COMPARATIVE STUDY OF THE STUDENTS' MATH LEARNING OUTCOMES TAUGHT USING TYPE OF COOPERATIVE LEARNING METHOD *NUMBERED HEAD TOGETHER* (NHT) AND *GAMES TEAM TOURNAMENT* (TGT) TO STUDENTS CLASS VII SMPN 1BAULA

AUTHORS INFO

Supratman
Universitas Sembilanbelas November Kolaka
Supratmanmathusnkolaka@gmail.com
+6285421154245

Abstract

The problems in this research are: (1) What is the result of learning mathematics in grade VII SMP Negeri 1 Baula taught by type of cooperative methods Numbered Heads Together (NHT)? (2) What is the result of learning mathematics in grade VII SMP Negeri 1 Baula taught by type of cooperative methods Team Games Tournament (TGT)? (3) Are the results of students' mathematics learning kelasVII SMP Negeri 1 Baula taught by cooperative methods with NHT is different with students who are taught by the type cooperative method TGT? The hypothesis in this study are: the results of students' mathematics learning class VII SMP Negeri 1 Baula taught by cooperative methods NHT type is different with the students taught with methods TGT. The population in this study was all students of class VII SMP Negeri 1 Baula in the second semester of the 2011/2012 academic year. Samples taken as many as two classes, namely class VIIc and VIId class. The results showed: (1) The results of students' mathematics learning of class VIIc are taught using cooperative learning NHT type obtained an average value of student learning outcomes at 82.86 and the passing rate of 100%. (2) Results of mathematics learning of class VIId taught using methods TGT obtained average value result of 67.25 and the percentage of students passing rate at 80%. (3) The results of hypothesis test obtained $t_{count} > t_{table}$ or equal to 3.997 > 2.02 with df = 39 at significance level $\alpha = 0.05$. Thus, it can be concluded that there were significant differences in the results of students' mathematics learning that are taught using NHT and IGT methods in the seventh grade students of SMP Negeri 1Baula.

Keywords: *mathematics learning outcomes, the NHT model, TGT model*

A. Introduction

The success of the student learning process is determined by several factors, among others, intelligence, training, motivation, tools used in teaching and learning, environment, family factors, methods of teaching and learning the subject (teachers and students). To help students for successful learning, teachers must pay attention to the factors that influence the success of students and also first need to know the purpose of the lesson material being taught. Soedjadi in Ikhanudin (2010: 2) Math that has abstract objects might be said "opposite" to the intellectual development of children. Besides, the order presentation materials in mathematics is usually done so far by the teacher in the learning process are (1) taught theory / definition / theorem, (2) given examples, (3) given exercises. In this kind of learning students are likely to receive and copy definitions and examples that teachers give. The lack of students' achievement in math, maybe also due to efforts of teachers to improve learning achievement has not gone as

expected.

Innovation in the learning process is needed to improve the achievement of the maximum. This innovation can be done by using some learning approaches, learning strategies, and learning models. The models of learning undertaken by teachers have a very important role in the education successfulness. The use of the right model will determine the effectiveness and efficiency of the teaching process, in addition to the teacher always be able to select and apply those appropriate methods that fit to the materials taught.

In mathematics, there are several methods that have been used by teachers include lectures, question and answer method and some of these methods may be regarded as conventional methods. Conventional learning model that is used by the majority of teachers are not in accordance with the demands of time this is evidenced by the low learning results obtained by the students, where the average obtained by the student at 50 is far below KKM determined by the school. This is because learning do not provide as much opportunity as possible for the student to construct knowledge.

Achievement of learners, their confidence, their behavior, and attitudes toward school, and relationships between individuals and groups of learners are all influenced by learning methods are applied in the classroom (Walkerdan Crogan in Ikhanudin, 2010: 4). In education, there are several models of learning that already exist for the teachers, especially for junior high school teacher, where this model can be used to enhance the activity of the learners in learning process among other models such as guided discovery, problem-solving model, learning model portfolios, and cooperative learning model , in a cooperative learning model, there are several types, namely the type of Investigation Group (Group investigation), Jigsaw, type Student Teams Achievement Divisions (STAD), type Teams Games Tournament (TGT), Learning Together (Learning together), Numbered Heads Together (NHT), etc.

The learning models involves the activities of all learners without any distinction of status, engage learners as peer tutors and contains elements of the game. Learning activities are designed such as to allow for the learners can learn more relaxing and enjoyable. It is also can foster a sense of responsibility, teamwork, healthy competition, and learning engagement. Through the study group is expected to activate learners in mathematics to increase achievement, for learners to actively participate and may obtain additional information from the groups. Thus, learning is able to enhance understanding for students in Junior High Schools. From some model of learning, the writer interested to compare the learning outcomes of students who are taught by the method of type Numbered Heads Together (NHT) with type Teams Games Tournament (TGT), so this research entitled "Comparative Study of the Students' Math Learning Outcomes Taught Using Type of Cooperative Learning Method *Numbered Head Together* (NHT) and Type *Games Team Tournament* (TGT) to Students Class VII SMPN 1 Baula".

B. Literature Review

1. *Numbered Heads Together(NHT)*

This is one of the structural methods in cooperative learning. NHT was developed by Spencer Kagan (Yulianingsih, 2010: 11) to engage students in looking back at the material covered in the lesson and check their understanding of the lesson content. In line with a direct question to the whole class, teachers use a four-step structure, is as follows:

a. Step 1 – Numbering

The teacher divides the students into groups or teams of 3 to 5 people and gives them numbers so that each student on the team has a different number.

b. Step 2 - Asking Questions

Teachers ask questions to the students. Questions can be varied, from the specific to the general.

c. Step 3 - Think Together

All members of the group discussed the questions given by the teachers and make sure each member knows the answer to those questions.

d. Step 4 - Providing Answers

Teachers mention a number and the students of each group with the same number of hand-picked and prepare answers to the entire class.

The team consists of varies students, namely: there is a high caliber, capable of being, and poor performance. Here positive dependence was also developed, and the ability to lower helped by the ability to more. High-ability students who are willing to help, even though they were not called upon to answer. The poor level students are expected very enthusiastic

understand the issues and answers.
The group division at NHT method is based on ability and gender.

2. ***Team Games Tournament (TGT)***

Nur in Zuliyani (2010: 6) suggested that TGT learning method is learning the same techniques as in every stage of learning STAD except in one phase that instead quiz and individual improvement scores system, TGT using academic game tournament. Students compete in the tournament representing his team with other team members that are the same level of their last academic rank.

TGT learning method is one type or model of cooperative learning that is easy to implement, involving the activities of all students without any differences in status, involves the role of students as peer tutors and contain elements of games and reinforcement. Slavin (Zuliyani, 2010: 6-7)

Slavin (Zuliyani, 2010: 6-7) state the main component in learning TGT is:

a. Classroom presentations

   At the beginning of learning the teacher presenting material in class presentation, usually done by direct teaching or by lectures, discussions led by teacher. At the time of presentation, the students are expected to be right and really pay attention and understand the material submitted by teachers, as it will help students perform better at work and the group at the time of the game because the game score will determine a score group.

b. Group

   The group usually consists of 4 to 5 students whose members' heterogeneous views of academic achievement, the different sex and ethnic. The function of the group is to further explore the matter with friends group and more specifically to prepare group members in order to work properly and optimally during the game.

c. Game

   Game consists of questions designed to test students' knowledge gained from classroom presentations and study groups. Most of the game consists of simple questions numbered. Students select the numbered cards and try to answer the questions that correspond with that number. Students who answer the question correctly will receive a score.

C. Methodology

1. Research Design

Research will be conducted in two classes with different treatment. The procedures to be performed in the determination of the class are:

a. Determine which class will be taught by type NHT and TGT.

b. Then the teachers will implement the learning according to the learning steps contained in the type of learning that has been determined. Thus the differences in learning outcomes will be considered to arise from the treatment given.

c. After learning the treatment is done, the next is to provide a written exam tests to be done by the students.

d. After the learning process are grouped group is completed, the next step is to provide a test in the form of questions that will be done by each student individually, the teacher will examine the results of student work and test data both groups will be conducted comparative tests to determine whether there is a difference and if there are differences as well as determine which classes that have a higher learning outcomes.

e. Because in this study students in different classes will be given treatment that is different i.e. NHT type cooperative learning methods and TGT that can be seen in the following table:

Table 1. Research Design

Groups	Methods	Results
KE_1	X_1	V
KE_2	X_2	V

Explanation:

KE_1 : Group of the experimental class 1

KE_2: Group of the experimental class 2

X_1 : Treatment 1 (cooperative type *NHT*)

X_2 : Perlakuan 2 (cooperative type *TGT*)

V   : Gained Results (*posttest*)

2. **Population and sample**

The population in this study was all students in grade VII SMP Negeri 1 Baula, the second semester of the Academic Year 2014/2015 that consists of four classes. Which in this study, there are two classes that are selected as a sample of class VIIc that consists of 21 students will be treated with the method of learning NHT and class VIId consisting of 20 students learning to be treated with IGT.

3. **Data Collection Technique**

The data collection technique is an activity to acquire the data needed to be processed and presented based on the problem faced. Data used in this research is data result of the students' learning mathematics of SMP Negeri 1 Baula. Data collection techniques were performed using the test, data collection techniques in the form of tests used to collect data from students' mathematics learning after being given the subject matter of mathematics.

4. **Research Instrument**

Instruments used in this research was to test the ability to complete math problems, where there were two classes given different treatment.

5. **Data Analysis Technique**

Analysis of the data in this study using the ready-made program SPSS version 20.0 and Microsoft Excel 2007.

a. **Validity Test of Instrument**

The validity of the items used to measure the support score each item on the total score. The greater the support score items to the total score, the higher the validity of the question. Thus, to test the validity of any items, then score each item on correlated with the total score using the formula RPBBI (correlation coefficient point biserial) with the following formula:

$$r\,\text{pbi} = \frac{Mp - Mt}{SDt}\sqrt{\frac{p}{q}} \qquad\qquad \text{(Awalluddin, 2008:9)}$$

Explanation:

r_{pbi} = point correlation index number biserial

Mp = mean scores of subjects who answered true / yes

Mt = total mean

SDt   = total Standard of dDeviation

p   = the proportion of subjects that are answered true / yes

q   = 1 - p

Statistical hypothesis tested was.

Ho $\rho = 0$, there is no significant relationship between the score of items with a total score

H1 $\rho \neq 0$, there is significant correlation between the score of items with a total sco

The test criteria is if a probability value (sig.) Is less than 0.05, then Ho is rejected and vice versa, then Ho is accepted. In addition, Masrun (1979) in Sugiyono (2012: 134) states that the minimum requirement is said to be valid if r = 0.3. Interpretation of the magnitude of the correlation coefficient r xy is based on the opinions Arikunto (2009: 75), as Table 13 below.

Table 2 Interpretation of Correlation Coefficient Values rxy

Coefficient	Interpretation
$0{,}80 < r \leq 1{,}00$	Very High
$0{,}60 < r_{xy} \leq 0{,}80$	High
$0{,}40 < r_{xy} \leq 0{,}60$	Enough
$0{,}20 < r_{xy} \leq 0{,}40$	Low

r $\leq$ 0,20	Very Low

b. Reliability Test

Analysis of reliability of the test is to measure the coefficient of reliability and are used to determine the level of reliability of a test. A test is said to be reliable if the results of measurements made using such tests repeatedly on the same subject, always shows the results remain the same or nature stable or steady (consistent).

The coefficient of multiple choice instrument using the formula K-R. 20 as follows:

$$r_{11} = \left(\frac{n}{n-1}\right)\left(\frac{S^2 - \sum pq}{S^2}\right)$$ (Arikunto, 2009: 100)

Explanation:

r_{11}= reliability in over all

p = the proportion of subjects who answered the item correctly

q = the proportion of subjects that are answered the item incorrectly

$\sum pq$ = the amount of the multiplication of p and q

n = number of item

S = standard deviation of the test

Interpretation of the coefficient of reliability of the test used is the interpretation according to J.P Guilford (Suherman, 2003: 139) as shown in Table 17 below:

Table 3. Reliability Coefficient Interpretation

Coefficient	Interpretation
$0,90 \leq r_{11} \leq 1,00$	Very High Reliability
$0,70 \leq r_{11} < 0,90$	High Reliability
$0,40 \leq r_{11} < 0,70$	Enough Reliability
$0,20 \leq r_{11} < 0,40$	Low Reliability
$r_{11} < 0,20$	Very Low Reliability

c. Descriptive Analysis

Descriptive analysis is intended to describe the characteristics of respondents by the independent variable of learning model Numbered Heads Together and Tournament Team Games on the dependent variable with the average value of students' mathematics learning outcomes of each cell, standard deviation, minimum and maximum values.

d. Inferential Analysis

Because in this study there are two groups that are given different treatment, namely the provision of using cooperative learning NHT type and TGT type hypothesis testing performed using t-test one, which is to determine which of the results of the class has the highest score.

The use of statistical test techniques of analysis of variance and covariance require certain requirements that must be met namely data normality and homogeneity of the sample.

1. Normality Test

Normality test is intended to determine whether the research data are normally distributed. Normality test used was chi-square with the formula:

$$x^2 = \sum_{i=1}^{k} \frac{(fo-fe)^2}{fe}$$ Riduwan (2003: 197)

Explanation:

fo = observed frequency

fe = expected frequency

i = number of lines

k = class interval

Testing criteria:

jika $x^2_{count} \geq x^2_{Table}$ distribution is not normal

jika $\chi^2{}_{count}$< $\chi^2{}_{Table}$ distribution is normal

2. Homogeneity Test

Homogeneity test data in this study using a test greatest variance compared with the smallest variance as following:

$$f_{hitung} = \frac{varians\ terbesar}{varians\ terkecil}$$

Riduwan (2003: 186)

Comparing the value of f_{hitung} with f_{tabel} using formula:

$dk_{nomeratorg}$= n – 1 (for the biggest variance)
$dk_{denominator}$= n – 1 (for the smallest variance)

Significant level α = 0,05, found out at table f

If F_{count} > F_{tabel} means not homogene
If F_{count} < F_{table} means homogene.

3. Hypotheses Testing
Independent Sample t-test

If based on the results of homogeneity of the two populations examined was homogeneous then apply the following formula t-test:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Sugiyono (2011:80)

Explanation:

t	= Value of statistical test
$\bar{X}_1$	= Average of students' learning outcomes (experimental class I)
$\bar{X}_2$	= Average of students' learning outcomes (experimental class II)
n_1	= The number of samples (the experimental class I)
n_2	= The number of samples (the experimental class II)
S_1^2	= Data Variance (experimental class I)
S_2^2	= Data Variance (experimental class II)
SP^2	= Mixed Standard Deviation value

Testing Criteria:
Jika t_{count} > t_{Table} H$_0$ rejected.

D. Finding and Discussion
1. Findings

Test the validity of the other class do not constitute experimental class (class VII SMPN 1 Wundulako 3). The test consists of 24 items and about 24 students. Calculation test the validity of test, if rhit> rtab the matter declared invalid item. Of the 24 questions that tested there are 20 items about valid and four items about invalid. Item about invalid is a matter of item numbers 3,14,19, and 21. To see the calculation results SPSS can be found in appendix 3. Once the validity test is done, the invalid item will be deleted to continue the reliability test. An instrument had a reliability study indicated sufficient if Kudher Ricadson 20 (KR-20) greater or equal to 0.70. From the test results on a computer obtained Kudher Ricadson 20 (KR-20) amounted to 0.930, thus it can be concluded that this matter is reliable to measure student learning outcomes.

Normality test is performed to determine whether the sample data is taken from the normal population or not. Normality test is done with the aid of a computer program SPSS using the quadratic formula Kai χ^2 (chi-square = SPSS). Samples were said to come from normal populations if $\chi^2{}_{count}$ <$\chi^2{}_{table}$. Normality test results can be seen in the following table:

Table 4. Summary results of the test for normality

Class	χ^2_{count}	Df	χ^2_{table}	Conclusion
NHT	10,00	6	12,59	Normal
TGT	4,00	5	11,07	Normal

Data χ^2 at the table above can be explained as follow:

1. $\chi^2_{count} < \chi^2_{table}$ = 10,00 < 12,59, means the sample derived from the normal population.
2. $\chi^2_{count} < \chi^2_{table}$ = 4,00 <11,07, means the sample derived from the unnormal population.

Homogeneity test is performed to determine whether the population has the same variance or not. Significance level was set at 0.05. The population is said to be homogeneous if the significance level is greater than the level of significance was set or if F_{count} (levene statistical value) is smaller than F_{table} then the population is also said to be was homogeneous. Homogeneity test results can be seen in the following table:

Table 5. Summary Result of Hogeneity Test

Class	F_{count}	F_{table} Df (1/39)	αgained	αstable	Conclusion
NHT	0,534	4,09	0,469	0,05	Homogene

The hypothesis is an answer to the question or problem in the study. The hypotheses in this study are:

H_0 = math learning outcomes of class VII SMP Negeri 1 Baula taught by cooperative method with the type Numbered Heads Together (NHT) is not different with the students taught by the type cooperative methods Team Games Tournament (TGT).

H_a = learning outcomes math class VII SMP Negeri 1 Baula taught by cooperative method with the type Numbered Heads Together (NHT) is different from the students taught by the type cooperative methods Team Games Tournament (TGT). If $T_{count} < T_{table}$ then H0 is accepted and Ha rejected, otherwise if $T_{count} > T_{table}$ then H0 rejected and Ha accepted.

Before performing the following hypothesis test result data grade students VIIc and VIId SMP Negeri 1 Baula that are subjected to different learning. Here are the results VIIc classroom learning with NHT type cooperative method:

Table 6. The frequency distribution of learning outcomes with a group of NHT type cooperative Method

	Value	Frequency	%	% Cumulative
Valid	60	2	9.5	9.5
	70	2	9.5	19.0
	75	1	4.8	23.8
	80	7	33.3	57.1
	90	5	23.8	81.0
	95	1	4.8	85.7
	100	3	14.3	100.0
Total		21	100.0	

The results of students' mathematics learning in the class is a class VIIc with NHT type cooperative learning method that consists of 21 students showed an average of study results at 82.86 with a minimum value of 60, the maximum value of 100 and a standard deviation of 11.79.

Table .7 The frequency distribution of learning outcomes with Method type cooperative group TGT

	Value			
Valid	45	1	4.8	5.0
		3	14.3	20.0
	50	5	23.8	45.0
		5	23.8	70.0
	60	4	19.0	90.0
		2	9.5	100.0
	70	20	95.2	
		1	4.8	
	80	21	100.0	

The results of students' mathematics learning in the class is a class with a method VIId cooperative learning TGT consisting of 20 students showed an average of study results at 67.25 with a minimum value of 45, the maximum value of 90 and a standard deviation of sebesar13,33

Further testing conducted by independent samplet-test conducted with the help of computer analysis using SPSS 17.0 statictics, so we get the following results:

Table 8. Results of testing the hypothesis with independent sample t-test

Class	t_{count}	df	t_{table}	A	Conclusion
NHT					There is
TGT	3,977	39	2,02	0,05	difference

Explanation:

df : Degree of Freedom

α: Significance level

Based on the results of hypothesis testing using t-test, obtained tcount variable student learning outcomes at 3,977 with df = 39, df those of the 5% significance level obtained T_{table} by 2.02.

From these data indicate that $t_{count} > T_{table}$ so then H0 rejected and Ha accepted. Alternative Hypothesis (Ha) which states that "the results of students' mathematics learning class VII SMP Negeri 1 Baula taught by cooperative methods with NHT is different with students who are taught by the type cooperative method TGT".

2. *Discussion*

Student learning outcomes data above shows that the application of NHT type cooperative method can provide better learning outcomes for students of SMP Negeri 1Baula when compared to the type cooperative method TGT. It is shown from the results of hypothesis testing is done at the top, where the most accepted hypothesis states that there are differences in learning outcomes between the two methods of teaching and learning.

In addition we can also see from the average value of students in the class VIIc (NHT type cooperative method) amounted to 82.86 were in class VIId (TGT type of cooperative method) amounted to only 67.25. In addition the percentage of graduation with the KKM = 60, for VIIc grade passing rate of 100% and the class VIId passing rate of only 80% (4 out of a total of 20 students have not reached the standard KKM).

Thus, we may conclude that the results of student learning class VIIc with the implementation of cooperative learning methods NHT better than grade students VIId are taught using cooperative learning TGT this is in line with research conducted by Yulianingsih (2010: 45) states that NHT cooperative learning model can improve students' mathematics learning outcomes.

E. Conclusion

From the results of data analysis and discussion conducted can be drawn the following conclusions:

1. The results of students in a given kelasVIIc treatment NHT type cooperative learning methods are: the average value of 82.86 by the number of students at least 21 people, the

     maximum value obtained is 100 and the minimum score is 60. The standard deviation of 11.79 and the passing rate of 100% (KKM = 60).

2. The results of students in the class VIId given treatment TGT cooperative learning methods are: the average value of 67.25 by the number of students as many as 20 people, the maximum value obtained is 90 and the minimum score is 45. The standard deviation of 13, 33 and the passing rate of 80% (KKM = 60).

3. There are significant differences in learning outcomes between the use of mathematical methods and the type cooperative NHT type cooperative TGT using seventh grade students of SMP Negeri 1 Baula, where tcount> TTable or 3.977> 2.02 and a 100% passing rate for NHT and 80 % for TGT.

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