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THE EFFECT OF *THE THINK PAIR SHARE* LEARNING MODEL ON STUDENTS' PROBLEM-SOLVING AND CRITICAL THINKING SKILLS

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Abstract

The purpose of this study is to determine the effect of learning models on students' problem-solving abilities and critical thinking skills. This study used a quasi-experimental study with a population of class VIII students. The sampling technique uses purposive sampling. The research design used was Noneequivalent (pretest and posttest) control group design. The data collection technique in this study was a test technique consisting of a pre-test and post-test in the form of a description test of students' problem-solving abilities and critical thinking abilities. The data analysis technique used is descriptive analysis and inferential analysis. Statistical techniques used for descriptive analysis include average, standard deviation, minimum score and maximum score. Meanwhile, to test the research hypothesis using the Hotteling's T2 test and the Independent Sample t-Test. The results of the study are as follows: 1). there is the influence of think pair share learning and scientific learning on problem solving abilities and students' critical thinking skills. 2). learning with think pair share has a greater influence than scientific learning on students' problem-solving abilities and critical thinking skills.

Keywords: *think pair share model, problem solving, critical thinking ability*

INTRODUCTION

Mathematics involves a lot of knowledge which is the basis of the needs and skills of each individual (Orcan kacan et al., 2020). Related to this, metathematic is one of the fields that has a role in encouraging the development of human resources who have 21st century skills that require students' knowledge and understanding. The development of the 21st century requires every individual to have skills as a provision in themselves to face developments in the era of globalization, in the 21st century there are several abilities that must be possessed, namely critical thinking skills, problem solving, communication, collaboration, creative skills, information and communication technology literacy skills, contextual learning skills as well as information and media literacy skills (Saputri et al., 2019). Thus, in the learning process, it is very necessary to provide learning that can develop these skills. One of the abilities that students must have is problem-solving skills.

According to Fitriani et al (2020) Problem-solving skills are one of the abilities that students must have in cognitive processes through knowledge, and personal experience so that students are able to recognize problems, find solutions and solve them effectively. Specifically in mathematics learning, (Polya, 1985) states that, "Solving a problem means finding a way out of a difficulty, a way around an obstacle, attaining an aim which was not immediately attainable." This statement can be interpreted as a process in solving problems to find solutions to problems whose goals are not immediately achieved. According to Kasmer & Kim (2011) which emphasizes that in the mathematics learning process, understanding mathematical concepts is the most important part of a person as the basis for

determining his ideas or ideas in solving problems. This explanation is in line with the definition of problem-solving ability put forward by (Lestari, K. E. & Yudhanegara, 2015) Problem solving is an effort to find a solution to a problem that is not routine so that the problem can be solved. According to Toksoy & Akdeniz (2015) That few students use the 'formula' and find the solution correctly, it shows that there are students who are not able to solve problems even though they know the formula. In line with the statements made by Yusri (2018) that the lack of problem-solving skills of students when facing new problems and seen when students are less able to solve problems, does not explain the steps to solve the problems they write, making it difficult for students to determine the formula to be used in solving problems. Meanwhile, in the process of solving problems, knowledge is needed in the process of recognizing problems, describing problems, overcoming problems, investigating solutions and making conclusions about the problems given (Kaya et al., 2014).

In solving mathematical problems, critical thinking skills are also needed to determine the initial idea in solving the given problem, this is because not all related problems can be solved immediately using the existing formulas (Putra & Vebrian, 2019). As explained by Setiana et al (2021) that by having the ability to think critically, it can help students to solve problems ranging from simple problems to complex problems. Students who have high critical thinking skills in determining the initial idea of mathematics will find it easier to solve problems, but conversely if students who have low critical thinking skills will find it difficult to solve Crismono problems (Amanda et al., 2020). This is strengthened by the results of the research conducted by Fasha et al (2018) That the results of the test of 80% of students' problem-solving and critical thinking skills still have difficulties in solving problems, because students are still not used to solving non-routine problems. John Dewey (Hosnan, 2014) Explain that students want to learn well when what they learn has a relationship between known knowledge and problems in their environment. Related to this, there are several topics of learning material that need to be mastered by students who have a relationship with the surrounding environment, one of which is building a flat side room. In the mathematics learning process, the topic of flat side space building material is one of the materials at the high school level in grade VIII whose application can be related to daily life. To obtain a solution to a mathematical concept, students are able to solve it by going through several steps that are in accordance with methods and procedures. The concept of the wide volume of flat side space building in junior high school students is very important to master and its application must be fully understood. Instilling the concept of the wide volume of flat-sided space building in junior high school students is not easy, because the area of the building volume is included in geometry and measurement, as other branches of mathematics are essentially abstract, so a mathematics learning method is needed that is able to open up the space of thought and become a bridge of concept understanding between teachers and students (Yazid, 2012: 32). Based on the results of an interview conducted on March 9, 2022 with a grade VIII mathematics teacher, it is explained that learning to build a flat side space is still difficult to understand, judging from the results of the test test description of the flat side space building material on the topic of area the volume of cubes and blocks is still low, students are still difficult to solve the problems given, students are still confused about distinguishing the formula used to solve the area or volume, Students only write short answers without appropriate steps, even at the time the learning process has been given. In line with the results of the research conducted by Hasibuan (2018) That the difficulty of learning mathematics for students on the subject of

building flat side spaces is that students do not understand correctly how to determine the surface area of cubes, blocks, prisms, and pyramids. Students also have difficulty in solving problems related to the volume of limas. To overcome this problem, there is one of the efforts made in responding to this, namely the need for a learning process that can build and provide ample opportunities for students to be able to develop their abilities, so that students can find ideas independently through interaction with their surroundings (Lestari et al., 2016). One of the learning models that can be applied is the *think pair share*.

According to Sutopo et al (2020) *think pair share* It is a cooperative learning model that can be applied to increase student participation, cooperation and a sense of togetherness as well as student responsibility. *Think pair share* is one of the learning activities that is able to activate learning in the classroom (Demirci & Duzenli, 2017). In the TPS learning model, students are directed to group learning activities in pairs in solving a mathematical problem based on togetherness through a process of cooperation between students (Jelatu et al., 2019). In line with the results of the research conducted by (Rismaini & Roza, 2019) that the learning model *think pair share* has a positive influence on students' problem-solving abilities and the results of research conducted by (Nasution, 2017) that by applying the learning model *think pair share* can make students' critical thinking skills improve. Based on the description above, data related to influence testing is required *thnk pair share* to students' problem-solving and critical thinking skills.

RESEARCH METHODS

This research is research *quasi experimen*. The population in this study is all grade VIII students. Based on this population, researchers took samples using *purposive sampling* where in determining the sample based on the suitability of the characteristics with the one to be selected (Johnson, R. B., & Chritensen, 2014). The sample to be used in this study was obtained based on expert recommendations and seen from the results of the average test scores of students. The expert in question is the teacher at the place where the research is carried out. Meanwhile, the average score of mathematics tests is seen from the low results for each class. Expert recommendations and the results of the average scores of the students' mathematics test aim to find out the characteristics of the population and identify the sample to be studied. This study took two class samples.

The sample used was class VIII A as a control class that used conventional learning. Conventional learning is learning that has been applied in schools. In this study, conventional learning uses scientific learning. Meanwhile, in class VIII B as an experimental class, the *think pair share* learning model is used. The research design used was *None equivalent (pretest and posttest) control group design*. The data collection technique in this study is a test technique consisting of *a pre-test* and *post-test* in the form of a test of description of problem-solving skills and students' critical thinking skills consisting of four questions. The data analysis techniques used are descriptive analysis and inferential analysis.

Inferential analysis was carried out to test the research hypothesis, namely: (1). Whether there is a significant difference in the student's problem-solving ability and critical thinking ability between learning *think pair share* and scientific learning, (2). Which learning has more influence on students' problem-solving skills and critical thinking skills. The statistical test analysis used is the test *Hotteling's T2* to see the difference between learning that applies *think pair share* with scientific learning of students' problem-solving and critical thinking skills and tests *independent sample t-*

test to see which learning has more influence on students' problem-solving and critical thinking skills.

RESULTS AND DISCUSSION

The results of the implementation of learning in class VIII A which is the control class and class VIII B as the experimental class. The data described is in the form of test results obtained by students before and after treatment through *pre-test* and *post-test* on the problem-solving ability and critical thinking skills of students in the control class and the experimental class using the learning model *think pair share*.

Table 1. Description of student problem-solving skills data

Variasi	Control		Eskperimen	
	Pretes	Posts	Pretes	Posts
N	30	30	30	30
Mean	27,1	79,8	9,15	82
Standard Deviation	10,1	7,48	3,66	7,03
Min score	10	65	10	70
Score max	50	95	45	95

Based on table 1, it can be seen that in the control class the average increased from 27.1 to 79.8, from the results of *the pretest* and *posttest* scores. In the experimental class, the average increased from 9.15 to 82 results of *the pretest* and *posttest* scores. Furthermore, for the description of critical thinking ability data based on mean scores, standard deviations, minimum scores and maximum scores in the control class and the experimental class are presented in table 2:

Table 2. Description of students' critical thinking skills data

Variasi	**Control**		**Eskperimen**	
	Pretest	***Postest***	***Pretest***	***Postest***
N	30	30	30	30
Mean	16,5	71,7	25,3	78,1
Standard Deviation	6,55	4,25	4,99	5,14
Min score	5	50	5	65
Score max	35	95	45	95

Based on table 2, it was obtained that in the control class the average increase was from 16.5 to 71.7 from the results of *the pretest* and *posttest* scores. In the experimental class, the results of pretest and postes increased from 25.3 to 78.1.

After describing the data on problem solving and critical thinking skills from the results of *the pretest* and *posttest* in the experimental and control classes, a hypothesis test was carried out to find out (1). Whether there is a significant difference in problem-solving ability and students' critical thinking skills between *think pair share* learning and scientific learning, and (2). Which learning has more influence on students' problem-solving skills and critical thinking skills.
The following is a description of the hypothesis test of students' problem-solving and critical thinking skills.

Uji Hypothesis

Hypothesis tests were carried out to find out whether there was a difference in learning average *think pair share* and scientific learning on students' problem-solving skills and critical thinking skills. Before the hypothesis test is carried out, a prerequisite test is carried out, namely the normality test and the homogeneity test. Next, to find out the significant differences in learning models *think pair share* and scientific learning on students' problem-solving skills and critical thinking skills using *SPSS Statistic* 25 through test *Hotteling's T2* with a significant degree α = 0.05. H0 is subtracted if the sig value < 0.05. Here are the test results *Hotteling's* which is done in table 3.

Table 3. Hypothesis Test Results 1

Effect	**F**	**Itself**	**Results**
Hotteling's	5,987	0,004	H0 is rejected

Based on test results *Hotelling's* It can be seen that the GIS value of 0.004 < 0.05 then Ho is rejected, meaning that there is a significant average difference in learning *think pair share* and scientific learning on students' problem-solving skills and critical thinking skills. In other words, there is an influence of learning *think pair share* and scientific learning on students' problem-solving skills and critical thinking skills. Furthermore, to investigate which learning more effects students' problem-solving and critical thinking skills, a test was carried out *independent sample t-test* with a significant degree α = 0.05. H0 is rejected if the significance value < 0.05.

Here are the test results *independent sample t-test* which was carried out for the variables of problem-solving ability and critical thinking ability of students in table 4.

Table 4. Hypothesis Test Results 2

Variabel	**Stuttgart Saintifick**	**Table Tps**	**Itself**
Problem-solving capabilities	22,88	25,93	0,000
Critical thinking	23,67	25,04	0,000

Based on the results in table 4, it shows that the problem-solving ability of students in the Tps class is better than the scientific class with a result of t 25.93; and sig

0.000 < 0.05. In addition, table 4 also shows that the results of students' critical thinking skills in the Tps class are better than those in the scientific class with a result of 25.04; and sig 0.000 < 0.05. Thus, it can be concluded that learning with *think pair share* has a greater influence compared to scientific learning on students' problem-solving skills and critical thinking skills. The results of the analysis that have been described show that the analysis of calculations on students' mathematical problem-solving ability obtained increased learning outcomes based on the average *pre-test* and *post-test* scores in the experimental class and the control class before and after treatment. The average obtained was 27.1 pretests and 79.8 postes, in the control class while the pretests in the experimental class were 9.15 and postes 82.

The results of the description on critical thinking skills obtained increased learning outcomes based on the average score *Pre-test* and *post-test* in the experimental class and the control class before and after treatment. The average obtained is *Pre-test* 16.5 and *Post-tests* 71.7 in the control class, while *Pre-test* in the experimental class of 25.3 and *post-test* 78,1.

Hypothesis test, based on the results of calculations carried out using the *Hotelling's* It was found that there was a significant mean difference in learning *think pair share* and scientific learning on students' problem-solving skills and critical thinking skills. In other words, there is an influence of learning *think pair share* and scientific learning on students' problem-solving skills and critical thinking skills.

In the second hypothesis test that used *independent sample t-test* on the variables of problem-solving ability and critical thinking ability of students obtained that learning with *think pair share* has a greater influence on students' problem-solving skills and critical thinking skills. The results of this study are in line with previous research that obtained results that there is a significant role of the learning model *think pair share* on students' mathematical problem-solving abilities (Rismaini & Roza 2019), in line with the results of research conducted by Kurniawati (2020) that students' critical thinking skills are applied through the model *think pair share* better than the ability to think critically using conventional models and research that Done by (Wicaksono et al., 2017) obtained results that the learning model *think pair share* experienced an increase from before in students' critical thinking skills.

Learning model *think pair share* being a learning model has a greater influence than scientific learning, this is because the TPS learning model is one of the learning models that prioritizes students to play an active role with their group mates through discussions in order to solve the problems given, students are guided to have individual responsibilities as well as in groups or partners (Nadhifah et al., 2016). Another opinion put forward by (Sari et al., 2018) that the model *think pair share* It is a simple learning with many advantages because it can optimize student participation to be able to express their opinions and increase student knowledge, in addition to the TPS model helps students to develop their understanding of the material being taught, develop their ability to be able to share information and draw conclusions. The TPS model has characteristics where students are guided independently, in pairs and sharing with each other to solve problems. Through the model *think pair share* This can allow students to interact optimally, develop a spirit of togetherness and foster an interest in learning. Fahrullisa et al (2018) explains that the *think pair share* has procedures or steps that are set specifically to give students more time to think, answer and help each other with their friends.

The steps of the learning model *think pair share* which is explained by Tirtanto ((2016) that is; 1: Thinking *(thinking)* In this step, the teacher provides problems related to the learning material being taught. When students are given problems,

students will try individually to think of solutions to the given problems; 2. Pairing *(phair)* In this step, the teacher asks students to pair up and discuss what they have gained. As long as time is given, it can make students be able to put the answers together; 3. Sharing *(share)* In this step, the teacher asks each pair of students to share with the rest of the class about the results obtained.

CONCLUSIONS AND SUGGESTIONS

The conclusions of this study are described based on the results and discussions that have been previously presented and it is obtained that: 1). there is an influence of *think pair share* learning and scientific learning on students' problem-solving ability and critical thinking skills. 2). Learning with *think pair share* has a greater influence compared to scientific learning on students' problem-solving skills and critical thinking skills.

Based on the results of the research, the suggestions that can be given are:1). As a teacher, you should use the learning model *think pair share* It is said that in addition to contributing to the ability to solve problems and think critically, Shiva can also be seen based on the characteristics of the model *think pair share* which is able to direct students first to carry out thinking, reflecting and compiling ideas to be able to solve the problems given by the teacher independently. This can also be seen from the findings made by (Sari et al., 2018) that at the stage *Think* The student thinks about the problem given by the teacher individually and this reduces the student to speak, because the student is busy thinking about the answer to the problem given by the teacher, stage *Pair* is the stage where students are paired, in this activity it is seen that students discuss with their partners about the answers obtained at the stage *Think* Discussion steps are implemented so that students who are good at helping their friends who are weak in learning and can share and cooperate with their partners. Students formulate the results of the answers and discuss the correct answers. Phase *Share* Students present the results that have been discussed with their partners, the teacher appoints one of the group pairs to advance to the front of the class, presents the results of the answers to unite opinions and other students participate in discussing and concluding the correct answers. 2). Teachers should develop other mathematical skills in students' mathematics learning.

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