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The Influence of Gamification Learning Model with Wordwall Assistance on Conceptual Understanding of the Material on the Properties and Changes in the Form of Objects at SD Negeri 1 Bubusan

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Abstract

Low conceptual understanding among elementary students regarding phase changes in science lessons remains a challenge, mainly due to monotonous and less innovative teaching methods. This study aims to examine the effect of gamification-based learning assisted by Wordwall on improving students' conceptual understanding. A quantitative approach with a pre-experimental one-group pretest-posttest design was used. The instrument consisted of 15 multiple-choice questions validated by experts. The data were analyzed using normality test, homogeneity test, paired sample t-test, and N-Gain, assisted by SPSS version 30. The results show an increase in the average score from 76.27 (pretest) to 89.23 (posttest), with a significant value of 0.001 (< 0.05). The average N-Gain score was 0.5014, indicating a moderate improvement. These findings indicate that gamification learning supported by Wordwall significantly enhances students' conceptual understanding. The integration of Wordwall into gamified instruction makes science learning more interactive, enjoyable, and meaningful for elementary students.

Keywords: Gamification, Wordwall, Conceptual Understanding, Science, Elementary School.

Pengaruh Model Pembelajaran Gamifikasi dengan Bantuan Wordwall terhadap Pemahaman Konseptual Materi Sifat dan Perubahan Bentuk Benda di SD Negeri 1 Bubusan

Abstrak

Rendahnya pemahaman konsep siswa terhadap materi perubahan wujud benda dalam pelajaran IPA masih menjadi tantangan, akibat metode pembelajaran yang monoton dan kurang inovatif. Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran gamifikasi berbantuan media *Wordwall* terhadap peningkatan pemahaman konsep siswa kelas IV SD Negeri 1 Bubusan. Penelitian menggunakan pendekatan kuantitatif dengan desain *pre-eksperimental (one-group pretest-posttest)*. Instrumen berupa 15 soal pilihan ganda yang telah divalidasi ahli. Data dianalisis menggunakan uji normalitas, homogenitas, *paired sample t-test*, dan *N-Gain* dengan bantuan SPSS versi 30. Hasil menunjukkan adanya peningkatan nilai rata-rata dari pretest 76,27 menjadi 89,23 pada posttest, dengan signifikansi 0,001 ($< 0,05$). Rata-rata skor *N-Gain* sebesar 0,5014 tergolong sedang. Hasil ini membuktikan bahwa gamifikasi berbantuan *Wordwall* berpengaruh signifikan terhadap peningkatan pemahaman konsep. Integrasi *Wordwall* dalam pembelajaran menjadikan proses belajar IPA lebih interaktif, menyenangkan, dan bermakna bagi siswa sekolah dasar.

Kata kunci: Gamifikasi, *Wordwall*, Pemahaman Konsep, IPA, Sekolah Dasar.

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INTRODUCTION

Education is a planned and systematic process designed to form individuals who are able to face the challenges of life through the development of all their potential. The purpose of education is not only limited to improving academic abilities, but also involves the formation of character, moral values, social skills, and readiness to face the future. Quality education is able to create a generation that is not only intellectually intelligent, but also emotionally and socially mature. (Rahman et al., 2022) emphasizes that education plays an important role in shaping individual intelligence, character, and skills for personal and social life. In this context, teachers as learning facilitators are required to be able to design learning that encourages students to develop actively, critically, and creatively. Changes in student characteristics in the digital era require a more innovative and flexible learning approach, including in terms of the use of technology and learning media.

Along with the rapid advancement of information and communication technology, the world of education has undergone a significant transformation. Technology has changed the way students learn and the way teachers teach, creating space for more contextual and engaging learning models. (Herwinda et al., 2022) revealed that educators are required to present innovative learning approaches so that the learning process becomes effective and interesting for students. One approach that has received widespread attention is gamification, namely the application of game principles to the learning process. According to (The Greatest Showman, 2023) the gamification approach is not only able to create a more enjoyable learning atmosphere, but has also been proven to increase student participation, motivation and enthusiasm for learning. This is very relevant to the characteristics of the current generation who grew up in a digital culture, accustomed to interactive applications and games in everyday life.

Gamification in education refers to the use of game elements such as challenges, points, badges, leaderboards, rewards, and achievement satisfaction in a learning environment to increase student motivation and engagement. (Putra et al., 2024) explains that these elements not only serve as entertainment, but also as a strategy to build students' emotional involvement in the learning process. Especially for elementary school students, this approach is very suitable because they naturally like playing activities. (Hidayat et al., 2021) stated that elementary school students tend to have an active, kinesthetic, and challenge-loving learning style. Therefore, gamification is not only an innovative approach, but also an effective solution to improve conceptual understanding in complex and abstract subjects such as Natural Sciences (IPA), which are often considered difficult by most students.

Science lessons have a strategic position in equipping students with basic scientific knowledge and logical and analytical thinking skills in dealing with various real-life problems. Science is also a means to raise awareness of the importance of protecting the environment and developing science process skills from an early age. However, the reality in the field shows that science learning still faces various obstacles. (Rusmansyah et al., 2023) stated that students often find it difficult to understand science concepts because the presentation is too theoretical and not contextual enough. (Ilma et al., 2024; Sari & Yarza, 2021) revealed that science is often considered difficult because of the abstract characteristics of the material and monotonous delivery methods. (Zulfah, 2023; Pinta et al., 2024) added that the low concentration of students' learning and the lack of innovation in the presentation of materials by teachers are factors causing students' weak understanding of this subject. Initial observation data and formative assessment results conducted at SD Negeri 1 Bubusan showed that most fourth grade students had not achieved the Learning Objective Completion Criteria (KKTP) of 70, which indicates the need for innovation in learning strategies.

This condition emphasizes the importance of implementing interactive and fun learning models as an effort to bridge the gap between subject matter and student

understanding. One relevant and easy-to-implement solution is the use of digital media based on educational games such as Wordwall. Wordwall is a web-based application that allows teachers to create various interesting learning games, such as quizzes, crosswords, pair matching, and random wheels. (The Sun, 2024; Andini, 2022) stated that Wordwall is able to present learning materials in a more visual and interesting form, thus encouraging active student involvement in learning. More than that, (Calvin et al., 2023; Turohmah et al., 2020) added that Wordwall can also be used in group and individual learning, and supports teachers in monitoring the development of student understanding directly and interactively. With its flexibility and ease of use, Wordwall is a potential tool to transform conventional learning into something more dynamic and effective.

Previous studies have shown that the use of Wordwalls in learning has a positive impact on students' interest and learning outcomes. (Zulfah, 2023; Hasanah et al., 2023; The Last Supper, 2022) reported that Wordwall is able to increase student engagement in the learning process and help them understand the subject matter more easily. However, most of these studies still focus on the motivational aspects and learning outcomes in general, and have not specifically examined the integration of Wordwall into a systematic learning model framework such as gamification. In fact, if Wordwall is used in a structured gamification model that is oriented towards strengthening conceptual understanding, the potential for increasing learning outcomes can be more optimal. Through proper integration, Wordwall not only functions as a visual aid, but also as part of a strategy that encourages students' cognitive development and creative thinking skills.

Therefore, this study aims to fill this gap by examining the effect of the Wordwall media-assisted gamification learning model on the understanding of science concepts in the material on the properties and changes in the state of objects. The main focus of this study is to analyze how Wordwall can be utilized not only as a medium for delivering material, but also as a main component in a gamification strategy designed to increase students' motivation, conceptual understanding, and positive perceptions of science subjects. With this approach, it is hoped that the learning process will be more meaningful, enjoyable, and able to increase students' absorption of the material being taught. Furthermore, this study is expected to be able to provide practical contributions for teachers in developing innovative learning and encouraging the creation of a learning environment that is adaptive to the needs of 21st century students.

METHODS

This study uses a quantitative approach with a pre-experimental design type, namely One-Group Pretest-Posttest Design to determine the effect of the gamification learning model on students' conceptual understanding. The subjects of the study were all 18 fourth-grade students of SD Negeri 1 Bubusan in the 2024/2025 academic year, who were selected using a saturated sampling technique. Data collection was carried out through observation and written tests in the form of 20 multiple-choice questions that had been tested for validity and reliability using Pearson correlation and Alpha Cronbach. Data analysis techniques include normality tests (Shapiro-Wilk), homogeneity tests (Levene), hypothesis tests (Paired Sample t-Test), and N-Gain tests to measure improvements in student learning outcomes. The analysis was carried out with the help of SPSS software version 30 and was set at a significance level of 0.05.

FINDINGS AND DISCUSSION

This research was conducted at SD Negeri 1 Bubusan, located on Jalan Raya Kayuagung Palembang, Bubusan Village, Jejawi District, Ogan Komering Ilir Regency, South Sumatra Province. This study aims to determine the effect of gamification learning models on students' conceptual understanding at SD Negeri 1 Bubusan.

From the research that has been done, this research began with a consultation with material experts where the researcher submitted an instrument from 20 questions obtained 15 questions after being tested on grade V students of SD Negeri 1 Bubusan. After the instrument test was carried out, 15 pretest questions were given to students before the material explanation, and 15 posttest questions were given to students after the material explanation. The questions were given to class IVB which consisted of 18 students. The pretest questions were given to determine the conditions before using the gamification learning model with the help of wordwall and the posttest questions were given after using the gamification learning model with the help of wordwall and the questions aimed to determine the learning outcomes of students in the ability to understand the concept of the material on changes in the state of the object. This data analysis was obtained from the pretest and posttest scores of students in the experimental class, namely class IVB, which are presented in the following table:

Table 1. Calculation of Pretest and Posttest Results

	Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
Pretest Score	18	60	100	76.27	14,693
Posttest Value	18	73	100	89.23	10,275
Valid N (listwise)	18				

Based on the table above, it can be seen that the average data from the posttest scores of class IVB was 89.23 after the wordwall-assisted gamification learning model was applied and the average pretest score in class IVB was 76.27 before the wordwall-assisted gamification learning model was taught. Before conducting analysis using hypothesis testing, namely paired sample t-test, a normality test is first conducted to ensure that the data comes from a normally distributed population. This normality test is conducted using SPSS version 30 software. The results of the normality test calculation using SPSS version 30 can be seen in the following table:

Table 2. Normality Test Results

	Tests of Normality		
	Statistics	Shapiro Wilk	Sig.
Pretest	,932	18	,213
Posttest	,953	18	,482

Based on the results of the normality test calculations carried out using Shapiro-Wilk assisted by SPSS version 30 above, the significant pretest value in the experimental class was 0.213 and the significant posttest value in the experimental class was 0.482. The pretest value in the experimental class was $0.213 > 0.05$ and the posttest value in the experimental class was $0.482 > 0.05$. Based on the requirements for data normality testing, it can be concluded that the data is normally distributed. The homogeneity test aims to ensure that the variance between sample groups is uniform, so that the statistical analysis carried out can produce valid conclusions. The results of the homogeneity test can be seen in the table below:

Table 3. Results of Homogeneity Test

Tests of Homogeneity of Variances					
		Levene Statistics	df1	df2	Sig.
Pretest	Based on Mean	3,382	1	34	,075
Posttest	Based on Median	1,381	1	34	,248

Based on the calculation of the table above, the value data in the Experiment class from the sample that has the same or homogeneous variance considering the significant value of $0.075 > 0.05$. Then the hypothesis test can be carried out. After conducting normality and homogeneity tests of the data, the next step is to test the hypothesis using the t-test. This test aims to determine whether the treatment given has a significant effect on the variables studied. The calculation results using SPSS version 30 show the data that can be seen in the following table:

Table 4. Hypothesis Test Results

Paired Samples Test										
		Mean	Paired Differences			t	df	Significance		
			Std. Deviation	Std. Error	95% Confidence Interval of the Difference			One-Sided p	Two-Sided p	
					Lower	Upper				
Pair 1	Pretest	-12,96667	9.83074	2.31713	-	-	-5,596	17	<,001	<,001
	Posttest				17,85538	8,07795				

Based on the results of the hypothesis test on the pretest and posttest values of the experimental class using the T test (paired Sample T test) above, it is known that the sig. (2-tailed) value is $0.001 < 0.05$, so H_0 is rejected and H_a is accepted. So it can be concluded that there is a difference between the results of the pretest and posttest values, which means that there is an influence of the gamification learning model with the help of wordwalls on the understanding of concepts in the Natural Sciences (IPA) subject of changes in the state of objects of class IVB students of SD Negeri 1 Bubusan. The results of the calculation using SPSS Version 30 Data are listed below:

Table 5. Paired Samples Statistics

Paired Samples Statistics					
Pair		Mean	N	Std. Deviation	Std. Error Mean
1	Initial understanding (Pretest)	76,2667	18	14.69302	3.46318
	Final understanding (Posttest)	89.2333	18	10.27498	2.42184

Based on the results of data analysis, the average pretest value was 76.2667 before treatment was given. Meanwhile, the average posttest value reached 89.2333. This study involved 18 students as samples. This shows that the average pretest result is $76.2667 < \text{posttest } 89.2333$, so that means descriptively there is a difference in the average learning

outcomes between the pretest and posttest results.. The comparison between the average pretest and posttest scores shows a significant increase in learning outcomes. Therefore, it can be concluded that the application of the gamification learning model with the help of Wordwall has a positive influence on the understanding of the concept of material changes in the form of objects in class IVB students of SD Negeri 1 Bubusan. The N-Gain approach is used to measure changes in the level of understanding of students relatively before and after participating in learning. This method provides a quantitative picture of the extent to which students have mastered the material given. The N-Gain score is in the range of -1 to 1, where positive values indicate an increase in learning outcomes after learning, while negative values indicate a decrease. The calculation results obtained through the SPSS version 30 application are displayed as follows:

Table 6. Descriptives of N-Gain Value

No.	Name	Pretest	Posttest	N-gain Score	Improvement	N-Gain_Percent
1	Gea	73.3	86.6	0.50	Currently	48.81
2	Aulia	66.6	86.6	0.60	Currently	59.88
3	Caca	66.6	80	0.40	Currently	40.12
4	Nazua	60	80	0.50	Currently	50.00
5	Cherry	100	100	0.00	No improvement	0.00
6	Raissa	93.3	100	1.00	Tall	100.00
7	Aqilah	100	100	0.00	No improvement	0.00
8	Rafiq	80	80	0.33	Currently	33.00
9	Rifqi	100	100	0.00	No improvement	0.00
10	Zahir	73.3	86.6	0.50	Currently	49.81
11	Adit	66.6	73.3	0.20	Low	20.06
12	Khalidin	60	86.6	0.66	Currently	66.50
13	Abdil	66.6	73.3	0.20	Low	20.06
14	Fahmi	66.6	93.3	0.80	Tall	79.94
15	Abid	60	73.3	0.33	Currently	33.25
16	Nabil	66.6	100	1.00	Tall	100.00
17	Pyro	93.3	100	1.00	Tall	100.00
18	Risk	80	100	1.00	Tall	100.00
Average				0.5014	Currently	50,1353

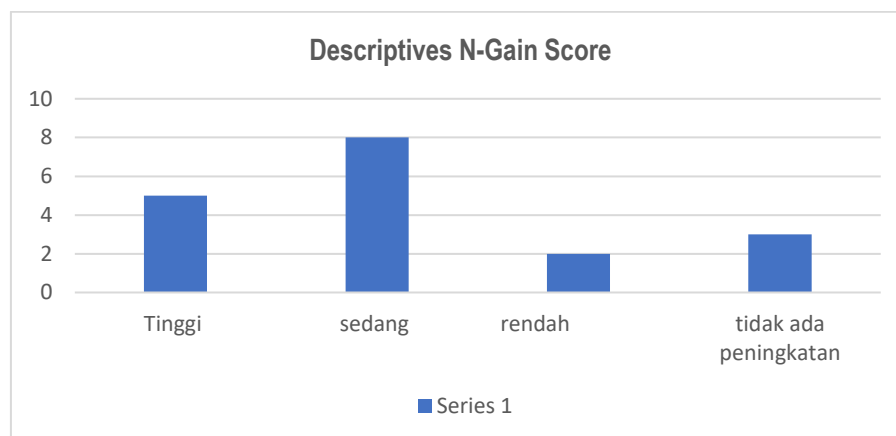


Figure 1. Descriptive N-Gain Score

Based on the results in the table above, it was identified that there was an increase in understanding of 5 out of 18 students (27.78%) in the "High" category. As many as 8 out of

18 students (44.44%) were in the "Medium" category. As many as 2 out of 18 students (11.11%) were in the "Low" category. As many as 3 out of 18 students (16.67%) did not experience a change in understanding because since the initial understanding the three students had mastered the material, so there was no increase in value (because it was already at its maximum from the beginning). Overall, the average N-Gain Score was 0.5014 and was included in the "Medium" category of understanding improvement.

CONCLUSION

Based on research conducted on class IVB students at school, it can be concluded that: The results of this study indicate that there is an influence of the application of the gamification learning model on students' understanding of the science concept of the material of changes in the state of objects. This can be seen from the results of the final grades of students in the class taught using the gamification learning model which are higher with an average value of 89.23%, which is a very good category with an average final grade of students who were previously taught using the gamification learning model, namely 76.27%, which is a good category. In addition, there is an influence of the learning model on students' understanding of the science concept of the material of changes in the state of objects and is also proven by the Paired sample t-test which obtained a sig. (2-tailed) value of 0.001. because the value of 0.001 is smaller than 0.05, it is concluded that the gamification learning model is able to provide a significant influence on students' understanding of the science concept of the material of changes in the state of objects.

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