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The Effect of Combination of Cooperative Learning Type STAD With NHT on Problem Solving Ability in Class X Students at High School

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ABSTRACT

This study aims to determine the effect of the combination of the STAD learning model with NHT on the problem solving ability of students in class X Mipa 3 and 4 at SMA Negeri 9 Malang with the material being taught is kingdom Monera this research is a qusi-experimental research using a purposive sampling design. The population in this study amounted to 68 students who werea a combination of all class X in the school, while the sample was taken from two classes with 34 participants in the each class. The class was divided into control and experimental classes, where each class used conventional model for the control class and combination of STAD and NHT learning model for the experimental class. The study measures the problem solving ability of students. The data collection teachniques in the study were in the from of problem solving ability tests, observations, interview, documention with instruments in the from of lesson plans, LKPD, LKPD assement rubrics, observation sheets on the implementation of learning implematation plans, and problem solving ability instrument sheets in the from pre-test and post-test essays. Test analysis of research data used inferential statistical analysis with covariate analysis (anacova). The result of the hypothesis test showed that there was a significant effect, namely 0.008 < 0,05 from the learning model combination the STAD and NHT models with the kingdom monera material in class X at SMA Negeri 9 Malang.

KEYWORDS

Problem Solving
NHT
STAD

1. Introduction

Education plays a very important role for everyone, this is because education is a foundation in improving and increasing the quality of human resources and the nation. Improvements in the world of education are urgently needed and must be improved to develop the quality of the world of education nationally (Perano, 2009). The success and quality of education is influenced by various factors such as the education system, educational facilities and infrastructure, the quality and professionalism of teachers, the curriculum being used, and the quality of learning. Regardless of which factors are the main determinants, the quality of learning still holds a large portion of the success and quality of educational outcomes (Muhibbin, 2009). Improving the quality of education is a logical impact of good learning. Good learning requires continuous adjustment and improvement of the learning process. In addition, there is a need for improvements in the selection of learning concepts used to improve the quality of the graduates themselves (Mustamin 2019).

The world of education often encounters various problems, one example of which is the problem-solving ability of students is classified as low and the problems raised in this study. Based on the results of an interview on May 27, 2021 at SMA Negeri 9 Malang, that learning at school uses a conceptual approach and the problem that occurs is that class X students at the school have not been able to solve the problem seen from the in terms of activity in the classroom where students tend to be lower, when given the opportunity to ask questions or be asked only certain people are involved, students are also not able to analyze problems, seek information, are less critical, and in learning conclusions are also still lacking so it can be concluded that students at school This is the ability to solve problems at school,

especially during a pandemic like this which requires online learning, causing its own difficulties when studying.

The solution to this problem is given the STAD (Student Team Achievement Division) type cooperative learning model according to (Suratmi 2018) is one of the learning models that encourage students to participate cooperatively in learning. With the STAD learning model, it is expected to be able to train cooperation in solving problems by forming groups, the learning is interesting and fun and encourages students to dive into it, not monotonous so that the atmosphere is not stressful and students are more enthusiastic about learning because the learning atmosphere is fun so as to help students achieve high scores with NHT. (Numbered Head Together) with the hope of increasing problem solving skills by students, creating fun learning, motivating children in learning, building students' enthusiasm in doing assignments, students can develop skills, be creative and innovative and give birth to a generation of intellectuals and skills.

Gunantara (2014) explains that problem solving is an effort undertaken by a person to deal with the problems he faces until what he considers the problem to be actually handled. Problem solving is also a term used by people when they find solutions to the problems they encounter. Problem solving is very important for students where students will initially find problems that are very difficult to solve, whether they are found in the classroom or outside the classroom, which can be in students' daily lives, therefore the solution in solving the problem is to use learning models such as the Trianto model (2007).) explained that the STAD type of learning model is a learning model that involves students in small groups with members between 4-5 people in one group chosen randomly based on character, level of ability. The NHT type of cooperative learning model is a strategy designed to create the best learning process and improve learning outcomes.

Ahmad (2021) on the effectiveness of cooperative learning STAD with NHT in terms of communication skills and mathematical problem solving stated that the study had a significant multivariate development in students. Sarwono (2017) The effect of the STAD type cooperative learning model on the problem-solving abilities and learning motivation of junior high school students said that the results of the study showed a very positive change. Nasution (2016) with the title differences in students' mathematical problem solving abilities who are taught using the STAD learning model with NHT stated that there are differences in problem solving abilities. Ratnaningdyah (2017) The implementation of the Novick learning model combined with the Cooperative Problem Solving (CPS) strategy to improve problem solving skills greatly affects students. Yanti (2013) the effect of the NHT cooperative learning model on students' mathematical problem solving abilities with results less than the average value of mathematical problems with conventional models.

In facing this era, educators, both teachers and lecturers, must present learning content that teaches students or students to have 4C skills, namely critical thinking and problem solving, communication, collaboration, and creativity and innovation (Prayogi et al, 2019). According to Dewi (2020), online learning is learning that is carried out by utilizing the internet network. Through online learning, students have the freedom of study time, can study anytime and anywhere, students can use several applications such as classroom, video conference, telephone or live, chat, zoom, or via whatsapp group. Online learning is carried out by all schools and levels of education. The form of lectures that can be used as a solution during the COVID-19 pandemic is online learning. In the teaching and learning process, the teacher has the duty to encourage, guide and provide learning facilities for students to achieve the goals. The teacher has the responsibility to see everything that happens in the classroom to help the student development process. Submission of subject matter is only one of various activities in learning as a dynamic process in all phases and processes of child development. The learning process is essentially to develop the activities and creativity of students through various interactions and learning experiences.

Based on the above background, the formulation of the problem in this research is whether there is a combination of the STAD (Student Team Achievement Division) and NHT (Numbered Head Together) type of cooperative learning model on students' problem-solving skills. The benefits of

research for teachers as a reference in modifying learning in the classroom so as to improve problem-solving skills by students, for researchers as information and consideration in conducting research, for students to grow learning motivation and be able to solve problems that occur during the learning process, for schools as a new innovation in developing and giving birth to the nation's generation with the best loyalty abilities, for readers as a reference when writing a thesis.

2. Method

The design in this study is a quasi-experimental research design using a quantitative approach. The population in this study is the entire student who will be given treatment. For the population in this study, all students in class X with a total of 6th grade and 204 students at SMA Negeri 9 Malang in the 2021/2022 academic year. Sugiyono (2010) explains that the research sample is representative of the population to be observed. This study uses purposive sampling with the aim of making it easier to measure the hypothesis test (Anacova). The sample in this study amounted to 68 with 34 students in the experimental class. For data collection using interviews, documentation, validation sheets (RPP, LKPD, learning model implementation sheets, assessment rubrics and student activity sheets), solving ability tests (pre-test and post-test). Data analysis of students' problem-solving abilities using inferential illiefor, inferential illiefor is an illiefor technique used to analyze data that has been collected which results will be applied to the population of the study. To test the hypothesis in this study using the technique of covariate analysis (Anacova) in measuring the results of solving problems based on the results of the pre-test and post-test. Anaova analysis for the significant level = 0.05 using IBM SPSS statistic 23. Analysis of research data was carried out to test requirements and test hypotheses with the steps, namely, converting student acquisition scores into scores on a scale of 1-100, with the following formula : = $\frac{\text{skor yang diperoleh siswa}}{\text{skor maksimal}} \mathbf{x\ 100}$, then calculate the average for the variables using the formula Calculate the average of each illiefo using the formula , : $\bar{x} = \frac{\sum Xi}{n}$, while in determining the standard deviation of each variable using the formula: : $S_D = \sqrt{\frac{n\sum X_i^2 - (\sum X_i)^2}{n(n-1)}}$.

The requirement test used is the normality test which is used to re-examine the sample data that has been found with the aim of whether the data population has a normally distributed data distribution or not. The significant level for accepting or rejecting the decision of normal or not distribution of data is by comparing the value of asymp sig (2-tailed) with a value of = 0.05. The normality test of the data is by using the lilliefors ui or approach. Homogeneity test, used to determine the relationship between the control class (X) and the experimental class (Y). The purpose of this test is to test whether the groups that are sampled come from the same population, which is said to be homogeneous (same). Hypothesis test is a different sample test conducted to determine whether there is a significant effect of the two samples studied with a significance level of 0.05. To test the hypothesis using covariate analysis (anacova) the results of solving problems by students. The purpose of using the anacova test is to find out or see the effect of treatment from the study whether there is a significant effect of the two treatment samples. If the results state that there is an influence from the two different treatment classes, further testing is carried out with the Tukey test to see a real effect on the treatment effect of problem solving ability activity data through pre-test and post-test scores from students in the field of biology. Data analysis was performed using the *IBM SPSS Statistics* 23 program.

3. Results and Discussion

This research is based on students' problem-solving abilities seen from the results of the pre-test and post-test which in the implementation of the pre-test will be given at the beginning of learning to measure understanding at the beginning of class learning. After that, learning takes place and at the

next meeting after the discussion of the material is complete, a post-test will be given as a form of measuring student understanding after receiving learning. Below is a table listing the statistical measures of the two classes that have been studied.

Table 1. List of Control Class Problem Solving Ability Test Statistics Measures

Statistical Data Size	*Pre-Test Control*	*Post-Test Control*
Number of Respondents	34	34
Average	63	88
Variance	154	44
Standard Deviation	12	7

Table 2. List of Statistical Measures of Experimental Class Problem Solving Ability Tests

Statistical Data Size	*Pre-Test Experiment*	*Post-Test Experiment*
Number of Respondents	34	34
Average	60	83
Variance	102	80
Standard Deviation	10	9

In order to facilitate understanding of the comparison of the average values of the pre-test and post-test above, it can be seen through the diagram in Figure 1 below:

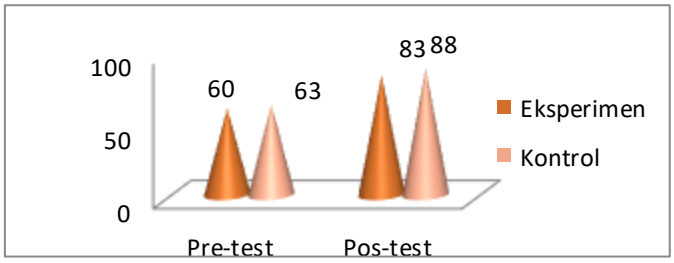

Figure 1. Diagram of Pre-test and Post-test scores

Figure 1 shows that there is a difference between the average value of the pre-test and post-test scores which has increased because it is influenced by the STAD learning model with NHT for the experimental class, and for the control class that uses the conventional learning model it also increases from the pre-value. -test to the post-test where these two treatments used an ability test in solving problems using a similar essay test model, only they did not use the same learning model with the reasons for comparison between the control and experimental classes at the time of the study.

Test Requirements

Requirement test is a test carried out before the implementation of the hypothesis test to see the norm and homogeneity of the data, the explanation is as follows:

Normality test

The normality test of the pre-test and post-test data were analyzed using the Lillefors test or the Kolmogorov-Smirnov approach, this is because the number of objects is more than 30 using the IBM SPSS statistic 23 program. To test the normality of the distribution of pre-test and post-test students' problem solving abilities by using the STAD learning model with NHT, it is stated that from the results of research using the conventional model for the control class and the combination for the experimental class, the STAD model with NHT is declared normal, this is evidenced by the distribution of data that is distributed if the significant value is < 0.005.

Homogeneity Test

The results of the homogeneity test aim to see if the pre-test and post-test data have the same distribution. To see whether the data have the same distribution of results or not, the results of the study stated that the problem solving ability of students was declared homogeneous with a significant value for the pre-test 0.1000> 0.05 while for the post-test 0.157> 0.05. Therefore, it can be concluded that the research data has the same or homogeneous distribution, this can be seen from the results of statistical data tests through SPSS.

Hypothesis testing

The discussion is focused on linking the data and the results of the analysis to the problem or research objective and the wider theoretical context. It can also be discussed as answers to questions. Hypothesis testing is a follow-up test after going through prerequisite tests such as normality and homogeneity tests. To test the hypothesis in this study using the covariate test (anacova) from research using the help of IBM SPSS 23, it shows that the learning model significantly affects the problem solving ability of students as seen from the value (F = 7.456: P = 0.008) where the value is 0.008 <0.05 H0 is rejected and H1 is accepted, which means that there is an effect of the STAD and NHT blend learning model on the problem solving ability of students which is quite significant where the influence of the learning model is 0.102 from the learning model used in the experimental class in class X Mipa 3 SMA Negeri 9 Malang.Pembahasan

The Combination of STAD (Student Team Achievement Division) and NHT (Numbered Head Together) Learning Models

The research was carried out at SMA Negeri 9 Malang on October 18, 2021 to November 1, 2021 with two meetings in each class. The control class in this study uses a conventional model with the lecture method. According to Supinah et al (2008), if conventional or traditional learning students work more for themselves where they are required to focus more on the blackboard, listen to the teacher explain and go through textbooks and all decisions are only from the teacher. This learning is also a lesson that is often used by teachers when carrying out learning with the lecture method and giving assignments at school. Meanwhile, the experimental class uses a blended learning model of STAD and NHT. STAD according to (Jamiyem 2018) is one of the simplest cooperative learning methods, and is the best model for beginning for teachers who are new to the cooperative approach, and STAD consists of five main components, namely class presentations, teams, quizzes, individual progress scores, and team recognition. NHT according to (Mitha 2018) is one type of cooperative learning model that can support ways of thinking, reasoning and communicating in mathematics so that it is expected to improve students' mathematics learning achievement. Where this learning model will help students learn the material and learn to be responsible for the completeness of their group assignments. In addition, the cooperative learning model of the Numbered Heads Together (NHT) type will change mathematics learning into fun learning and not make students feel bored with mathematics learning. So that this model is considered able to improve student achievement in learning mathematics. However, whether this is true or not is not known, it is necessary to conduct a study. The purpose of this study is to determine whether there is an effect of the Numbered Heads Together (NHT) type of cooperative learning model.

The material used at the time of the study was Kingdom Monera by using a learning model blending STAD with NHT to hone problem solving skills by students where cognitive tests were given in the form of pre-test (initial test) and post-test (final test). In this research, the questions given are in the form of essays with references based on indicators of problem-solving abilities that have been validated. The problem-solving indicators in this study according to Gunantara (2017) are awareness of problems regarding bacteria that exist in life, problems regarding bacteria are solved based on insight and experience in life, and explain the relationship between the role of bacteria and student experience based on the concept of biology learning. The purpose of the indicator is as a form of

competency achievement which will later be used as the basis for assessing the achievement of tasks or ability to solve problems.

At the time of carrying out the research, students were aware of the presence of bacteria in the surrounding environment, in this case students had started to refer to the first indicator. With an awareness of the bacteria, students linked their experiences with the material being taught where students began to explain that bacteria have a beneficial or beneficial role. harmful bacteria in everyday life such as the role of beneficial bacteria in industry, health, agriculture and animal husbandry, more specifically they explain the role of beneficial bacteria in the manufacture of tempeh, soy sauce, tape, nata de coco. In addition, they also explain the role of harmful bacteria that can cause diseases such as diarrhea, tuberculosis, typhoid, meningitis. This refers to the third indicator by studying the various roles of bacteria in the lives of students starting to solve these problems with the insights they have based on their experiences where they have learned the importance of maintaining a good and healthy lifestyle to avoid being attacked by harmful bacteria.

In the learning that took place at schools during the research during the COVID-19 pandemic, which resulted in obstacles during the learning process, where the implementation of learning took place partially online (zoom) and offline (face to face) except for the control class at the second meeting, all learning was online. Each task given is collected through the WhatsApp group application. The experimental class at the first and second meetings was online (zoom) and offline (face-to-face) by providing material to students by applying the STAD blended learning model with NHT and giving the participants an initial (pre-test) and post-test (post-test) test. students, besides that the teacher also gives group assignments to support learning outcomes in the form of LKPD which is done at home and presented at the second meeting. This is based as a form of sharpening the understanding of students who are still difficult to solve problems when studying. According to (Munir 2013) to improve students' understanding, efforts are needed to make them involved and active so that interactive teaching materials such as LKPD can be based on media, computers, graphics, video, text, audio and so on.

The researcher's field notes when using the STAD learning model with NHT received a very good response from students when they were involved in making head numbers as a form of supporting the syntax of NHT so that this process really helped students in developing their own creativity. But from the observations of the researchers during the research, it was still in the less effective category because it was still during the covid-19 pandemic. The explanation of learning during the pandemic is said to greatly affect many aspects, such as in the world of education according to Nurfaisal (2021) that students lose motivation to learn due to lack of real support from teachers, heavy workloads, fatigue, and other things such as lack of facilities such as internet quota, minimal teaching materials, interaction with teachers only through online media so it is not effective. Behind that there will definitely be advantages even though they are not so prominent as when in this study the advantages that were seen during the learning process were the creativity of the students who made the numbering of heads so enthusiastically that they exercised their creativity and were able to develop the opinions of students in their work.

This is supported by Novianawati (2016) who stated that expressing opinions can be trained by how to speak when expressing opinions, how to behave before and after expressing opinions and having a good mentality in speaking are the most important things, because in learning to express opinions is an important point and added value. for students. In this case, it strongly supports learning that is measuring the ability of students to solve problems where problem solving according to Sad et al (2008) says problem solving is a process that is carried out with great thought (planned) to be carried out to achieve resolution of the problems at hand.

The Influence of the STAD (Student Team Achievement Division) Blended Learning Model with NHT (Numbered Head Together) on problem solving abilities

Research that uses a blended learning model of STAD with NHT on students' problem solving abilities found in the field states that there is a significant increase where the covariate test value

(anacova) inputted using IBM SPSS 23 has an effect with a value of 0.008. and 0.008 < 0.05 therefore H0 is rejected while H1 is accepted. So it can be concluded that using the STAD learning model with NHT can affect problem solving by students. This is also proven according to Ulfa (2016) that the STAD learning model with NHT can affect student learning outcomes in solving problems. This is also agreed by Mansur (2018) where learning outcomes are results received by students after studying and are also very good results. This is based on the fact that students are able to solve problems properly and appropriately.

The average post-test score for problem-solving skills by students using the conventional model is 88 with a standard deviation of 7, the experimental class using the STAD and NHT blended learning model is 83 with a standard deviation of 9. So it can be said that the class average value higher control. This is because in the learning process the control class is aware of the problems that are happening, is able to analyze problems, is active in answering questions, is able to achieve what is intended by the teacher, the way of learning is fairly focused although sometimes it is still a little awkward when asked and when giving answers it is always right. and true, students in this class are also sensitive to problems and willing to investigate to find solutions. This is also supported by a statement according to Mufidatul et al (2016) who said that classes using a learning model (E-learning) were not better than classes with conventional models. So it can be concluded that the class using the learning model can not always attract students to be more active in participating in learning and teaching activities. From the results of the active observation of students, it was also found that the control class had a very good focus in responding to learning.

Learning activities carried out in school research using the STAD learning model with NHT are expected to provide students with opportunities to solve problems with active involvement in learning, where this model has the potential to develop teamwork, involvement as a good tutor for group mates, more ready to accept learning, serious in discussing, there is a close bond between group friends (team), helping each other less intelligent friends. While the conventional learning model with lecture and question and answer methods used in the control class focuses more on the teacher acting as a facilitator, PPT as a teaching medium, but in this learning model it does not enter the stage of solving the problem because it is a simple (traditional) learning model. The experimental class during the learning process they were more enthusiastic in responding to the numbering of heads but were so awkward when learning took place and seemed unable to accept new methods in learning because they were used to the model used at school, this was seen from the students who did not focus on learning, working on the task was not enthusiastic and when presenting the results of the analysis of the problem cases attached to the LKPD, there was still confusion when the head number was called for the presentation.

The STAD learning model with NHT is not attached to the stages in problem solving but this learning model is used as a new strategy or innovation to increase students' motivation in solving problems, as Chantika (2014) has said that solving problems is a step in solving and can So a system that relies on strengths in the use of certain subjects that uses solutions through stages in a learning model. This STAD learning model has several advantages according to Handayama (2014) where this model teaches students to respect group ethics, and cooperate with each other, motivate and help each other actively in groups, have a role as a tutor in increasing success in groups, interact well with each other. and have added value in practicing speaking skills. While the NHT model according to Fathurohman (2015) says that the NHT model is a model that prioritizes student activities in finding, processing, and reporting information obtained from relevant sources and will be presented in class.

In Damayanti's research (2015) which states that the STAD learning model can improve problem solving abilities, Sarwono (2017) also explained that the STAD learning model has a positive influence on problem solving abilities and student motivation compared to classes using conventional models. From Indriati (2009) also stated that there was a significant increase when using the STAD learning model. According to Daud et al (2010) stated that the NHT learning model can also improve learning activities in the classroom, Megawati et al (2014) said the same thing that the NHT learning model

showed an increase in problem solving abilities by students, Fitria (2019) stated that the NHT assisted learning model teaching aids can improve student learning outcomes, especially in problem solving, Ulfa (2016) also states if there are differences in problem solving abilities found when learning using both models of a combination of STAD and NHT. A meta-analysis study shows that cooperative learning also has a positive impact on student achievement (Hasibuan et al, 2022).

Research using conventional learning models with lecture and question and answer methods during learning takes place including focusing on what the teacher explains, although according to Musanah (2013) learning using conventional models does not get an optimal response from students because it is one-way or only comes from teachers only (more using the lecture method), sometimes the results found are not appropriate because it is very boring and cannot stimulate students to think critically. But this can be utilized as best as possible by using teaching materials in the form of media as an alternative, as according to Sagala (2009) said the lecture method is an interaction that is done by explaining in the form of narrative orally or directly from the teacher to students in the classroom where the explanation can be using tools such as pictures, videos, audio-visuals, and others. Research in the experimental class includes classes that are categorized as active by subject teachers but do not accept the new learning model seen from the responses of students during learning that they are only interested in making head numbers and are passive in class when learning takes place.

4. Conclusion

Based on the discussion, the conclusion of this study is that there is an effect of the combination of the STAD (Student Team Achievement Division) Type Cooperative Learning Model with NHT (Numbered Head Together) on problem-solving skills in the Monera kingdom subjects with a significant value of 0.008 < 0.05. So it can be concluded that using the STAD learning model with NHT can affect problem solving by students. This is based on the fact that students are able to solve problems properly and appropriately.

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