development of students' critical thinking skills. Improvements were observed in students' confidence in expressing opinions, analytical abilities, and self-reflection. Although development was not evenly distributed among all students, the overall trend indicated positive progress. With consistent guidance, students' critical thinking skills can continue to improve. These findings demonstrate the significant potential of gamification applications in learning. The next discussion will examine supporting and inhibiting factors in the implementation of gamification-based learning.

#### **D. Supporting and Inhibiting Factors in the Utilization of Gamification Applications**

The research findings indicate several supporting factors in the utilization of gamification applications at SD Raudlatul Ulum Bojonegoro. One of the main supporting factors was students' enthusiasm for using technology in learning. Students were attracted to the interactive and challenging features of the application. Teacher support also played a crucial role in the success of gamification-based learning. Teachers demonstrated readiness and willingness to implement learning innovations. A conducive classroom environment also supported the implementation of learning activities. These factors contributed to the smooth use of gamification applications.

Another supporting factor was the ease of use of the application. The application had a simple and user-friendly interface, making it easy for students to understand. This allowed students to focus on their thinking processes rather than technical aspects. In addition, immediate feedback from the application helped students identify mistakes and improve their understanding. Teachers also utilized the application as a tool for evaluation and discussion. Thus, the application served multiple functions in the learning process. These factors supported the enhancement of students' critical thinking skills.

However, the study also identified several inhibiting factors. Limited technological facilities became one of the main challenges. Not all students had access to adequate devices. In addition, limited instructional time required teachers to manage application use efficiently. Technical issues such as internet connectivity also posed challenges. These conditions occasionally disrupted the learning process. Therefore, careful planning was necessary to ensure effective implementation.

Interview results with teachers supported these findings. One teacher stated, "Sometimes we face limitations in devices and time, so we have to manage carefully to ensure all students can participate." This statement indicates that teachers encountered both technical and managerial challenges. Nevertheless, teachers continued to make efforts to

optimize learning activities. Teachers also expressed the need for additional infrastructure support and further training. Collaboration with school management was considered essential.

Based on the research findings, it can be concluded that the utilization of gamification applications is influenced by both supporting and inhibiting factors. Supporting factors include students' enthusiasm, teacher readiness, and application usability. Inhibiting factors include limited facilities, time constraints, and technical issues. Understanding these factors is essential for optimizing gamification-based learning. With adequate support, existing obstacles can be minimized. These findings provide a basis for recommendations and implications for future research.

## **Discussion**

The research findings indicate that the use of gamification-based learning applications is able to gradually enhance students' critical thinking skills. This finding aligns with the view that learning approaches positioning students as active subjects are more effective in developing higher-order thinking skills. Gamification applications present challenges, problems, and feedback that require students to analyze information, consider various options, and make decisions. These processes correspond to the characteristics of critical thinking, which emphasize analytical and evaluative abilities. Compared to conventional, teacher-centered learning, gamification creates a more dynamic learning environment. Students are not merely passive recipients of information but are directly involved in problem-solving processes. Thus, gamification serves as an effective medium for stimulating critical thinking skills among elementary school students.

These findings can also be explained through constructivist learning theory, which posits that knowledge is actively constructed by learners through meaningful learning experiences. In gamification-based learning, students develop understanding through interaction with questions, challenges, and discussions that arise during the use of the application. Teachers act as facilitators who provide guidance and reinforcement rather than functioning as the sole source of information. This approach allows students to develop independent and reflective thinking. Post-challenge discussions within the application provide opportunities for students to test and revise their understanding. This process strengthens students' critical thinking skills. Therefore, the results of this study support the principles of constructivism within the context of technology-enhanced learning.

Furthermore, the increase in students' confidence in expressing opinions and explaining the reasoning behind their answers indicates development in the metacognitive aspect. Gamification offers a relatively safe learning environment where mistakes are viewed as part of the game and the learning process. This reduces students' fear of making errors and encourages

them to try and express their ideas. Immediate feedback from the application helps students reflect on mistakes and refine their thinking strategies. These findings are consistent with previous studies indicating that gamification can enhance students' confidence and engagement. As students' self-confidence increases, they become more willing to think critically and embrace learning challenges. Therefore, gamification impacts not only cognitive development but also students' affective dimensions.

The findings also demonstrate that the teacher's role is a crucial factor in the successful implementation of gamification-based learning. Teachers do not merely use applications as instructional tools but actively manage and guide the learning process. Teacher facilitation through guided discussions, probing questions, and reinforcement of students' responses plays a significant role in fostering critical thinking. These findings emphasize that technology cannot replace the role of teachers but rather strengthens it. Teachers must possess pedagogical competence and creativity to effectively integrate gamification with instructional objectives. Without proper guidance, the use of applications may become mere gameplay without meaningful learning outcomes. Therefore, teacher competence is a key determinant in the success of gamification-based learning.

Although the findings demonstrate positive impacts, the study also reveals several limitations in the implementation of gamification, such as limited access to devices and constrained instructional time. These findings are consistent with previous research indicating that technology-based learning requires adequate infrastructure and careful planning. However, these limitations do not diminish the potential of gamification in enhancing students' critical thinking skills. Instead, they highlight the need for stronger institutional support and more effective instructional management. With appropriate planning and sufficient resources, gamification can be optimized as an innovative instructional strategy. Overall, this discussion confirms that the use of gamification applications is a relevant and effective approach to developing critical thinking skills among elementary school students.

## **CONCLUSION**

The use of gamification-based learning applications at SD Raudlatul Ulum Bojonegoro has had a positive impact on enhancing students' critical thinking skills. Gamification applications can create interactive, challenging, and enjoyable learning experiences, encouraging students to be more active in analyzing, expressing opinions, and making decisions. The success of implementing gamification is greatly influenced by the role of teachers in managing learning in a directed manner, as well as the support of a conducive learning environment. Therefore, it is recommended that teachers continue to develop gamification-based learning innovations with careful planning and consistent guidance, schools provide adequate facilities and infrastructure support, and

further research examines the use of gamification with more diverse approaches and contexts to strengthen the development of critical thinking skills in elementary school students.

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