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The Effect of Discovery Learning Model on Student Learning Outcomes In Science Subjects In Elementery Schools

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ABSTRACT

This study aims to determine the effect of the Discovery Learning model on students' learning outcomes in the subject of Natural and Social Sciences (IPAS) at SDN 7 Rantau Bayur, Banyuasin Regency. The research used a True Experimental design with a Pretest-Posttest Control Group Design. The study involved two classes: the experimental class, which applied the Discovery Learning model, and the control class, which was taught using the lecture method. The results showed an increase in the average score from pretest to posttest in the experimental class, from 57.00 to 77.80. This improvement was greater than that of the control class, which only increased from 56.75 to 67.50. Statistical analysis using the Independent Samples t-test showed a significance value of 0.003 (<0.05), indicating that H_0 was rejected and H_a was accepted. Thus, it can be concluded that the Discovery Learning model has a positive effect on students' learning outcomes in IPAS material.

Keywords*: *discovery learning, learning outcomes, ipas material

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INTRODUCTION

Education is one of the most vital sectors in producing quality human resources and one of the key factors in preparing a quality young generation (Arsyad, 2021). With education, students are expected to have a smart personality, noble character, and have the ability for themselves or for life in the community. Education has a very important role in shaping the character and personality of students. Through the education process, students are expected to grow into individuals who are intelligent, noble, and have skills that are beneficial to themselves and the surrounding environment. Especially at the primary education level because primary school education is an important foundation for the development of students' knowledge and skills, both in the congnitive, affective, and psychomotor aspects so that an effective learning process is needed to improve this development (Ariasanti, 2021).

Student learning outcomes are an important indicator to measure the success of the learning process. According to (Kusnadi, 2020) Learning outcomes are one of the learning objectives that can be influenced by the classroom atmosphere that educators create when learning takes place and the ability of students obtained after carrying out learning activities. Low student learning outcomes are another problem that often arises in elementary schools. Based on data submitted by the Ministry of Education, Culture, Research and Technology (Kemendikbudristek) in the Basic Education Report 2024, only about 60% of primary school students have achieved minimum competencies in subjects such as Mathematics and Science (Kemendikbudristek, 2024). These low learning outcomes are caused by a lack of innovation in the learning process, including a lack of learning models that can encourage students to think critically and creatively.

Learning is a process of transferring knowledge. Good learning must be effective, fun, and interesting for both students and teachers (Ariasanti, 2021). Effective learning is not just about delivering material, but

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must also be able to optimize students' potential so that they can master and understand the material well so as to increase student understanding (Roaidah, 2023).

Each student has a different way of learning effectively, so they cannot be treated in the same way, especially in relation to effective learning methods (Idris M. S., 2023). The use of learning models that have not been maximized, resulting in students being less active and more deeply involved during the learning process. This has an impact on the tendency of students to memorize rather than understand learning material, thus making student learning outcomes low (Kurniawan, 2021). One solution that can be applied is the use of the Discovery Learning learning model. Discovery Learning is a learning approach that emphasizes active student involvement in discovering concepts or principles through a process of exploration and investigation (Miftah, 2020).

Based on initial observations made by researchers at SDN 7 Rantau Bayur, Banyuasin Regency, it shows that grade 4 students of SDN 7 Rantau Bayur, Banyuasin Regency, still show relatively low learning outcomes in IPAS subjects. This is due to various factors, including the lack of diversity in learning methods set by teachers in the classroom (Sri and Prasetyo, 2021). This is reinforced by the results of interviews with teachers in class IV who are known in the learning process that teachers use lecture models, group work, and giving assignments that are done individually or in groups but still often use learning models that are dominated by lecture learning models. Initial observations showed that most students had difficulty in understanding the basic concepts taught. This can be seen from the data of 20 students with a set KKM of 70, the number of students who reached KKM (Minimum Completeness Criteria) was 9 students (55%) declared complete and the number of students who had not reached as many as 11 students (45%) and declared incomplete. Therefore, it is important to explore further to improve student learning outcomes, especially in IPAS subjects at the school.

A number of previous studies have examined the application of the Discovery Learning model in the context of learning various subjects, including social studies. One relevant study was conducted by Roaidah, Idris, and Irawan (2023), who examined the effect of the Discovery Learning model on improving student learning outcomes in social studies for fourth-grade students in elementary school. The results of the study indicate that the Discovery Learning model using interactive PowerPoint presentations has a greater impact on student learning outcomes compared to students who do not apply the Discovery Learning model. This was also found in a study conducted by Astriani, Idris & Ida (2023), which concluded that the application of Discovery Learning can improve student learning outcomes in social studies. The results of the study show that students not only understand the material in theory, but are also able to apply these concepts in their daily lives.

The application of the Discovery Learning model in grade 4 IPAS learning is expected to help students to be more active in exploring, understanding, and applying these concepts in real life. However, researchers who specifically examine the effect of the Discovery Learning model on student learning outcomes in IPAS subjects in grade 4 elementary schools are still very limited. Therefore, this study aims to fill this void by examining the effect of the application of the Discovery Learning model on student learning outcomes in grade 4 IPAS subjects in elementary schools.

LITERATURE REVIEW

Learning is a process of interaction between learners and their environment, both physical and social, which allows changes to occur in learners. Learning in this context is not only limited to teaching carried out in the classroom, but also includes activities that can enrich learning experiences outside the classroom (Miarso, 2020). According to Trianto (2020), learning is a systematically designed process with the aim of facilitating learners in acquiring knowledge and skills needed in life.

The definition of "Model" refers to an image, representation, or design used to describe a particular concept, system, or process so that it is easier to understand, analyze, and apply (Sutopo, 2020). A model is a design or pattern used to facilitate understanding and application of an idea or system in real life. The learning

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model is a design used by educators to design learning activities that can facilitate students in achieving learning objectives effectively and efficiently. According to (Gagne, J, & W, 2005), a learning model is a framework that describes the sequence and structure of learning activities that must be carried out by the teacher, with the aim of improving students' learning experience. Learning models have a very important role in creating conditions that are conducive for students to learn. Each learning model has a different approach in organizing the interaction between teachers and students, as well as the way students engage in learning activities.

Learning models have various important benefits in supporting an effective and efficient educational process. One of the main benefits of using a learning model is that it can increase the active involvement of students in the learning process. Trianto (2020) states that a good learning model can foster critical thinking skills, creativity, and the ability to work together in groups. Another significant benefit is that learning models help improve learning effectiveness. By using the right model, teachers can choose the strategy that best suits the characteristics of the teaching material and the needs of students. Overall, learning models provide great benefits in creating a more dynamic, interesting and effective learning experience.

One of the learning models that attracts attention in the world of education is the Discovery Learning model. The Discovery Learning model is a model that emphasizes active learning, where students are given the opportunity to discover the concepts and principles they learn through direct experience. According to Hasan (2023). this model invites students to actively seek information and find answers to the problems at hand, not just receive information from the teacher. According to Hanida (2019), which states that Discovery Learning is a cognitive learning model that requires teachers to be able to create creative learning situations, so that students can discover the concepts learned themselves.

The main purpose of the Discovery Learning model is to develop students' critical thinking and problem solving skills through independent discovery. According to Ramadhan (2020), this model aims to enable students to explore and discover information independently, which increases their understanding of the learning material. The use of learning models with discovery learning in order to increase student activity in the learning process.

The Discovery Learning learning model consists of several stages designed to facilitate students according to Rizki (2022):

1. The first stage is orientation, where the teacher introduces the topic or problem to be solved by students.
2. In the second stage, which is data collection, students conduct experiments or search for information to answer the questions or problems given.
3. After that, students enter the inference stage, where they organize their findings and make conclusions based on the data that has been collected.
4. The last stage is discussion or reflection, where students share their findings with classmates and teachers, which then helps to refine their understanding of the material. With these stages, students can understand concepts more deeply through an active and collaborative process.

Learning outcomes refer to the achievements or results obtained by students after following the learning process. These results include changes in knowledge, skills, attitudes, and values possessed by students after engaging in learning activities (Sudjana, 2021). According to Arsyad (2021), learning outcomes can be divided into three main categories, namely cognitive, affective, and psychomotor learning outcomes. Learning outcomes can also be measured through instruments that include tests, observations, and other assessments designed to measure the extent to which students can master predetermined competencies. According to Kusnadi and Suryani (2020), IPAS learning can be done using various approaches, either integrated or separate between science and social studies, according to the objectives to be achieved. The integrative approach in IPAS learning allows students to see the relationship between natural and social phenomena, such as how natural changes can affect society, or how social events can be influenced by natural conditions. The learning objectives of IPAS (Natural and Social Sciences) focus on developing learners' knowledge, skills and attitudes that cover various aspects of life.

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The discovery learning model is very appropriate to use in IPAS material related to the topic "My Indonesia is Rich in Culture," because this approach allows students to actively explore and discover Indonesia's cultural diversity through direct experience. In this study, the cultural diversity map media will serve as an effective tool to introduce various cultures, tribes, customs, and traditions in Indonesia. Students can be invited to study the map, identify various regions with their distinctive cultures, and find out more about the values and cultural practices that exist in each region. Materials that use the discovery learning model not only deepen students' understanding of the material, but also hone critical thinking skills, creativity, and problem-solving abilities. Thus, discovery learning supports the development of research skills, observation, and deeper understanding, which are essential in IPAS learning.

METHOD

The research method used in this study was experimental quantitative research. According to Sugiyono (2020), experimental research is a research method used to find the effect of one treatment on another treatment under controlled conditions. This research design uses a True Pretest-Posttest Experimental Research Design with a Control Group. According to Sugiyono (2020), a Pretest-Posttest Experimental Research Design with a Control Group is an experimental research design that uses two groups, namely an experimental group and a control group, to evaluate the effects of an intervention. The research population in this study were all students of SDN 7 Rantau Bayur, Banyuasin Regency, totaling 234 students. The sampling technique in this study used class-based or also called cluster sampling. Cluster is a sampling technique based on existing group classes, the sample of this study consisted of all fourth grade students of SDN 7 Rantau Bayur, Banyuasin Regency who were the subjects in this study. Researchers used a sample of 2 class IV, namely class IV.A experimental class and class IV.B control class. The research instruments used were observation, documentation, and tests. Data collection techniques with observation, documentation and tests. Data analysis techniques are normality test, homogeneity test and hypothesis testing.The data analysis technique in this study uses a quantitative approach that aims to process data systematically so that it can be concluded objectively. The analysis was carried out in several stages, namely normality test, homogeneity test, and hypothesis test. The normality test was used to determine whether the data was normally distributed or not, using the Kolmogorov-Smirnov test through the SPSS version 25.0 program and a significance level of 5% ($\alpha = 0.05$), where the data was considered normal if the significance value was greater than 0.05. Next, a homogeneity test was conducted to test the similarity of variances between the experimental and control groups, using a Chi-Square test in SPSS version 30.0 with the condition that the data is considered homogeneous if the significance value is greater than 0.05. After the data was declared normal and homogeneous, a hypothesis test was conducted using the t-test (independent sample t-test) to determine whether there was an effect of the Discovery Learning model on the learning outcomes of students in the IPAS subject. Based on the data analysis results, it was found that there was a significant difference between the experimental and control groups, so it can be concluded that the Discovery Learning model has a positive and significant effect on the learning outcomes of fourth-grade students at SDN 7 Rantau Bayur, Banyuasin Regency.

Research procedur

This research procedure consists of three stages, namely the preparation stage, the implementation stage, and the final stage/data analysis. The research was conducted at SDN 7 Rantau Bayur, Banyuasin Regency, in the even semester of the 2024/2025 academic year (March–April 2025).

1. Preparation Stage
   a. Conducting initial observations at SDN 7 Rantau Bayur to determine the condition of the school, student characteristics, and teaching methods commonly used by teachers.
   b. Obtaining research permits (University → Kesbangpol → Education Office → School).

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c. Developing research tools, including Discovery Learning lesson plans for the experimental class, lecture lesson plans for the control class, and pretest and posttest instruments.
d. Validating the instruments by subject matter experts in Science and Mathematics Education and experts in Primary School Teacher Education.
e. Testing the instruments on fifth-grade students to assess validity, reliability, difficulty level, and item discrimination. Items meeting the criteria were used as research instruments.

2. Implementation Stage

The research used the True Experimental Design method with a Pretest-Posttest Control Group Design, consisting of an experimental class and a control class.

a. Sampling was conducted using random sampling from the population of fourth-grade students.
b. A pretest was given to the experimental and control classes to determine their initial abilities.
c. The treatment was given: the experimental class with Discovery Learning, the control class with the lecture method.
d. A posttest was administered to both classes to determine learning outcomes after the treatment.

Research design:

Group	Pretest	Treatment	Posttest
Experimental / Control	O1 / O3	X (Discovery Learning) / Y (Lecture)	O2 / O4

3. Final Stage (Data Analysis)

a. Collecting pretest and posttest data.
b. Performing normality and homogeneity tests as prerequisites for analysis.
c. Conducting hypothesis testing using the Independent Sample t-test with SPSS version 30.
d. Drawing conclusions: if significance < 0.05 → H0 is rejected, meaning Discovery Learning has an effect on student learning outcomes.

RESULTS AND DISCUSSION

This research was conducted at SDN 7 Rantau Bayur, Banyuasin Regency, which is located at Jalan Kalangan Rabu Dusun III Lebung Village, Rantau Bayur District, Banyuasin Regency III, South Sumatra Province. The purpose of this study was to determine the effect of the *Discovery Learning* Model on IPAS Chapter VI My Indonesia is Rich in Culture Topic B : The Wealth of Indonesian Culture Class 4 SDN 7 Rantau Bayur Banyuasin Regency. Research data obtained from student learning outcomes. Learning outcomes are obtained from tests given to experimental and control classes. To find out an overview of student learning outcomes before and after treatment in both experimental and control classes, descriptive analysis of pretest and posttest data was conducted. This research was conducted in three stages, namely the preparation stage, the implementation stage, and the final stage. In the preparation stage, the researcher determined the research subjects, namely fourth-grade students at SD Negeri 07 Rantau Bayur, conducted initial observations with the IPAS subject teacher, compiled the “Indonesiaku Kaya Budaya” (My Indonesia is Rich in Culture) learning materials, compiled research guidelines and instruments, tested the instruments, and analyzed their validity and reliability. The implementation stage included learning activities in the experimental class, which used the Discovery Learning model, and the control class, which used the lecture method. In the experimental class, students were divided into several groups to create maps of cultural diversity based on the islands of Indonesia, while in the control class, learning was carried out directly by the teacher through explanations and note-taking. After the learning activities, both groups were given a final test (posttest). In the final stage, the researcher collected and analyzed the pretest and posttest data using statistical tests, namely normality tests, homogeneity tests, and t-tests. The results of the analysis showed that there was a significant increase in

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learning outcomes in the experimental class compared to the control class. This shows that the Discovery Learning model has a positive effect on student learning outcomes in IPAS subjects. These findings are in line with previous theories and research stating that active and discovery-based learning can.The results of the descriptive analysis are presented in the following table 1.

Table 1. Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Experiment Class Pre Test	20	28	76	57.00	14.030
Experiment Class Post Test	20	68	96	77.80	8.050
Control Class Pre Test	16	48	68	56.75	7.479
Control Class Post Test	16	48	88	67.50	11.015
Valid N (listwise)	16				

Based on the descriptive analysis results in the table above, it can be seen that there is a significant increase in scores in the experimental class using the discovery learning model. The experimental class consisting of 20 students had an average pretest score of 57.00 with a standard deviation of 14.030. After applying the discovery learning model, the posttest score increased to an average of 77.80 with a standard deviation that decreased to 8.050. This decrease in standard deviation also shows that students' learning outcomes became more even after the treatment was given. Meanwhile, the control class consisting of 16 students, without the application of the discovery learning model, had an average pretest score of 56.75 with a standard deviation of 7.479, and increased to 67.50 in the posttest with a standard deviation of 11.015. Although there was an increase in scores in the control class, the increase was not as large as the experimental class. This shows that the use of the discovery learning model contributes positively to the improvement of student learning outcomes, because it is able to encourage students to be more active in the learning process.

The data normality test was used to test whether the data obtained in the experimental and control classes were normally distributed or not. Normality test data analysis uses the Kolmogorov-Smirnov and Shapiro-Wilk tests on the SPSS application. The results of the normality test of the pre-test post test data of the experimental class and control class can be seen in the following table.

Table 2. Normality Test Results

Tests of Normality

	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Pre Test Experiment	.136	16	.200*	.944	16	.401
Experiment Post Test	.206	16	.067	.906	16	.101
Control Pre Test	.131	16	.200*	.960	16	.655
Control Post Test	.141	16	.200*	.939	16	.332

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

The Shapiro-Wilk test results show a significance value of 0.401 for the experimental class pre test, 0.101 for the experimental class pre test, 0.655 for the control class pre test and 0.332 for the control class post test. Because all of these values are greater than 0.05, it can be concluded that the pre-test and post-test research data before and after treatment have a normal distribution.

Homogeneity testing in this study needs to be done to prove the similarity of the variants of the groups that make up the sample, in other words, the groups taken with the same population. The following are the results of the homogeneity test of this study.

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Table 3. Homogeneity Test Results

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Results	Based on Mean	.130	1	34	.721
	Based on Median	.262	1	34	.612
	Based on Median and with adjusted df	.262	1	29.890	.613
	Based on trimmed mean	.181	1	34	.673

Based on the table above, it shows that the significant value is 0.721, because the significant value of 0.721> 0.05, it can be concluded that the samples come from the same population or are homogeneous. To determine the effect of using the *Discovery Learning learning* model on student learning outcomes in Class IV SDN 7 Rantau Bayur, Banyuasin Regency, the researcher analyzes the data obtained and analyzes it with an *independent t-test* because the *independent t-test* is used to compare the averages of two groups that are independent or not related to each other and the number (many) between the two groups of data being compared is not the same. The following are the results of the difference in the average post test scores of the experimental class and control class.

Table 4. Hypothesis Test Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Results	Equal variances assumed	.130	.721	3.242	34	.001	.003	10.300	3.177	3.843	16.757
	Equal variances not assumed			3.131	26.707	.002	.004	10.300	3.290	3.546	17.054

Based on the "Independent Samples Test" output table in the "Equal variances assumed" section, it is known that the Sig value. (2-tailed) of 0.003 <0.05, it can be concluded that H0 is rejected and Ha is accepted. Thus it can be concluded that there is an effect of the Discovery Learning Model on student learning outcomes in the IPAS subject of SDN 7 Rantau Bayur, Banyuasin Regency.

Based on the results of descriptive analysis, there was a significant increase in scores in the experimental class compared to the control class. In the experimental class that applied the Discovery Learning model, the pretest average value of 57.00 increased to 77.80 on the posttest, with a decrease in standard deviation from 14.030 to 8.050, indicating an increase that was not only significant but also evenly distributed. Meanwhile, in the control class that did not use the model, the average value increased from 56.75 to 67.50, but with a standard deviation that actually increased from 7.241 to 10.665, indicating a greater variation in learning outcomes.

The Independent Samples t-test results show a significance value of 0.003 (<0.05), which means there is a significant difference between the two classes. So, it can be concluded that H_0 is rejected and H_a is

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accepted, which means there is a significant difference between student learning outcomes in the experimental and control classes. Thus, it can be stated that the Discovery Learning learning model has an effect on improving student learning outcomes in IPAS subjects at SDN 7 Rantau Bayur. In other words, the Discovery Learning model has a positive and significant relationship with student learning outcomes and is proven to be effective in increasing student engagement and encouraging critical and analytical thinking processes, especially in understanding cultural concepts that are close to their lives. Therefore, this model is highly recommended to be applied in IPAS learning, especially on contextual themes that rely on deep understanding and reflection on students' social and cultural environment.

Based on the descriptive analysis results, there was a significant increase in scores in the experimental class compared to the control class. In the experimental class that applied the Discovery Learning model, the average pretest score of 57.00 increased to 77.80 on the posttest, with a decrease in standard deviation from 14.030 to 8.050, indicating an increase that was not only significant but also evenly distributed. Meanwhile, in the control class that did not use this model, the average score increased from 56.75 to 67.50, but with a standard deviation that actually increased from 7.241 to 10.665, indicating greater variation in learning outcomes.

Although there was an increase in scores in the control class, the increase was not as large as in the experimental class. This shows that the use of the discovery learning model contributed positively to the improvement of student learning outcomes, as it encouraged students to be more active in the learning process. Based on the results of the Independent Samples t-test, the significance value was 0.003 (< 0.05), which means that there was a significant difference between the two classes. Therefore, it can be concluded that H_0 is rejected and H_a is accepted, which means that there was a significant difference between the learning outcomes of students in the experimental class and the control class. Thus, it can be stated that the Discovery Learning model has an effect on improving student learning outcomes in IPAS subjects at SDN 7 Rantau Bayur.

Theoretically, Discovery Learning is a learning approach introduced by Jerome Bruner, which is based on constructivism theory (Hasan, 2023). Bruner (1961) stated that learning would be more effective if students were directly involved in the process of searching for and discovering concepts. Through this model, students are given the opportunity to explore, observe, discuss, and draw their own conclusions from the material being studied. This process not only improves understanding but also develops students' critical thinking and social skills.

The Discovery Learning model is highly relevant to be applied in IPAS learning, especially on the topic of "Indonesian Cultural Wealth," because the material is contextual and close to the students' lives. By using this model, students do not only receive information passively but actively seek and explore the cultural wealth around them, making learning more meaningful and memorable.

CONCLUSIONS AND RECOMMENDATION

Based on the results of the research that has been conducted, it can be concluded that the application of the Discovery Learning model has a significant effect on the learning outcomes of fourth-grade students at SDN 7 Rantau Bayur in the subject of IPAS Chapter VI My Indonesia is Rich in Culture, Topic B Indonesian Cultural Wealth. This can be seen from the difference in learning outcomes between the experimental class taught using the Discovery Learning model and the control class using the lecture method.

The average score of the experimental class increased from 57.00 on the pretest to 77.80 on the posttest. Meanwhile, the control class only increased from 56.75 to 67.50. The independent samples t-test produced a significance value of 0.003 (< 0.05), so H_0 was rejected and H_a was accepted. Thus, the Discovery Learning model proved to be effective in improving student learning outcomes, as it was able to encourage active engagement, independence, and a deeper understanding of the material being studied.

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