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THE EFFECTIVENESS OF COOPERATIVE LEARNING MODEL NUMBERED HEAD TYPE TO STUDENT MATHEMATICS PROBLEM SOLVING ABILITY

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ABSTRACT

The purpose of this research is to determine the Effectiveness of the Numbered Head Together (NHT) Cooperative Learning Model on the Mathematical Problem Solving Ability of SMA N 1 Batipuh Students. While the formulation of the problem in this study is: (a) how is the problem-solving ability of students after the NHT cooperative learning model is applied. (b) Is the NHT cooperative learning model effective in increasing at least 60.42 points on the mathematical problem-solving ability of XI grade students of SMA N 1 Batipuh?. The research method used is an experimental method with a research design of One Group Pretest-Posttest Design. The research sample was taken through a random cluster sampling technique. The sample obtained for class XI IPS5 with 32 students, the experimental class is a class that is taught with the Numbered Head Together type of cooperative learning model. Data analysis to test the hypothesis using t-test for paired data. The conclusion of this study is that the cooperative learning model of the NHT type is effective for increasing at least 60.42 points on the mathematical problem-solving ability of XI grade students of SMA N 1 Batipuh.

KEYWORDS

Numbered Head Together, Mathematical Problem Solving Ability.

Introduction

Learning is a process, the process is said to be successful if the learning objectives have been achieved. The achievement of learning objectives can be seen from the test results given by the teacher after the learning process ends. Learning outcomes are descriptions to answer the question "What should be explored, decided and done by students?" learning outcomes are closely related to understanding because learning outcomes are measured from what has been understood by students and student performances during the learning process (Sugandi, 2004: 63). Likewise, learning outcomes are changes in the person's behavior, for example from not knowing to knowing, from not understanding to understanding compared to before learning. From the teacher's point of view is how teachers can convey learning well and students can accept it (Hamalik, 2008: 30). Meanwhile, Gagne (in Dimyati and Mudjiono, 2006: 10) states that learning outcomes are obtained by someone after learning in the form of skills, knowledge, attitudes, and values. The emergence of skills, knowledge, attitudes and values comes from the learning process in the classroom or the interaction of students with the environment and cognitive processes carried out by students.

Susanto (2015) states that mathematics is needed by everyone in solving various problems for the counting process and thinking process. In learning mathematics problem solving ability is important. This is in line with the objectives of learning mathematics, namely solving problems which include the ability to understand problems, design mathematical models, complete models, and interpret solutions obtained, so that an important focus in learning mathematics is problem solving. NCTM (National Council of Teachers of Mathematics) states that problem solving is an integral part of learning mathematics, so it should not be separated from learning mathematics. Using reasoning on properties, performing mathematical manipulations both in simplification, analyzing components that exist in problem solving in the context of mathematics, as well as outside mathematics (real life, science and technology) which includes the ability to understand problems, build mathematical models, complete models and interpret appropriate solutions obtained including in order to solve problems in everyday life (Permendikbud RI NO 58 of 2014).

This problem-solving ability will help improve students' mindsets, analytical skills and the ability to solve problems in everyday life. Once the importance of problem solving skills, it is very important for every student to have this ability because: (a) problem solving is a general goal of teaching mathematics; (b) problem solving which includes methods, procedures and strategies is the core and main process in the mathematics curriculum; and (c) problem solving is a basic ability in learning mathematics (Noor & Megawati, 2014).

Seeing the importance of problem solving skills, various efforts have been made by educators in schools, but in fact based on the 2012 PISA results report; Indonesian students scored 368 in the process of formulating problems, 369 in applying concepts, and 379 in the process of interpreting the results. Judging from the three results of mathematical literacy, Indonesia is ranked 64th out of 65 countries. It can be seen from these scores that Indonesian students are the weakest in the problem solving process. Likewise, based on the reality in the field that the mathematics learning process is still dominated by teachers teaching with lecture strategies, teachers expect students to sit, be quiet, listen, record and memorize (Lie, 2010). As a result, students' mathematics learning outcomes are low, even many students do not meet the Minimum Completeness Criteria (KKM), and students have difficulty in problem solving abilities (ATPrayitno, et al.: 2012:34).

Similarly, based on the results of interviews and initial observations that the researchers conducted in class XI of SMA N 1 Batipuh, the researchers obtained information that learning mathematics uses a variety of learning models, namely lectures, and questions and answers. However, in the learning process, there are still many students who are passive; there are even some students who play. The data obtained from this initial study were obtained through a problem-solving ability test; the results obtained provide an illustration that students' problem-solving abilities are still low. Some of the problems found from the initial research were (a) students in solving problems were said to be good, but students in writing down what they knew and what was asked of the questions still experienced errors, (b) students wrote down the formulas that would be used in solving problems less correct, (c) students write down the problem solving of the questions systematically and incorrectly, (d) the students have not been able to write conclusions or what was asked of the questions.

The learning process at school or in the classroom, the teacher should pay attention to the individual and student conditions because they are the ones who will learn. So far, teachers only pay attention to the condition of students as a whole, not individually or in groups. So that individual differences and students receive less attention. In addition, another symptom that can be seen in the learning process so far is that most teachers use teaching methods that tend to be the same every time the learning process takes place. The method often used is the lecture method is a teacher-centered teaching (teacher centered), where the teacher is the main character in learning.

Based on the findings above, it is necessary for teachers to try to improve students 'problem solving abilities. In improving problem solving skills in learning mathematics, teachers must strive for learning by using learning models that can provide opportunities and encourage students to practice mathematical problem solving skills. The teaching and learning process, which is still seen as knowledge transfer process, and only relies on teachers rather than students, needs to be changed. The teacher does not only transfer knowledge, but also encourages the development of students' understanding of mathematical values so that their reasoning power grows, thinks logically, critically, creatively, opens up curiosity and is able to solve problems.

Learning mathematics that leads to improving students' mathematical problem solving abilities, encouraging students to actively participate in the learning process is pursued and implemented in mathematics learning, one way that can be done by teachers is to apply a learning model (Kemp, 1979 in Wena, 2016) . Cooperative learning is one of the teaching alternatives that can be applied to classroom learning. Cooperative learning can improve the quality of learning, providing opportunities for students to work together in groups, so that students can exchange ideas and help each other with their friends and their groups (Sharan, 2009: 349 and Rusman, 2013). In addition, the cooperative learning model has five important elements that will support cooperation in groups. The five elements are positive interdependence, individual responsibility, face to face, communication between members, and evaluation between groups (Rusman, 2013; Wena, 2016) and (Lie, 2010: 7). This is in line with the opinion of Isjoni (2014; 14) which asserts that in learning students is usually faced with practice questions or problem solving. Therefore, cooperative learning is very well implemented because students can work together and help each other to overcome the tasks at hand.

One of the cooperative learning models is the Numbered Heads Together (NHT) type of cooperative learning, which is cooperative learning that involves students working together in finding solutions to the problems given. In general, NHT is used to involve students in strengthening learning understanding or checking students' understanding of the learning material (Trianto, 2010; Ibrahim, et al., 2002). Likewise, Ibrahim (in Aisyah Noor and Megawati, 2014; 46)) said that the NHT learning model can actively involve students in the learning process, the collaborative involvement of students in groups to achieve this common goal allows NHT to improve students' mathematics learning outcomes, one of them is in students' mathematical problem solving abilities.

The application of the NHT type of cooperative learning model in learning mathematics results in reduced teacher involvement in the teaching and learning process, the teacher acts only as a facilitator who directs and motivates students to learn independently, and students will feel happy discussing with their groups, students interact with peers and the teacher as a mentor (Widaningsih, 2008: 2; Trianto, 2009; 82 and Suprijono, 2009: 92). While Satriani (2012) reported that the application of problem solving strategies in Cooperative Learning Type NHT can improve students' mathematics learning outcomes. This opinion is in line with the research report of Ondhi Pasrianto (2012) which states that applying NHT Type Cooperative Learning can improve students' ability in solving students' mathematical problems. From the statements of several researchers, it can be concluded that the application of problem solving strategies in NHT Type Cooperative Learning can improve students' mathematical problem solving abilities.

To overcome the problems faced by these students, the researchers applied the Numbered Head Together (NHT) cooperative learning model. Basically the NHT model is a variant of group discussion. According to Slavin in Huda (2014:203) the method developed by Russ Frank is suitable for ensuring individual accountability in group discussions. The purpose of NHT is to give students the opportunity to share ideas and consider the most appropriate answers.

The formulation of the problem in this study is: (a) How is the problem solving ability of students after the NHT type cooperative learning model is applied. (b) Is the NHT cooperative learning model effective in increasing at least 60.42 points on the mathematical problem solving ability of XI grade students of SMA N 1 Batipuh?. The research hypothesis being tested is the application of the -type cooperative learning model NHT is effective to increase at least 60.42 points on the mathematical problem solving ability of class XI students of SMA N 1 Batipuh.

METHOD

Type of this research is experimental research with a true experimental design in the form of pretest-posttest control group design (Sugiyono, 2016: 112. Experimental research is a way to find a causal relationship (causal relationship) between two factors that are deliberately caused by researchers, by eliminate or set aside other factors that interfere. The study design is shown in Table 1.

Table 1. The study design one group pretest-posttest design

Class	pretest	Treatment	posttest
Experimental	X_1	T	X_2

Source*: Adapted from Suryabrata (2011) according to the needs*

Description:

T = Learning cooperative Numbered Head Together (NHT)

X_1 = pretest (the ability of mathematical problem solving before being given treatment)

X_2 = posttest (the ability of mathematical problem solving after being given treatment)

This study uses a single class sample of experimental classes were given treatment application of the learning model NHT. Population in this research is the students of class XI IPS SMA N 1 Batipuh which consists of 5 classes. Sampling using Cluster Random Sampling. The sample selected as the experimental class was class XI IPS_5 with 32 students.

The variables in this study are X_1 = Pretest and X_2 = Posttest. The data used in this study are primary data and secondary data. Primary data is data taken directly from the sample, while the primary data in this study is mathematical problem solving ability. Secondary data is data obtained from other parties, while secondary data is the number of students who make up the population and the value of the Odd Semester Daily Exam of class XI students of SMA N 1 Batipuh.

The research procedure is divided into 3 stages, namely the preparation stage, the implementation stage, and the final stage. The test instrument used was a student's mathematical problem solving ability test which consisted of 5 questions containing four indicators of mathematical problem solving ability. In the data analysis technique, the first thing to do is to know the mathematical problem solving ability seen from the pretest and posttest scores. Where the assessment of mathematical problem solving abilities includes four abilities, namely (a) the ability to identify problems, (b) the ability to plan problem solving, (c) the ability to solve problems and (d) the ability to interpret solutions. To determine the ability of mathematical problem solving after the application of cooperative learning model NHT, can be calculated using the following formula:

$$\bar{x} = \frac{\Sigma \text{ total value obtained}}{\text{number of students}}$$

After analyzing the data on the ability of mathematical problem solving then used the t-test for data pairs with a 95% confidence level ($\propto = 0.05$). Based on the calculation, $t_{coumt} = 21.31 > 2{,}05 = t_{(0.05;28)}$. this means that H_0 is rejected and H_1 accepted. Thus, it can be concluded that the application of the NHT type of cooperative learning model has an effect of at least 60.42 points on the mathematical problem solving ability of XI grade students of SMA N 1 Batipuh.

RESULTS AND DISCUSSION

Data on Learning Outcomes of Mathematical Problem Solving Ability

Based on students' mathematics learning outcomes obtained through tests. The test was carried out twice, namely before learning was given (pretest) and after learning was given (posttest). The pretest and posttest have the same questions, namely in the form of a description of 5 items with an allocation of $\pm$ **90** minutes. The pretest and posttest were followed by students of class XI IPS_5. The pretest in the research class was attended by 30 students from 32 students while the posttest was attended by 30 students from 32 students on the Linear Program material. The distribution of students' pretest and posttest scores can be seen in Table 2 below:

Table 2. Distribution of students' pretest and posttest

No.	Pretest scores	Postest Scores	No.	Posttest Score	Posttest Score
1	15	80	17	2.5	67.5
2	8.75	93.75	18	25	95
3	17.5	-	19	15	87.5
4	2.5	81.25	20	17.5	75
5	8.75	60	21	-	87.5
6	2.5	80	22	15	90
7	2.5	66.25	23	11.25	80
8	10	77.5	24	20	67.5
9	10	67.5	25	20	86.25
10	7.5	80	26	25	86.25
11	8.75	77.5	27	8.75	65
12	18.75	87.5	28	27.5	95
13	10	80	29	2.5	77.5
14	3.75	90	30	8.75	60
15	25	100	31	12.5	86.25
16	-	-	32	15	75
$\bar{x}$	12.58	80.08			
X_{max}	25	100			
X_{min}	2.5	60			

Source*: Processed a test of students' mathematical problem solving abilities.*

From Table 2, it can be seen that the highest pretest score was 25 and the highest posttest score was 100. The lowest score for the pretest was 2.5 and the lowest score for the posttest was 60. There were 23 students who completed according to KKM 73. The average value of the pretest is 12.58 and the average value of the posttest is 80.08.

Students' Mathematical Problem Solving Ability Problem

Identifying Ability

Based on the analysis conducted on the students' pretest and posttest answer sheets, the results of the increased ability to identify mathematical problems were described. The results of the increase can be seen in Table 3.

Table 3. Average Score of Students' Ability in Identifying Problems

No.	Questions	Pretest	Posttest
1	1	1.00	3.75
2	2	1.34	3.56
3	3	0.34	3.75
4	4	0.84	3.50
5	5	0.37	3.09
	$\bar{x}$	0.778	3.53

Source: *Processed indicator data 1*

Based on Table 3, it can be seen that students' ability to identify mathematical problems has increased. In questions no. 1 to 5, the average student's ability to identify problems in the pretest has increased in the posttest. The highest increase in the average ability of students in identifying problems occurred in question no. 3 as much as 3.75 and the lowest increase occurred in question no. 5 as much as 3.09. This proves that students' ability to identify problems increases after the Numbered Head Together (NHT) Cooperative Learning Model is applied in mathematics learning.

Ability to Plan Problem Solving.

Based on the analysis conducted on the students' pretest and posttest answer sheets, it is described the results of increasing students' mathematical problem solving abilities in planning mathematical problem solving. The results of this increase can be seen in Table 4.

Table 4. The average score of students' ability in planning mathematical problem solving

No.	No.	Pretest	Posttest
1	1	2.12	3.75
2	2	1.84	3.75
3	3	0.06	3,75
4	4	0,68	3,56
5	5	0,18	3,12
	$\bar{x}$	0,976	3,586

Source: *Processed indicator data 2*

Based on Table 4, it can be seen that students' ability to plan mathematical problem solving has increased. In questions no. 1 to 5, the average student's ability to plan problems in the pretest has increased in the posttest. The highest increase in the average ability of students in planning problem solving occurred in question no. 3 as much as 3.75 and the lowest increase occurred in question no. 5 as much as 3.12. This proves that students' ability to identify problems increases after the Numbered Head Together (NHT) Cooperative Learning Model is applied in mathematics learning.

Problem Solving Ability

Based on the analysis conducted on the students' pretest and posttest answer sheets, it is described the results of increasing students' mathematical problem solving abilities in solving mathematical problems. The results of this increase can be seen in Table 5

Table 5. The average score of students' ability in solving Math problems

No.	Pretest	Posttest
1	0.25	3.31
2	0.21	3.03
3	0	3.68
4	0.15	1.90
5	0	2.28
	$\bar{x}$0.122.84	

Source: *Processed indicator data 3*

Based on Table 5, it can be seen that students' ability to solve mathematical problems has increased. In questions no. 1 to 5, the average student's ability to identify problems in the pretest has increased in the posttest. The highest increase in the average ability of students in planning problem solving occurred in question no. 3 as much as 3.68 and the lowest increase occurred in question no. 4 as much as 1.90. This proves that students' ability to solve problems increases after the Numbered Head Together (NHT) Cooperative Learning Model is applied in mathematics learning.

Ability to Interpret Solutions

Based on the analysis carried out on the students' pretest and posttest answer sheets, it is described the results of increasing students' mathematical problem solving abilities in interpreting solutions. The results of this increase can be seen in Table 6.

Table 6. The average score of students' ability in interpreting Mathematical solutions

No.	Questions	Pretest	Posttest
1	1	0	2.90
2	2	0.06	0.90
3	3	0	3.18
4	4	0	1.87
5	5	0	1.25
	$\bar{x}$	0.012	2.02

Source: Processed indicator data 4

Based on Table 6, it can be seen that students' ability to interpret mathematical solutions has increased. In questions no. 1 to 5, the average student's ability to interpret solutions in the pretest has increased in the posttest. The highest increase in the average ability of students in interpreting solutions occurred in question no 3 as much as 3.18 and the lowest increase occurred in question no 2 as much as 0.90. This proves that students' ability to interpret solutions increased after the Numbered Head Together (NHT) Cooperative Learning Model was applied in learning mathematics.

After testing the hypothesis using the t-test for paired data, at the 95% confidence level ($\propto = \mathbf{0.05}$) with degrees of freedom ($\mathbf{df = 28}$) then the value is obtained $\mathbf{t_{Count} = 21.31 > 2.05 = t_{(0,05;28)}}$. Therefore, the cooperative learning model of the NHT type is effective for increasing at least 60.42 points on the mathematical problem solving ability of class XI students of SMA N 1 Batipuh.

The results of this study are relevant to the research of Nur Birillina and Sri Hartatik (2019), namely there is an effect of the learning model Numbered Head Together on problem solving abilities and student learning outcomes in mathematics subjects, multiplication and division operations for class III SD Kemala Bhayangkari 1 Surabaya. The results of this study are also in line with Astuti's (2017) report that the application of the Numbered Head Together (NHT) type of cooperative learning model has a significant effect on improving mathematics learning outcomes for seventh grade students of SMP Negeri 1 Bangkinang.

Meanwhile, Koyumah & Utomo (2016) also stated that there was an effect of the Numbered Head Together Geogebra-assisted model on mathematical problem solving abilities. From the results of the study, it can be concluded that after being given treatment, the mathematical problem solving ability of students who were given the Geogebra-assisted NHT model was better than the mathematical problem solving ability of students who were given the conventional learning model. Furthermore, this research is relevant to the research of SY, et al (2016) entitled The Effect of Numbered Head Together (NHT) Learning Strategy on Student Learning Outcomes of SMA Negeri 1 Muara Badak. The results of the analysis show that learning strategies have an influence on students' cognitive learning outcomes. This is indicated by the learning strategy probability value of 0.000 which is smaller than 0.05. So it can be concluded that the Numbered Head Together learning strategy has a significant effect on students' cognitive learning outcomes. It can be seen from the comparison of the corrected averages, it is known that the Numbered Head Together learning strategy has a greater effect, which is 21.56% compared to the effect caused by conventional learning.

Muhammad Irwan Nur, Moh. Salam and Hasnawati (2016) also reported that the application of the cooperative learning model Numbered Head Together (NHT) had a significant effect on students' mathematics learning outcomes. This can be seen from the average mathematics learning outcomes of students who are taught using the cooperative learning model, which Numbered Head Together (NHT) is higher than the average mathematics learning outcomes of students who are taught using conventional learning models. In addition, based on the results of hypothesis testing, the value of $t_{count} = 2.4952 > 1.67735 = t_{table}$, this means that there is a significant difference between student learning outcomes who are taught using the type cooperative learning model Numbered Head Together (NHT)(VII2), with the learning outcomes of students who are taught using the conventional learning model (VII_4).

Furthermore, this research is also relevant to Noor & Megawati's (2014) research entitled Cooperative Learning Model Numbered Head Together (NHT) has an effect on Mathematics Problem Solving ability in Class VIII SMP. The mathematical problem solving ability of students in the experimental class using the NHT cooperative learning model overall is in good qualification, namely 46.9% with an average of 66.06, where based on the results of the study it was found that the average ability to understand problems in the experimental class are in good qualification of 37.5% with the ability to plan for completion are in good qualification of 43.8% with the ability to implement the completion plan are in good qualification of 74.6% and the ability to re-examine is in good qualification of 52.2%.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of research and discussion, it can be concluded that: The learning outcomes of students' problem solving abilities increased after the implementation of the Numbered Head Together (NHT) cooperative learning model. This can be seen in the indicators of students' mathematical problem solving abilities in: (a) identifying problems increased from 3.60 to 15.18, (b) planning problem solving increased from 4.74 to 15.43, (c) in solving problems increasing from 0.12 to 12.38 and (d) interpret the solution increasing from 0.01 to 9.10. Based on the results of hypothesis testing, it can be concluded that the application of the NHT type of cooperative learning model has an effect of at least 60.42 points on the mathematical problem solving ability of XI grade students of SMA N 1 Batipuh.

Numbered Head Together (NHT) Cooperative Learning Model in the learning process as an alternative way to improve students' mathematical problem solving abilities. Teachers in the field of Mathematics studies need to emphasize to students that problem solving is not only a solving procedure but also other indicators are needed in problem solving. This research is expected to provide information and input materials in planning and implementing the learning process, so as to further improve students' knowledge and problem solving abilities.

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REFERENCES

1. Arikunto, Suharsimi. 2006. *Research Procedure A Practical Approach*.PT Rineka Cipta, Jakarta, (2006)
2. Astuti. The Influence of Numbered Head Together (NHT) Cooperative Learning Model on Mathematics Learning Outcomes of Class VII Students of SMP Negeri 1 Bangkinang. Lemma, 3(2), 1-10. (2017).
3. Birillina, Nur and Sri Hartatik. The Effect of Numbered Head Together Learning Model on Problem Solving Ability and Student Learning Outcomes in Mathematics Subjects Operational Material Counting Multiplication and Division in Class III Elementary School Kemala Bhayangkari 1 Surabaya. MUST: Journal of Mathematics Education, Science and Technology Vol. 4, No. 2, December 2019 Pages 217-229. (December 2019).
4. Hartati Praise. Improving Problem-Solving Ability Related to Constructing Curved Side Spaces through the NHT Learning Model(Journal of Classroom Action Research, Vol. 16, No. 4, 2015).
5. Huda, Miftahul. 2013. *Teaching Modelsand Learning*. (Student Library, Yogyakarta, 2013).
6. Ibrahim et al., 2002. *Cooperative Learning.*(Unesa –University Press, Surabaya, 2002).
7. Irwan Nur, Muhammad, et al.. The Influence of the Application of Numbered Heads Together (NHT) Cooperative Learning Model on Mathematics Learning Outcomes of Class VII Students of SMP Negeri 1 Tongkuno. (Journal of Mathematics Education Research Volume 4 No.1 (January 2016).
8. Isjoni. *Cooperative Learning, Effectiveness of Group Learning*, (Alfabeta, Bandung, 2014).
9. Palace. *Innovative Learning Models.*(Media Persada, Medan, 2012).
10. Koyumah, S., & Utomo, RB . The Effect of Geogebra-Assisted Numbered Head Together Model on Mathematical Problem Solving Ability. (E-DuMath Journal, 2(2), 210-217 (2016).
11. Lee, Anita. *Cooperative Learning Practicing Cooperative Learning in Classrooms*. (Gramedia Widiasarana, Jakarta, 2002).
12. NCTM. *Principles and Standards for School Mathematics*. (National Council of Teacher Mathematics. Reston 2000)
13. Noor, JA Megawati. Cooperative Learning Model Numbered Head Together in Solving Mathematics Problems in Class VIII Junior High School. (Journal of Mathematics Education Economics. 2, (1)(2014.).
14. Noor Aisjah Juliani, Megawati. Cooperative Learning Model Numberd Head Together (NHT) in Mathematics Problem Solving in Class VIII SMP. (Journal of Mathematics Education, Vol. 2, No. 1, 2014).
15. Ondhi Pasrianto. Improving Students' Ability in Solving Mathematical Problems Through Cooperative Learning Model Number Head Together Type in Building Spaces (Cube and Blocks). (Muhammadiyah Surakarta University, 2012)
16. Regulation of the Minister of Education and Culture of the Republic of Indonesia number 58. (Junior High School Mathematics. Jakarta: Ministry of Education and Culture, 2014)
17. Polya, G. *How to Solve it*. (Princeton University Press, New Jersey, 1973)
18. Rusman. *Learning Models: Developing Teacher Professionalism.*(Rajawali Press, Jakarta, 2013).
19. Trianto. *Designing an Innovative-Progressive Learning Model*. (Kencana Prenada Media Group,Jakarta, 2010).
20. Satriani. Efforts to Improve Mathematics Learning Outcomes Through Problem-Solving Strategies in Cooperative Learning with NHT Structural Approaches in Class VII.3 SMP Negeri 13 Pekanbaru. (Riau University. Pekanbaru, 2012)..
21. Slavin, Robert. *Cooperative learning: Theory Research and Practice*. (Allyn and Bason Publishers. Boston, New York , 1995).
22. Sri Wardhani., Wiworo. Sigit Tri Guntoro., Hanan Windro Sasongko. *Learning Problem Solving Ability in Junior High School*. (P4TK Mathematics, Yogyakarta.2010).
23. Suryabrata, Sumadi. *Research Methodology.*(King GrafindoPersada, Jakarta, 2012).
24. SY, N., Corebima, AD, & Susilo, H. The Influence of Numbered Heads Together (NHT) Learning Strategy on Student Learning Outcomes of SMA Negeri 1 Muara Badak. Journal of Education, 1(10), , 2016) pp.1993-1998