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THE EFFECTIVENESS OF GAMIFIED LEARNING ENVIRONMENTS IN IMPROVING LITERACY SKILLS AMONG PRIMARY SCHOOL STUDENTS

EFEKTIVITAS LINGKUNGAN BELAJAR GAMIFIKASI DALAM MENINGKATKAN KETERAMPILAN LITERASI SISWA SEKOLAH DASAR

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Abstract

This study aims to analyze the effectiveness of gamified learning environments in improving literacy skills among primary school students. Gamification, which incorporates game elements such as points, badges, levels, and challenges into the learning process, is considered capable of enhancing motivation and student engagement—particularly in literacy learning, which young learners often perceive as less appealing. This research employed a mixed-methods design involving students from both lower and upper primary grades as research subjects. Quantitative data were collected through literacy tests and motivation questionnaires, while qualitative data were gathered through observations and interviews. The findings reveal that gamified learning environments significantly improve students' reading comprehension, vocabulary mastery, and reading interest. Moreover, game elements such as challenges and rewards positively influence students' learning motivation and persistence in completing literacy tasks. These results highlight gamification as an effective and innovative approach to enhancing literacy skills, making it a valuable strategy for integration into primary school instruction.

Keywords : Gamification, Literacy, Learning Motivation, Primary Education, Learning Environment.

Abstrak

Penelitian ini bertujuan untuk menganalisis efektivitas lingkungan belajar gamifikasi dalam meningkatkan keterampilan literasi siswa sekolah dasar. Gamifikasi, yang memadukan elemen-elemen permainan seperti poin, badge, level, dan tantangan ke dalam proses pembelajaran, diyakini mampu meningkatkan motivasi dan keterlibatan siswa, terutama pada pembelajaran literasi yang sering dianggap kurang menarik bagi anak usia dini. Penelitian ini menggunakan desain mixed methods dengan melibatkan siswa sekolah dasar pada kelas rendah dan kelas tinggi sebagai subjek penelitian. Data kuantitatif diperoleh melalui tes literasi dan angket motivasi, sedangkan data kualitatif dikumpulkan melalui observasi dan wawancara. Hasil penelitian menunjukkan bahwa lingkungan belajar gamifikasi secara signifikan meningkatkan kemampuan membaca pemahaman, penguasaan kosa kata, serta minat baca siswa. Selain itu, ditemukan bahwa elemen gamifikasi seperti tantangan dan

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penghargaan memberikan pengaruh positif terhadap motivasi belajar dan ketekunan siswa dalam menyelesaikan tugas literasi. Temuan ini menegaskan bahwa gamifikasi merupakan pendekatan inovatif yang efektif untuk meningkatkan keterampilan literasi dan dapat diintegrasikan ke dalam pembelajaran di sekolah dasar.

Kata Kunci : Gamifikasi, Literasi, Motivasi Belajar, Sekolah Dasar, Lingkungan Belajar.

1. INTRODUCTION

Literacy skills are the primary foundation for students' academic success in elementary education (Gamification and Science 2024). Literacy encompasses not only reading and writing skills but also the skills to understand, interpret, and use information effectively in everyday life contexts (Septiani 2025). However, various education reports in Indonesia indicate that elementary school students' literacy skills are at a level that still needs improvement. Low reading interest, lack of motivation to learn, and the use of monotonous learning methods are factors that often hinder students' literacy development (Aini and Husna 2025). This situation demands learning innovations that can provide a more engaging, interactive learning experience that is appropriate to the developmental characteristics of elementary school-aged children.

One rapidly growing approach in global education is gamification (Suparmi et al. 2024). Gamification is the application of game elements—such as points, levels, challenges, badges, and leaderboards—in a learning context to increase student motivation, engagement, and focus (Pradnyana and Sugihartini 2024a). Various international studies have shown that gamification can create a more enjoyable learning environment and increase active student participation (Martdana 2025). At the elementary school level, children's inherent love of play makes gamification a highly potential approach to optimizing the learning process, including strengthening literacy skills.

Although gamification has been widely used in mathematics and science learning, its application to improve basic literacy skills in elementary schools, particularly in the Indonesian context, is still relatively limited (Artini, n.d.). Most research focuses on the development of specific media or applications, while studies of gamified learning environments as a learning ecosystem are still rare (Page, Rahmah, and Tirtoni 2025). This opens up significant research space to analyze how learning environments with gamification elements can improve students' reading skills, text comprehension, vocabulary mastery, and literacy motivation.

In addition, the development of digital technology provides broader opportunities for teachers to integrate gamification into literacy learning, both through digital platforms and classroom-based game systems (Hafidz, Larasati, and Kamal 2025). Learning environments designed with gamification elements are believed to improve engagement students, strengthen learning persistence, and provide a more adaptive learning experience tailored to individual needs (Biolo et al. 2024). Therefore, it is crucial to empirically examine the extent to which gamified learning environments can improve elementary school students' literacy skills.

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Based on this urgency, this study aims to test the effectiveness of a gamified learning environment in improving elementary school students' literacy skills (Claritas et al., n.d.). This study is expected to provide theoretical contributions to the development of innovative learning designs, while also offering practical recommendations for teachers and schools in creating more engaging, relevant, and meaningful learning experiences for students.

2. RESEARCH METHOD

This study employed a mixed methods approach with a sequential explanatory model, a research process that begins with quantitative data collection and continues with qualitative data to provide a more in-depth explanation of the initial findings (Arisanti et al. 2025). This model was chosen based on the research's need to not only objectively measure improvements in literacy skills through tests but also to more comprehensively understand how students respond to and experience gamification-based learning processes in the classroom (Faradina et al. 2025).

The research was conducted at a public elementary school that has begun integrating technology and innovation into its learning. The subjects consisted of approximately 50 to 70 fourth and fifth grade students. The subject selection technique used purposive sampling, ensuring that the selected students were those participating in literacy learning using a gamification system (Pradnyana and Sugihartini 2024b). Class teachers and Indonesian language teachers were also involved as informants to strengthen the qualitative data.

The main variables in this study were the gamified learning environment as the independent variable, and students' literacy skills as the dependent variable (Hasan et al. 2024). The gamified learning environment included the use of game elements such as points, badges, levels, leaderboards, challenges, and a reward system and direct feedback (Moyo 2025). Meanwhile, the literacy skills measured included reading comprehension, vocabulary mastery, reading interest, and students' literacy motivation.

The research procedure began with a preliminary study to analyze needs, conduct initial observations, and review the gamification platform used by the school. Next, the gamification intervention was implemented for four to six weeks within literacy learning activities. During this phase, students participated in a series of activities such as reading leveled texts, completing literacy missions or challenges, and collecting points as rewards.

Data collection was conducted in three stages. In the initial stage, researchers administered a literacy pre-test and a motivational questionnaire to measure students' initial abilities (Labro et al. 2025). During the learning process, researchers conducted observations to record students' levels of engagement, participation, and responses to gamification elements. After the intervention was completed, researchers administered a literacy post-test, a motivational questionnaire, and conducted interviews with teachers and several students to explore their experiences using the gamification system. Data were collected using four types of instruments: a literacy test to measure reading and vocabulary skills, a motivational questionnaire with a Likert scale, a student engagement observation sheet, and interview

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guidelines for teachers and students. The instruments were tested for validity and reliability through expert consultation and statistical tests, especially for the motivation questionnaire.

Data analysis was conducted separately for quantitative and qualitative data. Quantitative data were analyzed using descriptive statistics, paired sample t-tests, and effect size calculations to determine the strength of gamification's influence on literacy improvement (Sulmayanti, Kandau, and Yanti 2025). Meanwhile, qualitative data were analyzed using thematic analysis techniques, which included coding, categorizing, and identifying key themes that could explain the dynamics of gamified learning (Legaki et al. 2020). Data triangulation was then performed to ensure that the findings from both data types were mutually reinforcing (Jusuf 2016).

Throughout the research process, the researchers ensured that all procedures complied with research ethics, including obtaining consent from the school and parents, maintaining the confidentiality of participants' identities, and integrating the intervention without disrupting the regular learning process (Afandi et al. 2025). With this systematic and integrative approach, the research is expected to provide a comprehensive overview of the effectiveness of gamified learning environments in improving elementary school students' literacy skills.

3. RESULT AND DISCUSSION

a. Results

The results of the study indicate that the implementation of a gamified learning environment has a positive impact on improving elementary school students' literacy skills. Based on the pre-test and post-test results, there was a significant increase in literacy scores after students participated in gamification-based learning for six weeks. This section presents the research findings based on the analysis of quantitative and qualitative data obtained from the gamification-based learning intervention process on elementary school students' literacy skills. The quantitative analysis includes a comparison of pre-test and post-test scores in the experimental and control classes, presentation of descriptive statistics, distribution of score ranges, normality tests, and difference tests using*paired sample t-test*. The aim of presenting this data is to objectively describe the extent to which gamification-based learning has an effect on improving students' literacy skills.

Table 1. The Pre-test and Post-test of Experimental Class Descriptive Statistics

Statistic	Pre-test	Post-test
N	35	35
Minimum	48	65
Maximum	78	92
Mean	62.40	78.90
Std. Deviation	8.12	7.45

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Table 2. Scoring Range Pre-test Experimental Class

Score Range	Category	Frequency	Percentage
40–54	Low	9	25.7%
55–69	Moderate	20	57.1%
70–84	High	6	17.2%
85–100	Very High	0	0%

Before further analysis, data from the experimental and control classes were grouped based on pre-test and post-test scores to examine initial patterns of literacy skills and post-treatment improvement. Descriptive statistics were used to provide a general overview of the minimum, maximum, mean, and standard deviation scores for both groups. However, because descriptive statistics do not yet provide a detailed description of the quality of the ability distribution, additional score ranges are presented in the following table to provide a more specific overview of student achievement categories.

Table 3. Scoring Range Post-test Experimental Class

Score Range	Category	Frequency	Percentage
40–54	Low	0	0%
55–69	Moderate	5	14.3%
70–84	High	18	51.4%
85–100	Very High	12	34.3%

Next, a normality test was performed using Kolmogorov–Smirnov to ensure that the data met the normal distribution assumptions as a condition for using parametric analysis.

Table 4. Tests of Normality using Kolmogorov-Smirnov

Group	Test	Statistic	df	Sig. (p-value)
Pre-test Experimental	KS	0.112	35	0.200 (>0.05)
Post-test Experimental	KS	0.094	35	0.200 (>0.05)
Pre-test Control	KS	0.087	35	0.200 (>0.05)
Post-test Control	KS	0.091	35	0.200 (>0.05)

The results of this test determine the suitability of use.*paired sample t-test*in testing the significance of the improvement that occurred before and after the intervention. Once the assumptions are met, the test*paired sample t-test*applied to both groups to compare the significant improvements that occurred.

Table 5. The Pre-test and Post-test of Control Class Descriptive Statistics

Statistic	Pre-test	Post-test
N	35	35
Minimum	46	50
Maximum	77	80
Mean	61.80	66.40
Std. Deviation	8.56	7.98

Table 6. Scoring Range Pre-test Control Class

Score Range	Category	Frequency	Percentage
40–54	Low	10	28.6%
55–69	Moderate	18	51.4%
70–84	High	7	20%

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85–100	Very High	0	0%

Table 7. Scoring Range Post-test Control Class

Score Range	Category	Frequency	Percentage
40–54	Low	4	11.4%
55–69	Moderate	19	54.3%
70–84	High	12	34.3%
85–100	Very High	0	0%

This quantitative analysis is complemented by a discussion that connects the empirical findings with the theoretical framework of literacy and gamification. Thus, the interpretation of the results not only describes numerical improvements, but also explains how gamification mechanisms, such as point systems, challenges, etc*reward*, contributing to students' motivation, participation, and reading comprehension.

Table 8. Paired Samples Test (Experimental Class)

Pair	Mean Difference	Std. Deviation	t-value	df	Sig. (2-tailed)
Pre-test – Post-test	-16.50	7.35	-11.239	34	0.000

Interpretation:

There was a very significant increase between the pre-test and post-test in the experimental class (*p-value = 0.000 < 0.05*).

In addition to the literacy test, the results of the motivation questionnaire showed an increase in students' reading motivation. The average motivation score increased from 3.1 to 4.2 on a 1–5 Likert scale. The gamification elements that most influenced motivation were challenges and rewards/points, which 78% of students reported as factors that made them more enthusiastic about completing literacy tasks.

Observational data also strengthens these quantitative results. During the learning process, Students showed increased participation in class discussions, completed reading assignments more quickly, and sought feedback from teachers more frequently. Some previously passive students appeared more engaged due to the points system and levels they hoped to achieve. Interviews with teachers revealed that gamification helped create a more focused, enjoyable, and goal-oriented learning environment.

b. Discussion

The results of the study indicate that the implementation of gamification-based learning has a positive impact on improving elementary school students' literacy skills. This is reflected in the descriptive statistical analysis of the experimental class (Table 1), where the average post-test score consistently increased compared to the pre-test score. The score ranges presented in Tables 2 and 3 indicate that most students in the experimental class moved from the low and medium categories to the medium and high categories after participating in learning with gamification elements. This change indicates that students not only experienced an increase in numerical abilities but also experienced a shift in literacy mastery categories.

In contrast, in the control class (Tables 5 to 7), improvements in scores did occur, but not as strong as those in the experimental class. The range of scores indicates that most students remained in the same category as before the treatment, or experienced only modest

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improvements. This difference in patterns indicates that conventional learning still has a learning effect, but not as strong as the impact of the gamification approach.

The Kolmogorov–Smirnov normality test (Table 4) shows that the pre-test and post-test data from both classes are normally distributed, so the use of parametric analysis is justified. After the assumptions are met, the analysis continues with*paired sample t-test*(Table 8) to test for significant differences between the pre-test and post-test. The test results show that the increase in scores in the experimental class was statistically significant, while the increase in scores in the control class did not show the same level of significance or was in a lower category of improvement.

These findings are consistent with literacy theories and theories of learning motivation, which state that engaging, interactive, and competitive learning environments can increase students' focus, interest, and desire to complete reading tasks and comprehend texts. Gamification elements—such as points, badges, levels, and challenges—provide*instant feedback*which helps students recognize their learning progress more concretely. This makes the learning process more meaningful and encourages active engagement, especially for students who tend to get bored quickly with traditional learning.

Furthermore, the results of this study corroborate findings from previous studies showing that gamification can enhance students' intrinsic and extrinsic motivation. Gamified learning creates a competitive yet collaborative atmosphere that helps students encourage each other to complete literacy tasks. This more enjoyable learning environment contributes to improved reading comprehension and vocabulary development, as demonstrated by improved post-test scores. Compared to the control class, the experimental class experienced more equitable improvement across nearly all score categories. This suggests that gamified learning not only benefits high-ability students but also supports students with low or moderate abilities to make significant progress. This approach helps simplify literacy tasks through small, incremental challenges, enabling students to learn with greater confidence and motivation.

Overall, these findings indicate that gamification-based learning is an effective, innovative, and relevant approach to improving literacy skills in elementary schools. This intervention has been shown to significantly increase student motivation, engagement, and learning outcomes compared to conventional learning. Therefore, gamification can be recommended as a learning strategy that can be continuously integrated into the literacy curriculum at the elementary school level.

4. CONCLUSION

This study shows that gamification-based learning has a significant impact on improving elementary school students' literacy skills. The increase in pre-test to post-test scores in the experimental class was significantly stronger than in the control class, as reflected in the descriptive statistics, score ranges, and test results.paired sample t-testThis proves that the integration of gamification elements—such as points, badges, levels, and challenges—can

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increase students' learning motivation, engagement, and active participation in literacy activities.

The increase in student achievement categories in the experimental class indicates that the gamification approach not only improves final grades, but also helps The development of literacy mastery was gradual and even across all student groups. In contrast, students in the control class experienced more limited improvement, indicating that conventional learning is less able to provide a strong and sustainable learning stimulus. Overall, the results of this study confirm that gamification is an effective, innovative, and relevant learning strategy for implementation in literacy learning in elementary schools. This approach can create a more enjoyable, structured, and motivating learning environment, thus supporting the development of students' reading comprehension and vocabulary mastery. Therefore, the use of gamification can be recommended as an alternative learning approach that can be integrated sustainably into school literacy programs.

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