

DIFFERENCES BETWEEN MATHEMATICAL PROBLEM SOLVING ABILITY OF STUDENTS TAUGHT USING COOPERATIVE LEARNING MODEL NHT AND STAD

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ABSTRACT

This research aims to determine whether there are significant differences between mathematical problem solving ability of students taught using cooperative learning model NHT and STAD on the matter fraction in class VII State of Junior High School 2 Kisaran. The results of the experimental class 1 taught using cooperative model type NHT, obtained the average pretest amounted to 39.789, and the average postes amounted to 78.737 while the experimental class 2 are taught by using cooperative model STAD obtained average pretest at 37.474 and average postes amounted to 70.474. Post-test data analysis using t-test at the level of $\alpha = 0,05$ obtained $t > t$ table so that H_0 rejected and H_a accepted. So we can conclude that there are differences in Mathematics Problem Solving Ability Students are taught by Using the Cooperative Model STAD type and NHT on Matter Fractions in class VII State of junior high school 2 Kisaran.

Keywords: *Problem Solving Ability, Cooperative Learning Model NHT, Cooperative Learning Model STAD.*

Introduction

National education goals based on Government Regulation No. 19 of 2005 is "Ensuring the quality of national education in the context of national life and form the character and civilization of the nation's dignity. One embodiment through quality education at any educational institution in Indonesia."

Teachers play an important role and strategic in education. Teachers, educators, and coaches the students, teachers are agents of social change (agent of social change) is to change the mindset, attitude, and behavior of human beings towards a better life, more dignified and independent. Directions fostering and improving the quality of teachers and educators should be oriented towards the establishment of an effective teacher is a teacher who is willing and able to leverage the entire potential of the internal and external optimally to achieve educational goals.

Problem solving is a very important thing in mathematics, so that almost all of Competency Standards and Basic Competence affirmation of the need for common problem solving abilities. According to Permendiknas No. 22 of 2006 on the Content Standards (SI) Subjects, one of the aims Subjects math junior high school is that the students are able to solve mathematical problems that include the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution (Depdiknas, 2006). Eysenck (Novotna, J. et al, 2014) Problem solving skills develop fast if the solver gets new and new experience with the activity. Pupils' performance in problem solving improves repeatedly if they meet the same type of problem or if they can the make use of Reviews their previous experience.

Therefore every teacher, especially junior high school teacher who manages the learning of mathematics necessary to understand the purpose of solving a mathematical problem. In addition, each teacher also must practice skills in helping students learn to solve mathematical problems.

Fractional material often used in solving a complex problem, especially in many mathematical models. Based on the results of the initial information gathering of authors to class VII-1 and VII-2 (50 students) in junior high school 2 Kisaran shows the range of 63.2% of students think math is hard, where as much as 65.8% cited difficulty in matter fractions. The reason is as much as 47.4% of students consider teachers do not clearly explain, 34.2% believe it is material fractions difficult, and 28.9% of students admitted to the less scrupulous, and the rest claimed lack of exercise (not learn).

Fractional material often confuse the students in solving a problem, especially if there are problems in a matter of a fraction - about the story. This is one of the materials that are considered less attractive by the students. Teachers should choose a model of good learning, so that the material is less attractive can be interesting for the students. Model learning of mathematics at this time affected more conventional view that the mathematical tools at its disposal. This view encourages teachers are inclined to say concepts / theorems and how to use them. Teachers tend to transfer knowledge to students and students' minds to accept passively and uncritically. This attitude often gives the deadlock think students where students can use the formula but do not know where it came from that formula and why the formula was used, in other words, students can only use the formula as a tool to answer questions and instead finding solutions and solving of problems that arise. Pehkonen (2007) about the ability of problem solving in school mathematics in Finland said, there are lectures and demonstrations that will be used to solve different problems. Troubleshooting was first introduced in 1986 in its efforts to systematically fatherly improve math education.

The fact on the field also showed unwanted things. Based on the results of the study of OECD PISA by the World Bank's support of the 7355 students aged 15 years of 290 SMP/ SMA / SMK student in Indonesia in 2003 is known that 96% of the students are only able to master mathematics limited to solve the problem is simple, they have not been able to finish complex issues and complex problems (Erankyas: 2011).

A teacher must be skilled to apply a model of learning in an instructional material that will be delivered. Even in applying a type of learning model should be carefully and can see the characteristics of a type of learning model, because not all types can be applied to all subjects. This is because it involves the final outcome or student achievement, if a teacher can not implement the type of learning model with both the learning objectives are achieved not optimal.

Cooperative learning model NHT and Student Teams Achievement Division (STAD) are two cooperative learning model that is considered to arouse the interest of students to the material of mathematics and make students more active, encouraging cooperation among students in learning the material, so as to enhance the ability of solving problem students.

Research Methods

The research was conducted on students of the grade VII in State of junior high school 2 Kisaran 2012/2013 academic year. This research was conducted in September-October 2012. The population in this study were all students of the grade VII State of junior high school 2 Kisaran, amounting to 8 classes and 8 classes of existing, samples taken at random sample of 2 classes. Both classes are taught in a different way, the way of teaching by using the Cooperative learning model NHT and STAD. The independent variables, namely the use of cooperative learning model STAD and cooperative learning NHT. The dependent variable is students' problem-solving abilities. Intervening variables (between) is the process of teaching and learning.

The sample in the study were classified into two groups, the experimental group 1 is taught using cooperative learning model NHT and the experimental group 2 are taught using cooperative learning model STAD.

Table 1. Study Design

Group	Pre test	Reatment	Post test
Experiment 1	Q ₁	X ₁	Q ₂
Experimen 2	Q ₁	X ₂	Q ₂

Where :

Q₁ = Pre test

X₁ = Treatment using cooperative learning model NHT

Q₂ = Post tes

X₂ = Treatment using cooperative learning model STAD.

Table 2. Guidelines Scoring of Problem Solving

Rated aspect	Score	Reaction to the Problem
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Understanding the problem	0	There is no answer at all
	1	Misinterprets partly of the question
	2	Writing data / information with complete and correct
Strategic Planning and Problem Resolution	0	There is no strategy at all
	1	Write a strategy that is not relevant
	2	Write down the correct strategy but incomplete
	3	Write down the complete and correct strategy
The implementation of the Settlement Plan and Strategy	0	There is no settlement at all
	1	Using the steps leading to the completion of a true solution but incomplete
	2	Using steps to resolve completely but the result is incorrect
	3	Results and process are correct
Checking Answers	0	There is no description whatsoever
	1	No examination results but incomplete
	2	Detailed examination of the results carried out to see the truth of the results and processes

Result and Discussion

The result showed the average value of the experimental class A pretest students are 39.789 and the average value of pretest student experiment class B is 37.474. Based on the value pretest testing normality and homogeneity. After testing turned out to be two classes of normal distribution and homogeneous.

After all finished material is taught, students are given a post-test (final test) to find out how the learning outcomes of students in the second grade after treatment. The result showed the average value posttest experimental class A is 78.737 or there is increased with an average of 38.948 and an average value posttest experimental class B is 70.474 or there is increased with an average of 33. Later testing the hypothesis by using uji- t. After testing the data turned out to be gained $-1,9953 < t_{hitung} < 1,9953$ is the price t other than

the test criteria. $\left(-t_{1-\frac{1}{2}\alpha} < t < t_{1-\frac{1}{2}\alpha}\right)$ then H_0 rejected and H_a accepted, which means that there are differences in mathematical problem solving ability of students taught using cooperative learning model NHT and STAD in fraction matter at the grade VII State of junior high school 2 Kisaran in 2012/2013 academic year. Similarly, if visible aspect of understanding a problem, planning, problem solving, troubleshooting, and problem solving evaluation obtained.

The results of hypothesis testing is of course related to the treatment given to both classes. In classes taught by cooperative learning NHT occur throwing questions to students with answering system based on the number called and the appointment of teachers randomly to make each student would not want to understand the material being studied. It is encouraging students to many questions about the material or matter that can not be missed to teachers or their friends group. In addition to the questions of the teacher (researcher) submitted for all groups, teachers also threw questions a group of teachers to other groups to answer it before the teacher finally concluded the correct answer of the problem. To further motivate the students, each group that provides questions or opinions given points.

While in classes taught with STAD cooperative learning, after the students had a discussion (working in groups), students are trained to work together and are responsible for their tasks by displaying the answer / presenting answers, here teachers facilitate and regulate and supervise the learning process. The downside of this model is when the percentage of students who idlers will be less active, because it relies on their friends more intelligent in the group. At the second meeting, the students seemed more active in the group to solve the problems in the LAS. They are more frequently asking friends or teachers in the group, because at the end of the meeting awarded to the group that is superior and more compact.

Obstacles encountered by teachers during the learning process takes place in both classes is the lack of time available. A large number of students in a class in which 38 students and not all students have the ability or intelligence is better at solving problems given that there are some students who have difficulty in solving the problems associated with the material learned and should be guided. Holding of grouping students

who have difficulty with students who already know and understand how to solve the problems of the material being studied quite helpful. Researchers asked students who have good intelligence or understand how to learn or how to find good solutions to guide or teach students who have difficulties in their group through a discussion of the problem (the group's activities). In group activities, students are required to understand the problem (given problem) and can figure out how to solve or do the problems with both, and liable to be careful in checking the process and results of the answers.

Nonetheless, both NHT and STAD turns together to improve the ability of mathematical problem solving in both classes on the material Denomination. From an average of learning outcomes and the average difference test proved that students who are taught by using cooperative learning model NHT has a problem-solving ability is higher than students taught using cooperative learning model type STAD. To strengthen the results of this study then compared with the relevant research conducted by Hermina M. Sitorus in 2008, the results showed the application of NHT on the subject of two variable linear equation can complete student learning outcomes. As well as the results of research conducted by Nunung S. Nasution in 2010 which stated that the cooperative learning model type STAD with the problem solving approach can improve student learning outcomes and the ability of students applying mathematical concepts to solve the given problem. Next Mohd Nazir Md Zabiti (2010) will stimulate teaching and learning. Problem is the main focus of teaching and learning that will happen through problem solving activities. Declarative knowledge and skills that are gained through critical thinking skills will be applied to solve a problem. This proves that the use of cooperative learning model NHT and STAD in the learning process is needed, particularly on the subject of mathematics learning in fraction matter.

Conclusion

Based on the research results obtained from the analysis of data obtained some conclusions, namely:

1. The result showed the average value posttest experimental class A is 78.737 or there is increased with an average of 38.948 and an average value posttest experimental class B is 70.474 or there is increased with an average of 33. Later testing the hypothesis by using the t-test. After testing the data turned out to be gained $-1,9953 < t_{hitung} < 1,9953$ is the price t other than the test criteria. $\left(-t_{1-\frac{1}{2}\alpha} < t < t_{1-\frac{1}{2}\alpha} \right)$ then H_0 rejected and H_a accepted, which means that there are differences in mathematical problem solving ability of students taught using cooperative learning model NHT and STAD in fraction matter at the grade VII State of junior high school 2 Kisaran in 2012/2013 academic year. Similarly, if visible aspect of understanding a problem, planning, problem solving, troubleshooting, and problem solving evaluation obtained.
2. Understanding of math problems students on the material fractions are taught using cooperative learning model NHT and STAD has an average value of 83.684 and 80.789. Statistically by using t-test concluded that there are different understandings of mathematical problems students taught using cooperative learning model NHT and STAD in fraction matter at the grade VII State of junior high school 2 Kisaran in 2012/2013 academic year, it is evident from the results of hypothesis testing where $-t_{tabel} < t_{hitung} < t_{tabel}$ is $-1,9953 < 1,9987 < 1,9953$.
3. Planning students' mathematical problem solving in the material fractions are taught using cooperative learning model NHT and STAD has an average value of 85.789 and 75.965. Statistically by using t-test concluded that there are differences in mathematical problem solving planning students taught using NHT type cooperative model and using the model type STAD cooperative in fraction material at the grade VII State of junior high school 2 Kisaran in 2012/2013 academic year, it is evident from the results of hypothesis testing where $-t_{tabel} < t_{hitung} > t_{tabel}$ is $-1,9953 < 3,687 > 1,9953$.
4. Problem solving math students on the material fractions are taught using cooperative learning model NHT and STAD has an average value of 79.123 and 72.456. Statistically by using t-test concluded that there are differences in problem solving math students taught cooperative learning model NHT and STAD in fraction material at the grade VII State of junior high school 2 Kisaran in 2012/2013 academic year, it is evident from the results of hypothesis testing where $-t_{tabel} < t_{hitung} > t_{tabel}$ is $-1,9953 < 2,336 > 1,9953$.

Evaluation of student mathematics problem solving on the material fractions are taught using cooperative learning model NHT and STAD has an average value of 62.632 and 48.947. Statistically by using t-test evaluation concluded that there are differences in mathematical problem solving students taught using

cooperative learning model NHT and STAD in fraction material at the grade VII State of junior high school 2 Kisaran in 2012/2013 academic year, it is evident from the results of hypothesis testing where $-t_{tabel} < t_{hitung} > t_{tabel}$ is $-1,9953 < 4,270 > 1,9953$.

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