Comparison of the Discovery Learning Model and the Direct Instruction Model on IPAS Learning Outcomes for Fourth Grade at SDN Centre Mawang Gowa Regency

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ABSTRACT

This research aims to determine: differences in science and science learning outcomes for students taught using the discovery learning model and the direct instruction learning model for class IV SDN Center Mawang, Gowa Regency. The type of research used in this research is Quasi Experimental, with a Posttest Only Control Group Design type. The sampling technique used a consecutive random sampling technique (Multi-stage Random Sampling) from a population of 96 students and the number of samples taken was 56 students. The instrument used to determine student learning outcomes is a 20 number multiple choice test. The data analysis techniques used are descriptive statistical analysis and inferential analysis. From the results of the descriptive analysis of the science and science learning outcomes of class IV A students who were taught using the discovery learning model, seen in terms of categories, the average score was 81.25, which was in the good category, while in class IV, which was taught using the direct instruction model, the average score was 68.21 is in the sufficient category. Based on the results of inferential analysis using a two-sample t-test to test the hypothesis, the p-value = 0.019<0.05, meaning the hypothesis is accepted. Thus, it can be concluded that there are differences between the Discovery Learning Model and the Direct Instruction Model on the Science Learning Outcomes of Class IV Students at SDN SDN Center Mawang, Gowa Regency.

Keywords: *Discovery learning model, Direct Instruction model, Science and science learning outcomes.*

1). INTRODUCTION

Education has a dynamic influence on students' future lives. It optimally develops various potentials, including physical, emotional, intellectual, social, and spiritual potentials, according to the stages of development and the characteristics of the physical, social, and cultural environment in which the individual lives. An educator must create learning outcomes for students, as these outcomes have a significant impact on their future. (Rosdiana and Muzakkir, 2019).

One of the factors that can produce learning outcomes for students is the selection of teaching models or materials that can be effectively taught. Teachers often provide various teaching materials with a wide range of variations available today. At the elementary school level, IPAS (Integrated Science and Social Studies) is one of the subjects that is crucial to teach students. This subject is relatively new, combining the subjects of Natural Sciences (IPA) and Social Studies (IPS) into one subject, IPAS, with the hope of inspiring students. As part of elementary school education, it is seen as the first step in formal efforts to equip students with essential knowledge.

Students, as subjects of IPAS learning, must be active in the learning process, seeking information and exploring either individually or in groups. They should be able to express their opinions based on their understanding and interact positively with both their peers and teachers when they encounter difficulties. The teacher's role as a facilitator and guide in optimizing the IPAS learning process is expected to develop a learning environment that is active, creative, enjoyable, and capable of improving satisfactory IPAS learning outcomes. (Syaiful Sagala, 2015).

Student learning outcomes are influenced by both internal and external factors. Internal factors originate from within the students themselves, while external factors come from outside the individual. The learning outcomes for IPAS in Indonesia are still relatively low. This is supported by the results of the Trends in International Mathematics and Science Study (TIMSS).

TIMSS is an international assessment of student literacy in reading, mathematics, and science. The TIMSS survey results released by the OECD (Organization for Economic Co-operation and Development) in 2018 showed that Indonesia's average science (IPAS) score was 396, ranking 71st out of 79 countries. These results indicate that IPAS learning achievement is still low, highlighting the need for improvements, particularly in the IPAS learning process in Indonesia. The issue of low IPAS learning outcomes also occurs at SDN Centre Mawang in Gowa Regency. This can be seen from the average scores of students who received grades below the KKTP (Criteria for Achievement of Learning Objectives). The KKTP benchmark set for IPAS learning is 78. In the fourth grade, several students have an average IPAS score of 60. Based on this data, it can be observed that the IPAS learning outcomes achieved by the students are still lacking.

Based on the researcher's observations of the fourth-grade teacher at SDN Centre Mawang in Gowa Regency, the commonly used teaching model is direct instruction. Direct instruction is a teaching model aimed at helping students learn basic skills and acquire knowledge that can be taught

gradually, step by step. The teaching approach used in direct instruction is teacher-centered, where the teacher presents the material directly and in a structured manner using methods such as lectures, expository teaching, question and answer sessions, and presentations or demonstrations conducted by the teacher. (Wirawan Fadly, 2022).

This model is the primary choice applied to students due to its advantages, including the ability to cover a relatively large amount of material, ease in managing instructional time, and its effectiveness in teaching procedural content, which is relatively easy for students to follow. However, despite these benefits, direct instruction also has drawbacks that are crucial to the learning process itself. For example, students tend to passively wait for answers directly from the material presented by the teacher and may struggle to construct their own answers. To address these challenges, teachers must recognize the importance of understanding various teaching models. One alternative teaching model that can be used is discovery learning."Discovery learning is a teaching model based on inquiry and is considered a constructivist approach in education.

This is because the discovery learning model encourages learners to actively find out their own knowledge."(M.Hosnan, 2017). Based on the explanation above, the researcher is motivated to conduct a study titled "A Comparison of the Discovery Learning Model and the Direct Instruction Model on IPAS Learning Outcomes in Fourth Grade at SDN Centre Mawang, Gowa Regency."

2) METHODS

The type of research used is a quasi-experimental study with a Post-Test Only Control Group Design. The sampling technique employed is multi-stage sampling from a population of 96 students, with a sample size of 28 students. The data analysis used in this study includes descriptive and inferential analysis techniques with the application of IBM SPSS v. 25. The data collection methods used are tests and documentation. The research instrument consists of a post-test with 20 multiple-choice questions, which include questions at the C1 and C2 cognitive levels aimed at assessing the cognitive learning outcomes of the students. The documentation referred to in this study includes written materials such as textbooks, teacher records, regulations, and other related documents.

The data analysis techniques used in this study include both descriptive and inferential statistics. Descriptive analysis consists of mean, standard deviation, variance, and range, which are used to

determine the cognitive learning outcomes of IPAS for the students. Inferential analysis is employed to test the hypothesis, specifically to determine whether there are differences in IPAS learning outcomes among fourth-grade students at SDN Centre Mawang, Gowa Regency.

3) RESULTS AND DISCUSSION

RESULTS

The results of this study reveal answers to the questions previously established, which reinforce the hypothesis. The results were obtained from the administration of a multiple-choice test consisting of 20 questions, which had been previously validated, on the IPAS material regarding the uniqueness of the customs of the community around me. In this study, two classes were observed: the first experimental class (IV A), which was taught using the discovery learning model, and the second experimental class (IV C), which was taught using the direct instruction model. The results of the analysis conducted are as follows:

In this study, two classes were observed: Experimental Class 1 (IV A), which was taught using the discovery learning model, and Experimental Class 2 (IV C), which was taught using the direct instruction model. The analysis results are as follows:

1. Descriptive Analysis

a. Post-test for Experimental Class 1 with the Discovery Learning Model

1. *Range*:

$$R = Xt - Xr$$

$$= 100\text{-}60$$

$$= 40$$

2. Number of class intervals:

$$K = 1 + (3{,}3)\log n$$

$$= 1 + (3{,}3)\log 28$$

$$= 1 + (3{,}3)1{,}4471$$

$$= 1 + 4{,}77543$$

$= 5{,}77543 = 6$

3. Mean

$$\bar{X} = \frac{\sum fixi}{\sum fi}$$

$$= \frac{2275}{28}$$

$= 81{,}25$

4. Length of class interval

$P = R/K$

$= 40/6$

$= 6{,}66 = 7$

5. Standard Deviation

$$S_D = \sqrt{\frac{\sum fi\,(xi\,\bar{x})2}{n-}}$$

$$= \sqrt{\frac{4737{,}23}{28-1}}$$

$$= \sqrt{175{,}45}$$

$= 13{,}24$

6. Varians

$$S^2 = \frac{\sum fi(x_i - x)2}{n-1}$$

$$= \frac{4737{,}23}{28-1}$$

= 175,45

Table 1. Categorization of Post-test IPAS Learning Outcomes for Experimental Class 1

Score Interval	Frequency	Percentage	Learning Outcome Categories

0-67	5	18%	Needs Guidance
68-77	5	18%	Sufficient
78-88	8	29%	Good
89-100	10	36%	Very Good

In the experimental class that implemented the discovery learning model, the learning outcome data showed that 10 students achieved a "very good" learning outcome category, representing 36%, 8 students achieved a "good" category, representing 29%, 5 students achieved a "sufficient"category, representing 18%, and 5 students fell into the "needs guidance" category, representing 18%.

The categories in the table above can be illustrated in the form of a bar chart as follows:

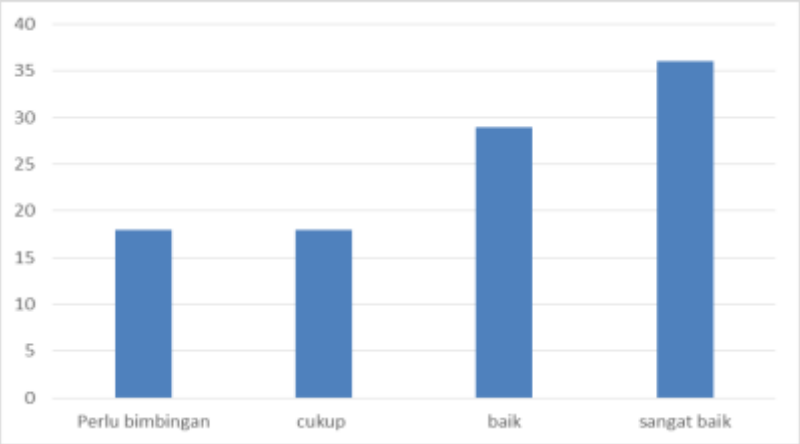

Figure 1 Bar Chart of Post-test Learning Outcomes for Experimental Class 1

b. Description of Science Learning Outcomes of Students Taught Using the Direct Instruction Model in Class IV C at SDN Centre Mawang.

Based on the research conducted at SDN Centre Mawang, a description of the science learning outcomes on the topic of "The Uniqueness of Local Community Habits" was obtained for Class IV C, which was taught using the direct instruction model. The results of the descriptive analysis in determining the mean, median, standard deviation, variance, range, minimum, and maximum values.

a. Post-test for Experimental Class 2 with Direct Instruction (Class IV C)

1. *Range*

$$R = Xt - Xr$$

= 95-25

= 70

2. Number of class intervals

$$K = 1 + (3{,}3)\log n$$

$$= 1 + (3{,}3)\log 28$$

$$= 1 + (3{,}3)1{,}4471$$

$$= 1 + 4{,}77543$$

$$= 5{,}77543 = 6$$

3. Class interval width

$$P = R/K$$

$$= 70/6$$

$$= 11{,}66 = 12$$

4. Mean

$$\bar{X} = \frac{\sum fixi}{\sum fi}$$

$$= \frac{1910}{28}$$

$$= 68{,}21$$

5. Standard Deviation

$$S_D = \sqrt{\frac{\sum fi\,(xi\,\bar{x})2}{n-}}$$

$$= \sqrt{\frac{8860{,}71}{28-1}}$$

$$= \sqrt{8860{,}71}$$

$$= 18{,}11$$

6. Varians

$$S^2 = \frac{\sum fi(x_i - x)2}{n - 1}$$

$$= \frac{8860{,}71}{28-1}$$

= 328,17

Table 2. Categorization of IPAS Learning Outcomes

Score Interval	Frequency	Percentage	Learning Outcome Categories
0-67	12	43%	Needs Guidance
68-77	7	25%	Sufficient
78-88	5	18%	Good
89-100	4	14%	Very Good

In the experimental class that implemented the direct instruction model, the learning outcome data showed that 5 students achieved a "very good" learning outcome category, representing 14%, 5 students achieved a "good" category, representing 18%, 7 students achieved a "sufficient" category, representing 25%, and 12 students fell into the "needs guidance" category, representing 43%.

The categories in the table above can be illustrated in the form of a bar chart as follows:

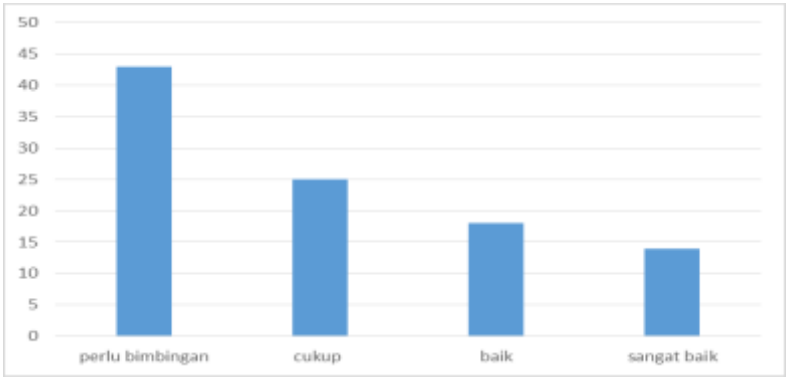

Figure 2 Frequency Diagram of Posttest for Experimental Class 2

2. Inferential Analysis

a. Normality Test

Table 3. Normality Test

Tests of Normality

		Kolmogorov-Smirnov[a]		
	Kelas IV	Statistic	df	Sig.
Hasil belajar IPAS	pretest eksperimen 1 (discovery learning)	.132	28	.200*
	posttest eksperimen 1 (discovery learning)	.114	28	.200*
	pretest eksperimen 2 (diret instruction)	.146	28	.132
	posttest eksperimen 2 (direct instruction)	.149	28	.114

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Referring to the decision-making criteria, if the significance value is < 0.05, the data is not normal; conversely, if the significance value is > 0.05, the data is considered normal. Based on the table above, the experimental class 1 using the discovery learning model obtained a pretest significance value of 0.200 > 0.05, indicating a normal distribution, and a posttest significance value of 0.200 > 0.05, also indicating a normal distribution. In experimental class 2 using the direct instruction model, the pretest significance value was 0.132 > 0.05, indicating a normal distribution, and the posttest significance value was 0.114 > 0.05, also indicating a normal distribution.

b. Homogeneity Test

Table 4 Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil belajar IPAS	Based on Mean	.789	1	54	.378
	Based on Median	.618	1	54	.435
	Based on Median and with adjusted df	.618	1	53.865	.435
	Based on trimmed mean	.752	1	54	.390

Based on the decision-making criteria, a significance value of less than 0.05 indicates that the data is not homogeneous, while a significance value of more than 0.05 indicates that the data is homogeneous. After performing the calculations, the homogeneity value for the significance was found to be 0.378, which is greater than 0.05. Therefore, it can be concluded that the data has a homogeneous distribution. Knowing that the data has a homogeneous distribution strengthens the validity of the analysis conducted and the results obtained. This is because homogeneous data tends to provide more consistent and reliable results in statistical analysis

c. Hypothesis Testing

Table 5. Hypothesis Testing

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil belajar IPAS	Equal variances assumed	.789	.378	2.424	54	.019	11.214	4.627	20.490	1.939
	Equal variances not assumed			2.424	53.506	.019	11.214	4.627	20.492	1.937

Hypothesis testing was conducted to determine whether there is a difference in learning outcomes between students in experimental group 1 and those in experimental group 2. For the purpose of analysis, the Independent Sample t-test analysis was used with the help of SPSS version 25. The Independent Sample t-test analysis was carried out by comparing the mean values of two randomly different sample groups.

Based on the results from the calculation table above, the significance value (2-tailed) obtained is 0.019 < 0.05, and the calculated t-value (tHitung) is 2.424, which is greater than the critical t-value (tTabel) of 2.004. Since the significance value (2-tailed) is less than the significance level of $\alpha < 0.05$, and tHitung > tTabel, the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted.

DISCUSSION

1. The Learning Outcomes of IPAS Students Taught Using the Discovery Learning Model in Grade IV A at SDN Centre Mawang.

Based on the descriptive analysis, the posttest results show that the highest score was 100 and the lowest was 60, with an average score of 81.25, which falls into the good category. From this data, it is evident that the posttest scores of the students in the experimental class 1 were better than those in the experimental class 2.

Roestiyah states that in the learning process, students who discover the core concepts on their own and deepen their understanding of the material become more independent and enthusiastic about engaging in discussions, explaining concepts to each other within their groups, and are more motivated to ask questions to the teacher when they do not understand the material presented. This is evident from the increasing number of students who engage in question-and-answer sessions during the learning process.

In the discovery learning model, the teacher strives to actively build students' conceptual understanding through discussions, emphasizing the importance of considering students' prior knowledge during the learning process. The results of this study are in line with those of Hanania Ayu, W., who found that students who are more active conceptually during the learning process achieve higher learning outcomes. This finding was also observed in this study, where the learning process in the experimental class using the discovery learning model led to better IPAS learning outcomes. Moreover, in this model, students experience, observe, and record their observations, making them more actively engaged in the learning process.

2. Learning Outcomes of IPAS Students Taught Using the Direct Instruction Model in Grade IV C at SDN Centre Mawang

In the learning outcomes of the experimental class 2, the researcher used the direct instruction model, where the educator actively played a role in delivering the material, and students listened attentively, took notes on key points, and asked questions. However, in the control class that used the direct instruction model, students tended to be less interested in understanding the material presented, as evidenced by students talking more than paying attention to the lesson. This aligns with the theory

of Sidik and Winata, which suggests that students who are centered on the teacher's explanation will become bored and uninterested in the learning process.

The assessment of the learning outcomes in the control class was the same as in the experimental class, using a multiple-choice test consisting of 20 questions. The posttest results showed a highest score of 95 and a lowest score of 25, with an average student score of 68.21, which falls into the "sufficient" category. This score has not yet reached the school's KKTP (Learning Objective Achievement Criteria). In this model, students were primarily focused on the teacher's lecture, which led to boredom. This finding is consistent with the theory of Siti Nurhasanah et al., which states that the success of this teaching model depends on the teacher's image. If the teacher does not appear prepared, knowledgeable, confident, enthusiastic, and structured, students may become bored, distracted, and their learning may be hindered.

3. Differences in IPAS Learning Outcomes for Students Taught Using the Discovery Learning Model and the Direct Instruction Model in Grade IV at SDN Centre Mawang.

The learning process using the discovery learning model led to differences in student learning outcomes, as measured by the cognitive test results. In this process, concepts were explained visually and concretely using examples relevant to students' experiences, and real questions were posed to engage students in the concepts being studied. Additionally, students were encouraged to discuss in groups to reach a shared understanding of the material, present their understanding through class presentations or discussions, and explore concepts independently through assignments in the LKPD (Learning Activity Sheets). Constructive and positive feedback was provided to help students improve their understanding.

The difference between the discovery learning model and the direct instruction model can be seen in their teaching approaches. The direct instruction model tends to use a teacher-centered approach, where the teacher is the main source of information. In contrast, the discovery learning model is more interactive and collaborative, encouraging students to actively engage in the learning process through experiments, observations, and discussions. The discovery learning model promotes deeper understanding through exploration, experimentation, and discovery, fostering collaboration among students as they work together in groups, share ideas, and participate in group discussions.

Another distinguishing factor is that the direct instruction model often emphasizes individual learning and the absorption of information from the teacher, as seen in students who mainly listen

and in teaching and learning activities that are mostly conducted in the classroom with limited student interaction. In contrast, the discovery learning model tends to use various forms of assessment, including problem-solving, projects, presentations, portfolios, and LKPD, whereas the direct instruction model in the classroom frequently relies on written tests as the primary form of evaluation.

This is consistent with the theory proposed by Widyastuti, D., et al., which suggests that understanding IPAS (Integrated Science and Social Studies) concepts requires student collaboration in groups to achieve learning objectives and improve their teamwork skills. The discovery learning model offers a more active and interactive approach to enhancing understanding, answering various questions, and solving problems to discover concepts.

Based on the results of the independent sample t-test analysis, where the value of sig. (2-tailed) was found to be significant at $\alpha < 0.05$ and t_calculated > t_table, the null hypothesis (H0) was rejected, and the alternative hypothesis (H1) was accepted. Therefore, it can be concluded that there is a difference in IPAS learning outcomes between students taught using the discovery learning model and those taught using the direct instruction model.

4). CONCLUSION

Based on the research results and discussions explained in the previous chapters, the following conclusions can be drawn:

1. The IPAS learning outcomes for students taught using the discovery learning model in Class IV A at SDN Centre Mawang, Gowa Regency, showed an average posttest score of 81.25, which falls into the "Good" category.
2. The IPAS learning outcomes for students taught using the direct instruction model in Class IV C at SDN Centre Mawang, Gowa Regency, showed an average posttest score of 68.21, which falls into the "Sufficient" category.
3. There is a difference in learning outcomes between the class taught using the discovery learning model and the class taught using the direct instruction model, as indicated by the hypothesis testing analysis with an independent sample test, where the significance value is less than α (0.019 < 0.05).

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