

## THE EFFECTIVENESS OF COOPERATIVE LEARNING TYPE OF NUMBER HEAD TOGETHER (NHT) TO MATHEMATICS LEARNING OF STUDENTS IN SMP MUHAMMADIYAH 2 MINGGIR

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### ABSTRACT

This research was done because the results of students' mathematics learning is still relatively low. Students are reluctant to ask about the material they have not understood that the learning outcomes obtained less optimal. This research aims to determine the results of learning mathematics using of cooperative learning model type of NHT (*Numbered Heads Together*) toward mathematic learning of student grade VIII at SMP Muhammadiyah 2 Minggir Sleman Regency of Even Semester in Academic Year of 2015/2016. This was design is Posttest-Only Control Design. The population in this research were students class VIII SMP Muhammadiyah 2 Minggir Sleman Regency. Samples of this research using random sampling techniques derived from class VIII B as an experimental class and VIII C as the control class. The data collection is done with the test method. Testing instrument using validity test and reliability test. Data were analyzed before using hypothesis testing with t-test first using analysis prerequisite test including normality test, and homogeneity test Based on calculations by the significant level  $\alpha = 5\%$  and the degrees of freedom 49, we concluded that: (1) There are differences in learning outcomes of students learning math using cooperative learning model type of NHT with learning using conventional learning model. This is indicated by the results of the first test of the hypothesis that  $t_{stat} = 2,089$  and  $t_{table} = 2,009$ , so that  $t_{stat} > t_{table}$ . (2) The type of cooperative learning model NHT more effective than the conventional learning model. It is shown on the second hypothesis that the test results  $t_{stat} = 2,089$  and  $t_{table} = 1,676$ , so that  $t_{stat} > t_{table}$ .

**Keywords:** Effectiveness, Mathematics Learning Outcomes, Cooperative Learning Model Type of NHT.

### INTRODUCTION

Education has an important role in the life of every individual and every individual has the right to get educational facilities to support his future and maximize the potential that exists in him. According to RI Law Number 20 of 2003 concerning the National Education System, Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by himself, society, nation, and state. Education is one of the primary needs for humans, everything about human life will not be separated from the name of education, both formal and non-formal education. Formal education itself is education that includes formal education in schools, from schools we learn many things that we do not get at home. Learning can be done anytime and anywhere, both in the family, in the community, in the play environment and in educational institutions both formal and informal. Learning activities are activities of interaction between a student, instructor and learning resources. Learning is a form of assistance provided by teachers with the aim of the process of gaining knowledge and knowledge, mastery of skills, and the formation of attitudes and beliefs in students. The process certainly cannot be separated from the direction of a teacher or in this case is a teacher, because a teacher has a difficult task, in addition to teaching a teacher as well as being an educator. Educating is not a simple task that can be done by just anyone who does not know the method of teaching and educating a student. According to Law Number 20 Year 2003 concerning the National Education System, Educators are qualified educational staff as teachers, lecturers, counselors, tutors, lecturers, tutors, instructors, facilitators, and other designations that are appropriate to their specificity, and participate in organizing education. The educator is someone who determines the black

and white of the class for which he is responsible. This means that a teacher must be able to bring the atmosphere of learning activities to be more fun and colorful.

Educators should be able to choose the right strategies and learning methods so that what is delivered by educators can be accepted and absorbed by students. In fact, educators use learning strategies and methods without regard to students' needs, so the subject matter delivered is difficult to accept and absorb by students. In addition, many students feel bored when learning takes place, this is due to mismatches in the use of learning methods. This is very influential on student learning outcomes because learning methods are not appropriate then student learning outcomes are also very unsatisfactory.

The learning model used by educators has a big role in the teaching and learning process if the learning model used is not appropriate resulting in students being less interested in the learning. Many learning models can be used by educators one of which is a cooperative learning model. From this learning model, there are many types of learning that can be used, for example, NHT (Number Head Together). This type of NHT learning model combines learning, discussion, and collaboration.

Based on the results of interviews with Mathematics VIII grade teachers in Muhammadiyah 2 Minggir Middle School, it is known that mathematics learning outcomes of VIII grade students are still very low, this is evidenced by the low average midterm grade scores of even VIII grade students of Muhammadiyah 2 Minggir Middle School Sleman Regency 2015/2016 teaching that students who reach KKM has not reached 50%, the results of the Even Semester Midterm Exam can be seen in Table 1.

**Table 1.** Average UTS Mathematics Even Semester Grade VIII of SMP Muhammadiyah 2 Minggir Sleman Regency Academic Year 2015/2016

	VIII A	VIII B	VIII C
Average	71,2	56,1	59,9
The highest score	82,5	75,0	75,0
Lowest value	50,0	32,5	35,0
$\geq 75$	7	1	2
$< 75$	20	23	24

*Source: SMP Muhammadiyah 2 Minggir*

From Table 1 it can be seen that students who achieved the KKM (Minimum completeness criteria) score of 75 is still very low. The average grade scores in Mathematics are also very low. Based on the results above it can be concluded that the student mathematics learning outcomes are still low. There are many factors that affect the low student learning outcomes, including the learning atmosphere that is less attractive to students. Based on observations obtained that most students in the class are less active in learning activities and pay less attention to the material delivered by the teacher. Meanwhile, based on the results of interviews with teachers obtained information that students tend not to be excited when learning mathematics and prefer to do other things. This is supported by the fact that many students prefer to do other things than pay attention to the explanation given by the teacher.

Another factor is that the monotony of teaching and learning activities while in class is the teacher giving an explanation and students listening, this makes students quickly get bored with learning mathematics. Based on the results of interviews with students, it is found that students get bored quickly with the classic learning model where learning only relies on the teacher. The lack of application of learning models that involve students in the learning process also affects student motivation when learning in class. To overcome this need to look for learning models to improve student learning outcomes. In this case, the cooperative learning model has the opportunity to overcome this. There are several types of cooperative learning models, one of them is the Number Head Together (NHT) type of cooperative learning model.

Based on this background so researchers are interested in conducting research with the title "Effectiveness of the use of the NHT (Number Head Together) type of cooperative learning model towards Mathematics learning outcomes for students of class VIII of SMP Muhammadiyah 2 Minggir

academic year 2015 / 2016. Based on observation learning still relies on teachers so the under-active students of UTS above seem that the learning outcomes of students of class VIII are very low. Based on these data, the researcher took the title "Effectiveness of the use of the NHT (Number Head Together) type of cooperative learning model towards Mathematics learning outcomes for VIII grade students of Muhammadiyah 2 Middle School in the academic year 2015/2016.

Based on the background, the problem identification and problem boundary that has been described can be formulated as follows:

1. Is there a difference in the difference between the results of classroom mathematics learning outcomes using the NHT type cooperative learning model with classes that use conventional learning models in class VIII students of SMP Muhammadiyah 2 Minggir Sleman Regency Academic Year 2015/2016.
2. Is the use of the NHT type of cooperative learning model more effective in learning mathematics in class VIII students in the even semester of SMP Muhammadiyah 2 Minggir Sleman Regency in the academic year 2015/2016?

Based on the problem formulation above, this study aims to find out the following matters:

1. To find out whether there are differences in classroom mathematics learning outcomes that use the NHT type of cooperative learning models with classes that use conventional learning models in class VIII students of SMP Muhammadiyah 2 Minggir Sleman Regency Academic Year 2015/2016.
2. To find out more effective learning models between NHT type cooperative learning models compared to conventional learning models in mathematics learning for VIII grade students of the even semester of SMP Muhammadiyah 2 Minggir Sleman Regency 2015/2016 Academic Year.

## METHODS

This type of research is comparative experimental research. According to Suparman (2015: 1) "Experimental research is research conducted by studying something that is held. In other words, in experimental research there is the treatment of researchers and the impact is measured ". This research was carried out intentionally in the classroom or at school to make the emergence of the variables studied in mathematics learning.

The research design in this study used a posttest-only control design with two treatments, namely the experimental class and the control class. In the experimental class, learning is carried out using the NHT type learning model, while the control class uses the conventional learning model. In this study, the post-its were carried out the same, both for the experimental class and for the control class. The design of this study is illustrated in Table 2.

**Table 2.** Posttest-Only Control Design research design

	Group	Treatment	Posttest
R	A	X	O <sub>2</sub>
R	B	-	O <sub>4</sub>

Information :

R: random

A: the experimental group

B: control group

X: treatment using the NHT type cooperative learning model

O<sub>2</sub>: test results of learning outcomes using NHT type cooperative learning models

O<sub>4</sub>: test results of learning outcomes using conventional learning models.

This research will be conducted at SMP Muhammadiyah 2 Minggir, Sleman Regency. When the research was conducted in the even semester of the academic year 2015/2016 on the subject of prism and pyramid. The population in this study were all students of class VIII of SMP Muhammadiyah 2 aside in the academic year 2015/2016 which were divided into 3 classes, namely VIII A, VIII B and

VIII C. In this study the sample was taken by using a random sampling technique for the class, namely taking the sample class conducted by how to draw the class without paying attention to strata because in the population considered to have the same ability, seen from the average UTS grade even semester students of class VIII SMP Muhammadiyah 2 Minggir 2015/2016 Academic Year for mathematics subjects. After the drawing of the population consisting of three classes, one class was obtained as the experimental class, one control class, and one test class. Obtained class VIII B as an experimental class and class VIII C as a control class. The variables in this study were the learning model and learning outcomes of students in class VIII semester 2 of SMP Muhammadiyah 2 Minggir, Sleman Regency Academic Year 2015/2016.

There are two data collection techniques or methods used in this study, namely the documentation method and the test method. The documentation used in the form of the results of observations of mathematics learning activities of students of class VIII of SMP Muhammadiyah 2 Minggir to determine the conditions of learning. While the test in the form of a test of learning outcomes (posttest) is given after receiving treatment with the NHT type cooperative learning model.

The instrument used was a learning achievement test for the subject of Prisma and Limas in the form of a mathematics learning achievement test item. Before being tested in the experimental class, so that the test results of the learning outcomes that are arranged do not deviate from the material to be taught, then a grid is made, the test items are tested, and a study of test items on the results of mathematics learning tests. After the test instruments are arranged, then they are tested on the instrument test class, namely class VIII A. After the test questions are tested, the test items are analyzed using the validity test using the product-moment correlation formula, the distinguishing power uses the discrimination index formula, and the reliability test uses the Kuder Richardson-20 formula (KR-20).

The analysis prerequisite test used the normality test with the Chi-Square test and homogeneity test with the Bartlett test. Hypothesis testing used two parties and one party t-test.

## RESULTS AND DISCUSSION

Based on research that has been carried out obtained data in the form of initial abilities and student learning outcomes in mathematics.

The students' initial ability scores were obtained from the list of the initial ability tests of class VIII B and VIII C of SMP Muhammadiyah 2 Minggir, Sleman as can be seen in table 3

**Table 3.** Summary of initial ability values

Learning	Parameter		
	The highest	Lowest	$\bar{X}$
Control class	80	30	57,69
Experimentation Class	80	30	54,16

Normality Test aims to determine whether the initial ability of the control class and the experimental class are normally distributed or not. Researchers performed 2 times the normality test calculation, namely the normality test for the experimental class and the normality test for the control class. Expressed in table 4.

**Table 4.** Summary of the Normality Test Results Initial Capability

Variable	Experimentation Class (VIII B)	Control class (VIII C)
$\chi^2_{stat}$	0,174	1,297
$\chi^2_{table}$	5,9915	5,9915
Testing criteria	Samples are normally distributed if $\chi^2_{stat} \leq \chi^2_{table}$	

Table 5 experimental class data with a significant level of 5% and  $dk = 3$ , it can be seen that  $\chi_{stat}^2 < \chi_{table}^2$  which means that the experimental class has normally distributed data. Normality test conducted in the control class with a significant level of 5% and  $dk = 3$ , it can be seen that  $\chi_{stat}^2 < \chi_{table}^2$  which means that the control class has normally distributed data.

The homogeneity test on data is intended to investigate whether the two samples have the same variance or not. The test used to test the similarity of sample variance is the Bartlet test, the homogeneity test results are presented in Table 5.

**Table 5.** Summary of Homogeneity Test for Initial Ability Value

Variable	Experimentation Class (VIII B)	Control class (VIII C)
$Si^2$	205,667	210,462
$\chi_{stat}^2$	0,00325	
$\chi_{table}^2$	3.842	3.842

Homogeneity is if  $\chi_{stat}^2 < \chi_{table}^2$ , hence the variance of the sample is homogeneous. Based on Table 5 above it appears that the value  $\chi_{stat}^2 = 0,00325$  and  $\chi_{table}^2 = 3,842$ , then  $\chi_{stat}^2 < \chi_{table}^2$  at a significant level  $\alpha = 5\%$  and  $dk = 1$ , so the variance of students' initial ability data in the study is homogeneous.

A summary of the results of the two-party hypothesis test of the initial ability scores of the experimental class and control class students can be seen in Table 6.

**Table 6.** Summary of Results of Two-Party Hypothesis Initial Values

$t_{stat}$	$t_{table}$
-1,1202	2,00958

Based on Table 6 obtained values  $t_{stat} < t_{table}$ , then  $H_0$  is accepted which means that there is no difference in the initial ability scores of students of class VIII B and VIII C of Muhammadiyah 2 Middle School, Sleman Regency in the 2015/2016 school year.

A description of the data of students' mathematics learning outcomes after the experiment is presented in Table 7.

**Table 7.** Summary Description of Mathematics Learning Outcomes

Class	Experimentation Class (VIII B)	Control class (VIII C)
The highest score	76	64
Lowest Value	32	32
Average	54,38	44,42308
Standard Deviation	14,4	10,31474
Variance	207,36	106,3938
Lots of Data	25	26

The normality test aims to determine whether the value of mathematics learning outcomes of experimental and control class students is normally distributed or not. A summary of the results of normality scores for students' mathematics learning outcomes is presented in Table 8.

**Table 8.** Summary of Normality Test Results for Mathematics Learning Outcomes

Variable	Experimentation Class (VIII B)	Control class (VIII C)
$\chi_{stat}^2$	1,609	4,6841
$\chi_{table}^2$	5,9915	5,9915

Based on the calculation of normality test Table 8 experimental class data with a significant level of 5% and  $dk = 2$ , it can be seen that  $\chi_{stat}^2 < \chi_{table}^2$  which means that the experimental class has normally distributed data. Normality test conducted in the control class with a significant level of 5% and  $dk = 2$ , it can be seen that  $\chi_{stat}^2 < \chi_{table}^2$  which means that the control class has normally distributed data.

A homogeneity test is carried out to investigate whether the two samples have the same or homogeneous variance. The test used to test the similarity of sample variance is the Bartlett test. The homogeneity test calculation process is performed using the Microsoft Excel program. The data used to carry out this test is data from the grades of students learning outcomes in class VIII B and class VIII C can be seen in Table 9.

**Table 9.** Summary of Homogeneity Test in Mathematics Learning Outcomes of Experiment and Control Classes

Variable	Experimentation Class (VIII B)	Control class (VIII C)
$Si^2$	226,667	118,055
$\chi_{stat}^2$	2,92497	
$\chi_{table}^2$	3.8415	3.8415

The test criteria for homogeneity tests are if  $\chi_{stat}^2 < \chi_{table}^2$ , then the variance of the sample is homogeneous. Based on Table 9 above it appears that the value  $\chi_{stat}^2 = 2,92497$  and  $\chi_{table}^2 = 3,841$ , then  $\chi_{stat}^2 < \chi_{table}^2$  at a significant level  $\alpha = 5\%$  and  $dk = 1$ , so the data variance of students' mathematics learning outcomes in research is homogeneous.

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$

With

$H_0$ : There is no difference in mathematics learning outcomes between students who use the NHT type cooperative learning model and students who use the Direct learning model in class VIII students of SMP Muhammadiyah 2 Minggir Sleman Regency in the even semester of the academic year 2015/2016.

$H_1$ : There is a difference in mathematics learning outcomes between students who use the NHT type cooperative learning model and students who use the Direct learning model in class VIII students of SMP Muhammadiyah 2 Minggir Sleman Regency even semester 2015/2016 academic year.

A summary of the results of the two-party hypothesis test on mathematics learning outcomes can be seen in Table 10.

**Table 10.** Summary of Hypothesis Test Results of Two Parties Student Mathematics Learning Outcomes

$t_{stat}$	$t_{table}$
2.08924	2,00958

Based on Table 10 obtained values  $t_{stat} > t_{table}$ , then  $H_0$  is rejected which means that there are differences in mathematics learning outcomes between students who use the NHT type cooperative learning model and students who use the Direct learning model in class VIII students of SMP Muhammadiyah 2 Minggir Sleman Regency in the even semester of the academic year 2015/2016.

$$H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 > \mu_2$$

With:

$H_0$ : The NHT type of cooperative learning model is no more effective than the direct learning model of the mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 2 Minggir.

$H_1$ : NHT type cooperative learning model is more effective on the mathematics learning outcomes of VIII grade students of Muhammadiyah 2 Minggir Middle School compared to using direct learning models.

A summary of the results of the one-party hypothesis test on mathematics learning outcomes can be seen in Table 11.

**Table 11.** Summary of One-Party Hypothesis Test Results Students Mathematics Learning Results

$t_{stat}$	$t_{table}$
2.08924	1.6766

Based on Table 11 obtained values  $t_{stat} > t_{table}$  then  $H_0$  is rejected, which means that the NHT type of cooperative learning model is more effective than the Direct learning model in mathematics learning for eighth-grade students of SMP Muhammadiyah 2 Minggir, Sleman Regency in the even semester of the 2015/2016 academic year.

## CONCLUSION

Based on the analysis of the experimental data and its discussion, it can be concluded as follows:

1. There are differences in mathematics learning outcomes between students of class VIII of SMP Muhammadiyah 2 Minggir who use the NHT type cooperative learning model and mathematics learning outcomes of students of class VIII of SMP Muhammadiyah 2 Minggir who use the direct learning model. This is indicated by the first hypothesis test wherewith a significance level of 5% and a degree of freedom 49, then the value of  $t_{stat} = 2.03135$  and  $t_{table} = 2.00958$  is obtained, meaning  $t_{stat} > t_{table} > t_{table}$ , so  $h_0$  is rejected  $h_1$  is accepted.
2. The NHT type of cooperative learning model is more effective on mathematics learning outcomes of Grade VIII students of SMP Muhammadiyah 2 Minggir compared to using direct learning models. This is indicated by the second hypothesis test with a significance level of 5% and a degree of freedom 49, then the value of  $t_{stat} = 2.08924$  and  $t_{table} = 1.67655$ , means  $t_{stat} > t_{table}$  so  $h_0$  is rejected  $h_1$  is accepted.

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