

Effect of Cooperative Learning Type Student Team Achievement Division (STAD) on Mathematics Learning Result of Students of SMP Negeri 7 Yogyakarta

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Abstract. This research is a quasi experimental research that use non equivalent control group design. This research aims to know the effect of cooperative learning type STAD on mathematics learning result of students of SMP Negeri 7 Yogyakarta, academic year 2013/2014, on polyhedron learning material. Research population is all students of class VII SMP Negeri 7 Yogyakarta. Sampling from five classes by using simple random sampling, drawn together with the teacher so that elected class VIII A and VIII B. Afterwards from the two classes conducted draw again, selected class VIII A (experimental class) and class VIII B (control class). Data collection techniques use test techniques, observation techniques, and documentation techniques. While the data collection instruments use test sheets and observation sheets. The test of student learning result was analyzed by descriptive statistical data analysis and inferential statistical data analysis. The results of descriptive data analysis obtained average learning result posttest experimental class = 85.26 and control class = 80.40. Furthermore, based on the data analyzed using t-test, the results showed that the experimental class is higher than the control class. This can be seen from the scores of posttest : $t = 8,066$ and $sign = 0.000$ with significant level $\alpha = 0,05$, then H_0 rejected. The conclusion of this research indicates that there is a significant effect on student learning result using cooperative learning type STAD toward using conventional learning.

BACKGROUND

Mathematics is one of the areas of study that occupy an important role in education. Mathematics is very aimed to create learners who think logical, rational, critical and broad-minded. Therefore mathematics is necessary in daily life and as a provision in the progress of science and technology, so it needs to be instilled in the students. Mathematics lesson is very important to be mastered by students, so the teacher has an important role to improve the quality of learning mathematics. Not only that, teachers can also apply the learning model that can facilitate the students in understanding the material in learning, which can bring up motivation to learn the mathematics of students. In addition, if students motivated so that they are active in the classroom during the learning process of mathematics takes place, it can affect student learning result.

The results of learning mathematics on a national scale, compared to other countries in the world, Indonesia is still relatively low learning result. Based on a survey conducted by TIMSS (Trend in International Mathematics and Sciences) Indonesia's participation in 1999, Indonesian rank was 34th of 38 countries. In 2003 Indonesia was 34th of 46 countries. In 2007 it fell to 36th of 48 countries. In 2011 Indonesian was 38th with 386 points from 42 countries. (1). If compared to neighboring countries, for example Singapore and Malaysia Indonesia's position is still below the average of these countries. Conditions are not much different from the results of studies conducted by PISA (Program for International Student Assessment) in 2009, as reported by PISA. Indonesia passed the 61st rank of 65 countries with 371 points, while the average score of International 500 points. While in 2012, Indonesia rank was 64th of 65 countries with an average score of 375, while the average International score 500 points (2). The results of the above survey explain how to improve the learning result of mathematics in students both in national and international, by making changes to the learning process and more use of learning models in teaching.

The fact that the results of student learning in Indonesia is still low is also view from the results of the national exam conducted by The Ministry of Education and Culture. Based on these data, it can be interpreted that the

average decrease in the national exam for mathematics subjects caused by the lack of ability of students in solving mathematical problems.

Based on the initial observations made by researcher in class VIII SMP Negeri 7 Yogyakarta, found some problems associated with the learning process, among which are: teachers still dominate the learning (teacher center) and provide less opportunities for students to communicate ideas, students are less involved directly in the process of learning mathematics. As a result, students only accept opinions from teachers and tend to be afraid in expressing their ideas, many students tend to wait for the work of their friends to be copied as the answer; average daily exam score is still low; learning in the classroom has not used cooperative learning; the use of LKS in learning is still lack, innovative efforts of teachers in applying the model of learning that can enable students in the classroom is still not seen. Because of these, the mastery of student material is very weak and student learning result are low.

Responding to problems related to the condition of classroom learning activities, competency standard achievement, the ability of mathematical communication, and mathematical thinking of students, it is necessary to improve and innovate in the learning process. One of the improvement efforts in order to improve the ability (competency standard achievement), communication, and mathematical thinking of the students is focused on giving students opportunities to actively build their knowledge, meaning that knowledge is found, formed and developed by the students themselves either individually or in groups using learning cooperative learning.

Through cooperative learning is expected students can be active individually, actively discussing, daring to express ideas and accept ideas from others, creative search for solutions from a problem faced, have a high mathematical thinking and confidence in learning mathematics, because cooperative learning can improve student learning result. One of the cooperative learning that is fun and activates the students is the learning type Student Teams Achievement Division (STAD). In STAD, students are required to be more active because it will be calculated contribution of individual scores according to the criteria set by Slavin (3).

Therefore, from the description above, the researcher interested to conduct research with the title "The Influence of Cooperative Learning type STAD towards Mathematics Learning Result of Students of Class VIII SMP Negeri 7 Yogyakarta".

RESEARCH METHOD

This research was conducted in SMP Negeri 7 Yogyakarta in the even semester of the academic year 2013/2014. The sample in this research is class VIII A (experiment class) and class VIII B (control class).

The form of this research is quasi experiment. While the research design used is non equivalent control group design that is part of quasi experiment, it is accordance with the sampling technique used by researcher that using Simple Random Sampling. The research instrument consists of learning tools, such as syllabus, RPP, and LKS. Data collection techniques is a test technique. Data analysis techniques consists of two parts i.e. :

1. Descriptive data analysis

The result data is obtained by collecting data of learning result in the form of pretest and posttest, then calculate the average scores of pretest and posttest. The formula used to calculate the average is:

$$\bar{x} = \frac{\sum X_i}{n}$$

(4)

Remarks:

\bar{x} = Learning result average scores (*mean*)

$\sum X_i$ = Sum of each data

n = Sum of data

2. Inferential data analysis .

Inferential statistical analysis is performed by normality test, homogeneity test of variance, and t-test. According to Sudjana (5) some experts claim that the normality test is not required for data of equal amounts or more than 30 or called large samples. Minimum if the minimum sample size is 30, then it is enough to assume that the sample distribution is normal. In this study the number of samples more than 30, then the normality test is not required and continued homogeneity test with Levene Test. If the value of significance > 0.05 , then it is said that the variant of the population data group is the same

(homogeneous). Furthermore, from the homogeneity test results are determined by two average equality test with independent t test that will be used to see whether there is a significant effect on the students mathematics learning result in the experimental class and control class. All research data were analyzed using SPSS 21.

RESULT AND DISCUSSION

Result

1. Descriptive Analysis of Pretest and Posttest Data

The pretest and posttest results that have been implemented in both classes, can be analyzed descriptively as the following table:

Table 1. Pretest and Posttest Result Data of Experiment and Control Classes

Description	STAD Class		Control Class	
	Pretest	Posttest	Pretest	Posttest
Average	46,24	85,26	44,86	80,40
Theoretical maximum scores	100	100	100	100
Theoretical minimum scores	0	0	0	0
maximum scores	64,00	100	69,33	93,75
minimum scores	29,33	67,50	32,00	52,50
Standard deviation	6,98	7,42	8,27	8,61
Variance	48,67	55,09	68,40	74,12

Source : Research Data Processed By Researcher

Based on Table 1., it is found that numerically the average pretest result of the experiment class is slightly lower than the control class with an insignificant difference. Furthermore, after treatment was given, the experimental class was higher than the control class with a significant difference in the average class. This explains that the effect of experiment class learning result is higher when compared with the control class.

2. Inferential Analysis of Pretest and Posttest Data on Mathematics Learning Result

2.1. Homogeneity Test Results Variance of Pretest and Posttest Scores of Experiment Class and Control Class

The hypothesis used in the homogeneity test is as follows:

$H_0: \sigma_1^2 = \sigma_2^2$: experiment group variance is the same as the control group.

$H_1: \sigma_1^2 \neq \sigma_2^2$: experiment group variance is different from the control group.

To test the homogeneity of the two variance using F test by using Levene Test on SPSS 21 application. If significance value > 0,05, it is said that the variant of the population data group is the same (homogeneous). The calculation results can be seen in the following table:

Table 2. Homogeneity Test of Pretest Scores of Experiment Class and Control Class

	Before Treatment	After Treatment
Levene Test	5,226	10,638
F	0,828	1,685
Sig.	0,548	0,120

Source : Research Data Processed By Researcher

Based on Table 2.above, the levene test significance scores is greater than 0.05 i.e. 0,548 for data before treatment and 0,120 for data after treatment. This indicates that multivariate homogeneity assumptions are fulfilled, both for data before treatment and after treatment.

3. Similarity Test Results Two Average Pretest Scores and Difference Test Average Posttest Scores of Experiment Class and Control Class

Test hypothesis using pretest data (two-sided test)

Hypothesis for pretest:

- $H_0: \mu_1 = \mu_2$: The average mathematics learning result of the experiment class is the same as the average of student learning result of the control class.
- $H_1: \mu_1 \neq \mu_2$: The average of mathematics learning result between students of the experiment class is different from the control class students before different treatment was given.

Test hypothesis using posttest data (one-party test)
 Hypothesis for posttest:

- $H_0: \mu_1 = \mu_2$: The average mathematics learning result between classes using cooperative learning type STAD are similar to the average classes that use conventional learning. This means that there is no effect of average learning result of mathematics using cooperative learning type STAD.
- $H_1: \mu_1 > \mu_2$: The average mathematics learning result between classes using cooperative learning type STAD is better than the average class that uses conventional learning. This means that there is an average effect of mathematics learning result using cooperative learning type STAD.

Similarity Test Results Two Average Pretest Scores of Experiment Class and Control Class

Based on the homogeneity test that has been implemented, the variance of pretest scores of experiment class and control class is homogeneous, then conducted the similarity test of two average scores (t-test) to know the comparison of initial knowledge before different treatment given between experiment class and control class. From the calculation is known that there is no difference in the average of mathematics learning result of students from experimental class and control class.

Difference Test Result of Two Average Posttest Scores of Experiment Class and Control Class

T-test conducted to determine whether there is influence cooperative learning type STAD on mathematics learning result. The results of difference test of two average can be seen in Table as follows:

Table 3. Average and Variance of Posttest Scores of Experiment Class and Control Class

Aspect	<i>t</i>	Sig.
Learning Result	8,066	0,000

Source : Research Data Processed By Researcher

Based on Table 3.above, it is found that the significance score *t* for aspects mathematic learning result is smaller than 0.05. That is, H_0 is rejected, or means average learning result between classes using cooperative learning type STAD is better than class that uses conventional learning, meaning cooperative learning type STAD influences student learning result.

Discussion

Based on the results of statistical process of pretest and posttest data of the experiment class and control class of significance *t* score for all aspects are greater than 0.05. That is, H_0 is rejected, or means the average of mathematics learning result between classes using cooperative learning type STAD is better than the class that uses conventional learning. In other words there is a significant influence on the mathematics learning result of students of class VIII SMP Negeri 7 Yogyakarta.

Based on the results obtained by researcher during conducted cooperative learning type STAD in class experiment, there is influence on student learning activities in the classroom. Although at first, the students have not seen active and are still confused in working on the questions on the student activity sheet. However, in subsequent meetings the students have shown their participation in discussions and began to understand cooperative learning type STAD and the use of LKS.

Meanwhile, in the control class that use the conventional learning model, the teacher's active role is more dominant than the students or it can be said that the learning is more teacher-centered. Students pay attention to the explanation submitted by the teacher and the student make a note from what the teacher say. Sometimes when the teacher explains in front of the class the students tend not to notice and make a noise, but there are some students who are active when the teacher gives the question and do it, some others just listen to the answers given by their friend. This will have an impact on the lack of mathematical learning result that seen in the final result (Posttest).

From the data analysis and observation, it can be accepted the research hypothesis which states that there is a significant influence of cooperative learning type STAD toward the mathematics learning result of students of class VIII SMP Negeri 7 Yogyakarta in the academic year 2013/2014. This condition show that students like cooperative learning, they can understand and active in the class. If student understand about they learn than can improve mathematics learning result. For the next time teacher can use this method for best instruction.

CONCLUSION

The results of descriptive data analysis obtained average learning result posttest experimental class = 85.26 and control class = 80.40. Furthermore, based on the data analyzed using t-test, the results showed that the experimental class is higher than the control class. This can be seen from the scores of posttest : $t = 8,066$ and $sign = 0.000$ with significant level $\alpha = 0,05$, then H_0 rejected. The conclusion of this research indicates that there is a significant effect on student learning result using cooperative learning type STAD toward using conventional learning. This condition show that students like cooperative learning, they can understand and active in the class.

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