

The Implementation of the Game-Based Learning Model through Kahoot on Mathematics Learning Outcomes of Students at SMP Negeri 2 Loceret

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ABSTRACT

The mathematics ability of students in Indonesia remains low, as shown by PISA and TIMSS results. One contributing factor is conventional teaching methods that do not actively engage students. This study aimed to examine the difference in mathematics learning outcomes on Data and Diagram material between conventional learning and Game-Based Learning using the Kahoot application for seventh-grade students at SMP Negeri 2 Loceret in the 2024/2025 academic year. A quasi-experimental method with a Post-test Only Control Group design was used. The population included 109 students, with purposive samples: class VII-A (32 students) as the control group and VII-B (26 students) as the experimental group. The instrument was a 16-item multiple-choice post-test. Data were analyzed using descriptive and inferential statistics, including normality, homogeneity, and t-tests. The experimental class scored higher (77.27) than the control class (60.00), with a significance value of 0.000 (<0.05), indicating a significant difference. Game-Based Learning through Kahoot effectively improves mathematics learning outcomes.

Keywords: Learning Model, Game-Based Learning, Kahoot Application, Learning Outcomes.

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INTRODUCTION

Education is an important foundation for individual and community progress. According to Law No. 20 of 2003, education functions to shape the character and educate the nation. Education essentially also plays a role in improving the knowledge, skills, and attitudes of individuals, so that it has an impact on the achievement of learning outcomes and performance in the short and long term (Hidayati et al., 2018). Thus, education requires individuals to be able to adapt and find solutions through logical and analytical thinking in dealing with various problems. Mathematics is a means to find solutions to problems faced by humans (Harahap, 2019).

Somakim (Ananda, 2024) concluded that the purpose of mathematics education in schools is to train students to think logically and solve problems. But in reality, the results of the 2022 Program for International Student Assessment (PISA) show that the results of Indonesian students' mathematics skills are still low. Of the 81 countries tested, Indonesia

occupied the 68th position. About 71% of students in Indonesia failed to achieve the minimum competency in mathematics (Ananda, 2024). This is directly proportional to the results of the *Trend in International Mathematics and Science Study* (TIMSS) 2015. Indonesian students' math results ranked 45th out of 50 countries. TIMSS categorizes research results in four levels, namely low, medium, high, and advanced. From these results it can be seen that 43% of Indonesian students were able to solve problems at a low level, 15% at an intermediate level, while only 2% were able to solve problems at a high level, and no students were able to solve problems at an advanced level (*T15-International-Results-in-Mathematics.Pdf.Crdownload*, n.d.). This clearly shows how low the mathematics learning ability of students in Indonesia is.

Based on the results of observations and interviews obtained by researchers from mathematics teachers and some students at SMP Negeri 2 Loceret, the majority of teachers still use lecture or conventional methods in the learning process. It was found that during the learning process, only a few students paid attention, while the rest were busy talking to themselves or playing *gadgets* for irrelevant activities. When teachers ask about the material, they tend to answer that they have understood the material, when in reality, no one really understands the material taught. In addition, many students state that they feel bored with math lessons and consider math as a difficult and scary subject.

These problems result in low student learning outcomes. According to Ekawati (Feitosa, 2020). Learning outcomes are a consequence of the learning process experienced by students after they undergo an assessment expressed in numerical form, which reflects their ability and success. The teacher's assessment of exercises and assignments shows that most learners have difficulty in solving problems related to understanding the subject matter. For example, they often struggle to analyze data or draw conclusions from the information presented. Common mistakes indicate that students' learning outcomes are still not optimal. If analyzed more deeply, this condition can be caused by the use of the lecture method by teachers, without making optimal use of learning media. As a result, learning feels monotonous and does not involve students actively, which causes boredom. In addition, math learning is often considered a scary and boring subject, further exacerbating the situation. Another contributing factor is the presence of *gadget* devices with various entertainment applications, social media, and games that are more interesting to learners than the subject matter. When learners prefer to play with these devices, their attention and concentration on learning is disrupted, so they tend not to listen or even follow the lesson properly. This condition is further exacerbated if the teacher cannot attract learners' attention with more interesting or interactive methods, which in turn exacerbates learners' habit of focusing more on their personal devices than the material being taught. The solution to this problem is the implementation of learning models that can be used in a creative and interactive way in the learning process. One of the creative and interactive learning models that can be applied in the learning process is the *Game-Based Learning* (GBL) learning model, through the *Kahoot* application.

The Game-Based Learning (GBL) model is a method that focuses on games created specifically to assist the learning process. In this model, learners not only listen to

explanations from educators, but also engage in various other activities, such as observing, doing, demonstrating, and acting. Kahoot is a technology-based learning platform that allows teachers and learners to create, share and play interactive quizzes or surveys. To improve learning outcomes, the role of educators as teachers and facilitators is very important. Educators not only convey knowledge, but also help students in the learning process (Aini, 2020)

Based on the results of previous research, namely 1) The results of research conducted by A.Rahayu (Rahayu et al., 2024) with the title "The Effect of Game-Based Learning Model One Board on Learning Outcomes of Madrasah Ibtidaiyah Learners". The results showed that the significance value (sig. 2-tailed) in the independent sample t-Test test was 0.000, which means it was smaller than 0.05. In addition, there is a difference in the average post-test results between the experimental class (85.19) and the control class (76.70). This shows that the game-based learning model has a positive effect on student learning outcomes. 2) In addition, research conducted by Akhmad Darmawan (Darmawan, 2020) entitled "The effect of using Kahoot on learning outcomes of biology scope material at SMAN 1 Muncar" The use of Kahoot in biology material shows a significant effect on student learning outcomes. The average post-test score for the experimental class using Kahoot reached 85.21, while the average score in the control class was only 76.72. This shows an increase in the average score of 8.49 when using Kahoot. With this method, learners become more engaged and encouraged to think more deeply about the topics studied, as well as helping them to build knowledge and reflect on the learning that has been done. 3) Research by Daniati and Darmawan (Daniati, 2024) also showed that Game-Based Learning (GBL) and the use of Kahoot proved effective in improving learning outcomes and making the learning process more fun. Kahoot is considered suitable with the character of today's learners because it is interactive and interesting. The combination of Game-Based Learning (GBL) and Kahoot is considered relevant and an area that needs further research.

Therefore, the researcher was encouraged to conduct a study with the title Application of Game- Based Learning Model (GBL) through Kahoot application on Mathematics Learning Outcomes in Data and Diagram Material for Grade VII Students of SMP Negeri 2 Loceret in the 2024/2025 academic year. By using this learning model, it is hoped that students can improve learning outcomes so that more students reach mastery in data and diagram material.

METHOD

This study uses a quantitative approach with the type of quasi-experiment to determine the difference in math learning outcomes in Data and Diagram material between conventional learning models and *Game-Based Learning* (GBL) learning models through the *Kahoot* application. The quantitative approach is used because it is able to measure data objectively through numbers and statistical analysis (Abraham & Supriyati, 2022). Meanwhile, Creswell (Agustina, 2022) states that the quasi-experimental design was chosen because it allows researchers to make comparisons between groups even.

The design used in this study was *Post-test Only Control Group Design*, where both groups were given a *post-test*, but only the experimental group received treatment in the form of a *Game-Based Learning (GBL) learning* model through the *Kahoot* application, while the control group used conventional learning (Tampubolon, 2023).

The research was conducted at SMP Negeri 2 Loceret with a population of all seventh grade students in the 2024/2025 academic year. According to (Sugiyono, 2020) population is the whole object or individual who has certain characteristics in accordance with the research criteria, and becomes the main target to draw conclusions based on the data obtained. Based on this, the population in this study were all seventh grade students of SMP Negeri 2 Loceret consisting of 4 classes with a total of 109 students. The sample is a set of elements taken from the population in a certain way based on specific criteria, and used as material for analysis in research (Subhaktiyasa, 2024). In this study, *purposive sampling* technique was used, namely the selection of samples intentionally in accordance with the research objectives. The samples selected were students of class VII-A with 32 students as the control class and VII-B with 26 students as the experimental class.

Data collection was carried out through test and documentation techniques. Test is an instrument used to assess the ability, understanding, or skills of students through a number of questions prepared according to research objectives (Dianingrum, 2020). In this study, researchers used a test in the form of 16 multiple choice questions prepared based on learning indicators and given to both groups to determine students' understanding of Data and Diagram material in class VII SMP Negeri 2 Loceret. Documentation is a data collection technique that functions as a complement and is used to support the validity of research results (Dianingrum, 2020). In this analysis, the researcher applies the level of mastery of the learning material according to the procedure designed by Depdikbud (2003). The category of student learning outcomes refers to the division of material mastery levels as shown in the following table:

Table 1. Material Mastery Level

<u>Mastery level</u>	<u>Learning outcome category</u>
0-34	Very low
35-54	Low
55-64	Medium
65-84	High
85-100	Very high

(Source: Rondius, 2012)

Data analysis used t-test to determine whether there was a significant difference in learning outcomes between the application of conventional learning models and *Game-Based Learning (GBL) learning* models through the *Kahoot* application.

FINDING AND DISCUSSION

RESEARCH RESULT

Based on the results of the post-test carried out in the control class and experimental class, the following results were obtained.

Table 2. Post-Test Results of Students' Mathematics Outcomes

Class	Average	Category
Control class	60,00	Medium
Experimental class	77,27	High

(Source: The data was processed by researchers using SPSS version 25,2025)

Before conducting the t-test, the prerequisite test was first carried out, namely the normality test and homogeneity test through SPSS Statistics version 25. The normality test was carried out to determine whether the data was normally distributed. The following are the decision-making criteria in the normality test: If the Sig. value > 0.05 , then the data is normally distributed, if the Sig. value is ≤ 0.05 , then the data is not normally distributed. The results of the normality test conducted by researchers can be seen in the following table:

Table 3. Normality Test Results

		<i>Tests of Normality</i>						
		<i>Kolmogorov-Smirnov^a</i>			<i>Shapiro-Wilk</i>			
	Class	Statistic	Df	Sig.	Statistic	Df	Sig.	
Math Learning	Control Class Post-test	.156	26	.102	.963	26	.454	
	Experimental Class Post-test	.156	26	.106	.930	26	.076	

a. Lilliefors Significance Correction

(Source: The data was processed by researchers using SPSS version 25)

The homogeneity test aims to determine whether the data variance in the experimental class and control class is homogeneous. The decision-making criteria in the homogeneity test are as follows: If the Sig. value > 0.05 , then the data variance between groups is considered homogeneous. If the value of Sig. ≤ 0.05 , then the data variance between groups is not homogeneous. The results of the homogeneity test conducted by researchers can be seen in the following table:

Table 4. Homogeneity Test Results
Test of Homogeneity of Variance

		<i>Levene Statistic</i>	df1	df2	Sig.
Math Learning	<i>Based on Mean</i>	1.018	1	50	.318
	<i>Based on Median</i>	.999	1	50	.322
	<i>Based on Median and with adjusted df</i>	.999	1	49.310	.322
	<i>Based on trimmed mean</i>	1.012	1	50	.319

(Source: The data was processed by researchers using SPSS version 25,2025)

After the prerequisite test is carried out, the post-test data is processed using the hypothesis test, namely the t test. the calculation results of the hypothesis test are as follows:

Tebel 5. Hypothesis Test Results

<i>Assumption</i>	<i>F</i>	<i>Sig.</i>	<i>T</i>	<i>Df</i>	<i>Sig. (2-tailed)</i>	<i>Mean Diff.</i>	<i>SE</i>	<i>95% CI Lower</i>	<i>Upper</i>
<i>Equal variances assumed</i>	1.018	.318	5.506	50	.000	17.269	3.137	10.969	23.569
<i>Equal variances not assumed</i>			5.506	48.53	.000	17.269	3.137	10.964	23.574

(Source: The data was processed by researchers using SPSS version 25,2025)

Based on the results of hypothesis testing, a significance value (Sig. 2-tailed) of 0.000 was obtained in the Equal variances assumed line, which is smaller than the significance level of 0.05. This shows that there is a significant difference between the learning outcomes of students in the control class and the experimental class. Thus, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. These results show that the Game-Based learning model has a significant effect on improving learning outcomes compared to the Conventional learning model on Data and Diagram material for Grade VII Students of SMP N 2 Loceret.

Learning activities using conventional learning models took place in class VII-A as the control class. Learning is done through the delivery of material using the lecture method, where the learning process is centered on the teacher, while students only listen, take notes, and occasionally ask questions. After finishing the learning process, the researcher conducted a post-test to evaluate the students' learning outcomes. The average score obtained by the control class was 60.00.

Learning activities using Game-Based Learning (GBL) model through Kahoot application took place in class VII-B as the experimental class. In the learning process, students use their respective gadgets to enter the Kahoot application. The teacher delivered the material through questions in Kahoot, which then became the basis for interactive

material explanation. In learning activities, students seemed active and enthusiastic. They answered the questions given through the application carefully and quickly because the ranking system that was displayed directly led to healthy competition. After the learning was completed, the researcher evaluated the post-test results. The average score obtained by the experimental class was 77.27.

DISCUSSION

Based Learning (GBL) models through the Kahoot application on Data and Diagrams material for Grade VII at SMP Negeri 2 Loceret for the 2024/2025 academic year. The instrument used was a learning outcome test that had been validated and tested for reliability, so that the data obtained was valid and could be used as a basis for analysis.

The results showed that the control class, which used conventional learning, obtained an average post-test score of 60.00, which is in the moderate category (Depdikbud, 2003), but still below the school's minimum passing grade. The learning process in this class tended to be teacher-centered, and student involvement was relatively low. In contrast, the experimental class that used the GBL model through Kahoot obtained an average post-test score of 77.27, which was in the high category. Learning activities in the experimental class were more interactive, and students were more active, enthusiastic, and motivated due to the game system and rankings in Kahoot.

The prerequisite test results showed that the data of both groups were normally distributed and homogeneous. Furthermore, the independent t-test produced a Sig. (2-tailed) value of $0.000 < 0.05$, so it can be concluded that there was a significant difference between the learning outcomes of students in the control class and the experimental class. Thus, the application of the GBL learning model through the Kahoot application proved to be more effective in improving mathematics learning outcomes compared to conventional learning.

CONCLUSION

Based on the theory supported by the results of data analysis and processing and referring to the formulation that has been described, the research results can be concluded: 1) The mathematics learning outcomes of students with the application of conventional learning models show the average post-test results reached 60.00 out of 32 students. The category of learning outcomes of students with the application of conventional learning models is moderate. 2). The mathematics learning outcomes of students with the application of the Game-Based Learning (GBL) learning model through the Kahoot application showed the average post-test results reached 77.27 of 26 students. The category of learning outcomes of students with the application of the Game-Based Learning (GBL) learning model is high. 3).Based on the results of hypothesis testing using the t-test through SPSS, the significance value (sig. 2-tailed) is 0.000, which is smaller than the significance level of 0.05. Thus it can be concluded that "There is a significant difference in Mathematics Learning Outcomes on Data and Diagram material between the Application of

Conventional Learning Models and Game-Based Learning Models (GBL) through the Kahoot application for VII grade students of SMP Negeri 2 Loceret for the 2024/2025 Study Year."

Based on the results of the study, researchers provide recommendations in the hope that they can be taken into consideration and improved to achieve the expected learning objectives. Adapaun recommendations that can be given based on the results of the study are 1) For teachers to consider using the Game-Based Learning (GBL) model through the Kahoot application to increase enthusiasm, active involvement, and understanding of students, especially in Data and Diagram material. 2) Schools are expected to support the implementation of technology-based learning by providing adequate facilities, stable internet connections, and teacher training in the use of digital media. 3) Students are expected to utilize media such as Kahoot optimally, participate actively, and use digital devices wisely for learning purposes. 4) For future researchers, it is recommended to expand the scope of research, both in terms of material, level of education, and other types of Game-Based Learning (GBL) media, as well as explore its effect on affective and psychomotor aspects.

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