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THE USAGE OF KIT-FOR-KIDS IN DISCOVERY LEARNING MODEL TO IMPROVE THE UNDERSTANDING OF SCIENCE TEACHING MATERIALS ON ELEMENTARY SCHOOL STUDENTS

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Abstract

This research was conducted to find out the increased in understanding of elementary school students' teaching material through the use of kits for kids on discovery learning models. This research used quasi-experimental method using the matching only pretest and posttest control group design. The learning process in the experimental group applies the discovery learning model with kit for kids while the control group applies traditional learning. Learning take place during two meetings, both in the experimental group and control group. Each learning process is conducted the observation process of the implementation of learning activities. The subjects in the experimental group were 23 students and in the control group were 22 students. The research instrument uses multiple choice tests. Data analysis techniques used n-gain mean data and U Mann-Whitney SPSS Version 22 non-parametric test. The results showed that the increase in understanding of teaching materials on students who received discovery learning model assisted with a kit-for-kid was higher than students who received traditional learning.

Keywords: Discovery Learning; Understanding Teaching Material

A. Introduction

Natural science or science is a human effort in understanding the universe through proper observation (on targets), using procedures, and explained with reasoning to get a conclusion. In this case, teachers, especially those who teach science in elementary schools, are expected to know and understand the essence of science learning, so in science learning, teachers will have no difficulties in designing and implementing the learning. Even students who do learning have no difficulty in understanding the concept of science.

The essence of science is regarded as a process, product, attitude, and application. As a process, science is defined as scientific activities to complete knowledge about nature and to discover new knowledge. As a product, science is interpreted as a result of the process, in the form of knowledge that is taught both inside or outside the school or as reading material to spread knowledge. As an attitude, besides science as scientific activities also have scientific attitudes, so the results achieved in scientific activities are in line with expectations. As an application, science is regarded as a knowledge whose application is in accordance with life (Mariana dan Praginda: 2009).

Discovery learning model stand on constructivist theories that emphasize the students' needs to investigate their environment and construct knowledge. This provides an opportunity for students to explore the surrounding environment. So expectedly the knowledge obtained by students can be constructed by themselves based on the discovery activities carried out in learning activities. In the learning process, Bruner attaches great importance to the active participation of each student and is well acquainted with differences in abilities. To support the learning process, the environment needs to facilitate students' curiosity at the exploration stage. This environment is called as discovery learning environment. Discovery learning environment is an environment where students can explore, discover new unknowns or understandings similar to those already known. Agreed with Njoo, 1994; De Jong & Van Joolingen, 1998 in Balim (2009) that explained that in

discovery learning, students construct knowledge based on new information and data collected by them in an explorative learning environment. This environment is intended so students in the learning process can run well and be more creative. So, to facilitate a good and creative learning process must be based on the manipulation of lesson material that in accordance with the cognitive development level of students. This indicates that in learning, especially science learning requires a teaching aid or experimental device which in this research called a kit for kids. The kit is a science teaching aid that is intentionally designed, created, compiled, or organized by the teacher with items related to the unit of study used in helping students to understand the science material of various objects in the environment and everyday life of students (Iswadji: 2003). Whereas the kit for kids is a translation of the kit for children. The children here are aimed at elementary school children. In this research, elementary school children meant are the 5th-grade students of elementary school.

The ability to understand concepts is a level of ability that expects students to not only to know (memorizing) but able to master or understand concepts (Rianti dan Nulhakim, 2017). The same thing was explained by Widodo (2006, page. 6) which explains that understanding is constructing meaning or definition based on the initial knowledge possessed, linking new information with existing knowledge, or integrating new knowledge into the schemes that already exist in students' thinking. Because the constructor of the scheme is a concept, then conceptual knowledge is the basis of understanding. From some expert's definition which has been explained, it can be concluded that understanding is the ability of students to construct the meaning of teaching, both verbal, written and graphical communication obtained based on the initial knowledge possessed then linked or integrated with new information into their thinking.

The results of previous research have shown the application of discovery learning models nor kit. Kadri and Rahmawati research results (2015) entitled the effect of discovery learning models on student learning outcomes on the subject matter of temperature and thermal. The results showed the posttest

mean score of the experimental group was 72.50 and the control group was 64.00. These results indicate that there are differences in the influence of discovery learning models on student learning outcomes. Furthermore, the research of Arnyana et al. (2013) entitled the effect of cooperative learning model type numbered head together (NHT) that assisted by science kits on creativity and student learning outcomes on science subjects of 4th-grade elementary school shows the results; first, there are differences in students' creativity in science learning between students who take the numbered head together (NHT) learning assisted by science kits with the students who take conventional learning. Secondly, there are differences in the science learning outcomes between students who take numbered head together (NHT) learning assisted by science kits with the students who take conventional learning. Based on these descriptions, it can be said that the research related to the application of discovery learning models and science kits has been done a lot. However, these researches were carried out partially. This meant that the research only focused on the discovery learning model or the science kit. Therefore, researchers intend to use the discovery learning model and science kit in this research.

Based on these descriptions, the formulation of this research problem is "How is the increase of understanding of teaching materials for elementary students who get discovery learning models using kit for kids compared to elementary students who get traditional learning?". While the purpose of this study is "Obtaining a description of increasing understanding of teaching materials among the elementary students who get the discovery learning model using kits for kids compared to elementary students who get traditional learning".

B. Research Methodology

The method used in this research is quasi-experimental method. Quasi-experimental research is a research where the research subjects are not randomly grouped, but accept the subjects as it is (Ruseffendi, 2006). This research uses two groups, namely the experimental group where students

learn by using kits for kids on the discovery learning model and the control group where students learn with traditional learning or learning as usual. This is based on the opinion of Fraenkel et al., (2012) which says that the research that tests the effectiveness of a new method in teaching has at least one group is given a new method of treatment compared to a comparator who is learning as usual by the teacher. Both groups were given different treatments but they were given the same pretest and posttest, so the research design used was the matching-only pretest-posttest control group design (Fraenkel, et al., 2012).

The population determined in this study is as much as the number of 5th-grades that is incorporated in cluster I at the school under research in Cinangka Subdistrict, Serang Regency, namely as many as 9 classes (study groups) of 7 elementary schools in the school cluster. This is because the characteristics of the schools in the cluster I are relatively similar in applying science learning. As for the sample determined was only 2 classes, namely class 5th A with a total of 23 students and class 5th B with a total of 22 students in one cluster I school in Cinangka Subdistrict, Serang Regency. Determination of sampling is determined by purposive sampling technique. Purposive sampling is taking the research objects based on the objectives or adjusted to the research objectives (Sukmadinata, 2011). Furthermore Arikunto (2006) explain that the purposive sampling technique is a technique of taking samples not based on random, regional or strata, but based on the existence of considerations that focus on specific objectives.

The instrument used in this research was a multiple-choice comprehension test. Comprehension test data processing techniques of teaching materials; scoring, calculating normalized gain.

C. Research Result and Discussion

To see the significance of the difference in N-gain of the two groups, a hypothesis test was performed. Hypothesis testing uses non-parametric statistical analysis (Minium, et al., 1993). In this case, using non-parametric statistics U Mann-Whitney on the SPSS Version 22 application with a significance value α = 0,05 the results are shown in Table 1.

Table 1
U Mann-Whitney Hypothesis Test Results
on Variable of Understanding The Teaching Material

	Nilai
Mann-Whitney U	3,000
Wilcoxon W	256,000
Z	-5,694
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: Model

Based on Table 1 shows the probability score (Sig.) *U Mann-Whitney* test of 0,000 (< 0,05) which means that Ho is rejected or H_1 is accepted. This means that there are significant differences between the experimental group and the control group in terms of understanding teaching material. Based on the hypothesis test, can be concluded that the increase in understanding of teaching material in experimental group students is higher than in control group students.

The Profile of Improvement in Understanding of Teaching Material of Each Aspect of Both Groups. This analysis was conducted to determine the average N-gain for each aspect of understanding teaching material based on the pretest and posttest of the two groups which can be seen in Table 2.

Table 2
The Average N-gain in Understanding The Teaching Material for Each Aspect in Both Groups

Cognitive Aspects (C_2)	Experimental group		Control Group	
	N-gain Average	Category	N-gain Average	Category
Exemplifying	0,85	High	0,27	Low
Classifying	0,51	Medium	0,28	Low
Comparing	0,43	Medium	0,27	Low
Explaining	0,66	Medium	0,15	Low

Based on the processing data of the pretest results of understanding teaching material, it is shown that the experimental group and the control group had almost the same comprehension ability. The experimental group got the discovery learning treatment using a kit for kids while the control group got the traditional learning treatment. From these two treatments, both those who got discovery learning using kits for kids and traditional learning proved that both are able to increase the understanding of teaching material. However, the improvement experienced by students who learn through discovery learning using kits for kids is generally higher than students that learn with traditional learning.

Through the statistical analysis, can be proven that the increased understanding of teaching material achieved by the experimental group is significantly different than the control group. So, it can be said that discovery learning using kits for kids can give a positive contribution to improving understanding of teaching materials. This is because during the learning process students are required to find, process, and form their own theory based on the experiments they do, so they subconsciously practice their understanding of teaching material. This is in line with Bruner's explanation (in Balim 2009) that explains that the material discovery in science takes place over experiments and investigations of natural phenomena through discovery learning. While the

experiment itself one of them can be done using kits. As was said by Rennie (in Jones et al., 2014, page 2374), The kit engages students in experimental activities to find science material related to questions, some forms of data collection, data interpretation, including assessment after using the kit.

Furthermore, if observed according to cognitive aspects, students still have difficulty in answering tests on the comparing aspects, can be seen in Table 2 with an improve in the N-gain average of 0.43, the lowest compared to the improvement in the average N-gain score of other aspects. Whereas happened in the cognitive aspects of the control group experienced an improvement of all the low categories. The lowest cognitive aspect is explaining, followed by comparing, modeling and classifying aspects, which are seen in the acquisition of an improvement in the average N-gain score of 0.15 which is categorized as low.

Therefore, it can be concluded that the discovery learning model using kits for kids can significantly increase the understanding of teaching materials, especially on mastering the concept of Displacement and Conversion of Electrical Energy. This is relevant to the results of research conducted by Widiadnyana (2014) the results show that there are differences in understanding of science concepts and scientific attitudes between students who get discovery learning compared to direct learning. This is in line with research conducted by Arnyana and friends (2013) the results show that there are differences in creativity and student learning outcomes between students who take cooperative learning with numbered head together (NHT) type assisted by science kits and students who take conventional learning. However, the improvement in N-gain that occurred in the experimental group was only categorized as moderate, this could be due to there are still some obstacles in the first meeting of the learning process. As for some of the obstacles that caused less optimal learning activities are students, teachers, learning time, and textbooks.

Student factors include the lack of student readiness. Jamis Drever (Dalyono, 2009) states that readiness is a willingness to respond or react. Based on the understanding of readiness

expressed by Drever, it can be said that students who are ready to learn are students who respond or react to learning activities. While in the learning activities there are still many students who are not ready to receive the learning, this can be seen from the fact that there are still group members who do not work and help their colleagues both in conducting experiments and answering questions in student worksheets.

Teacher factors include explaining planned activities and rules in groups. This is supported by the opinion of Darmadi (2012) which explains that the explain activities in learning aims to help students understand concepts, laws, procedures, etcetera objectively, guide students objectively, guide students to understand questions, increase student involvement, give students opportunities to appreciate the process of reasoning and obtain feedback on student understanding. This is in line with the opinion of Gillespie and Gillespie (2007) which states that for students to learn effectively through experiments, teachers must pay attention to four things, namely the level of guidance provided, the ability of students to work independently, plan investigative or experimental steps, the character of the problem raised (requires open-ended or close-ended answers), the availability of learning resources, and realistic time allocation for implementation. Next is the weakness in guiding students in the discussion evenly. Proven by the reluctance of teachers to go around to guide students in discussions. This is also supported by the opinion of Darmadi (2015) who explains that the components to guiding small group discussion include,

1) Focusing students' attention,
2) Clarifying students' opinions,
3) Analyzing students' views,
4) Increasing students' contributions,
5) Distributing students' views, and
6) Closing the discussions.

The next factor is learning time. The allocation of learning time at each meeting is 3x35 minutes as predetermined between the researchers and the teacher written in the learning syntax. But it was seized by the students' noise. Especially at the first meeting, where students are not familiar with the learning provided. This impacted on the course of learning that resulted in less maximal in the delivery of learning

material. The limited availability of learning resources in the form of textbooks also becomes an obstacle. Where in the discovery learning model there is a learning stage namely the verification stage that needs literature support to confirm the results of the experiment and student discussion in each group.

Students in the experimental group generally can solve the problem quite well, as seen in the improvement in the average N-gain score in Table 2 shows that an increase of 0.85 that is categorized as high for exemplifying problems. While the control group only experienced an improvement of 0.27 which was categorized as low. This is due to one of them by the experimental activities that have been done by students with objects or materials that they often encounter in their daily life related to the concept Displacement and Conversion of Electrical Energy.

In the classifying problem that can be seen in Table 2, the experimental group students experienced an increase in the average of N-gain by 0.51 that was categorized as moderate, while in the control group, the average of N-gain score increased by 0.28 in the low category. This happens because in the experimental group with discovery learning using kits for kids the students are required to find their own understanding through experimental activities. At this stage students are free to explore their experiments, moreover, the classifying problem is more related to the results of the experiment, thus allowing the experimental group students to be superior than the control group students.

In the comparing problem, students in the experimental group experienced an increase in the average score of N-gain of 0.43 which is categorized as moderate that can be seen in Table 2, while in the control group the average score of N-gain increased by 0.27 which is categorized as low. This can happen due to the traditional learning model emphasizes more on proofing rather than finding, besides learning on the control group applied traditional learning more to "what" not "why" so the understanding of teaching material in comparing problem for the control group tends to be less than the experimental group.

Students of the experimental group on the explaining problem getting an

increase in the average score of N-gain that can be seen in Table 2 by 0.66 that is in the medium category, while the control group has an increase in the average score of N-gain by 0.15 which was categorized as low. In the explaining problem, the experimental group increased better than the control group. This is because students in the experimental group are accustomed to cause-effect statements like "why ... because" that they get from discovery learning by conducting a series of experiments.

D. Conclusion

Based on the results of research and discussion that has been done, then can be concluded that the increased understanding of teaching materials between the elementary students that learns through discovery learning models using kits-for-kids is higher than the teaching materials understanding of the elementary students which learns through traditional learning.

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