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Concept Understanding of Science in The Project Based Learning Model Using Recycling Activities

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Abstract

This study was aimed to determine the level of classical completeness of student learning outcomes in the project based learning model by using recycling activities to describe the difference in concept understanding of science the experiment and control classes. The population in this study was the fifth grade students of SDN Setramanah, Subang District, Subang Regency 2018/2019 Academic Year. The type of research used in this study was a quasi-experimental design with nonequivalent control group design. The data analysis was done using the proportion test and the independent samples t-test. The results of this study showed that the completeness of concept understanding of science was more than 75%; and the ability of concept understanding in the project based learning model using recycling activities is was better than that of the project based learning model without recycling activities.

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INTRODUCTION

The understanding concept natural of science learning is one of the levels of ability in the process of thinking in which students are required to understand the concept and to gain knowledge and to see the phenomenon from various aspects. According to Linuwih (2013) understanding the concept of science in a review of physics as a structure of science, the concept is part of the structure of physical science in the form of ideas or understandings abstracted from concrete events or mental depictions of objects, processes or anything (that is outside of language) that considered true by physicists and used by reason to understand other things. Correspondingly Chiappeta and Koballa (2010) state that the concept is an abstraction of an event, object, or phenomenon that appears to have certain characteristics or something in common. Based on this understanding, it can be inferred that the concept has an abstract nature that can describe the general characteristics of a group of objects, events or other phenomena in a field of science.

The understanding the concept has an important role in the teaching and learning process and it is the basis for achieving student learning outcomes. The statement is in accordance with the opinion of Wardhani (2015) who found that there is a positive relationship with the understanding of the concept of learning outcomes of students. The understanding concept of science learning in elementary school is learning on knowledge relating to nature and daily activities around students involving scientific activities by observing, exploring, asking, negotiating and concluding (Hanifah, 2010: 27).

To instill a concept in the learning, a teacher needs to teach it in a real context by relating it to the surrounding environment. Widiawati, Pudjawa, and Margunayasa (2015) stated that understanding the concept of science in elementary schools needs to carry out activities outside the classroom to facilitate students in understanding the concept of science. The activity can be in the form of observation or investigation and can also carry out experimental activities or simple experiments. This will improve the ability of students to understand the concept.

Based on the results of observations and interviews conducted in grade V SD cluster III Subang District, obtained the average of mid-trem test natural science learning of students as can be seen in Table 1.

Table 1. The Average Score of Natural Science Mid-Trem Test of Fifth Grade Elementary School Students in Cluster III of Subang District

School	Average	Category
SDN Parung	72	Moderate
SDN Setramanah	71	Moderate
SDN Panembong	73	Moderate
SDN Pasir Kareumbi	72	Moderate
SD Yos Sudarso	75	Moderate
SD IT Yaisa	74	Moderate

Based on Table 1, it can be seen that the average results of the mid-term test of fifth grade elementary school students in Cluster III Subang Sub-district are in the moderate category. The student learning outcomes in each school is moderate category. This achievement obtained by the students due to the less meaningful learning. In addition, in the learning process the the understanding concept of science was not implemented or given properly. The role of the teacher as a facilitator in the learning can be used as a solution by conducting innovative and interesting learning. The development of learning presented by the teacher needs to facilitate students to develop new knowledge based on prior knowledge experience. In addition, the use of the environment as a learning resource is expected to facilitate the activities of students in the learning.

By applying the project based learning model using recycling activity in the science learning, connecting the knowledge that students already have with the knowledge to be learned is an important element. The stages of environmental observation, project planning, selection, collection, processing and publication of project results can interpreted by students.

According to the Ministry of Education and Culture (2013: 2) the project based learning

model is a learning model that uses activities/ projects as a medium to achieve learning objectives. According to Wijanarko, Supardi, and Marwoto (2017) the project based learning model is able to improve cognitive outcomes with activities that utilize the environment around students so that the learning becomes a meaningful learning. Cakici and Turkem (2013) stated that the project based learning model was able to improve the ability of students. Project based learning model with waste management activities becoming trash fashion can improve students' cognitive abilities (Astuti, 2015). Nawawi, Amilda, and Sari (2017) stated that the project based learning model has an effect on improving the ability of students on environmental management.

Waste recycling activity increase the knowledge of students on the environment (Suparto, 2016). Linda (2016) states that waste recycling activity affect the ability to hold concepts. Then waste recycling materials can train the life skills of students (Kusumaningrum, Susantini, and Hidajati, 2014). In addition, Afendiyanto (2015) states that the use of recycling activity in the learning can improve the learning outcomes of students. Sayketi (2012) states that learning using waste recycling activity can improve the learning outcomes of students.

Based on the description of the background, the study aims to examine the ability of understanding concept of natural science learning in the learning of project based learning models using the recycling activity toward students in grade V of water cycle material. The objectives of this study were: (1) to determine the level of classical completeness of students learning outcomes; and (2) to describe the differences in the ability of understanding concept of science learning between the project based learning model using recycling activities and the project based learning model without using the recycling activity.

METHODS

The type of research applied in this study was a quasi-experimental study with a type of nonequivalent control group design. There were two class groups. The experimental class obtained treatment using the project based learning model using waste recycling activity, whereas, the control class obtained the treatment using the project based learning model without waste recycling activity.

The population in this study was students of fifth grade SDN Setramanah Subang in the 2018/2019 academic year. The form of sampling applied was purposive sampling, namely sampling with certain considerations. The research sample was the fifth A and fifth B students of SDN Setramanah Subang.

The data collection techniques in this study was using concept understanding tests. The concept comprehension ability test was first tested on a trial class, the results obtained were analyzed by analyzing the items including validity test, difficulty level test, distinguishing power, and reliability testing so that the items obtained were used to test the concept comprehension ability.

The data in this study was the data of the ability of understanding concept of science learning. The test results obtained were analyzed by using the proportion test and comparison test using independent t-test.

RESULTS AND DISCUSSION

Learning Process of Project Based Learning Model through Recycling Activities

Learners' activities in learning process of project-based learning through recycling activities are showed in figure 1.

Figure 1. Observation of School Environment

Observation was carried out by observing the school environment in terms of recycling. The students took notes of in the student activity sheet. Then, the notes were discussed within their group to find out a solution as in figure 2.

Figure 2. Project Planning

The planning was carried out by discussing how to manage waste in order to be utilized as reused things starting from sorting the waste, collecting the waste, cleaning the waste, and processing the waste. Figure 3 shows the activity.

Figure 3. Sorting the Waste

Sorting the waste was carried out by collecting the waste according its type. The students were given two types of trash can: organic and non-organic. They then used the cans to sort the waste. The sorted waste then was recycled to be reused things as in figure 4.

Figure 4. Collecting the Waste

Collecting the waste was carried out after the waste was sorted in the previous process. The collected waste was then cleaned to be reused as planned in the planning activity. Figure 5 shows the activity.

Figure 5. Processing

The waste was processed to be reused things such as wall decoration, toys, souvenirs, hand crafts etc.

Figure 6. Public Publication

The publication was carried out by explaining what they have produced, tools and materials used, and the steps of making the product as in figure 6. Therefore, the information presented can be noted by the other students to be practiced in another occasions.

Classical Completeness of Learning Outcomes

The completeness test of learning outcomes aims to find out the percentage of the ability of understanding concepts of science learning of students in the fifth grade of SDN Setramanah Subang who obtained the project based learning model using waste recycling activity achieving classical completeness by 75%, with students passing grade ≥ 70. Before conducting the completeness test of learning outcomes, a prerequisite test was first conducted that consists of normality test and homogeneity test. Once proven to be normal and homogeneous, then a proportion test was performed.

The calculation results showed that the value of z = 1.971 with z_tabel = 1645. Since z ≥ z_ (0.5-α) or 1.971 ≥ 1.645 which means that the proportion of students taught by using the learning project based learning model using recycling activity reach passing grade more than 75%. There were 31 students who obtained score above the passing grade and 3 students obtained score below the passing grade. The following is the percentage of the classical completeness of the experimental class based on the results of the concept understanding ability test in Figure 7 below.

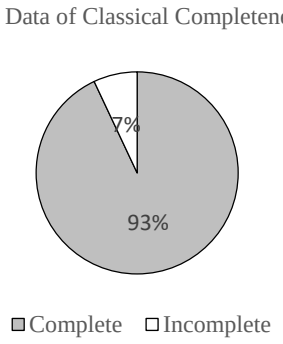

Figure 7. The Percentage of Classical Completeness

Based on the above figure, it can be concluded that the score of the ability of understanding concepts of science learning in the project based learning model using waste recycling activity achieve the completeness of learning classically.

This is in accordance with the statement that recycling activity is not only improve the ability of understanding concept of science learning based on project-based learning model but also helps to instill the understanding concept of science learning with the steps of the learning model. Cook, Gabriel, and Weaver (2015) stated that the syntax of the project based learning model is able to bridge the planting of students' understanding ability concepts so that students achieve classical completeness. In line with that, Putra *et al* (2014) states that recycling activity can facilitate students to learn so that students are able to build the ability to understand concepts. Sart (2014) mention that waste recycling is an activity that can help students to solve problems using the environment so that they can improve their understanding abilities. Then Kizkapan and Bektas (2017) argued that the project based learning model improves the ability of understanding concepts of science learning and makes the learning becomes more meaningful. Wijanayu, Hardyanto and Isnaeni (2018) asserted that the understanding concept of natural science improved during the activities that involve students caring for their environment.

The Comparison of the Understanding Concepts of Science Learning

The comparative test aims to find out the comparison of the average of the ability of the understanding concepts of IPA of students fifth grade SDN Setramanah Subang in the project-based learning model using waste recycling activity, with students who obtain learning with the project-based learning model without using recycling activity. Before conducting the test, the prerequisite test was carried out, followed by the test for normality and homogeneity. After the data were shown normal and homogeneous, then the comparative test using independent sample t-test with SPSS version 22 was done. The results of the independent samples test analysis results are presented in the following Table 1.

Table 1 ***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
Concept Understanding Competence Test	Equal variances assumed	.024	.8772.884		60	.005	6.25	2.17	1.91	10.59
	Equal variances not assumed			2.884	59.722	.005	6.25	2.17	1.91	10.59

The results of the analysis shows t = 2.884 with $t_{\_tabel}$ = 1.671. $t_{\_count} > t_{\_table}$ which means that the level of confidence is 95%, it can be concluded that there is a difference in the ability of understanding concept of science learning that obtained the learning model of project based learning using waste recycling activity, with students who obtained the learning model of project based learning without waste recycling activity. Besides, it was also obtained differences in the ability of understanding concepts of the science learning of students in the results of the statistical group output as can be seen in the following Table 2.

Table 2. Group Statistics

	Class	N	Mean	Std. deviation	Std. error mean
Concept understanding competence test	Experiment group	31	81.58	8.83	1.58
	Control group	31	75.32	8.24	1.48

Based on the results of the statistics group output above, the average score of the ability of understanding concept of science learning in the experimental class was 81.58, meanwhile, the control class was 75.32. Therefore, it can be concluded the score of the ability of understanding concept of science learning in the project based learning model using waste recycling activity is better than the ability of understanding concept of science learning the project based learning model without using recycling activity.

The result of this study is in accordance with the opinion of Atmojo (2014), learning related to the environment such as recycling activities is able to make students enthusiastic during the learning. Then, Rijati, Intan and Subekti (2017) stated in the results of their research that waste recycling activities enhance the understanding of students on the environment. In addition, Damayanti (2017) states that students feel challenged when learning on related to the environment. Chen and Yang (2019) argued that the steps of the project based learning model improve student learning outcomes compared to guidance-based learning.

CONCLUSION

Based on the results and discussion, it can be concluded that the learning using recycling activity through the project based learning model is effective in improving the ability of understanding concepts and the attitudes of students on the environmental care. This results can be seen through the following data the ability of understanding concepts achieved the classical completeness of 75%. The average ability of understanding concept by using waste recycling activity through project based learning model is better than the average ability of understanding concept using the project based learning model without using recycling activity.

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