THE EFFECT OF NUMBERED HEADS TOGETHER MODEL AGAINST STUDENTS' MATHEMATICAL CONCEPT MASTERY IN SMP NEGERI 8 MEDAN

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ABSTRACT

The aim of research to determine the effect of the model Numbered Heads Together and students' mathematical concept mastery of class VII SMPN 8 Medan. Quasi-experimental method, simple random sampling. Subjects of this research consist of 72 students. Mastering concept tests consist of 8 analysis questions. Normality and homogeneity tests with mean value of experiment class 82,75, control class 74,81, t-test = 3,487 > t table = 1,669, DK = 70, α = 5%. Gain index of experiment class = 0,72 > control class = 0,41. There was effect significantly between Number Heads Together and Direct Instruction model with students' mathematical concept mastery.

Keywords : Number Heads Together Model, Students' mathematical concept mastery.

1. INTRODUCTION

Mathematics is one of the lessons learned from the primary level up to tertiary level. Math is a tool that serves to build reasoning, logical thinking, critical, creative, objective and rational is needed both in everyday life and in the development of science and technology. From here we should already know that math is important.

According to the study Trends in International Mathematics and Science Study (TIMSS) in 2015 showed that students' mastery of mathematics in Indonesia ranked 44 out of 47 countries. Indonesia was only able to collect 397 points from an average score of 500. These results are an indication that the students' mathematical concepts mastery in Indonesia is low.

Schools as one means of formal education important task in achieving national education goals. One factor to achieve national education goals is the success of students in activities to learn in the classroom. According Sardiman (2011: 42), "The learning activities will be more successful if people who learn it active, act and react optimally." Thus the learning in the classroom should be an application of an appropriate learning models to be able to support successful learning activities.

Based on the results Mustafa (2011), that the cooperative learning model of Numbered Heads Together is able to enhance the activity and students' mathematical concepts mastery. Based on this study the authors wanted to apply the model Numbered Heads Together in SMP N 8 Medan, because based on the authors' observations of that learning in SMPN 8 Medan still using direct learning model instruction. In order for the model Numbered Heads

Together is more interesting when the learning so when the numbering heads, students participate made on cardboard number that will be pinned to the chest of students and awarded a prize for a group of teachers who answer questions correctly. The material will be presented in an envelope addressed making the curiosity of students. Furthermore, when students answer questions students have to present the results of the answers to the class so that the students actively in learning not just to hear a lecture from the teacher and also only able to present a good rote, and the dominant role of the teacher is not expected at the time of learning.

Many students have difficulty in solving problems assigned by the teacher, especially when such questions are kind of a matter of implementation of some mathematical concepts in everyday life. Students are familiar with the particular formula, but when teachers give variety math problems students are having trouble. This is an indication not optimal mastery of mathematical concepts in mathematics. Mastery of concepts that will aid students in solving problems related to everyday life.

Mastery in dictionary Indonesian (Abbas, 2006: 24) is defined as understanding or ability to use the knowledge, intelligence, and so on. Based on such understanding can be stated that the acquisition was an understanding. Understanding not only mean knowing the nature of remembering (rote), but were able to express in another form or with your own words so it is easy to understand the meaning of the material being studied, but it does not change the meaning in it.

According to Bloom (Gulo, 2004: 58-69), cognitive ability mastery of concepts include: (1) knowledge is knowledge is a process to remember and recall the information at a time that is required, (2) understanding is the ability to understand can also be termed understand. Someone student was said to have had the ability to understand or comprehend if the student can explain a particular concept in their own words, can compare, to differentiate and to counterpoise these concepts with other concepts. Ability belonging to the ability to understand is: a) translation, the ability to change certain symbol into another symbol without changing the meaning. For example, a symbol in the form of words (verbal) is converted into images, charts, or graphs, b) interpretation, the ability to explain the meaning contained in the symbol, both verbal and nonverbal symbols. For example, the ability to explain concepts or principles and specific theory, c) extrapolation, namely the ability to see trends or direction or continuation of an invention, (3) the application is the application is the ability to use concepts, principles, procedures or specific theories. Someone said to master this ability if he can give an example, using, clarifying, harnessing, completing, and identifying which are the same, (4) analysis (5) synthesis (6) evaluation.

A student can be said to master the concept if: 1) determine the characteristics of a concept, 2) recognize some samples and not samples of the concept, 3) recognize a number of properties and its essence, 4) can use the relationships between concepts, 5) can be recognize the concept that in many situations, 6) can use the concept to solve mathematical problems, 7) specialized in geometry, can get to know the form, can give model, and recognize similarities.

Some relevant research which are Atun (2011), that the learning model Numbered Heads Together have a significant impact on students' mastery of mathematics than learning by using the direct method (Direct Instruction). Further research Handri. (2010), that learning mathematics is not just memorize concepts well, but should be able to apply these concepts in everyday life or in the form of a game.

Based on the description above shows that the students were only able to memorize concepts, where the students more are in the stage of understanding instrumental only able to memorize, do the problems with routine algorithm without knowing why he should choose the algorithm. In addition, the more concern is the students do not know the benefits of the knowledge he has learned in everyday life, it is caused by learning to do more with the model of the teacher-centered learning.

There are some cooperative learning, one of them is Numbered Heads Together. Trianto (2007: 62) Numbered Heads Together or numbering, thinking together is a kind of cooperative learning designed to affect the pattern of interaction of students and as an alternative to the traditional class structure, Numbered Heads Together was first developed by Kagan, 1993 (Trianto 2007: 62) to involve more students in studying the material covered in the lesson and check their understanding of the lesson content. In addition, students can exchange information to resolve the problem so that it can increase the activity and social skills with their students to help each other in solving problems.

According Vigostky (Zubaidah & Risnawati, 2016: 137) that the learning process will take place in an efficient and effective if children learn cooperatively with other children in an atmosphere and environment that supports (supportive) in guidance or assistance from those who are more mature and more capable of them, such as teachers and parents. This occurs when students discuss teachers' answers to questions by pointing to numbers that exist on the student's head. At this time is expected to spur the formation of new ideas and enrich the student intellectual development.

According Istarani (2012: 13) As for the advantages of the model Numbered Heads Together are: 1) to enhance the cooperation between the students because in learning students are placed in a group discussion, 2) to increase the responsibility of students together because each group given different tasks to be discussed, 3) train students to unite the mind, because Numbered Heads Together invites students to integrate perception in a group, 4) train students to respect the opinions of others, because of the results of the discussion prompted a response from the other participants.

While the weakness Numbered Heads Together are: 1) it is difficult to unite the minds of students in one group, 2) a debate often less useful, 3) students who reserved it would be difficult to discuss, 4) discussions are often wasting considerable time.

Based on the background of the problem, the author considers it important to conduct research with the title "The Effect Model Numbered Heads Together Against Students' Mathematical Concept Mastery in SMPN 8 Medan

2. RESEARCH METHOD

This study considered quasi-experimental research. The design used in this study includes three phases, namely: (1) Phase preparation of learning tools and research instruments, (2) the trial stage of learning tools and research instruments, (3) The implementation stage of the experiment. Each stage is designed so that valid data obtained in accordance with the variable characteristics and according to the research objectives.

This study was conducted in SMP N 8 Medan. The election of class VII as the study population due to the mastery of the concept of class VII is low. This is evident when the teacher gives problems with some questions about the problems of everyday life of students experiencing difficulties and only a few students who are active in answering, remaining silent because students are accustomed to Direct Instruction learning.

The sampling technique used in this study is simple random sampling, because members of the population considered homogeneous (Sugiyono, 2010: 64). Random sampling by way of lottery, the class was selected as the study sample were students of class VII-7 as the experimental class and class VII-9 as the control class.

Table 1. Research Sample

Number	Class	Students		Sum
		Boys	**Girls**	
1	VII-9	17	19	36
2	VII-7	16	20	36

The shape of the research design is quasi experiment that used -Control group pretest-posttest design. The study design was used for this study using an experimental class and control class, the test is performed twice, before the learning process called pretest and after the learning process is called posttest like design below:

Table 2. Reasearch Design

Group	Pretest	Treatment	Post test
Experimental	O_1	X	O_2
Control	O_3		O_4

(Source: Lestari & Yudhanegara, 2015: 124)

Annotation:

O_1: Pre test that given in experimental class before the learning process

O_2: Post test that given in experimental class after the learning process

O_3 : Pre test that given in control class before the learning process

O_4 : Post test that given in control class after the learning process

X : Treatment with *Numbered Heads Together* model

3. RESULT

The first statistical hypothesis testing was conducted to test whether there is influence of the model Numbered Heads Together against Experimental class. Furthermore, comparing the effect of the model Numbered Heads Together toward mastery of math concepts students with grade control using Direct learning instruction. The results obtained showed that the value of t test = 3,487> t table = 1.669 with a degree of freedom (n-2) = 72-2 = 70 on the one hand test with significance level of 5%. It turned out that t test > t table means Ha accepted, so it can be concluded that there are significant model of Numbered Heads Together toward mastery of math concepts students in the experimental class. In other words, based on the average difference test, post-test scores mastery of the mathematical concept of junior high school students of class VII SMPN 8 Terrain model Numbered Heads Together is better than Instruction Direct learning.

Table 3. One-Sample Kolmogorov-Smirnov Test

		p.exp	p.control	ps.exp	ps.control
N		36	36	36	36
Normal Parameters[a,b]	Mean	57,5000	57,6111	82,7500	74,8056
	Std. Deviation	8,06226	5,62788	9,56295	9,75652
Most Extreme Differences	Absolute	,150	,192	,163	,122
	Positive	,094	,162	,157	,122
	Negative	-,150	-,192	-,163	-,119
Kolmogorov-Smirnov Z		,897	1,153	,979	,730
Asymp. Sig. (2-tailed)		,397	,140	,294	,661

a. Test distribution is Normal.

b. Calculated from data.

Table 4. Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
ps.eks	Based on Mean	,026	1	34	,873
	Based on Median	,036	1	34	,850
	Based on Median and with adjusted df	,036	1	32,857	,850
	Based on trimmed mean	,028	1	34	,867
ps.kontrl	Based on Mean	,565	1	34	,458
	Based on Median	,610	1	34	,440
	Based on Median and with adjusted df	,610	1	33,536	,440
	Based on trimmed mean	,548	1	34	,464

Based on the homogeneity of variance test result:

1. Post a significant experimental test of 0.873. This shows the significance > 0.05, meaning the Post test data for the value derived from a homogeneous population.
2. Post test control significantly by 0.458. This shows the significance
> 0.05, meaning the Post test data for the value derived from a homogeneous population.

Table 5. Homogeneity Test recapitulation Calculation Results

Class	Db	Significance	Alpha	Conclusion
Experimental	34	0,873	0,05	Homogeneous
Control	34	0,458		

Based on the calculations, the average for class experiment $\bar{X}_E = 82,75$ with a variance $S_E^2 = 91,39$ and gained control group $\bar{X}_K = 74,81$ with variance $S_K^2 = 95,26$ The value α is 0.05. The test used is a test in one direction with db = 70. By looking at the table t obtained value t table 1,669. Testing criteria is accept Ho if t test<t table and accept Ha if t test > t table (t be in the region of rejection Ho), then Ho is rejected. It can be concluded that the average students' mastery of mathematical concepts are given learning model Numbered Heads Together is higher than the mastery of mathematical concepts by learning the Direct Instruction. For more details can be seen in the table below:

Table 6. Calculation Result Recapitulation Hypothesis Test

Group	Sample	T_{test}	t_{table}	Hypothesis	Conclusion
Experimental	36	3.487	1,669	$T_{test} > t_{table}$	H_a accepted
Control	36				

Based on testing criteria listed in the table recapitulation hypothesis test obtained t = 3,487> t table = 1.669 means Ha accepted.
The second hypothesis proposed is:

H_o: $\mu_1 \leq \mu_2$: experimental class average less than or equal to the average grade control means there is no significant effect on learning model Numbered Heads Together toward students' mastery of mathematical concepts in SMP N 8 Medan

$H_a : \mu_1 > \mu_2$: experimental class average more than the average grade of control means that there is a significant effect on the learning model Numbered Heads Together toward students' mastery of mathematical concepts in SMP N 8 Medan

The hypothesis is also reinforced by the test using a normalized gain mastery of the concept of student learning outcomes as seen from both classes, the experimental and control classes. The normalized gain test results are as follows:

Table7 Results normalized Gain Value

Concept Mastery	Experimental Class	Control Class
Indeks gain	0,72	0,41
	High	Moderate

4. DISCUSSION OF RESEARCH

Based on the survey results revealed the average value of the experimental class 82.75 and the average value of the control class 74.81, whereas the results of hypothesis testing that has been done shows that t test is in the region outside the reception area Hour in other words Ho rejected. Thus the alternative hypothesis (Ha) is accepted. This shows that there are significant learning model Numbered Heads Together toward students' mastery of mathematical concept.

There is the influence of the model Numbered Heads Together toward students' mastery of mathematical concept in learning due to the characteristics of cooperative learning in the learning itself where students learn as a team. By learning teams can facilitate students in the division of tasks, allows students to learn execute personal responsibility. The cooperative learning model Numbered Heads Together classes are based on cooperative management. With cooperative classroom management students are required to have more responsibility not only to himself but also for his group. With each student's responsibility to help each other achieve learning goals, with this way of learning as students are more motivated to improve the control concept. Willingness to cooperate, and cooperation skills of students practicing the activity in group learning activities so that students are able to interact and communicate so that students are much more active. In addition, students become better prepared for self-learning based on the division number of each student at random so as to increase a student's readiness to absorb the lessons.

This study is in line with research Mustafa (2011), Atun (2011) that the use of the learning model Numbered Heads Together effect on students' mastery of mathematical concepts. Furthermore, based on research Kartikasasmi (2012) that the application Numbered Head Together can enhance students' creativity and makes students opinion and increase the responsibility of the individual against the group. This is in line with research Baker (2013), Pradnyani. (2013) that the implementation of Numbered Head Together learning can have a positive influence at the time of learning. Thus the selection of appropriate learning models, would improve students' mastery of mathematical concepts

In contrast to the control group whose learning is done Direct instruction, without cooperative learning. Learning is done tends to the direction that is only centered on the teacher. The teacher explains then student records and then students answer questions on worksheets. So from the data obtained by visible difference, although there are some students who understand learning materials. This is because they learn to just accept what is presented by the teacher without further explore and not be actively involved, so that learning becomes drab, unattractive and unpleasant.

Based on the foregoing, showed that activity in the experimental class and control class students demonstrate mastery of mathematical concepts are different, that the experimental class was clear that mastery of the mathematical concept of a higher experimental class students and students much more active than control class.
Thus it can be interpreted that there is a significant effect on the learning model Numbered Heads Together toward students' mastery of mathematical concept.

5. CONCLUSION

Based on the results, the students in learning by using a model Numbered Heads Together seen the average value of students' mastery of mathematical concepts is higher than the Direct Instruction learning. Means a significant difference between the learning model Numbered Heads Together towards mastery of the mathematical concept of students can be seen from the results of the calculation of the t-test with a value of t greater than t table, means Ha accepted which means that the average mastery of the mathematical concept of students in the experimental class is different with average mastery of math concepts students in the control class. And for normalized gain value, the experimental class is higher than the control class. Thus the results of this study indicate that cooperative learning model of Numbered Heads Together give a significant impact on students' mastery of mathematical concepts.

6. SUGGESTION

Based on the above conclusions and experiences in teaching and learning that occurred during the study, the authors can provide suggestions as follows:
1. In a learning process, in order to obtain maximum mastery of concepts, especially in junior high school students, the teacher should be able to use teaching methods are varied and can create a fun learning environment and can build liveliness and motivation.
2. Teachers can use cooperative learning model of Numbered Heads Together when teaching square and rectangular material, making it easier and helps students understand and mastering concept.
3. By using cooperative learning model of Numbered Heads Together students' average score was higher than students taught by learning Direct instruction. This proves that the cooperative learning model of Numbered Heads Together can be used as an alternative in the learning process.
4. When learning with Numbered Heads Together model learning teachers should have prepared a ripe time management and teaching aids to support the learning process so that students' mastery of mathematical concepts can be much more optimal.

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