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Effectiveness of mathematics learning through the application of cooperative models of numbered heads together (NHT) types with contextual approach

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Abstract
This research aims to know the effectiveness of the application of the Cooperative model of type Numbered Heads Together (NHT) with contextual approach in the learning of mathematics in students of class VIII SMP Negeri 5 Pallangga semester academic year 2018/2019 with experimental units is the class VIII as many as 36 students consisting of 19 men and 17 women. This type of research is research pre-experiments. The design on this research is one group Pretest-Posttest (The One Group Pretest – Posttest Design) which only involves a single class. Based on the results of the study it can be concluded that the application of the Cooperative model model type Numbered Heads Together (NHT) with contextual approach effectively applied in learning mathematics in grade VIII SMP Negeri 5 Pallangga.

Keywords: effectiveness, numbered heads together (NHT), contextual approach

Introduction

Mathematics became one of the subjects that have an important role in everyday life. Given the importance of the teaching of math in everyday life and in various level of formal education, so students are expected to learn in earnest so that the results of the study are obtained is not of concern, but in general students assume that the math is complicated subjects and mathematics related to the lesson concepts. Math lessons are lessons that the terms with the concept. Therefore, teach mathematics more related to teach concepts. A student can not be said to understand concepts in math, if he was only able to mention or memorize the definition of the concept, but haven't been able to use them in solving problems related to, that is because of the lack of the learning interest of students in learning mathematics that triggers the low ability of students in the math lesson, especially at the level of junior high school.

The low ability of students in mathematics at junior high school, as is happening in junior high Country Pallangga 5, this was confirmed by observations in February 2018 shows ability mastery and understanding of concepts math students are still low, it is triggered due to the students more likely to record and memorize these concepts but don't understand it so that what is learned by students in the class are merely temporary even likely students cannot work on a matter which has been previously exemplified. In addition students actively in the learning process in the classroom, largely dominated by his intelligence level above students, other students are simply listening and taking notes but are not active in the learning process even many students are embarrassed and feel afraid to ask about lessons that are not yet known, as well as less motivated students in the learning process so that many students potentially stupid in completing tasks given this is due because students don't have a sense of responsibility in completing its work.

So that learning is not only dominated by smart students and all students can participate actively in the learning process in the classroom, as well as students are motivated and responsible in completing the given task, then the alternative learning model is the Numbered Heads Together model. In addition so that students not only record and memorize the concepts given, it requires an alternative in the learning process to help students understand concepts and associate material with students' real life so that the chosen alternative is contextual approach. Numbered Heads Together is a learning model that is done in groups. Suprijono (2015) [7] states Numbered Heads Together begins with numbering..

Based on previous research conducted by (Pradana, Kusmayadi & Usodo, 2014) [6] in his research explained that the application of learning using NHT-CTL learning model student learning achievement is better than direct learning models other than that based on research conducted by (Wala, Purnami, & Widodo, 2018) [10] which shows that learning using Numbered Heads Together (NHT) learning models is more effective than conventional learning models in improving mathematics learning outcomes. This is shown in the results of the t-test with t count = 2.232> t table = 1.99773. As well as research conducted by (Firmansyah & Gani, 2017) [4] in the results of the study the average learning activity of students in the experimental class was better than the control class. With this in mind, it can be concluded that the cooperative learning model type NHT (numbered heads together) affects student learning activities in learning. The second objective of this study is to study student learning outcomes obtained from the results of the post-test scores. Sig (2-tailed) of 0.019. Because the test uses the right-hand rule, the sig (2-tailed) is divided in half so that it gets sig (1-tailed) 0.0095 or 0.0095 <0.05 which means that H_1 is accepted and

H_0 is rejected. This shows that there is an effect of students' learning outcomes between classes that use the numbered heads together cooperative learning model with classes that use learning models commonly applied in schools. While this approach is a learning concept that helps teachers associate material taught with the real-world situation of students.

While the contextual approach according to the Ministry of National Education (Suprihatiningrum, 2017) [9] is a learning concept that helps teachers associate the material they teach with the real-world situation of students and encourage students to make connections between the knowledge they have with their application in life. Learning like this can bring students in responding to every problem well. This is because in everyday life, students have known the problem. With this concept learning outcomes are expected to be more meaningful for students. According to (Ekawati & Dewi, 2016) [2] in his study explained the learning outcomes of class VIIIB students of SMP Negeri 3 Sukamaju before and after being applied to learning with contextual application that the results of inferential statistical analysis showed that all indicators of effectiveness met the effectiveness category then concluded effective applied learning approach contextual in mathematics learning class VIIIB students of SMP Negeri 3 Sukamaju. In addition, in the research conducted by (Marwanto, 2015) [5] shows an analysis of the learning process for students who learn to use the Contextual Teaching and Learning (CTL) model to experience an increase in each cycle along with the teacher's understanding of the characteristics of fifth grade elementary school students. In cycle I, there was a significant increase, from 63.4% at meeting 1 to 68, 8% at meeting 2, while at the third meeting it increased to 81.2%. In the second cycle the results of the observation increased at meeting 1 by 83.3% to 84.8% at meeting 2, and increased again to 87.0% at the 3rd meeting. This shows that the Contextual Teaching Learning (CTL) model can improve the process of learning mathematics well and has reached the determined performance indicator which is 85%.

From the description above, this study aims to determine whether the Numbered Heads Together (NHT) type of cooperative learning model with a contextual approach is effectively used in mathematics learning in class VIII students of SMP Negeri 5 Pallangga.

Research methods

The type of research used in this study is a pre-experimental study involving one class as an experimental class which will be given pretest and posttest which aims to determine the effectiveness of the application of Numbered Heads Together (NHT) learning model with a contextual approach to eighth grade students of SMP Negeri 5 Pallangga.

The experimental unit in this study only involved one experimental class or the class to be treated namely class VIII consisting of 36 students. After an experimental class, the research was carried out by giving a pretest to measure students' abilities before being treated, giving treatment by applying the Numbered Heads Together (NHT) type cooperative model with a contextual approach during learning that lasted 4 times meeting, and provide a final test (posttest) to measure students' abilities after being treated.

The research instrument that will be used is the completeness test of learning outcomes, observation sheet for student activity, and student response questionnaire. To analyze the data obtained is by using descriptive statistical analysis and inferential statistical analysis. Data collection about the completeness of mathematics learning outcomes was collected by using student learning outcomes test instruments after learning mathematics by applying the Numbered Heads Together (NHT) model with a contextual approach.

Data on student activity was obtained by using observation sheets of student activities during mathematics learning by applying the Numbered Heads Together (NHT) model with a contextual approach. Student activity data is obtained by observing students during learning activities. Data about student responses to learning were collected using student response questionnaires. Data on student responses were taken shortly after learning mathematics by applying the Numbered Heads Together (NHT) model with a contextual approach.

Data analysis using descriptive method to analyze data by describing or describing data that has been collected as it is, without intending to make generally accepted conclusions or generalizations, in Sugiyono (2016) [8] describes the characteristics of the factors investigated such as student learning outcomes which include highest value, lowest value, average value, range, median, standard deviation, and distribution table. Data obtained from pretest and posttest results were analyzed to determine student learning outcomes. With the aim of describing the understanding of students' mathematical material after applying Numbered Heads Together (NHT) with a contextual approach.

The type of data in the form of learning outcomes is then categorized qualitatively based on the five-scale categorization standard technique applied by the Ministry of Education and Culture, in Firdaus (2016) [3].

Table 1: Standardization of Standards set by the Ministry of Education and Culture

Value	Category
$0 \leq x < 55$	Very low
$55 \leq x < 70$	Low
$70 \leq x < 80$	Medium
$80 \leq x < 90$	High
$90 \leq x \leq 100$	Very high

Besides that student learning outcomes are also directed at achieving individual and classical learning outcomes. The criteria of a student is said to be complete learning if it meets the KKM determined by the school which is 75, while the classical completeness will be achieved at least 75% of students in the class have achieved minimal mastery.

Inferential statistical analysis is intended to test the research hypothesis. Inferential statistical analysis aims to generalize which includes estimations and testing hypotheses based on a data. Before testing the research hypothesis, the normality test and normalized gain test are carried out.

A. Normality test

Normality test is the first step in analyzing data specifically. The normality test is used to find out whether the data is normally distributed or not. Normality testing aims to see whether the data about results are normally distributed. For

the purpose of population normality testing, the One Sample Kolmogorov-Smirnov test was used with the following hypothesis:

If $V_{alue} \geq \alpha = 0,05$ the distribution is normal.

If $P_{value} < \alpha = 0,05$ the distribution is not normal.

B. Hypothesis testing

1) Testing the minor hypothesis based on the KKM using the average equality test by applying the one sample t-test technique.

One sample t-test is an analytical technique to compare one independent variable. This technique is used to test whether certain values differ significantly or not from the average of a sample. In testing this hypothesis, one sample was taken which was then analyzed whether there was an average difference from the sample. Test hypotheses made in this situation, namely:

$H_{0:}\ \mu \leq 74,9$ against $H_{1:}\ \mu > 74,9$

Source: (Arsini, 2017) [1]

information:

μ: Parameters of the average score of student learning outcomes

The decision making criteria are

H_0 rejected if $P\text{-}_{Value} > \alpha$ and H_1 accepted if $P\text{-}_{Value} \leq \alpha$, where α = 5%. If $P\text{-}_{Value} > \alpha$ means that the results of students' mathematics learning can reach KKM 75.

2) Testing the minor hypothesis based on Classical Completeness using a proportion test or z test.

Testing the proportion hypothesis is a test conducted to find out whether the hypothesized proportions are supported by information and sample data (is the sample proportion different from the hypothesized proportion). In testing this hypothesis using a hypothesis testing one population.

Test hypotheses made in this situation, namely:

$H_0 : \pi \leq 74,9$ against $H_1 : \pi > 74,9$

Source: (Arsini, 2017) [1]

The decision making criteria are

H_o rejected if $z > z_{(0,5-\alpha)}$ and H_1 accepted if $z \leq z_{(0,5-\alpha)}$ where α = 5%. If $z > z_{(0,5-\alpha)}$ means students' mathematics learning outcomes can reach 75%.

3) Testing hypotheses based on Gain using one sample t-test

Gain testing is used to determine the increase in mathematics learning outcomes that occur in students in the class, obtained by looking at the posttest average score.

Test hypotheses made in this situation, namely

$H_0 : \mu_g \leq 0,29$ against $H_1 : \mu_g > 0,29$

The decision making criteria are:

H_0 rejected if $t > t_{hitung}$ and H_1 accepted if $t \leq t_{hitung}$ where α = 5 %. If $t > t_{hitung}$ means students' mathematics learning outcomes reach 0.30.

Findings and Discussion

a) Description of students' mathematics learning outcomes before being given treatment

Statistical results related to variable scores taught using Numbered Heads Together (NHT) type cooperative learning with a Contextual Approach.

Table 2: Pretest Score Statistics for Class VIII Students of SMP Negeri 5 Pallangga

Statistics	Statistical Value
Sample Size	36
Highest Score	36
Lowest Score	11
Score Range	25
Average Score	23.81
Standard Deviation	7.48
Number of Completed Students	0
Number of Students Who Are Not Completed	36

If the score of students' mathematics learning outcomes variable is taught before applying the Numbered Heads Together (NHT) type of cooperative learning model with a contextual approach grouped into five categories according to the Ministry of Education and Culture (Firdaus, 2016) [3], frequency and percentage scores are obtained. shown in Table 3 below:

Table 3: Frequency Distribution and Pretest Score Percentage of Class VIII Students of SMP Negeri 5 Pallangga

Score	Category	Frequency	Percentage (%)
$0 \leq x < 55$	Very low	36	100
$55 \leq x < 70$	Low	0	0
$70 \leq x < 80$	Medium	0	0
$80 \leq x < 90$	High	0	0
$90 \leq x < 100$	Very high	0	0
Total		36	100

Based on the data obtained in Table 2 and Table 3, it can be concluded that the average score of mathematics learning outcomes for Class VIII students before being treated (treatment) is in the very low category, namely 36. In addition, it can be seen from the percentage of scores in the very low category. 100% of 36 students. 0% is in the low category while students in the moderate category are 0%. high and very high that is 0%. After the average pretest score of the eighth grade students of 23.81 was converted into the 5 categories above, the average pretest score for the eighth grade students of SMP Negeri 5 Pallangga Makassar before applying Numbered Heads Together (NHT) type learning model with contextual approach is very low.

Furthermore, the pretest score before being applied to the Numbered Heads Together (NHT) type of cooperative learning model with a contextual approach to the eighth grade students of SMP Negeri 5 Pallangga Makassar was categorized based on the minimum completeness criteria (KKM) can be seen in Table 4 as follows:

Table 4: Description of Pretest Completeness in Class VIII Students

Score	Category	Frequency	Percentage (%)
$0 \leq x < 75$	Not complete	36	100
$75 \leq x \leq 100$	Complete	0	0
Total		36	100

The criteria of a student is said to be complete learning if it has a value of at least 75. From Table 4 above it can be seen

that the number of students who do not meet the criteria for individual completeness is 36 students (100%) and complete classically no students (0%) students from 36 total number of students. Based on the description above, it can be concluded that the pretest results for Grade VIII students of SMP Negeri 5 Pallangga before being applied to Numbered Heads Together (NHT) type of cooperative learning model with a contextual approach are relatively low.

b) Description of students' mathematics learning outcomes after being given treatment

The following is presented the statistics and percentage of the results of mathematics learning for Grade VIII students after treatment.

Table 5: Mathematics Learning Outcome Statistics (Posttest) for Grade VIII Students of SMP Negeri 5 Pallangga

Statistic	Statistical Value
Sample Size	36
Highest Score	100
Lowest Score	50
Score Range	50
Average Score	83,8
Standard Deviation	13,5
Number of Completed Students	32
Number of Students Who Are Not Completed	4

If the scores of students' mathematics learning outcomes variable were taught before using the Numbered Heads Together (NHT) type of cooperative learning model with contextual approaches grouped into five categories, then obtained frequency and percentage scores as shown in the following Table 6:

Table 6: Frequency Distribution and Percentage of Mathematics Learning Outcomes (Posttest) for Grade VIII Students of SMP Negeri 5 Pallangga

Score	Category	Frequency	Percentage (%)
$0 \leq x < 55$	Very low	1	2,78
$55 \leq x < 70$	Low	1	2,78
$70 \leq x < 80$	Medium	11	30,56
$80 \leq x < 90$	High	11	30,56
$90 \leq x < 100$	Very high	12	33,33
Total		36	100

Based on the data obtained in Table 6 it can be concluded that in general the average score of mathematics learning outcomes for Class VIII students after being treated (treatment) is in the category of students who scored in the very low category of 0 students (0%), students who obtained scores in the low category were 1 student (2.78%), students who scored in the medium category were 11 students (30.56%), students who scored in the high category were 11 students (30.56%) and students who score in the very high category as many as 12 students (33.33%). After the average score of student learning outcomes of 83.81 was converted into the 5 categories above, the average score of the mathematics learning outcomes of the eighth grade students of SMP Negeri 5 Pallangga after being taught through Numbered Heads Together (NHT) cooperative learning model with an approach contextual is in the high category.

To see the completeness of students' mathematics learning after applying the Numbered Heads Together (NHT) cooperative learning model with a contextual approach can be seen in Table 7 below:

Table 7: Description of Posttest Mathematics Learning Outcomes in Class VIII Students of SMP Negeri 5 Pallangga

Score	Category	Frequency	Percentage (%)
$0 \leq x < 75$	Not complete	4	11,11
$75 \leq x \leq 100$	Complete	32	88,88
Total		36	100

Based on Table 7 it appears that of the 36 students as the subject of the study there were 32 students (88.88%) who were completed and 4 students (11.11%) who were not completed individually. This means that students in class VIII achieve mastery classically because classical completeness is achieved if at least 75% of students in that class have achieved the minimum completeness score set by the school. Based on the results of the study, showed that the Numbered Heads Together (NHT) cooperative learning model with Contextual Detection can improve students' mathematics learning outcomes.

The results of descriptive analysis of student learning outcomes data before applying mathematics learning through the Numbered Heads Together (NHT) type cooperative model with a contextual approach showed that there were 36 students or 100% of 36 students, who did not reach individual completeness (got an achievement score below 75), in other words student learning outcomes before applying the Numbered Heads Together (NHT) type cooperative model with a low contextual approach and not meeting the classical completeness criteria. While the results of data analysis of student learning outcomes after applying mathematics learning through the Numbered Heads Together (NHT) type cooperative model with a contextual approach showed that there were 32 students or 88.88% who achieved individual completeness (minimum score of 75) while students who did not achieve completeness minimum or individual of 4 students or 11.11%. This means that the Numbered Heads Together (NHT) type cooperative model with a contextual approach can help students to achieve classical completeness.

Based on the minimum completeness criteria (KKM) at SMP Negeri 5 Pallangga, the students are said to have completed their learning if the learning outcomes have reached a score of 75, then at the time before the treatment (pretest), all students do not achieve mastery learning or 36 people do not reach the KKM while after The application of treatment (posttest) achieved mastery learning was 32 people out of a total of 36 people with a percentage of 88.88. From the above explanations, it can be seen that learning using the Numbered Heads Together type cooperative model with a Contextual Approach can improve individual and classical learning completeness.

So it can be concluded that inferentially the students' mathematics learning outcomes after being taught using the Numbered Heads Together (NHT) type cooperative model with a contextual approach meet the criteria of effectiveness, especially in relation and function material.

Conclusion

Based on the results of the data analysis and discussion above, it can be concluded that 1) The achievement of mathematics learning outcomes of class VIII students after learning with the Numbered Heads Together (NHT) type cooperative model with a contextual approach meets the Minimum Passing Criteria (KKM). 2) Student activity in participating in learning is in accordance with the Numbered Heads Together (NHT) type cooperative model with a contextual approach categorized as active activity. 3) Positive student response to mathematics learning using Numbered Heads Together (NHT) type cooperative model with a contextual approach. 4) There was an increase in the results of mathematics learning after being taught using the Numbered Heads Together (NHT) type cooperative model with a contextual approach. 5) The results of inferential analysis indicate that the pretest and posttest data have met the normality test which is a prerequisite test before testing the hypothesis. 6) The fulfillment of the effectiveness of mathematics learning indicators above can be said that the Numbered Heads Together (NHT) type cooperative model with an effective contextual approach in mathematics learning of eighth grade students of SMP Negeri 5 Pallangga.

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