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The Use of NHT and TPS Assisted by Zoom Meetings on the Problem Solving Ability of Elementary School Students (An Experiment Study)

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ABSTRAK

Penelitian ini dilakukan untuk mengkaji dan menentukan perbedaan kemampuan pemecahan masalah IPA siswa antara penerapan pembelajaran NHT dan TPS materi bunyi kelas IV Sekolah Negeri di Jakarta Timur. Penelitian ini dilakukan dalam bentuk penelitian eksperimen dengan menggunakan Quasy Eksperimental Design. Desain yang digunakan yaitu Non Equivalen Control Group Posttest Design. Penelitian dilaksanakan di Sekolah Dasar Negeri Batu Ampar 02 Pagi di Jakarta Timur. Populasi dalam penelitian ini adalah sebanyak 58 siswa di kelas IV. Pengambilan sampel dilakukan dengan teknik sampel jenuh pada kelas IV A dengan jumlah 28 siswa sebagai kelas eksperimen I (NHT) dan Kelas IV B dengan jumlah siswa 30 yang diberi perlakuan TPS. Analisis data posttest kedua kelas menggunakan uji-t diperoleh $t_{hitung} = 4{,}21$ *serta* $t_{tabel} = 2{,}00$ *pada taraf signifikan* $\alpha = 0{,}05$*. Hasil tersebut menunjukkan bahwa* $t_{hitung} > t_{tabel}$ *maka* H_0 *ditolak berarti terdapat ketidaksamaan atau perbedaan antara kemampuan pemecahan masalah siswa kelas IV pada kelas eksperimen I (NHT) dan kelas eksperimen II (TPS) di Sekolah Dasar Negeri Batu Ampar 02 Pagi khususnya pada materi bunyi.*

ABSTRACT

This study was conducted to examine and determine the differences in students' science problem-solving abilities between the application of NHT and TPS learning materials for class IV public schools in East Jakarta. This research was conducted in the form of experimental research using Quasy Experimental Design. The design used is Non Equivalent Control Group Posttest Design. The research was conducted at the Batu Ampar 02 Pagi State Elementary School in East Jakarta. The population in this study were 58 students in class IV. Sampling was carried out using a saturated sample technique in class IV A with a total of 28 students as experimental class I (NHT) and Class IV B with a total of 30 students being treated with TPS. Analysis of post-test data for both classes using t-test obtained t_count = 4.21 and t_table = 2.00 at the significant level = 0.05. These results indicate that t_count > t_table, then H0 is rejected, meaning that there is an inequality or difference between the problem solving abilities of fourth grade students in experimental class I (NHT) and experimental class II (TPS) at Batu Ampar 02 Pagi State Elementary School, especially on sound material.

1. INTRODUCTION

Natural Sciences is taught to student since in elementary schools and is taken and is required at every level of education. Science subjects are one of the subjects in elementary schools that emphasize the curiosity of students scientifically. Natural Science is a systematic way of explore nature, so that it is not only the ability to master various accumulated knowledge which can be in the form of facts, concepts, or principles but a process of discovering (Shebastian et al., 2020). Therefore, the Natural Science subjects given are not only about memorizing and understanding theory, but how we act, do, and solve a problem. This definition states that science is a form of effort in various experiences that can develop process skills, understanding concepts, application of concepts, scientific attitudes, and is based on natural science learning activities on issues developed in society (Mulyaningsih et al., 2021). The process of learning science in elementary schools so far is still carried out conventionally which results in the lack of problem solving abilities in students. The practic of the learning process is only directed at the ability to memorize and understand theory so that students find it difficult to relate it to situations in everyday life. Science learning in elementary schools is also still less emphasis on the curiosity attitude of students scientifically, but it is always about memorizing and understanding theory, so that students are lacking in how to act, do, and solve a problem. Natural Science is a theoretical knowledge that is obtained or compiled by finding out and doing,

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it will assist students to achieve a rooted understanding which is a process (human effort to understand the universe), procedure (appropriate observations and correct procedures) and produce a product or conclusion (Soemari et al., 2020). The implementation of the science learning process is directed at the ability to develop scientific skills and attitudes in students so that they are able to relate them to situations in everyday life. Science learning in elementary schools also emphasizes the curiosity of students scientifically, but it is always about memorizing and understanding theory, so that students can understand how to act, do, and solve a problem. The science learning process in elementary schools does not only memorize concepts for students, but they must to comprehend, observe, analyze and solve problems which will be useful for everyday life through science subjects (Oktaviani & Tari, 2018).

Problem solving ability is the activity of higher order thinking skills to solve a problem in accepting new problems. Problem solving ability is power of a person to use the inspiration of his deep thinking so as to encourage scientific thinking which is expected in the learning process (Chin & Osborne, 2008; DeHaan, 2009; Mukhopadhyay, 2013; Mayratih et al., 2019). Problem solving leads to the efforts needed by students for the problems experienced and how students act to determine a way out in solving a problem. According to (Yandhari et al., 2019) problem solving indicators include clarifying concept terms which means classifying information in solving problems to get an overview of the things contained in the problem. Second, formulating problems and analyzing problems which means compiling several steps according to information and data from a problem. Third, building ideas systematically means carrying out problem solving based on steps that have been thoroughly designed. Fourth, seeking new information through other sources, which means that after the completion stage is reached, it is necessary to add new ideas to strengthen the concept. Thus this study observes the problem solving ability of students in learning science content. Therefore, an experiment has been carried out using one of the methods for researching science content learning in elementary schools. The methods used are NHT and TPS methods. NHT is a cooperative learning model by discussing in groups where each student is given a number and has the same opportunity to answer questions by calling the number randomly proposed by the teacher (Siti Muawanah & Nizaruddin, 2019). In the NHT model, students are directed to be able to participate actively by using numbered heads their groups. Research with learning techniques and learning steps in NHT, the first step is numbering. Students are divided in groups of 4-5 people, everyone in each group takes a number. Second, asking questions (questioning) The teacher gives assignments and each group does it. Third, think together (heads together), the group discusses the correct answer and make sure that their member be able to carry on or to understand it. Fourth, giving answers (answering) randomly, the teachers makes student who have number called out to report their discussion result. And fifth, the conclusion (Iskandar & Leonard, 2018) In process learning by applying the BHT model, students study in groups where each member is liable for the group's work. Through these activities, the application of NHT which during the process of learning involves students in implementing a learning process (Yuniarti et al., 2021). The NHT model is expected to activate students, motivate students, and invite students to think creatively in solving problems. According to (Haniyah, et al. 2014) the NHT model is one of cooperative learning type that design to affect the interaction patterns of student and it can be as an alternative to traditional classroom structures.

While the TPS model requires students to think and find the answers in pairs (Rahayu et al., 2021). The TPS emphasizes that every student are first given the opportunity to think individually, then students make a discussion with their partners and then present the results of their thoughts. According to (Rizqi et al., 2021) the TPS model is thinking in pairs in interacting with other students to appreciate any differences that exist and be responsible for learning activities. TPS is applied to students to let them to think, to give respond and to assist one and other in group learning. It presents inspiration such as thinking time as a solid aspect in improving students' skills in responding toward problems. Learning techniques and learning steps in the TPS model consist of Session one, think (thinking), Session two, pair (pairs), and the third session, share (sharing). Problem solving ability is an activity of thinking and reasoning in solving problems through problems that have previously been encountered to encourage students to be able to solve these problems. Indicators of problem solving include (1) Clarifying concept terms. That is, classifying information in solving problems to get a picture of something that is contained in the problem. (2) Formulate the problem and analyze the problem. That is, compiling several steps according to information and data from a problem. (3) Build ideas systematically. That is, carrying out problem solving based on steps that have been designed thoroughly. (4) Seeking new information through other sources. That is, after the completion stage is reached, it is necessary to add new ideas to strengthen the concept (Yandhari et al., 2019).

The learning process of NHT and TPS during pandemic has made the implementation of learning activities by online. In order to reduce and suppress the spread of the virus, the learning that was originally carried out in schools was diverted by changing all educational activities into learning at home via online or online. Learning through online or online using digital technology, namely zoom meetings. According to

(Riyan Rizaldi & Fatimah, 2020) Zoom meetings are one of the online platforms or applications that are often used to carry out online or remote activities such as meetings, dialogues and virtual or not face-to-face learning and distance education. Zoom meeting is an application that basically fits the demands of the industrial revolution 4.0 by emphasizing on system digitization or technology-based. Teachers are required to understand information and communication technology in order to make it easier for teachers to provide direction to students in learning (Zaenuri & Prastowo, 2021). The teacher position in online learning process must be more optimal, so that students become learning activists because teachers must be able to make the basis of a constructivist approach in which students are learning subjects. The zoom meeting application is an application that has developed in helping the online learning process. Zoom meetings are one of the applications or platforms that are very supportive in the needs of communication, interaction and remote education processes that can still be done virtually or not face-to-face. According to (Eko Yulianto et al., 2020) learning is through zoom meetings, where educators and students can meet face-to-face and interact properly so as to make it easier and at the same time help teachers to interact with their students in all learning process. Learning through zoom meetings is considered more efficient, because if teachers cannot attend, zoom meetings are an option for teachers and students to continue to carry out the distance learning process (Iaqien & Rahman, 2020). Learning is not just remembering, but broader than that, namely experiencing. This study aims to examine and determine the differences in students' science problem solving abilities between the application of the NHT and TPS learning models in the fourth grade sound material at SDN Batu Ampar 02 Pagi, East Jakarta.

2. METHOD

The population in this study were fourth grade students at Sekolah Dasar Negeri Batu Ampar 02 Pagi, East Jakarta. There are 58 students, divided into 32 student as member of first experiment class and 26 student as member of second experiment class students. The sample of this study using the Quasy Experimental Design method was carried out with the saturated sample technique in class IV A by being treated with Numbered Heads Together (NHT) and Class IV B by being treated with Think Pair Share (TPS). The data collection technique used a subjective test in the form of a posttest. In the experimental class I was given Numbered Heads Together (NHT) treatment, while the experimental class II was given Think Pair Share (TPS) treatment. After the two classes were given different treatments, they were then given a final test to determine students' understanding after being given treatment. The results of the final test of both class was analyzed and then compared to test the differences using statistical tests on students' problem solving abilities.

3. RESULT AND DISCUSSION

Result

The results of data analysis (Post-Test) conducted on fourth grade students at Sekolah Dasar Negeri Batu Ampar 02 Pagi East Jakarta, involving class IV A as the experimental class I which was treated with the NHT model and class IV B as the experimental class II given the TPS model treatment can be observed in Table 1.

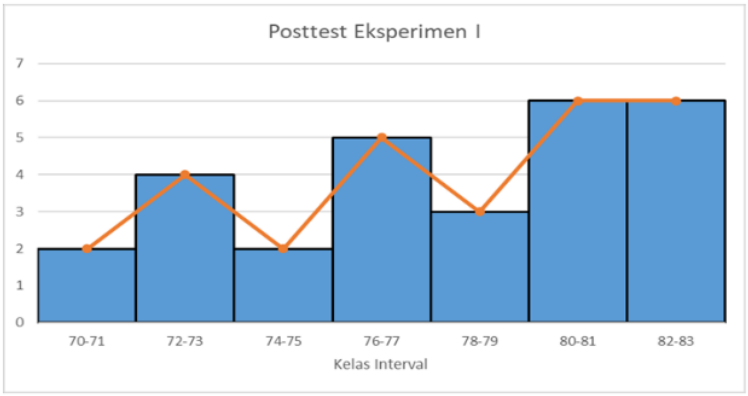

Figure 1. Frequency distribution of students' science problem solving ability scores in Experiment I class

Based on the results of the Experiment I class research as many as 28 students using the NHT model, the results data (Post-Test) obtained the lowest dan highest score in ar row are 70 and 82. Frequency distribution of the results of students' science problem solving ability scores for the post-test in the Experiment I class using the NHT model on the sound properties material, the score ranges from 70 to 82 with a total of 28 students as respondents.

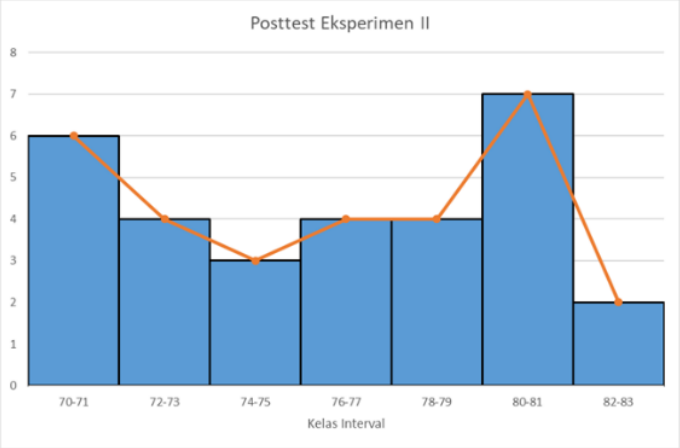

Figure 2. Frequency distribution of students' science problem solving ability scores in Experiment II class

Based on Figure 1 and Figure 2 for the frequency distribution of the results of students' science problem solving ability scores for the post-test in the Experiment II class using the TPS model on the material properties of sound, the score ranges from 70 to 82 with a total of 30 students as respondents. The data on the value of the results of problem solving abilities in the Experiment II class by applying the TPS model obtained the result data (Post-Test) which obtained the lowest and highest score in a row were 70 and 82.

Table 1. Post-Descriptive Statistical Test Results Problem Solving Ability

Descriptive Statistic	Experiment Class I	Experiment Class II
N	28	30
Highest Score	82	82
Lowest Score	70	70
Mean	78.7	76.16

Table 1 shows that the experimental class I with 28 students (N) has an average of 78.7. Meanwhile, in the experimental class II with 30 students (N) the average score was 76.16. From Table 1, it can be seen that there is a difference in the Posttest average, which is 2.54. Before analyzing the data, the researcher first conducted a normality and homogenity test on the data of post test. Normality test is presented in Table 2.

Table 2. Normality Test Results

Treatment	N	L_{hitung}	L_{tabel}
Numbered Heads Together (NHT)	28	0,119	0,167
Think Pair Share (TPS)	30	0,146	0,161

Based on Table 2, the normality test calculation for the Experiment I class (Post-Test) with the NHT model, it was obtained that 0.119 < 0.167 at the real level = 0.05 with n = 28. It shows that the data of Post-Test Experiment I is normal. While the calculation of the normality test for the Experiment II class (Post-Test) with the TPS model, it was obtained that 0.146 < 0.161 at the real level = 0.05 with n = 30. It shows that the data of Post-Test Experiment II is normal . The homogeneity test for both class can be seen in Table 3.

Table 3. Homogenity Test Result

Treatment	F_{count}	F_{table}
NHT TPS	1,06621	1,87513

Based on Table 3, the homogeneity test of two population variances from two groups was carried out using Fisher's exact test. From the test results obtained and = at a significant level of 0.05. Because it does not exceed the variance of the two groups is homogeneous.

Tabel 4. T-test Result

Group	α	t_{count}	t_{table}	Decision	Conclusion
Experiment	0,05	4,21	2,00	H_a diterima	Terdapat perbedaan kemampuan pemecahan masalah IPA siswa

From the results of the calculation of the price = 4.21 and = 2.00 at the significant level = 0.05. This shows that H_0 is rejected. It means that students' science problem solving abilities between two class is a significant different. The difference the problem solving abilities of fourth grade students between students who follow the NHT and the others who follow the TPS model is because there are differences in the stages of learning activities and delivery of material. The NHT model in its implementation has distinctive characteristics with the numbering of heads in groups of students where each group consisting of 4-5 students who are given a head number can emphasize learning activities by playing an active role through group discussions and developing problem solving skills. The NHT model creates joint activities that stimulate the curiosity of students with other group members, namely by providing problems or problems related to everyday life, and students finding out how problems could be solved. While the TPS model in its implementation in groups of students is carried out in pairs, students together help each other in group study. This model presents inspiration such as thinking time as a solid aspect in improving students' skills in responding to problems. By providing problems or problems related to everyday life, opportunities for students to carry out learning activities are to work alone and collaborate with their group mates in finding out how these problems can be solved. So that in this process, students need more time to think, respond and together help each other in their groups. According to (Nugroho & Wardani, 2019; Rahmawati, et al. 2021) it was revealed from the results of the study that the class that was treated with the implementation of NHT model proved that there was a better effect on students' problem-solving abilities. Learning from the NHT model makes all students more active in learning. The use of the NHT model can encourage student activities. Seen in group discussions through the activity of exchanging opinions and giving suggestions in solving problems, where each student will help each other so that all group members are ready to be more enthusiastic in learning. This is also reinforced by (Pakpahan & History, 2016; Juniarta, 2017; Baskoro, 2020) the NHT model will encourage students to be more active in developing ideas when conducting group discussions, namely by helping one another with students who do not master the subject matter. By helping each other and sharing knowledge, students can have open insights when exchanging their respective opinions.

Discussion

Based on result, it has been explained that in research on students' science problem solving abilities there are differences between the application of the NHT and TPS learning models. The hypothesis test shows that t_{count} = 4.21 and t_{table}= 2.00 at the significant level = 0.05. This shows that it is greater than (4.21 > 2.00) then H_0 is rejected. That is to say that the students' science problem solving abilities of both class (NHT and TPS) is not same. According to (Pakpahan & History, 2016) states that learning outcomes using the NHT model is better than the TPS model. Through the NHT model in learning will encourage students

to be more active because NHT has a characteristic that is numbering where the teacher appoints one student according to the numbering to represent the group (Maman & Rajab, 2016). This method aims to involve all students through out the learning activities. The group must ensure that each member of the group is able to master the material given by the teacher, this can make students exchange ideas or opinions to find the most appropriate answer collaboratively and train students' responsibility to try to master the material from the teacher. when conducting group discussions, students can share the knowledge they get and can exchange opinions with each other. According to (Nugroho & Wardani, 2019) stating that the learning model in the experimental class I using NHT is superior to the use of TPS in the experimental class 2. In the use of the NHT model students are better and effective compared to the TPS model. In the NHT model, students tend to be more explore and more focused, which makes students' insights more open to lessons. The NHT model also provides students with active learning so that they are encouraged to think, work together and prepare themselves in mastering the material (Simamora & Zunaiedy, 2021). According to (Asniwati et al., 2019; Hanifah, et al. 2019; Naibaho, 2019; Kurnia, et al. 2021) stated that student learning activities through the NHT model improve learning outcomes of students. Through the NHT model, the improvement in learning outcomes takes place because students work together with groups so that they can share data and the teacher also emphasizes students to be more careful in working on the questions that have been given. Information on student learning outcomes is obtained from assessment tests that are tried at the end of each meeting with the aim of sharing an overview of students' skills in understanding learning. The implication of this study results is that the NHT model has a better effect, superior to the use of TPS on students' problem-solving abilities which can affect the learning, and can make students improve their interactions with fellow friends in exchanging opinions and provide input or criticism.

4. CONCLUSION

Research that has been conducted at Sekolah Dasar Negeri Batu Ampar 02 Pagi East Jakarta, it can be concluded that students' science problem solving abilities between the application of the NHT and TPS learning models assisted by Zoom Meeting on sound material are not same or different. More effective learning with the NHT model that is applied has more effect on students' problem solving abilities in the teaching and learning process compared to TPS model. Other research can focus on more in-depth research related to the application of the two learning models. It can also be done other studies that focus on other materials.

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