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The Effect of Discovery Model on The Science Learning Outcomes of Class V Elementary School Students in The Wijayakusuma Cluster

Slamet[1*], Su'ad[2], Madjdi, Hilal Achmad[3], Arsyad Fardani & Gung, Yeu Tzeh[5]

[1,2,3,4]Faculty of Teaching and Education, Muria Kudus University, Central Java 59327, INDONESIA

[5]Tokyo University of Marine Science and Technology, Tokyo 108-8477, JAPAN

*Corresponding author Email: ucihaslamet18@gmail.com

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Abstract: The study is aimed at analyzing the effect of the discovery model on the science learning outcomes of grade V students of heat transfer material in the Wijayakusuma cluster, Karangtengah subdistrict. Quantitative research design was employed in this study. The population research were students from the V class in the Karangengah subdistrict. Public Elementary School Kedunguter and Public Elementary School number 1 Dukun were selected as the samples. The data collection technique includes test, observation, interview and documentation. Data analysis inclded the normality and homogeneity test. The results of the study showed the discovery learning model of the fifth grade students' science wete based on the learning outcomes. The post-test results showed students were able to achieve a class average of 85.45 and completeness of learning 95%, while the average learning outcomes of the control class were 74.00 and learning completeness 83.33. %. The value of t sat or t count is = 3.907 while the critical one-tail t or t table is 1.677. As for the conclusion, Ho affects the treatment of the experimental class is accepted because t count > t table is 3.907> 1.677. It could be seen that there was influence on the discovery models to learning outcomes of the fifth grade elementary school students.

Keywords: Science, discovery model, learning outcomes

1. Introduction

Teacher-centered learning and the media used do not match the material, which are still widely found during the learning process. In cluster meetings, teachers often exchange ideas in solving problems in realizing an education that has character and achievement, and is able to compete in all fields. The low learning outcomes in science subject content in Wijayakusuma cluster, Karangtengah District, Demak Regency are one of the concerns. From observations, the problem that causes the low science learning outcomes of grade V elementary school students in the Wijayakusuma Cluster, Karangtengah District is the weak implementation of the science learning process applied by the teacher, learning is still conventional, lectures and students only listen. In the learning process, students are less encouraged to build concepts, develop thinking skills, explore new understandings, and pose and solve problems.

Student learning outcomes have not met the minimum completeness criteria set by the school, which is 7.0, so student learning outcomes in science subjects are still low. Based on the grade V grade data in the Wijayakusuma Cluster, the learning outcomes obtained by students in science lessons are still below the minimum completeness criteria. The completeness of class V learning outcomes in the 2017/2018 school year was only 54%, in the 2018/2019 school year it was 63%, even though the minimum completeness in the Wijayakusuma Cluster was on average 70%. Based on these data, it can be concluded that students still have difficulty understanding science learning.

Based on these problems, researchers take action to improve the quality of learning that can create an active, creative, fun learning atmosphere and can improve learning outcomes (Roslan et al., 2021). To overcome this is applied an alternative learning model that is appropriate and can increase student interest in science lessons. Efforts in realizing a learning process that develops scientific concepts, the Inquiry model can be applied to determine the level of student learning outcomes in learning. The advantages of Discovery Learning are that students are more active, increase mastery of skills and develop students' cognitive abilities.

*Corresponding author: *ucihaslamet18@gmail.com*

Discovery learning can increase the role of HOTS learning in accordance with the demands of the 21st century which is in line with the research of Renita Prera (2019), Wartono et al. (2018) and Gung et al. (2007) who claim that Inquiry-discovery learning plays an important role in improving high-order thinking skills (HOTS) and scientific literacy (SL). Inquiry-discovery learning models are more likely to reconstruct students' scientific knowledge of physics on aspects of HOTS and SL with real-world life (Wartono et al., 2018).

Discovery learning is an effort to provide opportunities for students to uncover or find out about a problem or something that actually exists but has not yet surfaced and finds a solution based on the results of processing the information they seek and collect themselves, so that students have new knowledge that they can use in solving relevant problems. in everyday life (Hamid, 2017).

Nelgun and Husein (2016) in their research "Effects of Discovery Learning and Students Assessment on Academic Success". Who examined the evaluation of the effect of the Discovery method on academic assessment found that discovery learning do not only encourages students to learn actively, but also improves learning outcomes cognitively (Suphi & Yarathan, 2016). Natural science learning comes from the translation of words in English natural science. Meanwhile, literally it is scientific knowledge which has rational and objective characteristics. The science teaching and learning process should emphasize more on the process skills approach, so that students can find facts, build concepts, theories and scientific attitudes that can have a positive effect on the quality of educational processes and products. It is necessary to develop a science learning model that involves students actively in learning activities to find or apply their own ideas (Trianto, 2016).

Afandi et al. (2013) and Gung et al. (2009) state that learning outcomes are a process of changing intellectual abilities (cognitive), interest or emotional abilities (affective) and fine and gross motor skills (psychomotor) in students.[6]. The same idea was expressed in Chen's research (2017) whereby learning motivation presents significantly positive effects on learning effect in learning achievement. Learning motivation shows remarkably positive effects on learning harvest in learning achievement". To improve student learning outcomes can be done by understanding student learning styles, designing learning strategies that are tailored to the material, using interactive multimedia and designing meaningful learning.

To improve learning outcomes can be done by using the right learning model. Learning models are very diverse, with the consideration of whether the model is in accordance with the learning material. For this reason, the teacher must be able to choose the right learning model in accordance with the objectives to be achieved. One learning model that can improve student learning outcomes through reasoning, finding something for himself in understanding the structure of key ideas is by applying the discovery learning model.

Discovery model learning is a very effective model to activate students in learning. In discovery learning, students are expected to collect and process information by themselves so that they have new knowledge that they compile themselves. The steps (syntax) of discovery learning according to Ariyana, Bestary, & Mohandas (2019) and Kondo et al. (2007), state a stimulation; b) problem statement; c) data collection; d) Data processing; e) verification; f) generalization. The results of Rudyanto's (2016) research show that discovery learning has a significant influence between the character of curiosity and communication skills on students' creative thinking abilities.

The hypothesis proposed is that there is an effect of the discovery learning model on learning outcomes in fifth grade elementary school students in Wijayakusuma Cluster, Karangtengah District, Demak Regency.

2. Research Methods

The research design used was a pretest-posttest control group design. Type of experimental research. The population in this study were students of class V Public Elementary School in the Wijayakusuma Cluster, Karangtengah, Demak District, 2019/2020 academic year. The sample of the research was the students of Public Elementary School Kedunguter as the experimental class, and Public Elementary School number 1 Dukun as the control class. The choice of sampling in this study is a random technique. The independent variable is the use of the discovery learning model. The dependent variable is the student's science learning outcomes.

The data collection techniques were tests, observations, documents and interviews. The data analysis includes instrument test (validity and reliability test) data description, prerequisite analysis test (normality and homogeneity test) hypothesis testing using t-test were carried out using Microsoft Excell program.

2.1 Normality Test

Normality test by testing pretest and posttest, in this study using the Lilliefors test using Microsoft Excel as a tool. The lilliefors normality test uses 95% confidence in the condition that if Lo count <L table then the data distribution is normal. If the results of Lo count> L table, the distribution data is not normal.

Table 1: Normality test result

	Control		**Discovery**	
	Pretest	Posttest	Pretest	Posttest

Standard Deviation	13.566	10.222	13.563	8.2078
Average	64.333	77.000	63.636	82.273
Alfa	0.050	0.050	0.05	0.05
Lilifors	0.886	0.886	0.886	0.886
Lt (L table)	0.162	0.162	0.1889	0.1889
Lv (L count)	0.124	0.151	0.1608	0.0636

Based on table 2 above:

- The pretest control class Lo (L count) is 0.124, while the L table value is 0.162. The post-test result Lo (L count) is 0.151 <while L table is 0.162. Level L count <L table means that the control class is normally distributed.
- The discovery pretest class Lo (L count) is 0.1608, while the L table value is 0.1889. The post-test result Lo (L count) is 0.0636 <while L table is 0.1889. Level L count <L table means that the control class is normally distributed.

Sources of data processing were taken from the pretest and posttest scores using the help of calculating Microsoft Excel.

Table 2: F-Test Two-Sample for Variances

	Control		**Discovery**	
	Pretest	Posttest	Pretest	Posttest
Mean	64.82759	76.89655	63.333	81.42857
Variance	183.0049	107.8818	203.33	112.8571
Observations	30	30	22	22
df	29	29	21	21
F (count)	1.69634		1.8016	
P(F<=f) one-tail	0.08411		0.0983	
F Critical one-tail	1.88207		2.1241	

Based on the above data obtained:

- Control Class: F counted at 1.69 while F table was 1.88. This means that F count <F table, namely 1.69 <1.88, meaning that the data is said to be homogeneous.
- Discovery Class: F count is 1.80 while F table is 2.12. This means that F count <F table, namely 1.80 <2.12 means that the data is said to be homogeneous.

3. Results and Discussion

Based on the analysis conducted by the researcher, students are more active in discovery learning class. This can be seen from the steps for discovery learning where the teacher has provided material to students to learn first. Here students are required to first understand the concept that they will display in class, so students have prepared optimally.

3.1 Hypothesis Test

T-test to test discovery learning with conventional learning on the learning outcomes of students in science lessons. For the calculation of the two-party t test using calculation assistance via Microsoft Excel with the calculation of the t-Test: Two-Sample Assuming Equal Variances The result of the t test.

Table 3: T-test result

t-Test: Two-Sample Assuming Equal Variances		
	100	*80*
Mean	84.7619	73.7931
Variance	96.19048	95.81281
Observations	22	30
Pooled Variance	95.97017	
Hypothesized Mean Difference	0	
Df	48	

t Stat	3.907641
P(T<=t) one-tail	0.000146
t Critical one-tail	1.677224
P(T<=t) two-tail	0.000292
t Critical two-tail	2.010635

Based on the data above, t count = 3.907 while the one-tail critical t or t table is 1.677. Then the conclusion of the effect of the experimental class treatment is accepted because t count> t table is 3.907> 1.677 and the data is significant, so the hypothesis is accepted.

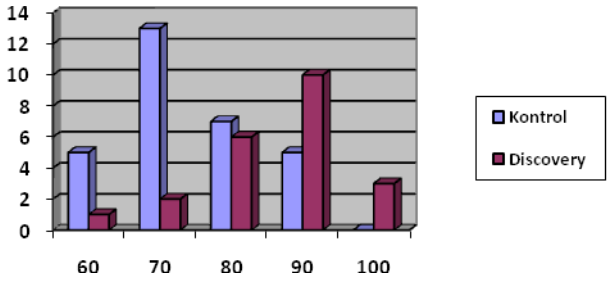

Fig. 1: Graph of posttest results for control and discovery class

Based on graph, it can be seen that there has been an increase in learning outcomes. After using the discovery model, student learning outcomes were more improved than the control class with an average student learning outcomes of the control class 74.00 while the discovery class students' learning outcomes were 85.45. This means that there is an effect of the Discovery learning model on learning outcomes in fifth grade elementary school students in Wijayakusuma Cluster, Karangtengah District, Demak Regency.

The results of this study are also in accordance with the research Wahjudi (2015) stated in his research that learning outcomes are positive changes in behavior and the abilities students have from an interaction of learning and teaching actions in the form of intellectual learning outcomes, cognitive strategies, attitudes and values, verbal innovation, and motor learning outcomes.

Based on the results of research conducted by researchers and previous research, that the discovery model can improve the results of learning science in the Wijayakusuma cluster, Karangtengah District. There is an average value of discovery learning class for the posttest score of 85.45, while in the conventional class the average value is 74.00. From this average value, it shows that there is a difference in the average between the conventional class and the discovery learning class. This shows that the ability of students to understand science material in class V with the theme of Heat Transfer is easier to accept when using discovery learning models when compared to using conventional models.

Basically, discovery learning has the same principles as inquiry, discovery learning emphasizes the discovery of previously unknown concepts or principles. The difference with discovery is that the discovery of problems faced by students is a kind of problem engineered by the teacher, whereas in inquiry the problem is not the result of engineering, so students must exert all their thoughts and skills to get the findings in the problem through the research process and try to looking for solutions to the problems it finds.

Discovery learning models can foster students' enthusiasm for learning to solve problems and make the classroom atmosphere more active. Students in discovery learning are more conducive, especially during discussion activities with group friends or with other groups. Students also begin to show awareness to provide opportunities for their friends who are not good at learning to join in discussion activities. In learning students also show their independent nature in learning, are active in conducting experiments and show the development of their creative thinking.

According to Trung's research (2014), after students learned according to discovery learning, we notoced that: students write well, briefly. They also express mathematical languages coherently and fluently. This thing proves that the competence of the self- learning of students develops clearly. Students are interested in mathematical learning. They develop mathematical thought specially to develop the creative thought.

It is expected that after students learn with discovery models, students get used to learning independently, students are more interested in learning and are able to develop their creative thinking in solving a problem. To develop student creativity in learning, the teacher provides a problem in learning to students and the teacher facilitates students to solve their own problems. If you pay attention to the atmosphere of the class conditions, it is a bit rowdy and out of control, but in fact they are doing organized activities. In discovery learning students are directed to solve real problems and students are given the opportunity to find solutions to their own problems.

By using discovery learning, students 'understanding will take longer in students' memories so that it will not be easily forgotten by students because students are directly involved, so that it becomes a guide in solving problems in everyday life. This is in accordance with the results of research from Kristin and Rahayu (2016), which states discovery learning is a model for developing active student learning by discovering on their own, investigating on their own, so that the results obtained will be loyal and long lasting in memory, will not easily forgotten by students.

Discovery learning also increases students' motivation to learn, this can be seen when they do experiments, they are very curious about the truth so that it can improve their learning outcomes. This is consistent with research from Irawan and Ruslan (2019) the conclusion: There is a significant effect of the discovery learning model on social studies learning. Student learning outcomes of class VII Junior High School Al-Azhar Medan (F count = 306,594; P = 0.000). There is a significant effect of interest in learning on social studies learning outcomes in class VII Junior High School Al-Azhar Medan VII (count = 69.071; P = 0.000). There is a significant interaction between the Discovery Learning model and the interest in social learning. Social studies learning outcomes of seventh grade students of SMP Al-Azhar Medan (Fcount = 5.288; P = 0.012).

Discovery learning develops students think creatively to solve problems faced through hypotheses that are made and proven through experiments.in line with research (Suwandari, Ibrahim &Widodo, 2019) The results showed that: First, learning outcomes by using discovery learning methods obtain an average yield of 88,3% and the percentage of these scores are included in the criteria very well. Second, discovery learning methods effect on creative thinking skill, it is based on the value of learning outcomes tcount of 7.549 (7.549>1.997) and and the results sig. 2 tailed worth 0.015 (0.000 <0.05). Based on observations and data analysis, it can be concluded that the discovery learning methods can significantly improve the creative thinking skill students and excellent learning outcomes.

Suendartia (2017) concluded that there is a significant effect of discovery learning model on the learning outcomes of natural Sciences. This shows that to improve the learning outcomes of natural sciences it is necessary to use discovery learning model.

This is in line with the research of (Rosarina, Sudin & Sujana, 2016). Based on the findings and discussion, applying the discovery learning model is an alternative to improve student learning outcomes, especially in material changes to objects. This increase is seen from the percentage of completeness of each cycle. Students who were declared complete in cycle I based on the test results were 7 students (26.92%), cycle II became 17 students (65.38%) and cycle III 23 students (88.46%).

Learning outcomes are more optimal if you use the right learning model and take advantage of things around students, especially using local cultural material, this is in accordance with the research results of (Simamora & Saragih, 2019) in Improving Students' Mathematical Problem-Solving Ability and Self. -Efficacy through Guided Discovery Learning in Local Culture Context is very relevant. This is due to the activeness of students and the integration of local cultural materials in learning so that learning outcomes are more visible than previous studies. This research like of Putriani and Rahayu (2018) research, the concluded that in general students who follow the learning using the model of Discovery Learning with the sunflower context showed better results in learning mathematics when compared with students who learning conventionally. This is possible because learning using the Discovery Learning model with the sunflower context provides flexibility for students to find and express answers with the use of various open issues, because in solving the problem students are required to be more active in understanding, reviewing and transferring knowledge gained. The researcher also found that students are more active with learning discovery learning and coupled with the props that they did not expect that will learn the circle using sunflowers.

Based on the results of research and discussion of discovery learning, it can be concluded that learning with the discovery learning model can improve science learning outcomes for grade V students in Wijayakusuma Cluster, Karangtengah District, Demak Regency with heat transfer material and is more effective when compared to conventional learning. This means that the hypothesis which states that there is an effect of discovery learning learning models on learning outcomes of fifth grade elementary school students in Wijayakusuma Cluster, Karangtengah District, Dema Regency is proven

4. Conclusion

The conclusion of this research was There is an effect of the discovery learning model on the science learning outcomes of the theme of heat transfer in fifth grade elementary school students in the Wijayakusuma cluster, Karangtengah district, Demak district. as evidenced by proven t count> t table (3.907> 1.677), with an average posttest learning outcomes of students in discovery learning learning 85.45 with 95% mastery learning while the average learning outcomes in the control class was 74.00 with learning completeness of 83, 33%. This is because discovery learning is a focus on the activeness of students in solving various problems faced, so as to find a concept that can be applied in the field.

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