e-ISSN: 2986-8076
DOI: 10.57254/tess.v2i1.28

International Journal of Geometry and Applied Mathematics
TESSERACT
Vol. 2, No. 1, March 2024 Pp. 51-60
Journal Page is available to http://ekalaya.nindikayla.com/index.php/home

THE EFFECT OF *THE NUMBERED HEAD TOGETHER* (NHT) COOPERATIVE LEARNING MODEL ON THE MATHEMATICS LEARNING OUTCOMES OF GRADE IX STUDENTS OF SMP NEGERI 6 BENGKULU CITY

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Abstract

This study aims to see whether there is or not the effect of the cooperative numbered head together learning model on the mathematics learning outcomes 9th grade students of SMPN 6 Bengkulu City. The type of research was a quasi-experimental design with The Nonequivalent Pretest-Posttest Control group design. The population in this study were all students of class IX SMPN 6 Bengkulu City. The sample selection used simple random sampling technique, the sample in this study was class IX A which consisted of 25 students as the experimental class and class IX B which consisted of 25 students as the control class. Data collection was carried out using questions pretest and posttest. The results of the hypothesis test showed the sig (2-tailed) value is 0.000 < α = 0.005, with an average student posttest score experiment class of 75,88 and an average student posttest score control class of 58,84. It can be concluded that there is a significant influence of the cooperative Numbered Head Together learning model on the mathematics learning outcomes 9th grade students of SMPN 6 Bengkulu City.

Keywords: *Quasi Experiment, Numbered Head Together, Learning Outcomes*

INTRODUCTION

Mathematics is one of the sciences applied in other sciences such as physics, chemistry, economics, and other sciences so that mathematics is a science that has an important role in the world of education. Mathematics is inseparable from everyday life (Kurniawati, Budiyono, & Saputro, 2017). Mathematics is one of the branches of education that must be studied from elementary school to university levels.

Math lessons are important lessons to learn for students (Baskoro, 2020). Mathematics learning is a learning that is not easy to understand. Abstraction of objects in mathematics requires various things close to daily life to help students in their understanding (Allathifah, Afghohani, & Wulandari, 2019). Given the importance of mathematics lessons, students are highly expected to be able to comprehend thoroughly so that students' mathematics learning outcomes are maximized (Fajriyati, Supandi, & Rahmawati, 2019).

However, there are obstacles faced in learning mathematics. Most students consider that mathematics is the most difficult, the most boring, and even the most frightening subject (Muliandari, 2019). Teachers also tend to emphasize numeracy, problem-solving, and reasoning skills (Haji & Abdullah, 2016). Students' negative assumptions about mathematics subjects can result in less-than-optimal student

learning outcomes.

Less than optimal learning outcomes were also experienced by grade IX students of SMP Negeri 6 Bengkulu City. Based on the results of initial observations at the PLP II UNIB activity which was held on November 6, 2021 in grade IX of SMP Negeri 6 Bengkulu City, the researcher observed that the learning that occurred in the classroom showed that teachers tended to use learning with the lecture method so that learning centered on teachers and students was less active. This is in line with research Hajj and Yumiati (2019), one of the causes of students' low thinking ability is because the teacher uses the lecture method and the students only record the material given by the teacher. In addition, many students first consider that mathematics is a difficult subject, from the beginning students have been suggested that it is difficult to learn mathematics. In this process, students often have difficulty solving math problems (Kurniawati et al., 2017).

This problem is indicated as the lack of optimal mathematics learning outcomes for students. This is evidenced by the acquisition of mathematics learning outcomes for grade IX students of SMP Negeri 6 Bengkulu City in the Middle School Assessment (PTS) odd semester for the 2022/2023 school year there are 4 classes, IX A 57.60; IX B 57.12; IX C 58.27; IX D 56.92. Of the 4 classes, it shows that the students' mathematics scores have not met the Minimum Completeness Criteria (KKM), which is 75. According to Baskoro (2020), Students' mathematics learning outcomes are said to be good if the learning outcomes tend to be good because the teaching and learning process is running well. And vice versa, students' mathematics learning outcomes tend to decline because the teaching and learning process experiences obstacles.

To overcome the problems faced by students in making it easier to understand mathematics lessons, there are many ways that can be taken to improve mathematics learning (Haji & Octizasari, 2018). Teachers are expected to use a learning model that makes students understand learning without feeling bored and boring. Because the learning process of students is greatly influenced by emotions. If students feel forced to attend a lesson, they will find it difficult to accept the material given by the teacher (Fajriyati et al., 2019). Therefore, teachers must create a conducive classroom atmosphere and make lessons fun. For learning to be fun, there needs to be a change in the learning model from a traditional to an innovative one.

The solution to make learning fun and actively engage students in learning to improve mathematics is to implement cooperative learning. Cooperative learning is a learning model that has been known for a long time, teachers encourage students to cooperate in certain activities such as discussions or teaching by peers (Allathifah et al., 2019). According to Muliandari (2019), Cooperative learning is very suitable to be applied in mathematics lessons because in learning mathematics it is not enough to only know and memorize mathematical concepts but also requires understanding and the ability to solve mathematical problems properly and correctly. According to Kholis (2017), cooperative learning accommodates students to work together in groups. One of the cooperative learning models in improving students' understanding and learning outcomes in learning is *Numbered Head Together* (NHT).

The NHT cooperative learning model is a learning model that requires students to have responsibility in groups and actively work together in solving their problems. Students who have higher abilities and also students who have lower abilities both have

a role in their groups, so that all students are active in the learning process. According to Muliandari (2019), NHT's cooperative learning model, namely students occupy a very dominant position in the learning process and the occurrence of cooperation in groups with the main characteristic of numbering, so that all students try to understand the material being taught and each student is responsible for their respective member number. The NHT learning model is a type of cooperative learning that is designed to influence interaction patterns in learning (Allathifah et al., 2019). The steps of the NHT cooperative learning model are: (a) teachers divide students into heterogeneous groups consisting of 3-5 members and numbered from 1 to 5. (b) the teacher asks questions directly or through the LKS. (c) Students discuss the answers together and make sure all group members know the answers. (d) the teacher calls the student by calling the number at random and the student with the number raises his hand and gives an answer to be delivered to all students in the class. (e) At the end of the session, the teacher and the students conclude the final answers of all questions related to the material presented (Yolanda, 2019).

Thus, there needs to be a strategy carried out by educators in the mathematics learning process to improve students' mathematics learning outcomes. Based on the background description above, a study was conducted on "The Influence of *the Numbered Head Together* (NHT) Cooperative Learning Model on the Mathematics Learning Outcomes of Grade IX Students of SMP Negeri 6 Bengkulu City".

RESEARCH METHODS

The type of research carried out in this study is *quasi-experimental research*. The purpose of this study is to find out whether there is a significant influence of the NHT cooperative learning model on the mathematics learning outcomes of grade IX students of SMP Negeri 6 Bengkulu City.

The sample of this study is students in grades IX A and IX B at SMP Negeri 6 Bengkulu City in the even semester of the 2022/2023 school year which was obtained from sampling using the *simple random sampling. Simple random sampling* is the selection of samples that are carried out randomly without paying attention to the strata that exist in the population assuming that the population is homogeneous (Lestari & Yudhanegara, 2017). Class IX A students totaled 25 students and class IX B totaled 25 students.

The design used in this study uses *The Nonequivalent Pretest-Posttest Control Group Design*. This design implements a system where the first group is given treatment and the other group is not given treatment. The treated group is called the experimental group, while the untreated group is called the control group. Furthermore, at the end of the study, the two groups were given *post-test* to see how it turns out (Lestari & Yudhanegara, 2017). The procedure in this study begins with the two classes given *Pre-test* which consists of 4 questions describing the material of congruence and coherence. Then, carrying out learning in the experimental classroom using the NHT cooperative learning model and carrying out learning in the control class with conventional learning. After the learning was carried out, both classes were given *post-test* to measure student learning outcomes.

The data collection technique used in this study is through a student learning

outcome test. Tests will be given to students before the treatment is applied and after the treatment is applied. The data analysis techniques used in this study are the analysis prerequisite test, *N-Gain test*, and hypothesis test.

RESULTS AND DISCUSSION

Description of Research Data

The research data were described based on each research class, namely the experimental class using the NHT cooperative model and the control class with conventional learning. This research was carried out 6 times with 4 learning meetings and 2 *pretest* and *posttest meetings*. The implementation of *the pretest* is carried out before learning and *posttest* after learning. The following is a description of the data of *the results of the pretest* and *posttest* of the creative thinking ability of each research class.

Table 1. Pretest *and* Posttest *Results* of Experimental Class and Control Class

Statistics	Experimental Classes		Control Class	
	Pretest	Posttest	Pretest	Posttest
N	25	25	25	25
Maximum Value	41	88	45	82
Minimum Score	20	52	18	35
Mean	32,84	75,88	32,44	58,84
Standard Deviation	4,749	9,506	6,338	10,919

Based on Table 1, it can be seen that there is an increase in *pretest* and *posttest values* in the experimental class and the control class. The data showed that the average score of students' mathematics learning outcomes in the experimental class was higher than that of the control class.

Results of Research Data Analysis

1. Analysis Prerequisites Test

Normality Test Results

In this study, the data normality test was tested using *the Shapiro Wilk test* assisted by SPSS. The criteria for testing normality with the help *of SPSS Software* are accepted if the value of sig. α (real level) = 0.05 and if the value of sig. < α (real level) = 0.05, then it is rejected. The results of the calculation of the SPSS-assisted normality test are as shown in the following table.$H_0 H_0$

Table 2. Results of the Normality Test *Pretest* of the Experimental and Control Class

Tests of Normality

		Kolmogorov-Smirnova			Shapiro-Wilk		
	Class	Statistic	Df	Itself.	Statistic	df	Itself.
Pretest	Eksperimen	.190	25	.021	.921	25	.055
	Control	.130	25	.200*	.979	25	.872

e-ISSN: 2986-8076
DOI: 10.57254/tess.v2i1.28

Table 3. Results of the *Posttest* Normality Test of the Experimental and Control Class

Tests of Normality

		Kolmogorov-Smirnova			Shapiro-Wilk		
	Class	Statistic	df	Itself.	Statistic	df	Itself.
posttest	Eksperimen	.143	25	.199	.927	25	.074
	Control	.182	25	.032	.943	25	.173

Based on Table 2 and Table 3, it is known that the significance value of each class is more than the real level, so it is accepted. Therefore, from the normality test, it can be concluded that the data of H_0*the pretest* and *posttest test* results have normal distribution data.

Homogeneity Test

The calculation of the homogeneity test in this study uses the formula *Uji Levene* with the help of *SPSS.* Testing criteria with help *SPSS* that is, it is accepted if the significance value > real level (α)=0.05. The results of the calculation with the help of H_0*Microsoft Excel* The following data was obtained.

Table 4. Homogeneity Test Results *of the Experimental and Control Class* Pretest

Test of Homogeneity of Variances

pretest

Levene Statistic	df1	df2	Itself.
1.862	1	48	.179

Table 5. Homogeneity Test Results *of Experimental and Control Class* Posttest

Test of Homogeneity of Variances

posttest

Levene Statistic	df1	df2	Itself.
.222	1	48	.639

Based on Table 4 and Table 5, it is known that the significance value of each test is more than the real level, so it is accepted. Therefore, from the two homogeneity tests, it can be concluded that the test result data H_0*pretest* and *posttest* Both classes of samples are homogeneous.

2. N-Gain *Test*

To see the improvement in learning outcomes that occurred before and after the learning model was applied, the *N-Gain* (*Normalized-gain) calculation formula was*

e-ISSN: 2986-8076
DOI: 10.57254/tess.v2i1.28

*used.*Based on the results of the calculation of the *N-Gain test* in the experimental class, the following calculation results were obtained.

Table 6. Experimental Class *N-Gain* Test Results

One-Sample Test

Number of Students	Average *Pretest Score*	Average *Posttest Score*	Highest Score	N-Gain	Category
25	32,84	75,88	88	0,751	Increase

Table 7. Control-Class *N-Gain* Test Results

Number of Students	Average *Pretest Score*	Average *Posttest Score*	Highest Score	N-Gain	Category
25	32,44	58,84	82	0,472	Increase

Based on Table 6 and Table 7, the *N-Gain value* for the experimental class was 0.751 and the control class was 0.472. This shows that the average score of students experienced an increase in learning outcomes before being given learning and after being given learning.

3. Uji Hypothesis

In this study, the statistics used to test the hypothesis are the t-test using a one-party test (right-side). To test whether there is an influence of the NHT cooperative learning model on students' mathematics learning outcomes. The statistical hypothesis is as follows:

H_0: $\boldsymbol{\mu}_1 \leq \boldsymbol{\mu}_2$: There is a difference in the average and there is no significant effect of the application of the cooperative learning model *Numbered Head Together* (NHT) on the mathematics learning outcomes of grade IX students of SMP Negeri 6 Bengkulu City.

H_1: $\boldsymbol{\mu}_1 > \boldsymbol{\mu}_2$: There is no difference in average and there is a significant influence of the application of the cooperative learning model *Numbered Head Together* (NHT) on the mathematics learning outcomes of grade IX students of SMP Negeri 6 Bengkulu City.

Table 8. Hypothesis Test Results

	Test Value = 100					
					95% Confidence Interval of the Difference	
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Experimental Classes	-12.687	24	.000	-24.12000	-28.0438	-20.1962

Based on Table 8, the value of sig*(2-tailed)* = 0.00 < α (real level) = 0.05 so that H_0 is subtracted. So, it was concluded that there was no difference in the average and there was a significant influence of the application of the NHT cooperative learning model on the learning outcomes of grade IX students of SMP Negeri 6 Bengkulu City.

DISCUSSION

1. Analysis of the Numbered Head Together *Cooperative Learning Process*

In this study, the analysis of the learning process of students is based on observations made by researchers during the learning process. Class IX A as an experimental class that applies a learning model cooperative NHT consists of 6 stages, namely group formation, problem giving, problem discussion, number summoning, response from other friends, and conclusion (Komalasari, 2017)

This learning uses LKPD (Student Worksheet) learning media. The first stage is formation of groups. The teacher divides the group of 5 members each with heterogeneous abilities, the teacher gives a different number to each student in the group (Syarif, 2022). Then students sit in groups according to the group that has been determined by the teacher. This stage is characteristic of the NHT cooperative learning model. Student learning outcomes increase because each student is active in the group helping each other to solve the problems given by the teacher, so that the problems given are easy to solve by students.

The next stage is to provide problems. Teachers give problems in the LKPD to each group. The next stage is problem discussion, the teacher guides students to work together in solving problems in the LKPD (Syarif, 2022) with the aim that students can find the concept of congruence and cohesion. This stage is characteristic of NHT cooperative learning because each student discusses the correct answers and ensures that each member of the group knows the answers from the LKPD. So that student learning outcomes increase by understanding the concept of learning materials given by teachers to problems in the LKPD. If students have difficulties, students can ask the teacher.

The next stage is the summoning of numbers. The teacher calls a random number to advance to the front of the class representing their respective groups (Syarif, 2022). This stage is also a characteristic of NHT cooperative learning, student learning outcomes increase because students must understand the answers to each given

problem, so that students whose numbers are called by the teacher are ready to go to the front of the class to answer questions. The next stage is the response from other friends. Other students responded to the results of the group's work moving forward. Then the teacher guides the students to conclude the learning that has been learned (Syarif, 2022).

The increase in students' mathematics learning outcomes occurred due to the implementation of the NHT cooperative learning model. Students can directly solve problems, understand a material in a group and help each other, make conclusions and express their opinions in front of the class. The level of understanding gained by students is greater because students are directly involved in finding answers to problems (problem discussion) so that the learning process is more effective and efficient (Muliandari, 2019).

Learning using the NHT cooperative model invites students to be able to express their opinions in public. Students will also feel more challenged in learning, because students don't know when the teacher will call their number. So that the NHT cooperative learning model makes students freer to express their opinions and learn to respect the opinions of others while still referring to the learning material and objectives so that it can improve students' mathematics learning outcomes.

2. Analysis of Learning Outcome Test Outcomes

The results of the research that have been carried out show that learning with the NHT cooperative model has better learning outcomes than conventional learning. This is because students in the experimental class using the NHT cooperative learning model have been trained to solve a problem independently or in groups (Birillina & Hartatik, 2019). This study used two classes, namely class IX A as the experimental class and class IX B as the control class. Value-based learning outcomes *posttest* that has been carried out shows that the average value of the experimental class is 75.88, more than the average value of the control class which is 58.84.

In the experimental class, the test answers were more detailed and thorough than in the control class. This is because the learning experiment class uses the NHT cooperative model with the help of LKPD so that students are used to solving problems. This difference also leads to the outcome of the *posttest* the experimental class is higher than the control class.

Based on the learning outcomes, it can be concluded that this research is in line with research that has been carried out previously, such as research (Tahir, 2023) in a study entitled "The Influence of Type Cooperative Learning Models *Numbered Head Together* Assisted by Manipulative Media on the Mathematics Learning Outcomes of Grade VI Elementary School Students for the 2022/2023 Academic Year". From the results of data analysis, the average value of the results was obtained *Pretest* The experimental class is 60.00 with a high score of 80 and a low score of 40, while the average score is *posttest* The experimental class obtained 77.80 with the highest score of 100 and the lowest score of 60. Looking at the average results of these values, it can be concluded that there is an influence of the type cooperative model *Numbered Head Together* Assisted by manipulative media on the mathematics learning outcomes of grade VI students of SD, T.A. 2022/2023. This is also reinforced by research (Birillina &

e-ISSN: 2986-8076
DOI: 10.57254/tess.v2i1.28

Hartatik, 2019) entitled "The Influence of Learning Models *Numbered Head Together* on Problem Solving Ability and Student Learning Outcomes in Mathematics Subject Multiplication and Division Calculation Operation Material in Grade III SD Kemala Bhayangkari 1 Surabaya". The results obtained stated that the average value of the experimental class *posttest* students, which is 90.09 higher than the average score *Pretest* namely 44.14.

Furthermore, research (Mukhrozin & Ratnawuri, 2017) entitled "The Influence of the Use of Methods *Numbered Head Together* (NHT) Assisting with a concept map for the learning outcomes of integrated social studies students in grade VII even semester MTs Negeri 1 East Lampung". The results obtained by the calculation of the analysis that and seen at a significant level of 5% are 7.04 > 1.70 and at a significant level of 1%, which is 7.04 > 2.46 which can be seen in the list of G statistics; thus the hypothesis is accepted. So that there is a positive influence of the method $t_{hitung} > t_{tabel}$*Numbered Head Together* (NHT) on the learning outcomes of Integrated Social Studies students in grade VIII even semester MTs Negeri 1 East Lampung.

CONCLUSION

Based on the data analysis and hypothesis testing that has been carried out, it can be concluded that there is a significant influence of the application of the *Numbered Head Together* (NHT) cooperative learning model on the learning outcomes of grade IX students of SMP Negeri 6 Bengkulu City.

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