

# The Effect of Discovery Learning Model and Scientific Attitude of Students on the Understanding of the Concept of Natural Science in Students of Grade IV Primary School

Debby May Puspita<sup>1</sup>, Sahyar<sup>2</sup>, Sriadhi<sup>3</sup>

Faculty of Mathematics and Natural Science, University of Medan<sup>2</sup>

Faculty of engineering, University of Medan<sup>3</sup>  
Medan, Indonesia

Email : [debbymay02@gmail.com](mailto:debbymay02@gmail.com)

**Abstract-**This study aims to analyze: (1) Is the understanding of the concept of Natural Sciences in students taught with the Discovery Learning model better compared to Direct Instruction model?, (2) Does the students' understanding of the concept of Natural Science of students who have high scientific attitudes better than that of low scientific attitudes? (3) Are there interactions between the learning model and the scientific attitude in influencing students' understanding of the concept of Natural Science? This research is a quasi-experimental study. The sample in this study was selected with a total sampling of two classes. The instrument consists of a test of understanding of the concept of Natural Science in the form of multiple choice tests and questionnaires of students' scientific attitudes. Data were analyzed using two-way ANOVA at significant level  $\alpha = 0.05$ . The results of the study show that (1) Understanding of the concept of Natural Science of students taught with the Discovery Learning model is better than the Direct Instruction model. This can be seen from the average understanding of the concept of Natural Science taught by the discovery learning model  $x = 69,261$  with the value of sig. is 0,000; (2) Understanding of the concept of Natural Science of students who have a high scientific attitude is better than those who have a low scientific attitude. This can be seen from the average understanding of the concept of Natural Science of students who have a high scientific attitude  $x = 69,261$  with the value of sig. is 0,000. There is an interaction between learning models with scientific attitudes in influencing students' understanding of the concept of natural science with sig. of 0.028, where the understanding of the concept of Natural Science is optimal for students who are taught with the Discovery Learning model for high scientific attitudes.

**Keywords:** *understanding of concept of Natural Science, scientific attitude, discovery learning model*

## I. INTRODUCTION

Education is a form of effort to prepare human resources capable of dealing with life's problems that always develop from time to time. One of the goals of elementary school is to prepare students who are faithful, pious, creative and innovative and have scientific insight and are also prepared to continue their education to a higher level [1]. The effort to

prepare students in achieving these goals requires a set of learning given to students including the subjects of Natural Science.

One effort to see the extent to which education in Indonesia develops compared to other countries in the world is by Indonesia's participation in the Program for International Student Assessment (PISA). This becomes important from the point of view of the interests of students in the future, so that they can compete with other countries in the era of globalization. The announced results of PISA in 2015 indicate that, of 70 participating countries, Indonesia was ranked 62nd for Science and 63 for Mathematics. This result is still far from what was expected, but generally improved especially for Science and Mathematics, where in the last PISA of 2012, Indonesia's ranking for Science and Mathematics was 64 out of 65 countries [2].

Natural Science learning must be directed to find out and act, so that it can help students to gain a deeper understanding. To be able to improve students' understanding of the concept of Natural Science optimally and well on cognitive aspects, it is necessary to change and innovate in developing learning models that are able to engage students actively in the learning process.

Concept understanding is the ability that is presented in a form that is better understood, able to provide interpretation and able to apply it [3]. Indicators of understanding the concepts used in this study [4] are: (1) interpret; (2) exemplify; (3) classifying; (4) summarize; (5) conclude; (6) compare; and (7) explain. Concept understanding can be interpreted as a process of translating a concept into a form, then interpreting a sign or symbol of a theory so that it can compare, classify, give an example and be able to predict the solution of a problem through high intellectual thinking.

The Discovery Learning model is a learning model that emphasizes student activity in learning to discover knowledge through problem solving [5]. Problem solving is not only done in groups and discussions but also emphasizes on conducting experiments, collecting and analyzing data, and drawing conclusions. From this learning model, students will develop learning experiences by constructing their own knowledge and developing students' critical attitudes [6]. Discovery learning can improve the independent learning process where students

form new ideas or new concepts based on knowledge through their own processes [7]. Collaborative Discovery Learning of Model Design can help students solve domains that have complex problems as long as students learn to design their own activities in groups [8].

The Discovery Learning model is a learning that is closely related to active activities in groups. Then it can be said that the Discovery Learning model will run well if students have a good scientific attitude. Scientific attitude is an establishment (tendency) towards a particular stimulus that is always oriented to science and scientific methods [9]. Scientific attitudes can be considered as a complex thing which is the values and norms inherent in scientists [10]. The scientific attitudes that will be observed are only attitudes: 1) curiosity; 2) critical thinking; 3) open thinking and cooperation; 4) respect for data; 5) discovery and creativity; 6) perseverance and; 7) sensitive to the surrounding environment [11].

The purpose of this research is: To analyze whether the understanding of the concept of Natural Science by students who use the Discovery Learning model is higher than the Direct Instruction model; To analyze whether the understanding of the Natural Science concept by students who have a high scientific attitude is better than students who have a low scientific attitude; To analyze whether there is an interaction between the Discovery Learning model and the students' scientific attitude towards students' understanding of the concept of Natural Science.

**II. METHOD**

This research is a type of quasi-experimental research. The population in this study was students of class IV of Public Primary School 028227 of Binjai Selatan in Learning Year 2017/2018, totaling 52 students. To determine the class, total sampling technique is used. The instrument used in this study is a test of students' understanding of the concept of Natural Science and the questionnaire of students' scientific attitudes. After the data is collected then the data is processed with SPSS 22.0 for windows.

**III. RESULTS AND DISCUSSION**

After the data is collected and analyzed statistically, then hypothesis testing is carried out. This hypothesis testing uses two-way ANOVA test with SPSS-assisted calculation. From the data as a result of the understanding test of the concept of Natural Science obtained then the average value of each group is calculated, which is then arranged as a table for 2-way ANOVA.

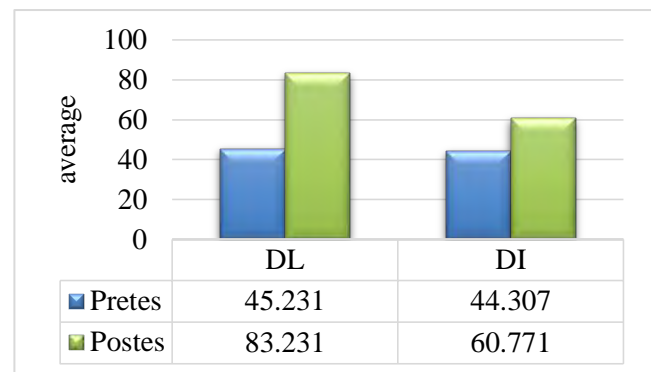
**TABLE 1. Results of Two-Way ANOVA Test**

Source	Number of squares type-III	df	Average squared	F	Sig.
Corrected model	8912.343 <sup>a</sup>	25	356.494	12.880	0.000
Intercept	168496.680	1	168496.680	6087.501	0.000
Learning_Model	2802.735	1	2802.735	101.258	0.000
Scientific-Attitude	1875.977	15	125.065	4.518	0.000
Learning_Model * Scientific-Attitude	397.904	9	44.212	1.597	0.028
Error	719.657	26	27.679		
Total	279200.000	52			
Total correction	9632.000	51			

Two-way ANOVA test results from the table above are then used to answer the hypotheses proposed in this study

- a. Differences in students' understanding of the concept of Natural Science by Discovery Learning Model and Direct Instruction Model

After the data obtained from the research results, then the next stage is done to analyze the result.



**Fig 1. Diagram Of Pretes-Postes Data Of Experience Class And Control Class**

The results of variance analysis provide a significance value of the learning model of 0.000. Because of the sig.-value is  $0,000 < 0,050$ , so the results of testing the hypothesis reject  $H_0$  or accept  $H_a$  in the alpha level of 5% means that the students' understanding of the concept of Natural Science is higher with the Discovery Learning model and the Direct Instruction model in natural science subjects.

The average results of understanding the concept of Natural Science of students in the Discovery Learning class is 81.738, while the average results of understanding the concept of Natural Science of students in the Direct Instruction class are 69.261. Thus from the results of this hypothesis test it can be concluded that students who are taught with the Discovery Learning model get a higher average score of understanding the concept of Natural Science compared to students who are taught with the Direct Instruction model.

The Discovery Learning model is a cognitive learning model that requires teachers to be more creative in creating situations that can make students actively discover their own knowledge [12]. The Discovery Learning model is more

effective than conventional learning on student learning outcomes [13].

b. Differences in understanding the concept of Natural Science in students from groups of high scientific attitudes and that of low scientific attitudes

Scientific attitude is defined as a general assessment by a person of an object that is typical of Natural Science or related to Natural Science, besides that attitude is a facilitator and product of cognitive learning processes [14]. The result of variance analysis shows that the significance value of scientific attitude is 0,000. Because sig.-value of  $0,000 < 0,050$ , then the results of testing the hypothesis reject  $H_0$  or accept  $H_a$  in the alpha level of 5% which means the understanding of the concept of Natural Science in groups of students who have a high scientific attitude is higher than the group of students who have a low scientific attitude.

TABLE 2. Comparison Of Science Nature Of Experience Class And Control Class

Nature Science	Average Learning Outcomes		Average
	Discovery Learning (DL)	Direct Instruction (DI)	
high	86,588	70,857	78,722
low	76,888	67,666	72,277
Average	81,738	69,261	

The average understanding of the concept of Natural Science of students who have a high scientific attitude is 78,722 while the average understanding of the concept of Natural Science of students who have a low scientific attitude is 72,277. From the testing of this hypothesis it can be concluded that understanding the concept of Natural Science of group of students who have a high scientific attitude is higher than the group of students who have a low scientific attitude.

c. Interaction between Discovery Learning Model and Direct Instruction Model with Scientific Attitude to Improve Understanding of the Concept of Natural Science of Students

Based on the results of variance analysis it is clear that the significance value of the learning model of students' scientific attitudes is 0.028. Because of sig.  $0.028 < 0.050$  then the hypothesis test results reject  $H_0$  or accept  $H_a$  in the alpha level of 5%. This shows that there is an interaction between the learning model and the student's scientific attitude, where the significance of the model for learning \* scientific attitude is 0.028. Because sig.-value of  $0.028 < 0.050$ , the results of testing the hypothesis reject  $H_0$  or accept  $H_a$  in the alpha level of 5%. This shows that there is an interaction between the learning model and the scientific attitude towards understanding the concept of Natural Science of students on the theme 7 'The Beautifulnness of My Country Diversity' concerning force and changes in force. The results of the interaction between the learning model and the scientific attitude in influencing the understanding of the concept of Natural Science can be presented in graphical form as in Figure 3 below.

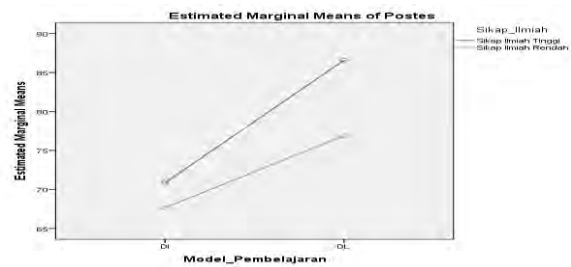


Fig 3. Graph of the Interaction between the Discovery Learning Model and the Direct Instruction Model with Scientific Attitudes

From Figure 3. above the results of the interaction between learning models with scientific attitudes can be seen directly with the intersection of lines, but if the two lines are extended, there will be a crossing between the two. This indicates that understanding the concept of Natural Science of students based on high scientific attitudes shows an increase in both Discovery Learning and Direct Instruction classes.

#### IV. CONCLUSIONS

Based on the results of the research and discussion, some conclusions can be drawn as follows: (1) The average value of understanding the concept of Natural Science in Discovery Learning class is 81,738 and the average value of understanding the concept of Natural Science in Direct Instruction class is 69,261 (sig.  $0,000 < 0,050$ ). Through testing the hypothesis it was found that understanding the concept of Natural Science that uses the Discovery Learning model is higher than using the Direct Instruction model. (2) The average value of understanding the concept of Natural Science in the group of students who have a scientific attitude above the average (height) is 78.722, and the average value of understanding the concept of Natural Science in groups of students who have a scientific attitude below the average (low) is 72.277 (Sig.  $0.000 < 0.050$ ). Through testing the hypothesis it was found that understanding the concept of Natural Science of students who have a high scientific attitude is higher (better) than understanding the concept of Natural Science of students who have a low scientific attitude. (3) There is an interaction between the learning model and the scientific attitude in influencing students' understanding of the concept of Natural Science (sig.  $0.028 < 0.050$ ).

#### References

- [1] BSNP. 2010. *Standar Isi Untuk Satuan Pendidikan Dasar dan Menengah*. Jakarta.
- [2] OECD. 2016. *Programme for International Student Assessment (PISA) 2015 Result in Focus*. New York : Colombia University.
- [3] Vestari, D. 2010. *Model Pembelajaran Berbasis Fenomena Dengan Pendekatan Inkuiri Terbimbing untuk Meningkatkan Pemahaman Konsep Pembiasaan Cahaya dan Keterampilan Generik Sains Siswa SMP*. Pascasarjana Universitas Pendidikan Indonesia : Bandung.
- [4] Anderson, L.W., & Karthwohl, D.R. 2011. *Kerangka Landasan Untuk Pembelajaran, Pengajaran dan Asesmen*. Yogyakarta : Pustaka Pelajar.

- [5] Joyce. 2002. Discovery Learning for the 21<sup>st</sup> Century : What is it and how does it compare to traditional learning in effectiveness in the 21<sup>st</sup> Century. *Journal of Technology and Teacher Education*. 14-15
- [6] Saefuddin, Asis. 2014. *Pembelajaran Efektif*. Bandung: Remaja Rosdakarya.
- [7] Joolingen, Wouter. V. 1999. Cognitive Tools for Discovery Learning. *International Journal of Artificial Intelligence In Education*, 10: 385-397.
- [8] Bravo, Crescencio., Redondo, Miguel A., Ortega, Manuel., and Verdejo, M. Felisa. 2002. Collaborative Discovery learning of Model Design. *Springer-Verlag Berlin Heidelberg*, 2363: 671-680.
- [9] Sujanem, R dan Adiarta, A. 2001. Upaya peningkatan sikap ilmiah siswa, literasi sains dan teknologi dalam pembelajaran IPA di Sekolah Dasar melalui pendekatan Sains Teknologi Masyarakat. Laporan penelitian, IKIP Negeri Singaraja.
- [10] Patil, G.V. 2011. A Comparative Study Of Scientific Attitude About Secondary And Higher Secondary Level Students. *International Referred Research Journal*. Vol. 2. No. 24 : 24-26.
- [11] Harlen & Anwar. 2009. *Teaching and Learning Primary Science*. London : Paul Chapman Publisher
- [12] Abdullah, Sani. 2013. *Inovasi Pembelajaran*. Jakarta : Bumi Aksara.
- [13] Effendi, L.A. 2012. *Pembelajaran Matematika dengan Metode Penemuan Terbimbing untuk Meningkatkan Kemampuan Representasi dan Kemampuan Pemecahan Masalah Matematika Siswa SMP*. Tesis. Universitas Pendidikan Indonesia : Bandung.
- [14] Mulyasa. 2014. *Guru dalam Implementasi Kurikulum 2013*. Bandung: Remaja Rosdakarya.