

EFFECTIVENESS OF COOPERATIVE LEARNING MODEL NUMBERED HEADS TOGETHER (NHT) AND THINK PAIR SHARE (TPS) TOWARD STUDENTS MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

The learning process centered on teachers has resulted in less active students to follow the learning of mathematics. The use of less appropriate learning model makes students less familiar with the material described by teachers and lead to poor learning outcomes mathematics. This study was included in experimental research that aims to determine the effectiveness of cooperative learning model NHT type cooperative learning model TPS. The population in this study were students of class VII SMP Muhammadiyah 3 Yogyakarta 2016/2017 academic year consisting of 8 classes. The sampling technique using random sampling techniques derived from class VII D as an experimental class I and VII E as experiment class II. The research instrument is the math achievement test in the form of multiple-choice questions. Test instruments include validity, distinguishing features, and reliability testing. Analysis of data using analysis prerequisite test consisting of a test for normality and homogeneity. Hypothesis test using t-test two parties and one party t-test. Based on the calculation of the t-test two parties with a significant level of 5%, and 58 degrees of freedom obtained $t_{count} = 3,082904717 > t_{table} = 2,00238$, indicates that there are differences between the students' mathematics learning outcomes of students using cooperative learning model NHT with students who use cooperative learning model TPS in the second semester of seventh-grade students of SMP Muhammadiyah 3 Yogyakarta academic year 2016/2017. In the calculation of the t-test with a significance level of 5%, and 58 degrees of freedom obtained $t_{count} = 3,082904717 > t_{table} = 1,67193$, shows that the cooperative learning model NHT more effective than cooperative learning model TPS to mathematics learning outcomes second semester of seventh-grade students of SMP Muhammadiyah 3 Yogyakarta academic year 2016/2017.

Keywords: Effectiveness, Numbered Heads Together, Think Pair Share, Learning Outcomes.

INTRODUCTION

The progress of a nation is influenced by one factor, namely education. Education is also very much needed by a nation to form a qualified young generation. This is in accordance with the functions and objectives of national education stated in Law no. 20 of 2003 Chapter II Article 3. Education in Indonesia is divided into three main lines, namely formal, non-formal, and informal. Informal education, there are several groups of subjects, one of which is mathematics.

Mathematics is a universal science that underlies modern technology, has an important role in various disciplines and advances human thinking. Mathematics needs to be given to all students starting from elementary school to university with the aim of equipping students with the ability to work together, and so that students have the ability to understand mathematical concepts, use reasoning on patterns and traits, solve problems, communicate ideas, and have attitude of appreciating the usefulness of mathematics in life.

Based on the results of interviews and observations conducted at Muhammadiyah 3 Yogyakarta Middle School, it shows that learning that takes place in the classroom still places the teacher as the center of learning so that students are passive and less involved in learning. Some students at Muhammadiyah 3 Yogyakarta Middle School said they did not understand and did not like mathematics because it was difficult to understand. Some students consider mathematics an unpleasant subject.

Based on the results of the Even Semester Semester 2016/2017 school year in mathematics, the average grade of VII grade students of SMP Muhammadiyah 3 Yogyakarta is still below the expected minimum completeness criteria and is set at 75. The percentage of students who are not completing the

mathematics PTS is still high namely 94.07%, but the percentage of completeness only reached 5.93%. This shows that student mathematics learning outcomes are still low. The low learning outcomes of mathematics must be immediately corrected in order to achieve the expected goals. Factors causing the low learning outcomes allegedly because students are difficult to understand mathematics and students are not interested in mathematics because the learning model chosen is not precisely the teacher.

The learning model chosen by the teacher should be a learning model that can attract the attention of students to be more active in learning, especially mathematics. Therefore, mathematics lessons should be endeavored to be interesting and fun lessons. One interesting learning model and increasing student interactive intensity is cooperative learning. Cooperative learning can be done by dividing students into small groups to do joint activities. Not only that, but cooperative learning also requires student cooperation and interdependence in the structure of assignments, goals, and rewards. There are various types of cooperative learning models that can be used by teachers, including the NHT and TPS types.

The objectives to be achieved in this study are:

1. To find out whether there are differences in student learning outcomes in mathematics using NHT type cooperative learning models with student mathematics learning outcomes using TPS type cooperative learning models in class VII students of the even semester of SMP Muhammadiyah 3 Yogyakarta 2016/2017 school year.
2. To find out the effectiveness between NHT type cooperative learning models and TPS type cooperative learning models on mathematics learning outcomes of seventh-grade students of the even semester of SMP Muhammadiyah 3 Yogyakarta 2016/2017 school year.

METHODS

1. This type of research is an experimental study that aims to determine whether there is a difference in the treatment (treatment) of the research object. The experimental design used in this study is True Experimental Design with the type of Posttest-Only Control Design.

Table 1. Posttest-Only Control Design Research Design

	Group	Treatment	Posttest
R	Experiment I	X_1	O_1
R	Experiment II	X_2	O_2

2. This research was conducted at Muhammadiyah 3 Junior High School Yogyakarta. When the study was conducted in the even semester of the 2016/2017 school year on the subject of the triangle.
3. The population in this study were students of class VII Yogyakarta 3 Muhammadiyah Middle School 2016/2017 academic year which is divided into eight classes, namely classes VII A, VII B, VII C, VII D, VII E, VII F, VII F, VII G, and VII H with a total of 236 students.
4. Sampling is done by random sampling techniques to the class, namely taking the sample class by means of a lottery class, taken class VII D as the experimental class I and class VII E as the experimental class II.
5. In this study, there are two variables used, namely the NHT type of cooperative learning model of student mathematics learning outcomes and the type of TPS cooperative learning model of student mathematics learning outcomes.
6. Data collection techniques used in this study are documentation and student mathematics learning achievement tests. The documentation was used to obtain students' initial ability data before the research was carried out, the data was taken from the results of the Even Midterm Semester Student of Muhammadiyah 3 Yogyakarta Middle School. The instrument used in this study was a matter of mathematics learning achievement test.
7. Test instruments include: Validity Test, Distinguishing Power Test, Reliability Test
8. Analysis Prerequisite Test: Normality Test and Homogeneity Test
9. Hypothesis Test: Two-Party Hypothesis Test and One-Party Hypothesis Test

RESULTS AND DISCUSSION

1. Description of Initial Ability Value

Table 2. Description of Student Initial Values Data (PTS)

Variable	NHT	TPS
Many students	30	30
The highest score	80	78
Lowest value	35	37
Average	53,03333333	52,76666667
Standard Deviation	8,992269988	9,073201668
Variance	80,86091954	82,32298851

Based on the calculation of the normality test, in the NHT experimental class values are obtained $\chi^2_{count} = 2,624653783 < \chi^2_{table} = 5,9915$ with a significant level of 0.05 and degrees of freedom 2, so that the initial ability value data of the NHT experimental class is normally distributed data. In the experimental class, TPS obtained values $\chi^2_{count} = 3,483056202 < \chi^2_{table} = 7,8147$ with a significant level of 0.05 and a degree of freedom 3, so that the data of the initial ability of the experimental class TPS is normally distributed data.

Based on homogeneity tests that have been carried out in the NHT and TPS experimental classes, values were obtained $\chi^2_{count} = 0,002328144 < \chi^2_{table} = 3,8415$ at a significant level of 0.05 and $df = 1$, the variance of students' initial ability data in the study is the same or homogeneous.

Based on hypothesis testing conducted with a significant level of 0.05 and a degree of freedom 58, a value is obtained $-t_{table} = -2,00238 < t_{count} = 0,1143380244 < t_{table} = 2,00238$, then H_0 is accepted and H_1 is rejected which means there is no difference in students' mathematics learning outcomes between students who use the NHT type cooperative learning model and students who use the TPS type cooperative learning model in VII grade students of the even semester of SMP Muhammadiyah 3 Yogyakarta 2016/2017 school year.

2. Description of Mathematics Learning Outcomes Test Scores

Table 3. Summary Description of Learning Outcomes Test Value Data

Variable	NHT	TPS
Many students	30	30
The highest score	100	90
Lowest value	65	50
Average	77,83333333	71,16666667
Standard Deviation	8,271610498	8,477488785
Variance	68,41954023	71,8678160

Based on the calculation of the normality test, in the NHT experimental class values are obtained $\chi^2_{count} = 4,730219153 < \chi^2_{table} = 7,8147$ with a significant level of 0.05 and a degree of freedom 3, so that the data on the results of mathematics learning tests in the NHT experimental class is normally distributed data. In the experimental class, TPS obtained values $\chi^2_{count} = 0,767363237 < \chi^2_{table} = 7,8147$ with a significant level of 0.05 and a degree of freedom 3, so that the data on the results of mathematics learning tests in the TPS experimental class is normally distributed data.

Based on homogeneity tests that have been carried out in the NHT and TPS experimental classes, values were obtained $\chi^2_{count} = 0,01752663761 < \chi^2_{table} = 3,8415$ at the significant

level of 0.05 and $df = 1$, the variance of the data scores on the mathematics learning outcomes in the sample class is the same or homogeneous.

3. Hypothesis Test Mathematics Learning Outcomes Test

a. Two-Party T-Test

Based on the two-party hypothesis test conducted at a significant level of 0.05 and a degree of freedom 58, a value is obtained $t_{count} = 3,082904717 > t_{table} = 2,00238$. So H_0 is rejected and H_1 is accepted which means there are differences in students' mathematics learning outcomes between students who use the NHT type cooperative learning model and students who use the TPS type cooperative learning model in VII grade students of the even semester of SMP Muhammadiyah 3 Yogyakarta 2016/2017 school year.

b. One Party t-test

Based on one-party hypothesis testing conducted at a significant level of 0.05 and a degree of freedom 58, a value is obtained $t_{count} = 3,082904717 > t_{table} = 1,67193$. So H_0 is rejected and H_1 is accepted, which means that the NHT type of cooperative learning model is more effective than the TPS type cooperative learning model of mathematics learning outcomes for seventh-grade students of the even semester of SMP Muhammadiyah 3 Yogyakarta 2016/2017 school year.

After conducting research at Muhammadiyah 3 Junior High School in Yogyakarta, the results of research on the mathematics learning achievement test data show that the data are normally distributed and homogeneous. Then hypothesis testing is done using a two-party t-test and one-party t-test. Based on the analysis of the first hypothesis test on mathematics learning outcomes obtained $t_{stat} = 3,082904717 > t_{table} = 2,00238$ shows that there is a difference between mathematics learning outcomes using the NHT type cooperative learning model and mathematics learning outcomes using TPS type cooperative learning models. With the second test obtained $t_{count} = 3,082904717 > t_{table} = 1,67193$ shows that the NHT type of cooperative learning model is more effective than the TPS type of cooperative learning model of mathematics learning outcomes for seventh-grade students of SMP Muhammadiyah 3 Yogyakarta in the 2016/2017 school year.

Through NHT type cooperative learning students can play an active role in the learning process because this learning involves many students. In the learning process, students exchange ideas and opinions to make it easier to find answers. Students are required to be able to understand the material being taught and take responsibility for their group assignments because at the end of the discussion the teacher calls student numbers randomly to convey the results of the group discussions. While the TPS type of cooperative learning model is a learning model that gives students time to think and respond and help one another. With this learning, students are able to work together, need each other, and are interdependent on small groups. Students exchange ideas and opinions with their partners to discuss the answers to the assignments.

From the description above, it illustrates that learning using the NHT type of cooperative learning model has a positive influence on learning outcomes. This is indicated by an increase in mathematics learning outcomes of students who use NHT type cooperative learning models better than mathematics learning outcomes of students who use TPS type cooperative learning models on the subject of Triangle VII class even semester SMP Muhammadiyah 3 Yogyakarta 2016/2017 school year.

CONCLUSION

Based on data analysis and discussion that has been described, it can be concluded as follows:

1. There is a difference in mathematics learning outcomes for VII grade students of SMP Muhammadiyah 3 Yogyakarta who use the NHT type cooperative learning model with mathematics learning outcomes for VII grade students of SMP Muhammadiyah 3 Yogyakarta who use TPS type cooperative, learning models. This is indicated by the results of the two-party hypothesis test with a significant level of $5\% = 0.05$ and a degree of freedom 58, obtained value $t_{count} = 3,082904717 > t_{table} = 2,00238$. So H_0 is rejected and H_1 is accepted.

2. The NHT type of cooperative learning model is more effective than the TPS type of cooperative learning model of mathematics learning outcomes for Grade VII students of SMP Muhammadiyah 3 Yogyakarta. This is indicated by the results of the one-party hypothesis test with a significant level of $5\% = 0.05$ and a degree of freedom 58, obtained values $t_{count} = 3,082904717 > t_{table} = 1,67193$. So H_0 is rejected and H_1 is accepted.

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