*IOSR Journal of Research & Method in Education (IOSR-JRME)*
*e-ISSN: 2320–7388,p-ISSN: 2320–737X Volume 7, Issue 6 Ver. V (Nov. – Dec. 2017), PP 74-81*
*www.iosrjournals.org*

# The Difference in Improving Students' Mathematics Understanding and Ability of Visual Thinking by Using Cooperative Learning Model types Think Pair Shared (TPS) and Number Head Together (NHT) At SDN Percobaan Medan

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***Abstract :*** *The purpose of this research is to describe: (1) the difference of improvement of students' mathematical reasoning ability which is learned by using cooperative learning type think pair share (TPS) and number head together (NHT), (2) difference of visual thinking ability of students using cooperative learning model of TPS and NHT type, (3) student's answer process in solving problems related to mathematical reasoning ability after obtaining cooperative learning of TPS type compared with NHT learning, (4) student's answer process in solving problems related to visual thinking ability after obtaining cooperative learning type of TPS compared with NHT learning. This study is a quasi-experimental study. The population in this research is class IV SDN Percobaan Medan Baru consisting of 2 classes that is class IVa and IVb which each class amounted to 32 people, so the research population amounted to 64 people. The sample was taken using purposive sampling method or also known as sampling consideration of 2 classes. Data analysis was done by inferential analysis. The results of this study indicate that (1) there is a significant difference in improvement between students' mathematical reasoning abilities taught through the TPS and NHT learning model, (2) There is a significant difference of improvement between Visual Thinking students taught through TPS and NHT models, (3) Student response measures on the reasoning skill tests according to the indicators make the allegations and the proof-maker of the reasoning skills test obtained that the correct answer for the NHT class is 22 more students than the TPS class as many as 15 students, (4) Student response measures on the test of visual thinking ability especially aspects of painting, drawing or plagiarize the geometry between students who were given NHT learning better than students who were given NHT learning.*

***Keywords –*** *mathematical reasoning ability, visual thinking ability, cooperative type of TPS and NHT*

## I. INTRODUCTION

The efforts of the Indonesian government to improve the quality of education, especially mathematics education have been done a lot. Efforts to improve the quality of mathematics learning process is still being done to achieve the goal of mathematics education. However, mathematical materials to date are still perceived as difficult for many students to understand, even worrying enough for some students. Soedjadi argues that the causes of the difficulties can be sourced from within students, as well as from outside the self, for example the way the presentation of lesson material or learning atmosphere that is implemented [1]. Hudoyo argues that the mastery of mathematical material and the mode of delivery are non-negotiable conditions for mathematics teachers [2]. This means the mastery of the material and the way of delivery is an absolute requirement that must be mastered by the teacher. A professional teacher ideally has educational competence, namely pedagogic, professional, personality and social competence. Especially in the learning process teachers are required to master a variety of learning strategies so that the atmosphere of learning in the classroom more passionate and fun.

The objectives of the mathematics learning formulated by the national council of teachers of Mathematics are as follows: (1) learning to communicate (mathematical communication); (2) learning to bemalar (mathematical reasoning); (3) learning to solve problems (mathematical problem solving); (4) learning to link ideas (mathematical connection); (5) learning to present ideas (mathematical representation) [3]. Reasoning is an activity, a process or a thought activity to draw conclusions or make a true new statement based on some statements whose truths have been proved or assumed before. Reasoning is divided into two, namely inductive and deductive reasoning. Through mathematical reasoning, students can make guesses and then

compile evidence, manipulate mathematical problems and draw conclusions correctly and correctly. Observing the importance of reasoning ability in mathematics learning, students are required to have this ability. But the fact that it is seen nationally that the results of learning mathematics in Indonesia is less satisfactory and even lower value than other subjects.

The specific difficulty of mathematical knowledge for students lies in its abstract nature. Students often find it difficult to associate mathematics learned in the classroom with real situations, and also have difficulty in connecting between the mathematical knowledge they already possessed and what they have learned in school [4] . Based on observations and interviews at SDN Percobaan with one of the mathematics teachers that the students' initial ability is still low, this can be seen from the way they linked the previous material with the next material. Students' attitudes toward learning mathematics show a poor response so they are lazy to do the exercises given by the teacher. From the results of direct observation, the researchers see that in general the process of learning by teachers is still using conventional learning model, where in the process of learning the teacher is still the domain of delivering verbal messages to students, then provide an example with the completion of the problem and end with the assignment and training.

As expressed by Nurdalillah reasoning is a way of thinking that connects between two or more things based on certain traits and rules that have been acknowledged correct by using the steps of proof to reach a conclusion [5]. The importance of mathematical reasoning ability to be possessed by students is very helpful for students in making analogies and generalizations, providing examples of denying, establishing direct proofs, preparing indirect proofs and providing explanations by modeling. This is in line with that proposed by Suryadi in Saragih which states that learning that emphasizes on reasoning and problem-solving activities is closely related to high achievement of student achievement [6]. Muliati's research results states that the development of reasoning also means the development of thinking, both basic thinking, critical thinking and creative thinking [7]. Although reasoning is one of the standards that must be achieved in learning mathematics, but the implementation is not an easy thing. The ability of mathematical reasoning, especially the elementary school students, has not been handled properly. Preliminary study of research conducted by Muliati students have difficulty when reasoning problem and it is clear that the student is confused in doing the question [8].

## II. METHOD

This study is a quasi-experimental study. The population in this research is class IV SDN Percobaan Medan Baru consisting of 2 classes that is class IVa and IVb which each class amounted to 32 people, so the research population amounted to 64 people. The sample was taken using purposive sampling method, also known as the sampling consideration of 2 classes taught by Think Pair Share (TPS) cooperative learning and Number Head Together (NHT) learning. The instruments used are the students' initial ability test, mathematical reasoning test, and visual thinking ability test. Data analysis was done by inferential analysis and descriptive analysis.

## III. RESULT AND DISCUSSION

### Result

Based on the mathematical reasoning test given after the treatment process, the average data of students' learning achievement is 74.69; standard deviation of 13.67; a variance of 187.00 with a total of 32 students. Description of the level of students' mathematical reasoning abilities quantitatively based on student learning outcomes taught by using TPS learning model can be seen in Table 1.

**Table 1. Interval Values of Student Class Mathematical Reasoning Ability**

| Interval | Criteria | The number of students | Percentage |
|---|---|---|---|
| 90 ≤ SKPM < 100 | Very good | 7 | 21,88 |
| 75 ≤ SKPM < 90 | Good | 9 | 28,13 |
| 65 ≤ SKPM < 75 | Enough | 10 | 31,25 |
| 45 ≤ SKPM < 65 | Less | 6 | 18,75 |
| 0 ≤ SKPM < 45 | Very less | 0 | 0,00 |
| Total | | 32 | 100 |

Based on the mathematical reasoning test given after the treatment process, the average score of student learning outcomes is 77.81; standard deviation of 11.28; variance of 127.32 with a total of 32 students. Description of the level of students' mathematical reasoning abilities quantitatively based on student learning outcomes taught using NHT learning model can be seen in Table 2.

**Table 2. Interval Value of Student Mathematics Reasoning Competence NHT Class**

| Interval | Criteria | The number of students | Percentage |
|---|---|---|---|
| 90 ≤ SKPM < 100 | Very good | 9 | 28,13 |
| 75 ≤ SKPM < 90 | Good | 11 | 34,38 |
| 65 ≤ SKPM < 75 | Enough | 8 | 25,00 |
| 45 ≤ SKPM < 65 | Less | 4 | 12,50 |
| 0 ≤ SKPM < 45 | Very less | 0 | 0,00 |
| Total | | 32 | 100 |

Based on the Visual Thinking test given after the treatment process, the average score of the students' learning outcomes is 71.56; standard deviation of 10.51; variance of 110.38 with the number of students as much as 32 people. Description of Visual Thinking level of the students quantitatively based on the data of student learning outcomes taught by using TPS learning model can be seen in Table 3.

**Table 3. Visual Value Thinking Visual Intervals of TPS Class Students**

| Interval | Criteria | The number of students | Percentage |
|---|---|---|---|
| 90 ≤ SKVT < 100 | Very good | 2 | 6,25 |
| 75 ≤ SKVT < 90 | Good | 11 | 34,38 |
| 65 ≤ SKVT < 75 | Enough | 12 | 37,50 |
| 45 ≤ SKVT < 65 | Less | 7 | 21,88 |
| 0 ≤ SKVT < 45 | Very less | 0 | 0,00 |
| Total | | 32 | 100 |

Based on Visual Thinking test which is given after treatment process, the average value of student's learning result is 76,56; standard deviation of 11.53; variance of 132.96 with the number of students as much as 32 people. Description of Visual Thinking level of students quantitatively based on data of student learning outcomes taught by using NHT learning model can be seen in Table 4.

**Table 4. Interval of Visual Thinking Values of NHT Class Students**

| Interval | Criteria | The number of students | Percentage |
|---|---|---|---|
| 90 ≤ SKVT < 100 | Very good | 8 | 25,00 |
| 75 ≤ SKVT < 90 | Good | 12 | 37,50 |
| 65 ≤ SKVT < 75 | Enough | 7 | 21,88 |
| 45 ≤ SKVT < 65 | Less | 5 | 15,63 |
| 0 ≤ SKVT < 45 | Very less | 0 | 0,00 |
| Total | | 32 | 100 |

The steps of completion of the students' answers regarding the reasoning ability in each learning are analyzed descriptively relating to collecting, analyzing and presenting the data of some or all of the data without decision making, the data analyzed descriptively is the student answer sheet on the test of mathematical reasoning ability to see measures of student responses tailored to indicators of mathematical reasoning abilities. The description of the steps of completion of student answers on each indicator is described as follows.

1. Attract Logical Conclusions

The students' answers show that they are able to draw a logical conclusion based on the results of the tests given in the two experimental classes can be seen in item 1. For question number 1 in the experimental class 1, the students are able to solve the problem with the completion steps already directed but still lacking in interest the logical conclusion of the question so the answer is wrong. While in the experimental class 2, students have been able to draw a logical conclusion so that clearly visible steps of directional resolution so that the answer is correct.

2. Provide an explanation using the model.

The answer of the students who showed the ability to give an explanation by using the model based on the test result given in the two experimental classes can be seen in item number 10. Problem 10 in the experimental class 2, the students have been able to give explanation by using the model to solve the problem so that the answer is correct. Likewise in the experimental class 1, students are able to provide explanations using the model so that the answer is correct.

3. Make allegations and make proofs
The students' answers indicating the ability to make predictions and construct proofs based on the results of the tests given in the two experimental classes can be seen in item no. 1. Problem 1 in the experimental class 1, the student has not been able to establish the proof to solve the problem correctly so the answer is still wrong. While question number 1 in experiment 2 class, students have been able to arrange the proof so that the answer is correct.

4. Use relationship patterns to analyze situations, or make analogies, or generalizations
Students' answers indicating that they were able to use a relationship pattern to analyze the situation, or make an analogy, or generalizations based on test results given to the two experimental classes can be seen in item 4. Question 4 in the experimental class 1, students were able to use the relationship pattern for analyze the situation, or make an analogy, or generalize it with the correct steps so that the answer is correct. While in the experimental class 2, students have been able to arrange the proof by using the relationship pattern but to analyze it is still less precise so the answer is wrong.

The steps of completion of student's answer related to visual thinking ability in each learning is analyzed descriptively related to collecting, analyzing and presenting data of some or all data without taking conclusion, data analyzed descriptively is student answer sheet on visual thinking ability test student to see the student's response measures that are tailored to the indicator of the students' visual thinking skills. The description of the steps of completion of student answers on each indicator is described as follows:

1. Painting, drawing or tracing the geometry
Students' answers showing the painting, drawing or tracing of geometry based on test results given to the two experimental classes can be seen in item no. 7 which shows the steps of students' answers on visual thinking skills tests that show indicators of painting, drawing or tracing geometry. The ability of students in experiment-2 class in answering the posttest problem of visual thinking ability number 1 indicator of painting, drawing or tracing wake geometry. Both students showed the correct solution. It indicates the fulfillment aspect of painting, drawing or tracing the geometry. While in the experimental-1 class the 1st student looks to show the solution of the correct problem, but the student-1 reply describes almost similar to the cube. It does not match what is needed in the matter so the answer is wrong. So it can be concluded that the student's answer steps on the visual ability test thinking aspects of painting, drawing or plagiarize the geometry between students who were given NHT learning is better than students who were given TPS lessons.

2. Identify the geometry builds based on the appearance of the whole:
(a) A simple drawing, diagram or set of cutouts in different positions
(b) Other forms and configurations are better complex

The student's ability to provide the answer solution measures identifies the geometry build up based on the complete appearance of the test result given to the two classes can be seen in the student's answer. It appears that the student in identifying geometry builds based on the appearance of the whole. Students in both classes provide correct answers in answering questions.

1. Verbally, students describe the geometry building with its full appearance
Students' ability to provide verbal indicator completion measures, students describe the geometry constructions with their complete appearance of the tests given to the two classes can be seen in item # 4. It appears that students in verbal reply, students describe the geometry with the appearance intact. The student in the experimental class 1 answered the problem is still wrong. While the students in experiment 2 answer the problem correctly.
2. Complete the routine problem by operating (applying) on the geometry wake with its full appearance. The ability of students in solving routine problems by operating (applying) on geometry builds is in question number 4, the goal is that students can calculate the volume and surface area of the cube. Visible ability of students in solving routine problems in operating (applying) to build geometry with its appearance as a whole. Students' ability to solve number 4 related to their application of counting volume and surface area is by counting the many bamboo used. From the question of this number the students in experimental-1 class still answer wrongly and the students in the experimental class-2 have answered the question correctly.

Inferential analysis of the test results of students' mathematical reasoning ability is shown to test the hypothesis that the difference in the increase of mathematical reasoning ability between the students who are given the learning with the TPS learning model and the NHT learning model statistically still need to be tested for significance difference of improvement by using ANAKOVA statistic test, ANAKOVA statistics must be tested in the normality test, homogeneity test, linear regression model, independence test, equality test and

alignment test of two regression models. The result of Childova test of statistical hypothesis research is presented in Table 5.

**Table 5. Anakova Test Analysis Statistical Hypothesis Research**

| Source Variation | Adjusted SS | Adjusted Df | Adjusted MS | F* |
|---|---|---|---|---|
| Treatmens | 388,393 | 1 | 388,393 | 5,466 |
| Error | 4334,243 | 61 | 71,053 | |
| Total | 4722,636 | 63 | | |

From result of calculation of Anacova test presented in Table 5 obtained value of F * (Fcount) 5,466 and then consulted with table F for significance level $\alpha$ = 5% obtained Ftabel (0,95,1,61) = 3,998. Hypothesis testing that has been formulated used ANACOVA statistical test with the formula and criteria set. The results of hypothesis test calculations with the help of SPSS 17.1 can be seen in Table 6.

**Table 6 Covariance Analysis of Mathematical Reasoning Ability**

| Tests of Between-Subjects Effects | | | | | |
|---|---|---|---|---|---|
| Dependent Variable: Postest | | | | | |
| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
| Corrected Model | 10941,697[a] | 6 | 1823,616 | 528,636 | ,000 |
| Intercept | 69,723 | 1 | 69,723 | 20,212 | ,000 |
| Pretest | 796,018 | 1 | 796,018 | 30,752 | ,000 |
| Experiment Class | 3565,431 | 1 | 3565,431 | 8,559 | ,000 |
| KAM | 39,598 | 2 | 19,799 | 5,739 | ,006 |
| Experiment Class * KAM | 18,352 | 2 | 9,176 | 2,660 | ,079 |
| Error | 182,832 | 53 | 3,450 | | |
| Total | 237739,842 | 60 | | | |
| Corrected Total | 11124,529 | 59 | | | |

a. R Squared = ,984 (Adjusted R Squared = ,982)

Based on table 6 it is found that the result of analysis shows the value of Fcount = 8,559 and Ftable = 3,962 where Fcount> Ftable and obtained sig value (2-tailed) = 0,000, where the sig value is far below criteria 0,05 so Ha is accepted and H0 is rejected. This indicates that the value of Fcount> Ftable means that H0 is rejected and simultaneously accept Ha which states there is a significant improvement difference between the students' mathematical reasoning ability taught through the TPS and NHT learning model. Furthermore, inferential analysis of Visual Thinking test result of students to test the hypothesis is the difference of Visual Thinking increase between students who were given learning with TPS learning model and NHT learning model statistically still need to be tested for significance difference of improvement by using statistical test of ANAKOVA, but before used statistic The ANAKOVA must first meet the requirements of the normality test, homogeneity test, linear regression model, independence test, equality test and alignment test of two regression models.

Having obtained that the two regression models are not equal (unequal) and parallel it can be concluded that there is a difference in the increase of Visual Thinking results between the TPS learning group and the NHT learning group. Furthermore, to find out whether the alignment difference is significant then the hypothesis of the analysis of the TPS learning group and the NHT learning group from each score of the final result of the average score of the final test of the TPS learning group and the final test score from the NHT learning group. The results of the analysis of Anakova test of statistical hypothesis of the study are presented in Table 7.

**Table 7. Anakova Test Analysis Statistical Hypothesis Research**

| Source Variation | Adjusted SS | Adjusted df | Adjusted MS | F* |
|---|---|---|---|---|
| Treatmens | 289,768 | 1 | 289,768 | 4,457 |
| Error | 3965,819 | 61 | 65,013 | |
| Total | 4255,588 | 63 | | |

From the result of calculation of Anacova test which is presented in Table 7 we get the value of F * (Fhitung) 4,457 and then consulted with table F for significance level $\alpha$ = 5% obtained Ftabel (0,95,1,61) = 3,998. This indicates that the value of Fcount> Ftable means that H0 is rejected and simultaneously accept Ha which states there is a significant improvement difference between Visual Thinking students taught through TPS and NHT learning model. Hypothesis testing that has been formulated used ANACOVA statistical test with the formula and criteria set. The results of hypothesis test calculations with the help of SPSS 22.1 can be seen in Table 8.

**Table 8 Covariance Analysis of Mathematical Reasoning Ability**

| Tests of Between-Subjects Effects | | | | | |
|---|---|---|---|---|---|
| Dependent Variable: Postest | | | | | |
| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
| Corrected Model | 10941,697[a] | 6 | 1823,616 | 528,636 | ,000 |
| Intercept | 69,723 | 1 | 69,723 | 20,212 | ,000 |
| Pretest | 796,018 | 1 | 796,018 | 30,752 | ,000 |
| Experiment Class | 3565,431 | 1 | 3565,431 | 9,765 | ,000 |
| KAM | 39,598 | 2 | 19,799 | 5,739 | ,006 |
| Experiment Class * KAM | 18,352 | 2 | 9,176 | 2,660 | ,079 |
| Error | 182,832 | 53 | 3,450 | | |
| Total | 237739,842 | 60 | | | |
| Corrected Total | 11124,529 | 59 | | | |

a. R Squared = ,984 (Adjusted R Squared = ,982)

Based on Table 8 it is found that the results of analysis show the value of Fcount = 9,765 and Ftable = 3.962 where Fcount> Ftable and obtained sig value (2-tailed) = 0,000, where the sig value is far below criteria 0,05 so Ha is accepted and H0 is rejected. This indicates that the value of Fcount> Ftable which means that H0 is rejected and simultaneously accept Ha which states there is a significant improvement difference between visual thinking ability of students who are taught through TPS and NHT learning model.

**Discussion**

Mathematical reasoning is an activity, a process or activity of thinking in learning mathematics to draw conclusions or make a new statement is correct based on some new statements that the truth has been proved or assumed before. For that a teacher is expected to be able to choose the method of learning that will be used in learning mathematics in order to achieve maximum student skills. This is reinforced by the results of research conducted by Nurdalillah, Syahputra & Armanto that is where their research results show that the ability of reasoning with problem-based learning differs from students' reasoning ability taught by using conventional learning model [9]. Thus, students' reasoning ability can also be improved by using cooperative learning model of NHT type or TPS.

Based on the results of data analysis of mathematical reasoning ability, it is found that there is a significant difference between the students' mathematical reasoning ability taught through the TPS and NHT learning model. This is evidenced from the results of statistical analysis test by Anacova method which states there is a significant improvement difference between students' mathematical reasoning abilities taught through learning models of TPS and NHT. The results of research by Amalia & Surya also indicate that there is a difference in statistical capability between experimental classes given NHT type learning with students in the experimental class given the type of TPS learning [10]. Thus for the students 'reasoning abilities taught by the NHT model will be different from the students' reasoning skills taught by the TPS model. Results of research conducted by Nasution & Surya showed that learning styles of students who learn by using TPS and student learning outcomes can be improved by using cooperative learning learning model with TPS [11]. Thus the students 'reasoning ability taught by the NHT type cooperative model is different from the students' reasoning ability taught by the TPS type cooperative model.

The difference in the results of this study is due to the application of NHT learning characteristics in the learning process in the classroom resulting in more active students' reasoning ability than students who received TPS learning. In NHT Lessons students are actively involved both physically and mentally in constructing their thoughts and investigating with their environment to solve problems. Unlike the case with the learning model of learning TPS is a learning that puts the teacher as the main character in learning. In addition Nasution, Surya, Fauzi, & Syahputra in the results of his research mentioned that the problem solving skills of students using the model of cooperative type NHT and STAD different in improving the problem solving skills of students in class VII SMP Negeri 2 Kisaran [12].

Visual Thinking is defined as appropriate for active thinking and analytical processes for understanding, interpreting and producing visual messages, the interaction between viewing, visualizing and depicting as objective and sophisticated uses such as verbal thinking. Surya, Sabandar, Kusumah & Darhim in his research also found that the visual ability of students can be improved by using contextual problem based learning, so it can be concluded that students' visual thinking ability can also be improved by using NHT cooperative learning and cooperative learning type of TPS [13]. Based on the results of data analysis of visual thinking ability of students obtained information that there is a significant difference between the ability of visual thinking students are taught through the model of TPS learning and students are taught through NHT learning model. This is evidenced from the results of statistical analysis test with Anacova method which states to the difference of significant improvement between the visual thinking ability of students who are taught through the model of learning TPS and NHT.

Nasution & Surya shows that learning styles of students who learn by using TPS and student learning outcomes can be improved by using cooperative learning learning model with TPS [14]. Thus the visual thinking ability of students taught by NHT type cooperative model is different from students' reasoning ability taught by cooperative model of TPS type. Surya, Sabandar, Kusumah & Darhim in his research also found that the visual ability of students can be improved by using contextual problem based learning, so it can be concluded that students' visual thinking ability can also be improved by using NHT cooperative learning and cooperative learning type of TPS [15].

The difference of the results of this study is caused by differences in treatment and learning process in both learning learning model. The difference is in learning NHT teachers have provided a mind map that will direct students to the concept of new information to be learned, empowering the brain to be able to visualize, explain and unify the opinions of learners and provide conclusions from the learning. In this NHT learning the teacher also takes the time by displaying instructional videos that will motivate the students as well as carry out the enrichment at the end of the lesson. Thus learning NHT is more oriented to the brain that improves students' visual thinking skills. The application of learning characteristic of NHT learning in the learning process in the classroom will result in visual thinking ability of the students better than the students who get the TPS learning because in the NHT learning the students are actively involved both physically and mentally in constructing their thinking and investigating with their environment to solve the problem.

Unlike the case with what happens in the TPS lesson where the role of teachers is more than the students. The teacher gives examples of problems and solutions, then gives practice questions, and students are told to do it. So the main teacher activity is to explain and the students listen or record what the teacher says. Such learning process makes students more passive so that weaken the ability of visual thinking students in constructing his thoughts. In addition, Nasution, Surya, Fauzi, & Syahputra in the results of his research mentioned that the problem solving skills of students using the model of cooperative type NHT and STAD differ in improving the problem solving skills of students in the seventh grade of SMP Negeri 2 Kisaran. Thus the visual thinking ability of students who are given cooperative learning of NHT type is different from visual thinking ability of students taught by using cooperative learning type of TPS. In addition, Amalia & Surya also showed that there is a difference in statistical capability between experimental classes given NHT type learning with students in the experimental class given the type of TPS [16].

Mathematical reasoning is important for knowing and doing mathematics. The ability to reason makes students solve problems in mathematics. The steps to solve the answer really determine the truth of the answer produced. Based on the findings of the results of the research on student answer sheets, the student's response steps according to the indicators make the guesswork and make the proof of the reasoning skills test obtained that the answer is correct for the NHT class more than the TPS class. In the NHT class the students are able to draw a logical conclusion so that the process of directional resolution steps is done so that the answer is correct, whereas in the TPS class, the students are able to solve the problem with the completion steps already directed but still lacking in drawing the logical conclusion of the question so that the answer is wrong.

Then the student's response steps according to the indicator using the relationship pattern to analyze the situation or make an analogy or generalization of the reasoning reasoning test obtained that the correct answer for the Number Head Together class more than the Think Pair Share class. In the Head Number Together class the student is able to use a relationship pattern to analyze the situation or make an analogy or generalization with the correct steps so that the answer is correct. While in Think Pair Share class, students have been able to arrange the proof by using relationship pattern but to analyze it is still less precise so the answer there is still error.

Visual thinking skills play an important role in solving problems that require high-level reasoning. If the ability to solve problems is the heart of mathematics, then visualization is the core of mathematical problem solving. Based on the research data obtained from the student answer sheet obtained information that the steps of student answers on the test of visual ability thinking aspects of painting, drawing or plagiarize the geometry between students who were given NHT learning is better than the students given the TPS lesson. This is evidenced from the student answer sheets where the steps of student answers on visual thinking tests on the class Head Number Together in answering postes problem of visual thinking thinking ability to paint, draw or trace geometry. They show the right solution. Unlike the case obtained from the student answer sheets in the TPS class where the completion of the answers shows the solution of the correct problem and the answer with the answer step illustrates the length of the outer fellowship tangent. it does not match what is needed in the matter so the answer is wrong.

Then on the ability of students in completing the routine problem by operating (applying) on the geometry wake with its appearance in full. The student's ability in solving problems related to the application of calculating the length of the tangent of the two-circle alliance is to compute the minimum length of the winding belt that connects the two circles. students from the NHT class describe the steps in solving the problem so that the answer is correct. In contrast to the students' answers from the TPS class that showed that the lack of understanding of the problem so that the answer steps are wrong. So it can be obtained that the number of students who have the ability to visual thinking with very good criteria more

in the NHT class. This shows that classically the acquisition value of visual thinking ability in NHT class is higher than TPS class.

## IV. CONCLUSION

Based on data analysis of research results and research discussion, the researchers obtained the following conclusions:

1. There is a significant difference of improvement between students' mathematical reasoning abilities taught through Think Pair Share (TPS) and Number Head Together (NHT) models. It can be seen from the result of analysis of covariance (ANAKOVA) for fcitung value is 5,466 bigger than FTabel value (0,95, 1,62) that is 3,998. In addition, based on the results of statistical analysis of regression equation of students' mathematical reasoning ability also describes regression constant value for learning model of Number Head Together (NHT) is 50,32 bigger than regression constant value from Think Pair Share (TPS) is 32, 31. The difference in the increase of students' mathematical reasoning ability is greater in the NHT compared to TPS learning model.
2. There is a significant difference in improvement between Visual Thinking students taught through Think Pair Share (TPS) model and Number Head Together (NHT). It can be seen from the result of analysis of covariance (ANAKOVA) for value fHitung is 4,457 bigger than FTabel value (0,95, 1,62) that is 3,998. In addition, based on the results of statistical analysis of regression equation visual thinking ability also describes regression constant value for learning model of Number Head Together (NHT) is 42,743 bigger than regression constant value from Think Pair Share (TPS) is 39,910. Differences in visual thinking development of larger students occurred in the model of learning Head Number Together (NHT) than on the model of learning Think Pair Share (TPS).
3. The student's response measures on the reasoning skills test according to the indicators make the allegations and the proof-maker of the reasoning skills test obtained that the correct answer for the Number Head Together (NHT) class is 22 more students than the Think Pair Share (TPS) class as much as 15 students. Then the student response steps according to the indicator using the relationship pattern to analyze the situation, or make an analogy, or generalization of the reasoning skills test obtained that the correct answer for the Number Head Together class is 13 more students than the Think Pair Share (TPS) ie 3 students.
4. The steps of students' answers on the test of visual thinking ability, especially the aspects of painting, drawing or plagiarize the geometry between students who are given learning Head Number Together (NHT) is better than the students who were given learning Head Number Together. Then on the ability of students in solving routine problems by operating (applying) to build geometry with the appearance of the whole students from the class Head Number Together (NHT) describes the steps in solving the problem so that the answer is correct while students from Think Pair Share (TPS) less in understanding the problem so that the answer steps are wrong.

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