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The Effect Of The Discovery Learning Model with The Card Matching Game on Students' Learning Activities in Science Material for Class VIII at Mts Ma'arif Ambulu

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Abstract

This study aims to analyze the effect of the Discovery Learning model, supported by the Card Matching Game media, on students' science learning activities in grade VIII at MTs Ma'arif Ambulu. The study used a quantitative approach with a quasi-experimental posttest-only nonequivalent control group design. The study sample consisted of 45 grade VIII students, divided into an experimental class (n = 24) that received Discovery Learning assisted by a Card Matching Game and a control class (n = 21) that received conventional learning. Learning activity data were collected using observation sheets that had been tested for validity by expert judgment and declared reliable, and were then analyzed using the Shapiro-Wilk normality test, Levene's Test for homogeneity, and Independent Sample T-Test at a significance level of 5%. The results of the descriptive analysis showed that the average learning activity for the control class was 28.93 and for the experimental class was 28.69, with the experimental class showing a more homogeneous distribution of data (SD = 2.221) compared to the control class (SD = 4.950). The results of the hypothesis test obtained a Sig. value. (2-tailed) of 0.839 (> 0.05), so H0 is accepted and H1 is rejected. This finding indicates that the implementation of Discovery Learning assisted by the Card Matching Game has not provided a statistically significant effect on student learning activities, which is thought to be influenced by the limited duration of treatment, the equality of the initial abilities of both classes, and the stage of student adaptation to discovery-based learning. This result provides empirical evidence that the effectiveness of a learning model depends on contextual factors, not merely on the model's theoretical superiority.

INTRODUCTION

Education is an important means of developing students' potential so that they can think critically and creatively and play an active role in community life. (Alpian et al., 2019) . Natural Sciences (IPA) as one of the core subjects not only emphasizes mastery of concepts, but also process skills and student learning activities during the learning process (Fatoni et al., 2014; Lubis et al., 2023)

Learning activities are students' physical, mental, and emotional involvement in the learning process, which plays a crucial role in supporting conceptual understanding and overall learning quality (Erlina & Sutarni, 2024; Handoko, 2019). High levels of learning activity indicate student participation in observing, listening, asking questions, discussing, writing, and responding to the material being studied (Widodo et al., 2022). One model that has the potential to encourage this active involvement is Discovery Learning, which emphasizes independent discovery of concepts through the stages of stimulation, problem formulation, data collection, data processing, verification, and generalization (K. Hasinah, 1973; Norita, 2023). Discovery Learning is a learning model that places students at the center of learning by having them discover concepts independently. This model is believed to improve learning activities because students are directly involved in observing, collecting information, processing data, and drawing conclusions (Fadillah et al., 2021; Marisya & Sukma, 2020).

However, the results of observations and interviews with science teachers at MTs Ma'arif Ambulu show that student learning activities are still relatively low: students tend to be passive, less courageous in expressing opinions, and not optimally involved in discussions or problem solving, partly due to the dominance of lecture methods that limit the space for active student participation. Low learning activity can be influenced by various factors, including the use of teacher-centered learning methods, low motivation to learn, low student self-confidence, and limited opportunities for students to be actively involved in learning activities (Busa, 2023; Salo, 2023). To strengthen student participation, this model can be combined with game-based learning media, such as the Card Matching Game, which involves matching pairs of cards to create a more interesting learning atmosphere (Rahmawati & Saputro, 2024). The use of game media, such as the Card Matching Game, can create a fun learning atmosphere, increase student interaction, and encourage active involvement in learning. Card-matching activities require students to work together, discuss, and think quickly to find matching pairs of cards (Nevyta et al., 2023; Ratnawati et al., 2025; Susanti, 2022).

Previous studies generally report that Discovery Learning can improve student activity and learning outcomes. Still, most of them use the Classroom Action Research (CAR) approach and have not combined it with educational game media such as Card Matching Games, especially in science learning at the MTs level (Hidayat, 2024; Mawardah et al., 2022). This gap forms the basis of this study, which aims to analyze the effect of the Discovery Learning model, assisted by Card Matching Games, on students' learning activities in the material on elements, compounds, and mixtures for class VIII MTs Ma'arif Ambulu.

Literature Review

Discovery Learning Model

The Discovery Learning Method is an approach to active study introduced by Jerome Bruner in the 1960s. Bruner emphasized that the learning process should be carried out through direct activity (learning by doing), in which participants actively acquire knowledge rather than

passively accept information from the teacher. Bruner's invention has roots in cognitive psychology and has become the basis for various new instructional approaches that emphasize the learner's active participation in the learning process.

Although Bruner is known as a pioneer of Discovery Learning, concept Study through invention has been influenced by earlier thinkers such as John Dewey, Jean Piaget, and Seymour Papert. Bruner argued that through the process of finding alone, participants can gain more meaningful, easily remembered knowledge because it is obtained directly from experience (Khasinah, 2021). In line with that, Hammer explained that Discovery Learning is a learning process that guides participants to educate themselves and reach conclusions based on activities and observations they make independently. Thus, this model pushes participants to educate, use, find, and discuss draft learning, so that the knowledge gained will be stored in memory longer and not easily forgotten (Suriadi, 2023).

Learning model: This emphasizes the importance of understanding concepts in a field of knowledge through active participation and education during the learning process. In its application, students are directed to observe activities, conduct experiments, or engage in action-based scientific inquiry to draw conclusions based solely on their findings. Therefore, Discovery Learning was assessed as effective in helping students overcome difficulties with control science concepts. An important feature of learning invention is that participants are expected to be able to form abstract knowledge, such as concepts and principles, by reasoning from concrete evidence (Khasinah, 2021).

Card Matching Game

Card Matching Game is a learning-based card game that contains paired concepts, such as questions and answers or words and pictures, which students must match. This media is designed to create active, fun, and interactive learning, so that students not only accept information passively but also engage in thinking, discussing, and competing in a healthy way to find an appropriate partner card. In-context learning methods support mastery of the material, deepen understanding of concepts, work in the same way, and increase students' responsibility to answer (Purba, 2023).

Characteristics Card Matching Game consists of two sets of cards that must be matched, such as picture – word or questions and answers, and can be played in individual and group settings. Characteristic educational, fun, interactive, and placing the student at the center of learning, while the teacher plays a role as facilitator. Practice concentration, accuracy, and the student's power of recall. Push Work is the same, competition is healthy, and involvement is active in understanding the material. The design is simple, flexible, and economical, and can be applied to various eye subjects, including Islamic Education, Mathematics, and Science (Ratnawati, 2025).

The purpose of the Use Card Matching Game is to increase power, memory, concentration, and understanding of the draft student in an active and fun way. Encourage involvement, work the same, communication, and motivation. Study in an atmosphere of healthy competitiveness. Developing affective and psychomotor aspects through social interaction and hand-eye coordination. Help students think critically and creatively to find an answer. Make learning more interesting, interactive, and less monotonous.

Application of the Discovery Learning Model with the Card Matching Game

The implementation of the learning model, Integrated Discovery Learning with Matching Card Game, is one of the efforts to create an active, interactive, and fun learning atmosphere. The

Discovery Learning Model, according to Bruner, emphasized the importance of active participation in learning, finding concepts and principles through direct involvement in the learning process. Learning is based on the constructivist theory, which holds that participants build knowledge through experiences and interactions with the environment (Ratnawati, 2025). In its application, Discovery Learning has six main steps, namely stimulation (giving stimulus), problem statement (identification of the problem), data collection (data collection), data processing (data processing), verification (proof), and generalization (concluding) (Khasinah, 2021).

METHODS

This study uses a quantitative approach with a *quasi-experimental posttest-only nonequivalent control group design, involving* an experimental class and a control class without full subject randomization. The research population was all eighth-grade students of MTs Ma'arif Ambulu in the 2025/2026 academic year. The sample was selected using a purposive sampling technique, thus selecting class VIII B as the experimental class (n=24), which received the Discovery Learning model treatment assisted by the Card Matching Game, and class VIII D as the control class (n=21), which received conventional learning with the lecture method. The total research sample was 45 students. Learning in each class was conducted in two meetings, covering the material on elements, compounds, and mixtures.

The independent variable in this study is the *Discovery Learning model, assisted by the Card Matching Game*, while the dependent variable is students' science learning activities. The research instrument is a student learning activity observation sheet that measures five indicators, namely visual, oral, listening, writing, and emotional activities. The instrument was first tested for validity through expert judgment *by* two validators who assessed the media, language, material, and instrument aspects, and was tested for reliability to determine the consistency of the measurements. The test results stated that the instrument is valid and suitable for use.

Data were analyzed using IBM SPSS Statistics version 28 through the following stages: (1) descriptive analysis to describe student learning activities in each class; (2) *Shapiro-Wilk normality test* to determine data distribution; (3) *Levene's Test homogeneity test* to determine the similarity of variance between groups; and (4) hypothesis testing using *Independent Sample T-Test* at a significance level of 5% to test the effect of the application of the learning model on student learning activities. Testing criteria: H_0 is accepted if the Sig. (2-tailed) value is > 0.05, and H1 is accepted if the Sig. (2-tailed) value is < 0.05.

RESULTS AND DISCUSSION

The results of the descriptive analysis of observational data on student learning activities in the experimental and control classes are presented in Table 1.

Table 1. Analysis Test Results Descriptive

Descriptives

	Class			Statistics	Std. Error
Student Grades	Ex	Mean		28.69	,453
		95% Confidence Interval for Mean	Lower Bound	27.75	
			Upper Bound	29.63	
		5% Trimmed Mean		28.68	
		Median		28.00	
		Variance		4,931	
		Standard Deviation		2,221	
		Minimum		25	
		Maximum		33	
		Range		9	
		Interquartile Range		4	
		Skewness		,254	,472
		Kurtosis		-,809	,918
	Knl	Mean		28.93	1,080
		95% Confidence Interval for Mean	Lower Bound	26.68	
			Upper Bound	31.18	
		5% Trimmed Mean		28.81	
		Median		28.50	
		Variance		24,507	
		Standard Deviation		4,950	
		Minimum		23	
		Maximum		38	
		Range		15	
		Interquartile Range		10	
		Skewness		,367	,501
		Kurtosis		-1,168	,972

There was no missing data (missing = 0) in either group, so all observations were deemed valid for analysis. The control class had an average learning activity of 28.93, slightly higher than the experimental class at 28.69. However, the experimental class showed significantly lower data diversity (SD = 2.221; range = 9) than the control class (SD = 4.950; range = 15). This finding indicates that although the average scores of both classes were relatively equal, the distribution of learning activities in the experimental class was more homogeneous, suggesting a more consistent and even distribution of student engagement throughout the learning process.

Prerequisite Analysis Test

Before hypothesis testing, the data are assessed using normality and homogeneity tests as prerequisites for parametric statistics.

Table 2. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Class	Statistics	df	Sig.	Statistics	df	Sig.
Student Grades	Ex	,163	24	,098	,958	24	,396
	Knl	,148	21	,200 *	,917	21	,075

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The Shapiro-Wilk significance values for the experimental class (0.396) and the control class (0.075) were both greater than 0.05, so the student learning activity data in both classes were deemed normally distributed and met the requirements for further testing using the Independent Sample T-Test. The homogeneity test was conducted using *Levene's Test*. The test results showed a significance value of 0.000 (<0.05), indicating that the posttest data variances in both classes were not homogeneous. Consequently, the t-test interpretation was based on the line " *Equal variances not assumed*."

Testing Hypothesis

Hypothesis testing aims to determine whether there is a difference in student learning activities between classes that use the Discovery Learning model assisted by the Card Matching Game and those that use conventional learning. The null hypothesis (H0) $_{states}$ that there is no difference in learning activities between the two classes. In contrast, H1 $_{posits}$ a difference in learning activities between the two classes.

Table 3. Results of the Homogeneity Test and *Independent t-Test*

Independent Samples Test

		t-test for Equality of Means						
		t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Student Grades	Equal variances assumed	-,215	43	,831	-,241	1,119	-2,499	2,017
	Equal variances not assumed	-,206	26,936	,839	-,241	1,172	-2,645	2,163

Equal variances not assumed, row, the Sig. (2-tailed) value is 0.839. This value is greater than 0.05 (0.839 > 0.05), so H0 $_{is}$ accepted, and H1 $_{is}$ rejected. Thus, there is no statistically significant difference in the average learning activity between classes that implement *Discovery Learning* assisted by *Card Matching Game* and classes that use conventional learning. However, the application of this model is shown to reduce inequality in activity among students, as evidenced by the experimental class's standard deviation, which is much lower than that of the control class.

Discussion

The results of the hypothesis test indicate that the application of *Discovery Learning* assisted by the *Card Matching Game* has not produced a significant difference in learning activities compared to conventional learning on the material of elements, compounds, and mixtures of class VIII MTs Ma'arif Ambulu. This finding is theoretically inconsistent with Bruner's view that Discovery Learning provides opportunities for students to discover concepts themselves through direct learning experiences, and thus should encourage greater active involvement than conventional learning. Similarly, the Ministry of Education and Culture outlines six stages *of Discovery Learning,* including stimulation, problem statement, data collection, data processing, *verification, and generalization,* which are conceptually relevant to the learning activity indicators used in this study. (Khasinah, 2023) .

Several contextual factors are thought to explain the lack of significant differences—first, the limited implementation duration. *Discovery Learning* requires a relatively long time because students must go through a gradual process of concept discovery, including exploration, discussion, analysis, and verification. (Hidayat, 2024; Marisya & Sukma, 2020) . The treatment implementation in this study took place in only two meetings. It occurred near the school academic period, so students did not have sufficient opportunity to optimize all stages of the model.

Second, the equivalence of initial student abilities between the experimental and control classes. Interviews with science teachers and Mid-Semester Assessment (PTS) scores indicate that both classes had similar academic characteristics and learning interests before the treatment was administered, reducing the likelihood that differences in learning activity were attributable to the treatment. Third, the structured quality of learning in the control class, coupled with teacher guidance, maintained student learning activity within the good category, resulting in a very small difference in the average score between the two classes and the experimental class.

Fourth, student readiness to participate in learner-centered learning. One of the weaknesses of Discovery Learning is that it requires students to be prepared for independent learning and have adequate prior skills, so not all students can immediately adapt to the discovery-based learning model. (Fadillah et al., 2021; Marisya & Sukma, 2020) . In this study, some students still tended to wait for teacher guidance when facing problems, indicating that they are still in the adaptation stage of the discovery-based learning model. The use of *the Card Matching Game media* successfully created a more enjoyable learning atmosphere. Students appeared enthusiastic about finding card pairs and discussing in their groups. Still, this enthusiasm was not enough to produce a statistically significant difference in learning outcomes unless it was supported by adequate learning time and continuous learning experiences.

This finding differs from the results of previous research, which reported an increase in student learning activity and motivation after implementing Discovery Learning, and that Discovery Learning can improve student learning activities (Agustina et al., 2024; Jayadiningrat

et al., 2019; Norita, 2023. These differences are thought to be influenced by differences in treatment duration, student characteristics, and different learning environment conditions. Variations in research design may lead to differences in results. Previous research generally used Classroom Action Research (CAR), which was conducted in several cycles, giving students more opportunities to adapt to differences in subject characteristics, treatment duration, learning materials, and school environmental conditions.

These insignificant results still have scientific value. Sugiyono (2008) emphasized that research results that do not show significant differences are still original and valid findings, considering that social phenomena are complex and influenced by many contextual variables. (Sugiyono, 2008) . This finding underscores that the effectiveness of a learning model is determined not solely by its theoretical superiority but also by student readiness, the duration of implementation, the equality of initial abilities, and learning environment conditions. The results of interviews with science teachers also reinforce this picture: qualitatively, teachers assessed that students in the experimental class appeared more enthusiastic, more active in group discussions, and more confident in expressing their opinions compared to the previous learning method dominated by lectures, a qualitative indication that was not fully captured by quantitative statistical tests due to the limited duration of the treatment.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the application of the Discovery Learning learning model assisted by Card Matching Games on the material of elements, compounds, and mixtures has not shown a statistically significant effect on the learning activities of class VIII students of MTs Ma'arif Ambulu, with a Sig. (2-tailed) value of 0.839 (> 0.05). However, the experimental class showed a more homogeneous distribution of learning activities than the control class, indicating more consistent student involvement. These results cannot be interpreted as evidence that Discovery Learning is ineffective in general; rather, they indicate that its effectiveness in this study is influenced by factors such as the limited treatment duration, the equality of students' initial abilities, and the stage of students' adaptation to discovery-based learning.

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