The Effect of Think Pair Share Learning Model to Improve Student's Problem-Solving Ability

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Abstract

Problem solving skills are useful for training students to face increasingly complex problems. Learning models that have not been able to stimulate these abilities need to be applied. Thus, the purpose of this study was to determine the effect of the Think Pair Share learning model to improve students' problem solving abilities. This type of research is experimental research with pretest posttest control group design. The samples in this study were class VIIIA students as the experimental class and class VIIIC students as the control class, each class totaling 32 students. Data collection techniques used interviews, observations, and problem-solving ability test questions on the Pythagorean theorem material. The results showed that the application of the Think Pair Share learning model has been proven to be effective in improving students' problem solving abilities. Based on the results of the increase in students' problem-solving ability tests, the experimental class was higher than the control class (32.5 > 21.88). In addition, the application of the Think Pair Share learning model gives students more time to think deeply about what is being explained or experienced (thinking, answering, and helping each other). In addition, the TPS learning model also provides opportunities for students to think deeply and can help each other.

Keyword: *Cooperative learning model, Think Pair Share, Problem solving ability*

INTRODUCTION

Education is a continuous process to produce a better future human quality (Sujana, 2019). In practice, education must be carried out throughout the ages through the act of learning in all situations of life activities (Mukodi, 2018).These activities can occur if the teacher provides appropriate meaningful learning opportunities so that students can think scientifically, solve problems, think critically, and reflect on every problem that occurs in everyday life (Arestu et al., 2018).The subject that plays an important role in these activities is mathematics, because almost all parts of human life contain mathematics (Fitrianingsih et al., 2019).However, there are still many students who think that mathematics is a difficult and boring subject (Anjarsari et al., 2020; Dirgantoro & Soesanto, 2021; Rawa & Yasa, 2018).Whereas mathematics is a subject that must be studied at all levels of education (Hakim & Windayana, 2016; Utami et al., 2020).

The difficulty of students in learning mathematics is due to its abstract nature so that logical and ordered thinking skills are needed (Aditya & Tatang, 2018; Sartika, 2019). In addition, students also have difficulty understanding mathematics due to a lack of interest in mathematics, resulting in students' inability to learn mathematics skills (Sumantri & Satriani, 2016).. Whereas mathematics plays an important role in all aspects of life, especially in increasing the power of human thought (Sumartini, 2016). One of the important abilities that play a role in this is problem solving ability.

Problem solving is a process to overcome the difficulties encountered in solving problem-based questions (Sumartini, 2016). According to the NCTM, problem solving

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skills have a dual role in the school curriculum, namely as a means or a fundamental tool for learning mathematics and as the main goal in learning mathematics (Amam, 2017).This ability is needed by students to face life in the era of globalization and the rapid development of technology and information (Ariawan & Nufus, 2017).In learning mathematics in schools, teachers usually make problem solving an important part to determine the level of understanding of the learning material and train students to be able to apply their knowledge in different situations. According to Ibrahim, the characteristics of a good problem should be adapted to the student's condition, associated with the material to be studied, have answers/solutions that require exciting and challenging explanations, not too difficult, and not boring (Ibrahim, 2012).While the indicator of problem-solving ability is a process when students carry out activities including identifying elements to solve problems, selecting and implementing problem-solving strategies, performing calculations, and interpreting their findings on the original problem and re-examining the solutions that have been obtained (Akbar et al., 2018).

However, in reality, the problem solving ability of students in Indonesia is still very low (Bidasari, 2017; Rambe & Afri, 2020). This is in with the results of interviews with mathematics teachers of class VIII SMP in Yogyakarta which showed that the problem solving abilities of students still tended to be low. In addition, accordance based on the results of observations in the class, it also shows that when students are given math problems, students tend to write only the final answer without including the steps for doing it. This makes it a little difficult for teachers to check students' mathematical problem solving abilities. Other results obtained from the initial test of problem-solving ability showed that the problem-solving ability of students was still low. Other results show that students already quite understand the problem and implement plans, but students are still weak in making plans and concluding. So far, the tendency of students to solve a problem is to solve it immediately, but the steps in understanding the problem, planning and concluding (looking back) are sometimes not done (Pardimin & Widodo, 2017). Therefore, based on the initial ability test, the average problem solving ability of students tends to be low.

The low problem-solving ability related to the inability of students to use their knowledge to be poured into routine or non-routine problem solving methods or algorithms shows that students are less trained to deal with mathematical problems (Marhaeni et al., 2021).So that students need a cooperative learning model that can make the problem a starting point in their learning. One learning model that accommodates this is Think Pair Share. Think Pair Share is a learning model that is quite effective in increasing learning activities and influencing student interaction patterns (Husna et al., 2013). That way, students are given the opportunity to think in solving problems and collaborate with friends in the form of discussions (Kusuma & Aisyah, 2012). The implementation of the learning begins with thinking independently about solving a problem, then students are asked to discuss the results of their thoughts in pairs (pairs), and ends by sharing the results of thoughts that have been discussed with partners (Rosita, 2013).Several studies have also shown that this learning model is able to improve students' problem solving abilities (Azizah et al., 2019; Latifah & Luritawaty, 2020). Based on the description above, this study aims to determine the effect of the Think Pair Share learning method to improve the problem-solving ability of seventh grade students of junior high school on the Pythagorean Theorem material.

METHOD

Experiment with the design used is the pretest posttest control group design. This research was conducted with two sample classes, namely the experimental class and the control class. The experimental class was given treatment by learning using the Think Pair Share model while the control class used a conventional learning model. The population in this study were all students of class VIII in one of the junior high schools in Yogyakarta, Indonesia totaling 192 students. The sample selection was carried out by purposive sampling by considering the average characteristics of the initial test ability. The class VIIIA became the experimental class with 32 students and class VIIIC became the control class with 32

students. For data collection techniques using interviews, observations, and pretest posttest questions of problem solving abilities on the Pythagorean theorem material. The instruments used in this study were valid and reliable before being used for research.

The implementation of the research begins by giving a pretest of problem-solving abilities in the experimental and control classes. Then proceed with giving treatment, where the experimental class uses the Think Pair Share learning model, while the control class uses a conventional learning model. After the treatment was completed, it was continued by giving a posttest of students' problem-solving abilities. The results of the pretest and posttest were then analyzed. Analysis of the data used in this study is a test of analytical prerequisites in the form of normality and homogeneity tests, paired sample t-test, and independent sample t-test.

RESULTS AND DISCUSSION

Result

The results of the study were obtained using instruments in the form of pretest and posttest problem solving abilities on the Pythagorean theorem material. After the pretest and posttest questions were given, the researcher carried out a calculation process assisted by SPSS 20 software to conclude that the Think Pair Share learning model was more influential than the conventional learning model to improve students' problem solving abilities. Here are the steps for which the tests were carried out:

1. Analysis Prerequisite Test

As a requirement to test the hypothesis to show the effect of the learning model, the data obtained, namely the pretest and posttest data for the control class and the experimental class must meet two assumptions, namely normal and homogeneous.

a. Normality test

In this study, the data obtained were analyzed using SPSS 20 for Windows software, namely the Kolmogorov Smirnov normality test. The results of the pretest and posttest normality tests in the experimental class and control class are presented in Table 1.

Table 1. Normality Test Results

Aspect	Significance	Description
Pretest experimental class	0,133	Normal
Pretest control class	0,259	Normal
Posttest experimental class	0,271	Normal
Posttest control class	0,128	Normal

Table 1 shows that the significance values for the pretest and posttest in the experimental class and control class are normally distributed. Thus, it can be concluded that the distribution of data for students' initial problem solving abilities is normal, both in the experimental class and the control class.

b. Homogeneity Test

Another assumption that must be met for hypothesis testing is that the data must be homogeneous. Homogeneity tests were carried out for pretest and posttest data in the control and experimental classes using the Box's M homogeneity test assisted by the SPSS 20 for Windows software program. The results of the pretest homogeneity test are presented in Table 2

Table 2. Pretest Data Homogenity Test

Box's M	F	Sig.
5,686	1,829	0,139

Based on Table 2. it is known that Box's M value is 5.686 with a significance of 0.139. With pretest data the experimental class and control class are homogeneous. Furthermore, the homogeneity test was also carried out on the posttest data in the experimental class and the control class. The results of the posttest data homogeneity test are presented in Table 3.

Table 3. Posttest Data Homogenity Test

Box's M	F	Sig.
3,408	1,096	0,349

Based on Table 3. it is known that the value of Box's M is 3.408 with a significance of 0.349. With posttest data the experimental class and the control class are homogeneous. Furthermore, the homogeneity test was also carried out on the posttest data in the experimental class and control class.

2. Uji Paired Sample t-Test

Paired sample t-test was conducted to compare the mean of two variables in one group. This means that this analysis is useful for testing whether the treatment carried out has an effect or not by considering the average pretest and posttest. Paired sample t-test was carried out with the help of SPSS 20 software for the following:

a. The effect of the TPS model on students' problem solving abilities

This test was carried out using pretest and posttest data in the experimental class and the results obtained in Table 4.

Table 4. Paired Sample t-Test in Experiment Class

t	Sig. 2 tailed
10,759	0,000

Based on Table 4. shows that sig. 2 tailed < significance level (0.000 < 0.050) and tcount > t table (10,759 > 2,040), then H0 is rejected. This means that there is a difference between the average pretest value and the average posttest value in the experimental group. The average value of pretest problem solving ability before treatment was 49.25 while the posttest average value of problem solving ability after treatment was 81.75. This shows an increase from before the treatment until after the treatment with the Think Pir Share learning model of 32.5.

b. The effect of conventional learning models on students' problem solving abilities

This test was carried out using pretest and posttest data in the control class and the results were obtained as shown in Table 5.

Table 5. Paired Sample t-Test in Control Class

Nilai t	Sig. 2 tailed
18,004	0,000

The results of the paired sample t-Test show that sig. 2 tailed < significance level (0.000 < 0.050), and tcount > ttable (18.004 > 2.080) then H0 is rejected. This means that there is a difference between the average pretest value and the average posttest value in the control group. The average value of the pretest problem solving ability before treatment was 51.25 while the posttest average value of problem solving ability after treatment was 73.13. This shows an increase from before the treatment until after the treatment with conventional learning models is

21.88

3. Independent Sample t-Test

Independent sample t-test was used to determine which learning method had more influence between the TPS method and conventional methods on problem-solving abilities and student learning activities. The test was carried out using independent sample t-Test analysis with the help of SPSS 20 software for windows. The data tested are the results of the posttest experimental class and control class which are presented in Table 5.

Table 5. Result of Independent Sample t-Test

T	Sig. 2 tailed
3,766	0,001

Based on the results of calculations with the help of SPSS 20 software for windows, the value of tcount > ttable (3.766 > 1.998) with a significance value of 0.001 < 0.05 significance with a significance level of 0.000. This means a significant t-value of p (0.000 < 0.05), which means that the problem-solving abilities of students are significantly different. Thus it can be concluded that H0 is rejected, meaning that the application of the TPS method is more influential than the conventional method on the problem-solving ability variable.

Discussion

This study applies the TPS learning method and conventional methods to the subject matter of the Pythagorean Theorem in class VIII. The things investigated in this study include the influence of the TPS method and conventional methods on problem solving abilities and determine which method is more influential between the TPS method and conventional methods on students' problem solving abilities. Based on the results of data analysis carried out, it can be concluded that there are significant differences in the problem solving abilities of students using the TPS learning model and conventional learning models. This can be seen showing the difference in student scores using the TPS method and conventional methods. From the results of further tests showed that learning with the TPS method had more influence on students' problem solving abilities on the Pythagorean Theorem material.

In learning mathematics with the Think Pair Share method, aspects of problem solving abilities are developed in the form of questions containing 3 description questions. The TPS method in the experimental class is done by giving students questions related to problem-solving abilities that must be done alone to find solutions to existing problems. Then the results of individual student thoughts are discussed in pairs with a tablemate (pair). Furthermore, the results of the paired discussion are presented (shared) to other students in front of the class. At the time of this presentation, other students can ask questions or express their opinions if the answer is different from the group of students who are presenting in front. The results of this discussion then become their capital in solving other problems individually.

In this study, the use of the TPS learning model is known to be effective in making students active and making students have good problem solving skills. This is evident from the number of students in the experimental class who experienced a significant increase when given a problem-solving ability question after treatment. This is because the application of the TPS learning model provides opportunities for students to think deeply and can help each other. In addition, TPS is a cooperative learning model that has an explicit defined procedure that gives students more time to think deeply about what is being explained or experienced (think, answer, and help each other) (Ajhar et al., 2020; Nur, 2017; Widati, 2016).To describe the results of data analysis from the research that has been carried out, the following describes the results of the research that has been studied:

1. **Differences in the influence of the TPS learning model**

   Differences in the effect of the TPS method and conventional methods on mathematics learning were analyzed by using the paired sample t-Test. The results obtained indicate that there is an increase in the aspect of students' problem-solving abilities before the treatment until after the treatment with the TPS learning model and conventional learning models. However, the increase in students' problem-solving abilities in the class that applied the TPS model was higher than the class that applied the conventional method. This shows the influence of the TPS model on students' problem solving abilities.

2. **More influential learning models**

   Based on the results of the independent sample t-Test analysis with the help of SPSS 20 software for windows, it was found that the problem solving abilities of students using the TPS learning model and the conventional learning model were significantly different. The results of the analysis also show that learning mathematics with the TPS learning model has more influence on students' problem solving abilities compared to conventional learning models. This can be seen from the posttest average score in the group using the TPS learning model, which was higher than the group using the conventional learning model. Thus it can be concluded that the application of the TPS learning model is more influential than the conventional learning model on students' solving abilities. This is in line with several previous studies which showed that the TPS (think pair share) type of cooperative learning model was considered effective for improving students' problem solving abilities (Kalbuadi et al., 2020; Sutrisno et al., 2020; Turyanto et al., 2019).

CONCLUSION

Based on the results of the study, it was concluded that the application of the Think Pair Share learning model has been proven to be effective in improving students' problem solving abilities. This is because the learning model gives students more time to think deeply about what is being explained or experienced (thinking, answering, and helping each other). In addition, the TPS learning model also provides opportunities for students to think deeply and can help each other.

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