



Analysis of Cooperative Learning Reviewed From The Activities of Science Learning of Elementary School Teacher Education Students Science Teaching Materials Development

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Abstract

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This research was conducted to determine the effect of the cooperative learning model on improving learning outcomes science concentration student Muhammadiyah University of Magelang Primary teacher education. Therefore, in the learning process, the model used by the researcher is the cooperative learning model. The type of research used is experimental research with research design One Group Pretest-Posttest Design. The study's sample consisted of 27 students from the science concentration class. The instrument used in this study was a multiple choice question (PG) with 10 items. The results showed that with $t_{count} > t_{table}$ at 5% significance level ($8.69 > 2.060$) and P value < 0.050 . Based on the results of the study, it can be concluded that the use of cooperative learning models, there is an increase in student learning outcomes in the Science Concentration class at Muhammadiyah University of Magelang for elementary school teacher education.

Keywords: Cooperative Learning; student learning activities; ilmu pengetahuan alam Teaching Materials;

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INTRODUCTION

Education and humans cannot be separated because the essence of education is humans themselves. Education can be defined as humanization or an effort to humanize humans. Education is an effort to help humans to be able to exist in accordance with their dignity as humans. Because humans become real humans if they are able to realize their essence totally, then education should be an effort that is carried out consciously by starting from the assumption of human nature.

According to (Freire 1999, 24) education must be oriented towards recognizing the reality of humans and themselves. Therefore, in the process of learning science in schools, lecturers need to increase their effectiveness so that the quality of learning is always maintained and the expected results can meet the learning objectives that have been set because science is one of the lessons taught in schools and is expected to be a place for students to learn things around them. In its concepts, science lessons have a fairly high level of abstraction, which causes students to have difficulty understanding the lessons. For that reason, Lecturers and Teachers as teachers and educators, have a role in the success of every educational effort (Manurung, et al., 2013).



The implementation of learning today must undergo changes, where students can no longer be considered mere objects of learning but must be given an active role and made partners in the learning process so that students act as active learning agents while lecturers act as creative facilitators and mediators. According to (Sanjaya 2005, 99) The selection of teaching models or methods will affect student learning outcomes; if the selection of the method is in accordance with the material to be taught, it will change the way students learn. Likewise with the learning process, to achieve learning objectives, a strategy needs to be formulated so that the objectives are achieved optimally. Without a suitable appropriate, and precise strategy, it is impossible for the objectives to be achieved.

Based on information from the lecturer of the science course in the sixth semester concentration class the of undergraduate program in elementary school teacher at education Muhammadiyah University of Mangelang, there are several student problems, namely, not all students who are still at the Senior High School or Islamic boarding school level majoring in science so their basic knowledge is still different, and they tend to understand the material but find it difficult to teach. In this science learning, conventional learning models (lectures) are still used, which do not provide students with the opportunity to be active in learning so students tend to just be silent and just listen so that student learning activities in the teaching and learning process are lacking. For this reason, the researcher applies a cooperative learning model to foster student learning activities, stimulate students to actively in the teaching and learning process and achieve specific educational goals in science courses in the sixth semester.

Jean D. Crambs in Rohani (1991: 11) stated that to form individual students into democratic human beings, teachers emphasize the principle of cooperation or group work. This example of cooperative learning is very simple because it only divides students into several small groups (4-5 people/group) and is a mixture of ability levels, gender and ethnicity. This teaching model is essentially exploring and developing active student involvement in the teaching and learning process and this is very good to be applied to subjects that teachers feel are very difficult for students to understand and one of them is the subject of natural sciences. In line with the description above, the author has conducted a study entitled "Analysis of Cooperative Learning Reviewed from the Natural Science Learning Activities of School Teacher Education Students"

RESEARCH METHODS

The population in this study were all students of the Science concentration class of Muhammadiyah University of Magelang Elementary School Teacher Education sixth semester with a total of 27 students. The data collection technique used in this study was the test technique. The test in this study used a pretest and posttest. The pretest questions were used to determine the initial abilities of students and the posttest questions were used to determine the students' science learning scores after learning. This study is a type of experimental research with the research design used, namely One Group Pretest-Posttest. The sampling design was not selected randomly and there was a pretest before the treatment so

that the results of the treatment could be known more accurately because they were compared with the previous conditions (Sugiyono2016, 111).

Learning by using cooperative learning, first given a pretest in the form of multiple choice questions to determine the initial abilities of students. Then the teaching and learning process is given using cooperative learning, then given a posttest to obtain data on the results of treatment with natural science material, namely the development of teaching materials.

According to (Sugiyono 2016, 207) in quantitative research, data analysis is an activity after data from all respondents or other sources is collected. Activities in data analysis are: grouping data based on variables and types of respondents, presenting data for each variable studied, performing calculations to answer the problem formulation and performing calculations to test the hypothesis that has been proposed. To analyze the data in this study using t-test statistics.

The data analysis technique in this study used t-test statistics.

1. Calculation of Normalized Gain,

Previously obtained pretest and posttest data were calculated using Normal Gain to determine the increase in student learning outcomes after undergoing treatment using cooperative learning. To determine the increase in student learning outcomes from pretest and posttest scores, the Normalized formula can be used, namely N.gain (g) obtained by subtracting the posttest score from the pretest score divided by the maximum score minus the pretest score. The increase in learning outcomes is categorized as high if $g > 0.70$, moderate if $0.30 < g \leq 0.70$ and categorized as low if $g \leq 0.30$. To find out the qualification of student learning outcomes, you can see the 5-scale Benchmark Reference Guide (PAP), 85% - 100% Very good learning outcomes, 70% - 84% good learning outcomes, 55% - 69% sufficient learning outcomes, 46% - 54% less, 0 - 45% very less (Arikunto 2013, 73).

2. Hypothesis Testing

The hypothesis test conducted in this study is inferential statistics. Inferential statistics have two possible uses of statistics, namely parametric statistics and non-parametric statistics. If the data to be analyzed is normally distributed, parametric statistics are used, but if the data is not normally distributed, non-parametric statistics are used. The research hypothesis test is conducted based on data on the increase in learning outcomes, namely data on the difference in posttest and pretest scores. According to (Sugiyono 2016, 273), if the samples are correlated or paired, for example comparing before and after treatment or treatment, or comparing the control group or experimental group, then the sample t-test is used. In conducting the t-test, the data requirements must be homogeneous and normal. The formula used is as follows:

$$t = \frac{X_1 - X_2}{\dots}$$

$$\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

Information :

X_1 = Posttest mean score

X_2 = Pretest average score

S_1^2 = Posttest variance

S_2^2 = Pretest variance

n_1 = Number of students at the time of posttest

n_2 = Number of students at the time of pretest

If the sample is not normally distributed, then non-parametric statistics are used. The t-count results above are then compared with the student's t distribution table.

The action hypothesis in this study is to apply the cooperative learning model in the Semester VI concentration class on the subject of developing natural science teaching materials for student learning outcomes, so that in line with that, the indicator of success in this study is seen from the increase in the process of student learning outcomes from the pretest and posttest.

3. Test Criteria

The provision is that if thithing is smaller than t table, then H_0 is accepted and H_a is rejected. But conversely if thithing is greater than t table, then H_0 is rejected and H_a is accepted. Significantly if $\text{sig (2-tailed)} < \alpha$, then H_0 is rejected and vice versa.

RESULTS AND DISCUSSION

The results and discussion must be presented in the first step in data collection wich, is to conduct an investigation into the abilities of students concentrating in natural science. Initial ability in natural science is taken from the final grade of the fifth semester. The final results of the students' fifth semester grades are qualified based on the reference guidelines for scale 3. The following is an example of a table presentation:

Table 1. Initial natural science ability (NSA) qualifications of students concentrating in natural sciences, Muhammadiyah University of Magelang results value fifth semester (Development of natural science learning) 2020/2021 academic year.

No	Interval Natural Science Ability (NSA)	Number of Students	Percentage	Classification
1	$NSA \geq 83,5$	2	8 %	High
2	$79,4 < NSA < 83,5$	24	88 %	Medium
3	$NSA \leq 74,9$	1	4 %	Low
Amount		27	100%	

After knowing the initial ability value of students' natural sciences listed in table 2 above, an initial test was conducted to determine students' learning outcomes before using cooperative learning. The instrument used was a Multiple Choice (MC) test question to determine students' learning outcomes. Scores were given according to the number of correct answers. In the pretest, a minimum score of 30 was obtained, and a maximum score of 100, with an average score of 57.7 and a standard deviation of 17.8. The achievement of natural sciences learning outcomes of students in the concentration class of sixth semester on the material on developing teaching materials before learning in the qualification was sufficient, so it still needs to be improved. For this reason, towards achieving an increase in student learning outcomes, it is necessary to use the cooperative learning process.

Data regarding the final score (posttest) as a result of student learning after being given treatment using the cooperative learning model in learning natural sciences for the development of science teaching materials (natural sciences) can be seen in the presentation of table 3 as follows.:

Table 2. Descriptive of natural science learning outcomes of students in the natural science concentration class in the sixth semester.

	Statistics	Posstes	
		Score	Category
	Minimum	70	Good
	Maximum	100	Very good
	Average	89,6	Very good
	Standard deviation	11,5	

It appears that in the presentation of Table 3, the data obtained on students' natural science learning outcomes with a minimum score of 70, a maximum score of 100, and an average score of 89.6 with a standard deviation of 11.5. This illustrates that students' natural science learning outcomes have increased from before being given treatment with cooperative learning. the increase in students' natural science learning outcomes calculated based on the results of the pretest and posttest individually and classically

a. Analysis of Learning Outcome Improvement

The N-gain results in the sixth semester natural science concentration class were reviewed using normalized gain with an average of 0.80 included in the high classification. There were 19 students who had high classification scores, and 8 students who got scores with medium classifications. It can be seen in the presentation of table 3 below:

Table 3. Normalized N-gain Classification of Student Learning Outcomes after Using the Cooperative Learning Model.

	Interval	Number of Students	Percentage	Classification
	$g > 0,70$	19	70 %	High
	$0,30 < g \leq 0, 70$	8	30 %	Medium
	Amount	27	100%	
	Average	0,80		High

It can be explained that there are no student learning outcomes with a low classification, which means that the students in the learning process experienced an increase in learning outcomes of natural sciences. after learning, there were 8 students or 30% with an increase in learning outcomes in the moderate classification, and there were 19 students or 70% with an increase in learning outcomes in the high classification. Overall, the increase in learning outcomes of the natural sciences concentration class in the sixth semester of the Elementary School Teacher Education study program at Muhammadiyah University of Magelang turned out to reach 0.80 in the high classification.

b. The Improvement of Student Learning Outcomes after Using the Cooperative Learning Model is reviewed from NSA

The students' abilities developed in the development of natural science teaching materials using the Cooperative Learning model can develop well if each step is implemented well. The results of improving students' natural science learning outcomes in terms of initial Natural Science Ability (NSA) are presented in Table 4 as follows.

Table 4. Improvement of student learning outcomes in the development of natural science teaching materials material after using the cooperative learning model reviewed from the NSA

	NSA	Learning outcomes	Number of Students	Percentage
	High	High	2	7%
	Medium	High	21	78%
		Medium	4	15%
	Low			

From table 5, that the increase in learning outcomes of natural science semester six on the material of developing teaching materials using cooperative learning models reviewed from NSA can be explained, namely, (1) students with high NSA experienced an increase in learning outcomes of natural science with a high classification (7%); (2) students with moderate NSA experienced an increase in

learning outcomes of natural science with a high classification of 21 students (78%) and a moderate classification of 4 students (4%); and (3) students with low NSA experienced a moderate increase. These results indicate that the use of cooperative learning models to teach teaching materials and development materials can increase learning outcomes in natural science from high to high, moderate to high and moderate, and low NSA to moderate. Based on this increase, it can be said that the use of the cooperative learning model in natural science learning is for students with low, medium and high initial abilities.

Hypothesis Testing

The hypotheses tested:

- H₀ : There was no increase in the learning outcomes of natural science students in the sixth semester concentration class of the Elementary School Teacher Education Study Program, Muhammadiyah University of Magelang who used the cooperative learning model.
- H_a : There is an increase in the learning outcomes of natural sciences of sixth semester concentration class students of the Elementary School Teacher Education Study Program, Muhammadiyah University of Magelang after using the cooperative learning model.

The presentation of table 5 is as follows:

Table 5. Analysis of hypothesis testing for improving learning outcomes

Average Student Learning Outcomes		t _{count}	P
Pretest(before)	7,7	2,060	0,00
Posttest(after)	9,6		

From the table data above, the average pretest score was 57.7 and the average posttest score was 89.6, thus increasing by 31.9. The t-test result of 8.69 is greater than t-table = 2.060 at a significance level of $\alpha = 5\%$, so the null hypothesis (H₀) is rejected and the alternative hypothesis (H_a) is accepted, so the conclusion is that there is an increase in learning outcomes of natural science using cooperative learning in the sixth semester. kelas konsentrasi .

The cooperative learning model is a learning model that is used and is of concern and recommended by education experts. This is because based on the results of research conducted by Slavin (1995), it states that the use of cooperative learning can improve student learning outcomes and at the same time can improve social relationships and foster learning attitudes.

CONCLUSION

Based on the data and discussion results above, from the research results it can be concluded that there is an increase in the learning outcomes of NATURAL SCIENCES of sixth semester Concentration Class Students of Elementary School Teacher Education Study Program, Muhammadiyah University of Magelang, by using cooperative learning on the material of developing teaching materials, namely the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted with a t count value of $8.69 > t$ table 2.060 at a significance level of <0.05 .

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