

## THE EFFECTIVENESS USING COOPERATIVE NUMBERED HEADS TOGETHER AND TWO STAY TWO STRAY TYPE LEARNING MODEL ON STUDENT'S MATHEMATIC LEARNING AT SMP

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### ABSTRACT

The nature of learning that still tends to be teacher-centered. This is what is thought to lead to poor learning outcomes. Need a learning model to improve learning in the classroom to obtain satisfactory learning outcomes. This study aims to determine the effectiveness of the use of cooperative learning model between Numbered Heads Together (NHT) with Two Stay Two Stray (TS - TS) on the learning outcomes of VII students of State Junior High School (SMP Negeri) 3 Jetis Bantul Yogyakarta academic year 2014/2015 on the principle of linear equations one variable and equivalents. This type of research is a comparative study. This research uses a posttest - only control design. The population in this study were all students of class VII, namely class VII A, VII B, VII C, VII D, and VII E, consisting of 160 students. The research sampling technique used random sampling: the entire population consisting of five classes is randomized. In one class for the trial, class VII D, and Class VII A and VII B as the research sample. The research data was collected by using the posttest problem to know the learning result. Data analysis for hypothesis testing in this research using a two-party t-test and one party t-test with a 5% significance level. Based on the calculation of two-t-test on the research with a significant level of 5% = 0.05 and dk = 62 obtained  $t_{table(0,05)(62)} = 1,999$  and  $t_{count} = 7,2640$  which mean  $t_{count} > t_{table}$  then there are differences in mathematics learning outcomes using NHT type cooperative learning method and TS-TS type cooperative learning. Then based on the hypothesis test, one party with significant level 5% = 0,05 and dk = 62 obtained  $t_{table(0,05)(62)} = 1,6706$  and  $t_{count} = 7,2640$  which mean  $t_{count} > t_{table}$  the cooperative learning model of NHT type is more effective than the TS-TS model of cooperative learning model of the mathematics learning outcomes of grade VII students of SMP Negeri 3 Jetis academic year 2014/2015 on the subject of linear equations of one variable and the equivalence.

**Keywords:** Nature of learning, Learning outcomes, Mathematics

### INTRODUCTION

Teaching and learning process, adhering to a curriculum where an educator conducts appropriately learning delivery. The curriculum is a set of plans and arrangements regarding the objectives, content, and learning materials and the ways used as guidelines for organizing learning activities to achieve specific educational goals. (Mukhlisin, Mohammad: 2012). As one of the institutions that conduct formal education, schools have an essential role in realizing national education goals through the teaching and learning process. An educator's role is vital to realize the success of students in the teaching and learning process. If the teacher teaches using the lecture method only, students become bored, sleepy, passive, and take notes. Progressive teachers dare to try new methods, which can help increase students' motivation to learn so that students learn well. Learning methods must be tried that are appropriate, efficient, and effective Slameto (2003: 65). For that improvement, an educator must watch out for. Also, improvement is from the competence of an educator and by improving the education system. One of the interesting and interactive learning methods is that cooperative learning is developed to achieve learning outcomes in the form of tolerance, diversity and social development (Suprijono, Agus: 2011)

A useful learning model is a student-centered learning model. In this model, the role of educators is only as a guide. Simultaneously, students have an essential role in implementing the learning process and are demanded to be active. The NHT and TS-TS type cooperative model places

educators as facilitators and supervisors. Both of these learning models, students are encouraged to think, analyze, and conclude themselves about a topic to find solutions to problems based on materials and data provided by educators (teachers). Learning mathematics is still less varied and less creative. Expository methods are more often used in learning mathematics. Of the total number of students in class VII A, B, C, D, and E, as many as 160 students, that all students have not met the Minimum Completeness Criteria (MCC) value specified by the school, which is 75. One class consists of 32 students, the average value of Mathematics lessons, for class average class, is 40. To increase motivation and make class learning activities, teachers can use cooperative learning models. One of them is by directing students to work together in groups. So expect students to be able to work together with friends in solving problems or problems encountered and not just rely on the teacher. Cooperative learning can train students to be active and able to solve problems with their groups.

From the above problems, in general, this study aims to determine the effectiveness of the cooperative learning model type NHT and TS-TS. These objectives can be specified in several specific objectives, namely:

1. Is there a difference in Grade VII students' mathematics learning outcomes in the even semester of SMP Negeri 3 Jetis, Bantul, Yogyakarta in the 2014/2015 academic year against The NHT and TS-TS type of cooperative learning models.
2. The NHT type of cooperative learning model is more effective than the TS - TS type of mathematics learning outcomes for seventh-grade students in even semester of SMP Negeri 3 jetis, Bantul, Yogyakarta in the 2014/2015 academic year.

## METHODS

This research was conducted at SMP Negeri 3 Jetis, Bantul, in the even semester of the 2014/2015 academic year. This research is a type of experimental research, in this study using a posttest-only design with one kind of treatment (Sugiyono, 2009: 76). In this design, there are two groups, each randomly chosen (R). The first group treated ( $X_1$ ) is called the experimental group, which uses the NHT type of cooperative learning model. The second group was given treatment ( $X_2$ ) called the control group, a class that uses a cooperative learning model type TS - TS. The object of research is the results of learning mathematics for class VII students. The population is the whole subject of research (Suharsimi, Arikunto: 2010). This study's population was VII grade students in the even semester of SMP Negeri 3 Jetis, Bantul Regency in the 2014/2015 academic year consisting of 5 classes, namely VII A, B, C, D, and E. The population can be seen in table 1.

**Table 1.** Research Population

Class	VII A	VII B	VII C	VII D	VII E	Total
Amount	32	32	32	32	32	160

Source: data from SMP Negeri 3 Jetis

The sample is part of the number and characteristics possessed by the population (Sugiyono, 2010: 118). The sample is part or representative of the population under study (Arikunto, Suharsimi, 2010: 174). So it can be concluded that the sample is the part that will be seen. In this study, sample selection is made using a random sampling technique for classes, i.e., sampling is done randomly. From 5 classes, sampling classes were carried out randomly to obtain two classes, namely class VII A and VII B as sample classes, and 1 class VII D as a trial class. The variables used in this study are NHT type cooperative learning model, TS-TS type cooperative learning model, and grade VII mathematics learning outcomes in the Variable and Equivalent One Linear Equation material.

## RESULTS AND DISCUSSION

After processing the data, the descriptive statistics of the UAS value of experimental class I NHT and experimental class II TS-TS results are illustrated in the following table.

**Table 2.** Summary Description of UAS Data

Variable	Experiment Class I	Experiment Class II
The number of students	32	32
Average	48,7812	47,03
Lowest Value	33	31
The highest score	64	65
Standard Deviation	8,2958	8,4030
Variance	68,8215	70,6118

A normality test is used to determine whether the data used is normally distributed or not. To do the normality test, the Chi-Square formula is used. Based on the calculations, it can be seen that the value of  $X_{\text{count}} < X_{\text{table}}$  at the significant level  $\alpha = 5\%$  and  $df = 3$  in the experimental class I and experimental class II, then the variance of students' initial ability data in standard research, so that the population variance is expected.

A homogeneity test is done to determine whether both classes have the same assignment or are homogeneous or have the same variance. The following are homogeneity test data based on the calculations performed. Bartlett test is used to test the homogeneity of the sample. Based on the calculations, it can be seen that the value  $X^2_{\text{count}} < X^2_{\text{table}}$  at a significant level  $\alpha = 5\%$  and  $df = 1$ , then the variance of students' initial ability data inhomogeneous research.

**Table 3.** Summary of two-Party T-Test Results

$t_{\text{count}}$	$t_{\text{table}}$	Significant Level	df	Info.
1,0295	1,999	0,05	62	$H_0$ accepted

From the analysis results conducted with a significant level of 5% and a degree of freedom 62, obtained  $t_{\text{count}} < t_{\text{table}}$  So that  $H_0$  is accepted and  $H_1$  is rejected. This means that there is no difference between class VII A who will use the cooperative learning model type NHT, and class VII B who uses the cooperative learning model type TS-TS class VII students in the even semester of SMP Negeri 3 Jetis 2014/2015 academic year The final test is conducted to determine the final results of student grades after being given good treatment in experimental class I NHT and experimental class II TS-TS. The following are descriptive statistical analysis data, the final test scores of the experimental class I and experimental class II.

**Table 4.** Summary Descriptions of Final Test Data

Variable	Experiment Class I	Experiment Class II
The number of students	32	32
Average	62,1875	48,4375
Lowest Value	35	25
The highest score	80	70
Standard Deviation	11,49596703	14,052752
Variance	132,1572581	197,4798387

A normality test is used to determine whether the data used is the normal distribution or not. To do the normality test, the Chi-Square formula is used. Based on the normality test calculation that the value  $X^2_{\text{count}} < X^2_{\text{table}}$  at a significant level  $\alpha = 5\%$  and  $df = 3$  both in the experimental class I and experimental class II, then the variance of student ability data in research standard, so population variance is normal.

The homogeneity test is intended to determine the spread of the final value variance in research derived from a homogeneous population or not. To do the homogeneity test of the sample, using the Bartlett Test. The summary of the calculation results is presented in table 5 below:

**Table 5.** Summary of Homogeneity Test Calculation Results Final Test Data

$X^2_{count}$	$X^2_{table}$	Significant Level	$df$	Info.
1,2419	3,841	0,05	1	<b>Homogeneous</b>

Based on homogeneity test calculations, Table 5 above shows that the value of  $X^2_{count} < X^2_{table}$  at the significance level = 5% and  $df = 1$ , then the variance of student ability data inhomogeneous research. The summary of the results of the two-party hypothesis test final test data of experimental class I and experimental class II can be seen in table 6.

**Table 6.** Summary of T-Test Results of Two Parties Final Tests

$t_{count}$	$t_{table}$	Significant Level	$df$	Info.
7,2640	1,999	0,05	62	$H_1$ accepted

From the results of the analysis carried out with a significant level of 5% and a degree of freedom 62, obtained  $t_{count} = 7,2640$  and  $t_{table} = 1,999$ , which means  $t_{count} < t_{table}$ . So  $H_0$  is rejected, and  $H_1$  is accepted. This means that there is a difference between mathematics learning outcomes using the NHT cooperative learning model and mathematics learning outcomes using the TS-TS cooperative learning model of class VII graders of the even semester of SMP Negeri 3 Jetis in the 2014/2015 school year.

The summary of the results of one-party hypothesis test data posttest experimental class I and experimental class II can be seen in table 7 below.

**Table 7.** Summary of One-Party T-Test Results

$t_{count}$	$t_{table}$	Significant Level	$df$	Info.
7,2640	1,6706	0,05	62	$H_1$ accepted

From the analysis results conducted with a significant level of 5% and a degree of freedom 62, obtained  $t_{count} < t_{table}$ . So  $H_0$  is rejected, and  $H_1$  is accepted. This means that the mathematics learning outcomes of students who use the NHT type of cooperative learning model is more effective than the mathematics learning outcomes that use the TS-TS cooperative learning model of class VII students of the even semester of SMP Negeri 3 Jetis Bantul in the 2014/2015 academic year.

## RESULTS AND DISCUSSION

The purpose of this study was to determine whether or not there were differences in mathematics learning outcomes between students taught using the Numbered Heads Together (NHT) type of cooperative learning model with students who were taught using the TS-TS type of cooperative learning model for seventh-grade students in the even semester of 2014/2015 academic year. Based on these objectives, the study was conducted by involving two classes, class VII A as an experimental class I NHT with 32 students and class VII B as an experimental class II TS-TS with a total of 32 students. Before the research is conducted, first analyzing the UAS value results, which aims to determine the initial ability of students before being given treatment. After that, enter the trial class to find out the validity and reliability. Based on the results of the UAS obtained, the average value of experimental class I students NHT was 48.7812, and the experimental class II TS-TS was 47.03.

Hypothesis testing is done to determine whether students' initial abilities are the same or not. The first step in testing a hypothesis is to conduct a prerequisite test, including a homogeneity test and a normality test. Based on the normality test conducted in the experimental class I NHT and the experimental class II TS-TS, it is known that for the experimental class, I obtained  $X^2_{count} = 7,0918$  and  $X^2_{table} = 7,815$ . In contrast, the test results for the experimental class II obtained  $X^2_{count} = 4,8918$  and  $X^2_{table} = 7,815$  because of  $X^2_{count} < X^2_{table}$  and based on normality tests, It can be concluded that the sample is normally distributed at a significant level of 5% with  $df = 3$  in the experimental class I and the experimental class II.

The next prerequisite test by doing homogeneity test on the UAS value of mathematics learning outcomes and obtained value  $X^2_{\text{count}} = 0,0051$  and  $X^2_{\text{table}} = 3,841$  because  $X^2_{\text{count}} < X^2_{\text{table}}$  means the variance is the same, so the experimental class I and experimental class II are homogeneous. After testing the analysis prerequisites are met, the next step is to test the hypothesis using the two-party t-test with a significance level of 5% and  $dk = 62$ . Based on the analysis of the two-party t-test on the results of learning mathematics obtained  $t_{\text{count}} = 1,0295$  and  $t_{\text{table}} = 1,999$  because of  $t_{\text{count}} < t_{\text{table}}$  so  $H_0$  is accepted and  $H_1$  is rejected, which means that there is no difference between mathematics learning outcomes of class VII A and class VII B even semester of SMP Negeri 3 Jetis in the 2014/2015 school year. Based on the analysis results, the UAS mathematics learning outcomes indicate the sample conditions, namely experimental class I and experimental class II before being treated, have the same initial ability so that they can be given different treatments.

After being given a different treatment, the experimental class I was taught using the Cooperative Learning model Type of Heads Together Together and the experimental class II using the TS-TS cooperative learning model. Then both classes were given a test of mathematics learning outcomes from the pilot class. It aims to find out the results of learning mathematics in both classes. Based on the test results obtained, the average value of experimental class I NHT students was 62.1875, and the experimental class II TS-TS was 48.4375.

Hypothesis testing is done to determine whether students are equal or not. The first step in testing a hypothesis is to conduct a prerequisite test, including a homogeneity test and a normality test. Based on the normality test conducted on the experimental class I NHT and the experimental class II TS-TS, it is known that for the experimental class I obtained  $X^2_{\text{count}} = 6,0173$  and  $X^2_{\text{table}} = 7,815$ . In contrast, the test results for the experimental class II obtained  $X^2_{\text{count}} = 5,6642$  and  $X^2_{\text{table}} = 7,815$ . Based on the normality test, it can be concluded that the sample is normally distributed at a significant level of 5% with  $dk = 3$ . The next prerequisite test by doing homogeneity tests on the value of mathematics learning outcomes and obtained value  $X^2_{\text{count}} < X^2_{\text{table}}$ , which means the variance is the same. The experimental class I and experimental class II are homogeneous.

After testing the analysis prerequisites are met, the next step is to test the hypothesis using the two-party t-test with a significance level of 5% and  $df = 62$ . Based on the analysis of the two-party t-test on the results of learning mathematics obtained  $t_{\text{count}} = 7,2640$  and  $t_{\text{table}} = 1,9999$  because  $t_{\text{count}} > t_{\text{table}}$  so  $H_0$  is rejected and  $H_1$  is accepted, which means that there is a difference between mathematics learning outcomes using the NHT type of cooperative learning model and mathematics learning outcomes using the TS-TS cooperative learning model of class VII graders in the second semester of SMP Negeri 3 Jetis 2014/2015 school year.

The difference in mathematics learning outcomes between experimental class I and experimental class II, one of which is due to differences in treatment in the two classes, namely the NHT cooperative learning model in the experimental class one and the TS-TS cooperative learning model in the experimental class II. Cooperative learning model type NHT is a learning model that requires students to think actively about the teacher's problems and discuss with classmates and present in class based on the numbers worn or based on the teacher calling the numbers worn, so students more active. While the TS-TS cooperative learning model after the intra-group discussion is over, students visit other groups and finish them. The students return to the original group to match the results.

Furthermore, because there are differences in mathematics learning outcomes between the experimental class I and experimental class II, then the average similarity test of one party was carried out and obtained  $t_{\text{count}} = 7,2640$  and  $t_{\text{table}} = 1,6706$  at a significance level of 5% and  $df = 62$ , because  $t_{\text{count}} > t_{\text{table}}$  so  $H_0$  is rejected and  $H_1$  is accepted which means that the mathematics learning outcomes of students who use the Cooperative learning model NHT are more effective than the mathematics learning outcomes that use the TS-TS cooperative learning model in class VII students in the even semester of SMP Negeri 3 Jetis in the school year 2014/2015.

One of the factors that make the experimental class I better than the experimental class II is that the experimental class I NHT class students work in small groups that require students to think of

answers to a given problem, then students present to the class based on numbers that he has. In presenting a problem's results, all students can express their opinions by refuting the results presented, so students know their mistakes and truths. The role of the teacher here is only as a facilitator. Hence, students actively discuss and solve problems, so students will more easily understand mathematical concepts.

Whereas in the experimental class II learning using the TS-TS cooperative learning model, when students discuss intra-group students will actively solve problems, but when visiting other groups, students become rowdy and result in much time wasted. Although the role of the teacher here as a facilitator but to anticipate that time is not wasted, then the consequence of the teacher's changing role is as a teacher-centered, the changing teacher's role is making students difficult and unable to understand mathematical concepts, only students who have high concentrations can understand mathematical concepts.

## CONCLUSION

Based on data analysis and research discussion described in chapter IV, it can be concluded as follows:

1. There is a difference between the learning outcomes of mathematics using the cooperative learning model type NHT and the learning outcomes of mathematics using the TS-TS type class VII students of the even semester of SMP Negeri 3 Jetis in the 2014/2015 school year. This is evidenced by the test t two parties with the value of  $t_{\text{count}} = 7,2640$  and  $t_{\text{table}} = 1,9999$  because  $t_{\text{count}} > t_{\text{table}}$  so,  $H_0$  is rejected and  $H_1$  is accepted at a significant level  $\alpha = 5\%$  and  $df = 62$ .
2. Mathematical learning outcomes of students who use the Cooperative learning model type NHT are better than the results of learning mathematics using the cooperative learning model type TS-TS class VII students even semester of SMP Negeri 3 Jetis 2014/2015 school year. This is evidenced by the test t one party with the value  $t_{\text{count}} = 7,2640$  and  $t_{\text{table}} = 1,6706$  because  $t_{\text{count}} > t_{\text{table}}$  so  $H_0$  is rejected and  $H_1$  is accepted at a significant level  $\alpha = 5\%$  fund  $df = 6$ .

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