

THE EFFECT OF GAME-BASED LEARNING USING WORDWALL ON FOURTH-GRADE STUDENTS' READING COMPREHENSION OF DESCRIPTIVE TEXTS

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ABSTRACT

Reading comprehension is an essential language skill for elementary school students. However, fourth-grade students' ability to comprehend descriptive texts remains relatively low due to teacher-centered instruction and the limited use of interactive learning media. Although previous studies have reported the effectiveness of Game-Based Learning and Wordwall in improving students' motivation and learning outcomes, limited research has specifically examined their integration to enhance elementary students' reading comprehension of descriptive texts. Therefore, this study aimed to examine the effect of Game-Based Learning using Wordwall on fourth-grade students' reading comprehension of descriptive texts. This study employed a quantitative approach with a quasi-experimental method using a pretest-posttest control group design. The sample consisted of 60 fourth-grade students divided equally into an experimental class and a control class. Data were collected using a validated and reliable multiple-choice test and analyzed through descriptive statistics, an independent samples t-test, and effect size analysis. The results showed that the experimental class achieved a higher mean posttest score (93.73) than the control class (88.70). The independent samples t-test revealed a statistically significant difference ($p < 0.001$), while the effect size (Cohen's $d = 1.227$) indicated a large practical effect, demonstrating that Game-Based Learning using Wordwall substantially improved students' reading comprehension. These findings suggest that integrating Game-Based Learning with Wordwall is an effective instructional approach for enhancing fourth-grade students' reading comprehension of descriptive texts.

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INTRODUCTION

Reading comprehension is one of the core competencies that elementary school students must possess, as it serves as the foundation for understanding various subjects. Reading comprehension is not only about the ability to recognize words or sentences, but also includes the ability to identify main ideas, draw conclusions, connect information to prior knowledge, and evaluate the content of a text. Therefore, mastery of reading comprehension contributes to

the development of critical thinking, problem-solving skills, and students' overall academic success. According to the (*PISA 2022 Results (Volume I)*, 2023), reading ability is one of the key indicators of literacy that determines students' readiness to face the learning challenges of the 21st century.

The results of the 2022 Programme for International Student Assessment (PISA) show that Indonesian students' reading literacy skills remain below the average of OECD member countries, making the improvement of reading and text comprehension skills starting in elementary school a continuing concern. This situation serves as a crucial foundation for developing more effective learning innovations. In line with this, the results of the pretest administered to fourth-grade students at SDN Dukuh 08 Pagi before the intervention showed that the average reading comprehension score in the experimental class was 78.17, while in the control class it was 77.17. The minimum scores obtained by students were 72 in the experimental class and 71 in the control class, while the maximum scores reached 84 in the experimental class and 83 in the control class. These data indicate that students' initial reading and text comprehension skills still vary, necessitating learning strategies capable of optimizing the reading and text comprehension skills of all students.

One learning approach considered capable of increasing student engagement is Game-Based Learning (GBL). GBL is a learning approach that integrates game elements into the learning process, thereby creating an active, enjoyable, and meaningful learning experience. The use of games in learning is based on constructivist theory, which states that knowledge is actively constructed through learning experiences and interactions with the environment (Belay, 2022). Furthermore, the use of digital media such as Wordwall is supported by the Cognitive Theory of Multimedia Learning developed by (Mayer & Fiorella, 2022), which explains that presenting information through a combination of text, images, and interactive activities can reduce cognitive load and improve students' understanding of the learning material.

Various previous studies have shown that the implementation of Game-Based Learning and the Wordwall platform has a positive impact on the learning process. For example, a study by (Putri et al., 2025) showed that Wordwall can increase the learning motivation of elementary school students. Another study by (Rohman et al., 2022) found that the use of Game-Based Learning affects students' learning outcomes across various subjects. Meanwhile, (Nur Sukarno et al., 2025) reported that Wordwall can increase student engagement during the learning process.

Nevertheless, these studies still have several limitations. First, most studies focus primarily on improving learning motivation, general learning outcomes, and student engagement, while studies that specifically measure reading comprehension of descriptive texts remain relatively limited. Second, most studies have not examined the effectiveness of Wordwall assisted Game-Based Learning among elementary school students using reading comprehension indicators that include the ability to identify main ideas, find detailed information, make inferences, and summarize the content of a text. Third, there are still few studies that integrate the Game-Based Learning approach with Wordwall as a reading comprehension strategy in the context of Indonesian elementary schools.

Based on this synthesis, there is a research gap in the form of limited empirical evidence regarding the effectiveness of implementing Game-Based Learning using Wordwall on the reading comprehension skills of fourth-grade elementary school students when reading descriptive texts. Therefore, this study was conducted to address this gap by examining the effect of Game-Based Learning aided by Wordwall on students' reading comprehension skills.

The significance of this study lies not only in its use of a quasi-experimental design but also in its scientific contribution to expanding the body of research on the effectiveness of Wordwall-assisted game-based learning in improving elementary school students' reading comprehension of descriptive texts. This study integrates a game-based learning approach with

interactive digital media to develop reading skills, which have thus far been studied primarily from the perspectives of motivation and general learning outcomes. Thus, this study is expected to provide empirical evidence regarding the implementation of Wordwall-assisted Game-Based Learning as an effective learning strategy for improving elementary school students' reading comprehension skills.

METHOD

This study employed a quantitative method using a pretest-posttest control group quasi-experimental design. This design was used to compare students' reading comprehension skills before and after the intervention in the experimental and control classes. The research design is presented in Table 1.

Table 1. Group Design

Class	Pretest	Treatment	Posttest
Experiment	O ₁	X ₁	O ₂
Control	O ₃	X ₁	O ₄

This study was conducted at SDN Dukuh 08 Pagi, East Jakarta, during the even semester of the 2025/2026 school year. The study population consisted of all 60 fourth-grade students, divided into classes IVA and IVB, with 30 students in each class. The sampling technique used was saturation sampling, meaning that the entire population was included as the study sample. The designation of the experimental and control classes was based on the class assignments established by the school; therefore, no randomization of students was performed. Class IVA was designated as the experimental class, while Class IVB served as the control class. Before the intervention was administered, both classes first took a pretest to assess their initial reading comprehension abilities and ensure that the baseline conditions of the two groups were relatively equivalent.

The research instrument consisted of a multiple-choice test of reading comprehension of descriptive texts, designed based on reading comprehension indicators, including identifying main ideas, locating specific information, understanding the meaning of vocabulary in context, connecting information within the text, and drawing conclusions. The initial instrument consisted of 20 test items. The results of the validity test using the point-biserial correlation showed that 15 items were deemed valid, while 5 items were deemed invalid. Furthermore, the results of the reliability test using the Kuder-Richardson 20 (KR-20) formula yielded a coefficient of 0.723, indicating that the instrument has high reliability and is therefore suitable for use as a data collection tool.

The research procedure began with administering a pretest to the experimental and control classes. Next, the experimental class received instruction using the Wordwall-assisted Game-Based Learning model, while the control class received conventional instruction. The treatment was conducted over two sessions, with each session lasting 2×35 minutes. The entire learning process in both classes was conducted by the same researcher using the same materials, learning objectives, and time allocation. The only difference between the treatments was the use of the Wordwall-assisted Game-Based Learning model in the experimental class. After the entire treatment was completed, both classes took a posttest using the same instrument as the pretest. The learning stages in the experimental class are presented in Table 2.

Table 2. Of Implementing Game-Based Learning

Stage	Learning activities
Introduction	The researcher begins the lesson, explains the learning objectives, conducts an apperception activity, and motivates the students
Presentation of Material	The researcher explains the descriptive text material as preparation for the game activity
Game-Based Learning Using Wordwall	Students complete an interactive Wordwall game that includes reading comprehension questions, such as identifying the main

	idea, recognizing specific details, understanding vocabulary meanings in context, and drawing conclusions. The researcher guides the students throughout the game
Feedback	The researcher discusses the students' answers, provides reinforcement, and clarifies concepts that are not yet fully understood
Conclusion	The researcher and students summarize the material and reflect on the learning activity

The research data were analyzed using IBM SPSS version 29. The analysis began with descriptive statistics to determine an overview of the pretest and posttest results. Next, prerequisite tests were conducted, including the Shapiro-Wilk normality test and Levene's test of homogeneity. Hypothesis testing was performed using an independent samples t-test at a significance level of 0.05 to determine the difference in reading comprehension ability between the experimental and control classes. Additionally, the effect size was calculated using Cohen's d to determine the magnitude of the impact of implementing Wordwall-assisted game-based learning on students' reading comprehension ability.

RESULTS AND DISCUSSION

Results

A descriptive analysis was conducted to provide an overview of the students' ability to read and understand descriptive texts before and after the intervention. The results of the analysis showed that both groups experienced an increase in scores after the instruction. However, the increase in the experimental class was greater than that in the control class. The control group's average pretest score of 77.17 increased to 88.70 on the posttest, while the experimental group's average score rose from 78.17 to 93.73 after participating in Game-Based Learning supported by Wordwall. These findings indicate that game-based learning yields better learning outcomes than conventional instruction.

To examine students' reading comprehension performance before and after the implementation of Game-Based Learning assisted by Wordwall, descriptive statistical analysis was conducted on the pretest and posttest scores of both the experimental and control groups. The results are presented in Table 3.

Table 3. Descriptive Statistics of Students' Reading Comprehension Scores

Group	N	Mean	Standard Deviation	Minimum	Maximum
Pretest Control	30	77.17	3.19	71	83
Posttest control	30	88.70	4.87	81	100
Pretest experimental	30	78.17	3.19	72	84
Posttest experimental	30	93.73	3.15	89	100

Table 3 presents the descriptive statistics of students' reading comprehension scores in both the experimental and control groups before and after the learning intervention. Prior to the intervention, the mean pretest scores of the experimental group ($M = 78.17$) and the control group ($M = 77.17$) were relatively similar, indicating that both groups had comparable initial reading comprehension abilities. After the intervention, the mean posttest score of the experimental group increased to 93.73, while the control group achieved a mean score of 88.70. Although both groups showed improvement, the increase in the experimental group was greater than that of the control group. This finding indicates that students who learned through Game-Based Learning assisted by Wordwall demonstrated better improvement in reading comprehension than students who received conventional instruction. In addition, the relatively small standard deviation values suggest that students' scores within each group were fairly consistent, indicating that the learning outcomes were not concentrated only among a few students but were experienced by most participants.

Before conducting hypothesis testing, the data were examined using the Shapiro–Wilk normality test. The results are presented in Table 4.

Table 4. Result of The Normality Test

Class	Kolmogorov-Smirnov			Shapiro-Wilk		
	statistic	df	Sig.	Statistic	df	Sig.
Pretest Control	0.085	30	0.200	0.977	30	0.744
Posttest Control	0.109	30	0.200	0.949	30	0.154
Pretest Experimental	0.085	30	0.200	0.977	30	0.744
Posttest Experimental	0.109	30	0.200	0.961	30	0.325

Table 4 presents the results of the Shapiro–Wilk normality test conducted before hypothesis testing. The significance values for the pretest and posttest scores of both the experimental and control groups were 0.744, 0.154, 0.744, and 0.325, respectively. All of these values are greater than the significance level of 0.05, indicating that the data are normally distributed. Therefore, the assumption of normality required for parametric statistical analysis was fulfilled. Since the data met this assumption, further analysis using the Independent Samples t-test could be conducted appropriately.

Since the data met the assumption of normality, the next prerequisite analysis was the homogeneity of variance test. This test was conducted to determine whether the variances of the experimental and control groups were homogeneous before proceeding to the hypothesis testing. The results of the homogeneity test are presented in Table 5.

Table 5. Result of The Homogeneity Test

Variable	Levene Statistic	df1	df2	Sig.
Based on Mean	2.413	3	116	0.070
Based on Median	2.120	3	116	0.102
Based on Median and with adjusted df	2.120	3	84.297	0.104
Based on trimmed mean	2.329	3	116	0.078

Table 5 presents the results of Levene's Test for homogeneity of variance. The analysis produced a significance value of 0.070, which is higher than the predetermined significance level of 0.05. This result indicates that the variances of the experimental and control groups are homogeneous, meaning that the score distributions of the two groups do not differ significantly. Consequently, the homogeneity assumption for conducting the Independent Samples t-test was satisfied, allowing the hypothesis testing to proceed.

Since both the normality and homogeneity assumptions were satisfied, the hypothesis testing was conducted using the Independent Samples t-test to determine whether there was a significant difference in reading comprehension achievement between the experimental and control groups after the implementation of Game-Based Learning assisted by Wordwall.

After confirming that the assumptions of normality and homogeneity were met, the hypothesis was tested using the Independent Samples t-test. The results are presented in Table 6.

Table 6. Result Of The Independent T-Test

Variable	F	Sig.	t	df	Sig.(2-tailed)	Mean Difference
Reading Comprehension	3.799	0.056	-4.752	58	<0.001	-5.033

Table 6 shows that the Levene's Test significance value was 0.056, which is greater than 0.05, indicating that the assumption of equal variances was satisfied. Therefore, the hypothesis testing was interpreted using the Equal Variances Assumed results. The Independent Samples t-test produced a t value of -4.752 with 58 degrees of freedom (df) and a significance value (Sig. 2-tailed) of < 0.001, which is lower than the significance level of 0.05. These findings indicate a statistically significant difference in students' reading comprehension scores between

the experimental and control groups. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted.

Furthermore, the mean difference between the two groups was -5.033 , indicating that the students who participated in Game-Based Learning assisted by Wordwall achieved higher reading comprehension scores than those who received conventional instruction. This finding suggests that the implementation of Game-Based Learning assisted by Wordwall had a significant positive effect on students' reading comprehension skills.

Although the hypothesis test indicates whether the difference between the experimental and control groups is statistically significant, it does not describe the magnitude of the treatment effect. Therefore, an effect size analysis was conducted using Cohen's d to determine the practical impact of Game-Based Learning assisted by Wordwall on students' reading comprehension skills.

Table 7. Effect Size				
Value	Standardizer	Point Estimate	95% Confidence Interval	
			Lower	Upper
	Cohen's d	1.227	1.775	0.670

Table 7 presents the results of the effect size analysis using Cohen's d . The analysis yielded a Cohen's d value of 1.227, which is classified as a large effect according to Cohen's criteria. This finding indicates that the implementation of Game-Based Learning assisted by Wordwall had a substantial practical impact on students' reading comprehension skills. In addition to producing a statistically significant difference between the experimental and control groups, the intervention also demonstrated high practical effectiveness. Therefore, the use of Game-Based Learning assisted by Wordwall can be considered an effective instructional approach for improving elementary school students' reading comprehension.

DISCUSSION

The results of the study indicate that the application of Game-Based Learning assisted by Wordwall has a positive and significant influence on the reading comprehension ability of fourth-grade elementary school students. This is indicated by an increase in the average posttest score in the experimental class which is higher than the control class. In addition, the results of the Independent Samples t-test show a significant difference between the two groups (Sig. <0.001), while the effect size analysis produces a Cohen's d value = 1.227 which is included in the large effect category. These findings indicate that the use of Game-Based Learning assisted by Wordwall not only provides a statistically significant effect, but also has a large practical impact in improving students' reading comprehension abilities.

This improvement in reading comprehension skills can be explained through the characteristics of Game-Based Learning, which integrates learning objectives with game elements, thus encouraging active student engagement in the learning process. During learning, students not only passively read descriptive texts but also engage in activities such as identifying main ideas, finding detailed information, understanding vocabulary meanings based on context, and drawing conclusions through various games on the Wordwall. These activities encourage students to actively build understanding through meaningful learning experiences. These results align with a systematic review by (Guan et al., 2024) which concluded that Game-Based Learning can increase engagement, motivation, cognitive processes, and learning outcomes in elementary school students because students play an active role in constructing knowledge during learning.

In addition to increasing learning engagement, Wordwalls also support reading comprehension by presenting material through interactive activities and providing immediate feedback. When students receive feedback after answering each question, they can immediately identify errors and improve their understanding of the reading content. This process helps

students construct a better representation of the meaning of the text they read. Numerous studies on reading comprehension skills show that active, interactive, and student-centered learning produces better results than learning that focuses solely on one-way presentation of material (Triana et al., 2024).

The findings of this study also indicate that the use of Wordwalls can create a more enjoyable learning environment, enabling students to focus more effectively during the reading process. Game elements such as challenges, scoring, and feedback motivate students to complete each learning activity with greater enthusiasm. This environment increases students' attention to the reading content and helps them connect important information within the text, making the reading comprehension process more effective. In other words, the improvement in reading comprehension in this study was influenced not only by the media used but also by increased cognitive engagement and student motivation during the learning process.

The results of this study reinforce the findings of previous studies showing that game-based media can improve the quality of learning in elementary schools. However, this study provides a more specific contribution because it tests the effect of Game-Based Learning assisted by Wordwall on the reading comprehension ability of fourth-grade elementary school students using a quasi-experimental design with an experimental group and a control group. Therefore, this study provides empirical evidence that the integration of game-based learning models with interactive digital media not only increases learning motivation but also significantly improves students' reading comprehension ability.

The findings of this study align with those of (Maryam et al., 2024) who demonstrated that game-based learning can improve learning motivation, student engagement, and the quality of the learning experience through challenging and enjoyable activities. This was also evident in this study, where students demonstrated high enthusiasm during the Wordwall game, making them more active in understanding the contents of descriptive texts. Furthermore, the results of this study support the findings of (Frans et al., 2023) who stated that improving reading comprehension requires active and contextual learning strategies so that students not only read text but also construct meaning from the information obtained. In this study, the game activities in Wordwall provided students with the opportunity to identify main ideas, find important information, and obtain direct feedback, thus optimizing the reading comprehension process.

The results of this study are also consistent with the research of (Istiqomah Afifah et al., 2025), (Diva Ayu Riskinasih & Dina Nurmalisa, 2025), and (Afiyah Nur Naila & Wahyuningsih, 2023) which showed that the use of Wordwall can improve student motivation, engagement, and learning outcomes. However, this study has a different contribution because it not only evaluates the use of Wordwall media, but also integrates it with a Game-Based Learning approach to improve the reading comprehension ability of descriptive texts through a quasi-experimental design with an experimental group and a control group. Thus, this study provides stronger empirical evidence regarding the effectiveness of implementing Game-Based Learning assisted by Wordwall on the reading comprehension ability of elementary school students.

This study has several limitations. First, the study was conducted in only one school with 60 students as respondents, so the results cannot be generalized to a wider population. Second, the treatment was given in two sessions, so the long-term effectiveness of using Game-Based Learning with Wordwall assistance is unknown. Therefore, further research is recommended to involve more schools, a larger sample size, and a longer treatment duration to obtain a more comprehensive picture of the effectiveness of Game-Based Learning with Wordwall assistance on students' reading comprehension skills.

CONCLUSION

This study shows that the implementation of Game-Based Learning assisted by Wordwall has a positive and significant effect on the reading comprehension ability of fourth

grade elementary school students. The results of the analysis show that the reading comprehension ability scores of students in the experimental class are higher than those of the control class after being given treatment. In addition, the results of the Independent Samples t-test show a significant difference between the two groups, while the effect size value (Cohen's $d = 1.227$) is included in the large effect category, which indicates that the implementation of Game-Based Learning assisted by Wordwall has high effectiveness in improving students' reading comprehension abilities.

This research contributes to the development of Indonesian language learning, particularly in reading comprehension of descriptive texts in elementary schools. The research findings indicate that the integration of the Game-Based Learning approach with the digital media Wordwall can create more active, interactive, and student-centered learning. Therefore, the results of this study can be used as an alternative learning strategy that teachers can use to improve reading comprehension skills while encouraging active student participation during the learning process.

Furthermore, this study has implications for the development of digital learning media in elementary schools. The use of Wordwall demonstrates that game-based digital media not only serves as an evaluation tool but can also be utilized as a learning tool that supports student engagement, provides direct feedback, and creates a more engaging and meaningful learning experience. Therefore, teachers are encouraged to integrate interactive digital media appropriately according to learning objectives to enhance the effectiveness of the learning process.

This study has limitations in that it was conducted in only one school with a sample size of 60 students and the treatment was administered over two sessions. Therefore, future research is recommended to involve a larger sample size, be conducted in several schools with different characteristics, and apply the treatment over a longer period of time so that the effectiveness of Game-Based Learning with Wordwalls can be studied more comprehensively.

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