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THE EFFECT PROBLEM POSING AND THINK PAIR SHARE LEARNING MODEL ON STUDENTS' MATHEMATICAL PROBLEM-SOLVING, AND COMMUNICATION SKILLS

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Abstract: The main purpose of this study was to compare and examine the effectiveness of problem posing and think pair share cooperatives learning models on mathematical problem-solving skills, and mathematical communication ability. This study was experimental research with a quasi-experimental design. The samples of the study are 41 students for classroom experiments and 40 students for classroom control. The instruments employed in this study were pre-test and post-test. The instruments are made in essay forms which design to measure students' mathematical problem-solving ability. The result of the study shows that Problem posing and Think-pair share are very effective to improve students mathematical achievements. However, between the Problem-posing and Think-pair share, the Think pair share are more effective than Problem posing, view from the standards of mathematical problem-solving skills, and mathematical communication ability of Junior High School students.

Keywords: Problem Posing, Think-Paired-Share, Mathematical Problem-solving, Mathematical Communication skills.

I. INTRODUCTION

Technology development in mathematical learning process a has gradually change mathematical educational focus from students mathematical achievement to the improvement of students' various ability(Tan & Ang, 2016; Khoerul Umam & Kowiyah, 2018). Although mathematical achievement is important but the needs to improve other students' abilities nowadays was compulsory Mathematical learning process should continue to improve others' ability such as problem-solving skills, communications skills, critical thinking skills, and creative thinking skills(Sanders, 2016; Khoerul Umam, 2018). Paridjo & Waluya (2017) said that mathematical communication skill is vital in learning mathematics. Students should be able to communicate their ideas to others. If students have communication skill, they will be confident in front of the class. Additionally, Umam et al (2017) had overview that problem-solving is play a major process during mathematical learning in the classroom. Before communicating the ideas, students have to master mathematical concept and a problem-solving skill. The higher problem-solving, the more confident students in communicating their mathematical ideas. Corresponding to this information, this research would accommodate to improve was problem-solving skills, and communication skills.

Pugalee (2004) said that nowadays mathematical learning process need to improve students' mathematical problem-solving skill. Problem-solving skill play an important rule in mathematical learning process. Polya (1957) said there are four steps in mathematical problem-solving such as understanding problems, planning, looking back. First, students need to understand the problem. Student should read carefully the problems and identify the important information. After selecting the information, students need to construct their understanding about problem(Genarsih, Kusmayadi, & Mardiyana, 2015). Secondly, students should device a plan what they were going to do to solve a problem. In devising plan, students should overview many mathematical concepts corresponding to problems prior to choose and apply the appropriate concept.

Thirdly, students need to carry out the plan. This step is an important in problem-solving process. This is where students need to apply their understanding and selective mathematical concept to solve the problem(Genarsih et al., 2015; Pugalee, 2004). Students usually transform the problem into mathematical model by using letters, numbers, and others mathematical symbol (Alim, Umam, & Rohim, 2015; Csíkos, Szitányi, & Kelemen, 2012).

The last step, students should look back into their work. Basically, student need to check out whether the answers make sense (Garderen, 2006; Yerushalmy, 2001). They should evaluate their answer by looking back from the first step until the end. If students found any mistake in any step, they should revise their answer. However, if they had believed that the answers had represented the appropriate solving, they should write their final answer.

Another important aspect than problem-solving skills was mathematical communication skills. Paridjo & Waluya (2017) overviewed that mathematical communication skill is important in the mathematical classroom activity. Students who can communicate their mathematical concept will be more confident than the others(Khoerul Umam & Supiat, 2019). This is mainly because students can share their ideas to their peers. If their ideas were incorrect, they can quickly revise their answer. Students who can communicate their mathematical ideas to their friends, will change will be the way students interact with their assignment.

Mathematical Communication skills need to improve not only the written communication but also the verbal communiation. In written communication, teacher should encourage students to communicate their ideas by using words, figures, mathematical symbols, tables and many other forms which represented students' mathematical thinking process. If students' written communication were merely low, teacher should be able to evaluate their answers by giving constructive feedbacks. Muir & Geiger (2016) and Wang (2017) said that teachers feed backs will motivate students to revise and improve their mathematical competences. Meanwhile, mathematical verbal communication can be increase through posing problem and ask students to comment on particular concept or problems. Posing a question to students give teachers an important opportunity to evaluate students mathematical understanding. Student who dare to communicate their mathematical ideas will continue to grow their competence in the future(K. Umam, 2011). Although students had a lot of mistake, they can quickly revise their answers, as they get it.

The above explanation has shown us that mathematical problem-solving and communication skills are compulsory for students. Siswono (2010) Problem posing learning provide a good opportunity for student to pose a question to their peers about the lesson. Students can ask their peers to respond their question. Giving answer and posing question at the same time, will improve student's mathematical communication and problem-solving skills. While think-pair-sharing learning also provide the opportunity for students need to analyze their answer, and sharing their answers to their peers, as well. Think-pair-share cooperative learning model facilitate students to enhance their problems solving skills through communicating their mathematical ideas to their friends. Tint & Nyunt (2015) revealed that cooperative learning has improve students' learning achievement. This research will examine the effectiveness of problem posing and think pair share cooperatives learning model on mathematical problem-solving skills, and mathematical communication ability.

II. METHOD

This study was experimental research with a quasi-experimental design. This research was conducted in two experimental classes which has the same characteristics such as learning habits and the average scores of mathematics achievement. Teacher use Problem posing learning model in the first class while teaching used Think-pair-shared model in the second class. During the treatment in two experimental class, we have provided two different supporting books to improve mathematical problem-solving and communication skills. Population in this study are all students of class VIII which is approximately about 81 students Junior High School consisted of 41 students in the first experimental class and 40 students in the second experimental class. The instruments are made in essay forms which design to evaluate students' mathematical problem-solving and communication skills. Problem-solving instruments was developed through a series of daily life around students environments and instructed students to think carefully in applying an appropriate mathematical concept for given problems.

Data in this research data will be analyze using descriptive and inferential statistics. Descriptive data analysis will focus to present the mean, standard deviation, variants, minimum score and maximum score which is presented the data before and after treatment in two experimental class. The examinations test was conducted in essay forms. Data also will demonstrate the improvement of mathematical problem-solving and communication skills from two experimental class (Class using Problem-posing and Think-pair-share).

To examine the difference of mathematical problem-solving and communication skills between two experimental class, we calculate data from pre- test and post-test using statistic t-test, MANOVA, and t-Benferroni Test. The data were analyzed using

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software SPPS for windows version 20.

III. RESULTS AND DISCUSSION

Data represent the comparison of students' mathematical achievement in two experimental class (before and after the treatment) will be presented as follows, we can be seen in Table 1.

Table 1

Data of Standard competency Achievement

Description	Problem Posing		Think-Pair-Share	
	Pretest	Posttest	Pretest	Posttest
Mean*	50.23	87.09	49.79	82.67
Theoretical Score	100	100	100	100
Maximum Score	68.54	88.79	62.72	96.29
Minimum Score	39.34	76.15	32.91	57.89
Standard Deviation	8.72	8.19	7.78	8.94

**Ideal score 100*

From the above data, we can see that the mean score of two class which is taught by using problem posing model and think-pair-share learning model before treatment was not achieve the standard of mathematical achievement. From table 1, we can overview that the teaching treatment has significantly influence the mean score of two classes which is exceed 75. The class which is taught by problem-posing showed that their mean score is 88.79 while the class which is taught by think-pair-share showed that their mean score is 88.79. This results supported that learning with discussion form had encouraged students improved the learning achievements (Ainley & Ainley, 2011; K. Lee & Lai, 2017; M. Lee, 2018). As consequently, we can inference that the mean score of class using think-pair-shared learning approach get higher the class using problem-posing learning approach.

The result of students of mathematical problem-solving Skills, for problem-posing and think-pair-share will be presented in Table 2, as follows;

Table 2

Data Description of Mathematical Problem-solving Skills

Description	Problem Posing		Think-Pair-Share	
	Pretest	Posttest	Pretest	Posttest
Mean Score*	57.23	85.21	49.79	88.47
Theoretic Maximum Score	63.12	96.18	62.14	97.13
Theoritic Minimum Score	27.89	65.08	23.14	67.13
Standard deviation	10.42	7.43	12.84	10.56
Variants	135.12	62.74	182.17	151.01

*Ideal Score 100

From the above data, we can see that the mean score of students' mathematical problem-solving skills from two experimental classes which were taught by using problem posing model and think-pair-share learning model before treatment was not achieve the standard of mathematical achievement. From table 2, we can overview that the teaching treatment has significantly influence the mean score of two classes which is exceed 75. The class which is taught by problem-posing showed that their mean score of students' mathematical problem-solving skills is 87.21 while the class which is taught by think-pair-share showed that their mean score of students' mathematical problem-solving ability is 88.47. As consequently, we can inference that the mean score of class using think-pair-shared learning approach get higher the class using problem-posing learning approach.

The result of students of mathematical communication skills, for problem-posing and think-pair-share will be presented in Table 3, as follows

Table 3

Data Description of Mathematical Communication Skills

Description	Problem Posing		Think-Pair-Share	
	Pretest	Posttest	Pretest	Posttest
Mean Score*	53.65	85.04	51.50	88.32
Theoretic Maximum Score	67.12	95.02	70.94	97.35
Theoritic Minimum Score	25.84	65.78	28.62	65.63
Standard deviation	11.23	14.69	15.65	13.57
Variants	135.25	119.67	173.26	101.27

**Ideal score 100*

From the above data, we can see that the mean score of students' mathematical communication skills from two experimental classes which were taught by using problem posing model and think-pair-share learning model before treatment was not achieve the standard of mathematical achievement. From table 2, we can overview that the teaching treatment has significantly influence the mean score of two classes which is exceed 75. The class which is taught by problem-posing showed that their mean score of students' mathematical communication skills is 87.21.Siswono (2004) and Khoerul Umam (2011) also revealed that problem posing learning method has increased students' mathematical achievements.

Siswono (2004) identify that problem posing learning can promote students creative thinking. On the other hand, the class which is taught by think-pair-share showed that their mean score of students' mathematical communication ability is 88.47. As consequently, we can inference that the mean score of students' mathematical communication ability class using think-pair-shared learning approach get higher the class using problem-posing learning approach(Li & Shahrill, 2018; Siswono, 2004; Tint & Nyunt, 2015).

The effectiveness of learning model (Problem Posing and Think-pair-share) will be calculated in three different aspects, namely, (1) Standard Mathematical Achievements, (2) mathematical problem-solving skills, and (3) mathematical communication ability will be presented as follows, see table 4.

Table 4

Result of One Sample t-Test

Aspect	Problem Posing		Think-Pair-Share	
	Pretest	Posttest	Pretest	Posttest
Standard Mathematical Achievements	10.662	0.00	10.999	0.00
Mathematical Problem-solving Skills	8.713	0.00	3.655	0.00
Mathematical Communication Skills	7.722	0.00	6.444	0.00

Data from Table 4 has shown us that the t-value of three different aspects were lower than 0.05. This value can be interpreted statistically that H_0 was rejected. As consequently, both Problem Posing and Think-pair-share learning model were effective viewed from three different aspect such as standard mathematical achievement, mathematical problem-solving skills, and mathematical communication skills.

MANOVA test will be conducted to see whether there is any difference in the initial ability from two experimental class both before and after the treatment. The MANOVA Result will be presented as follows, we can see Table 5;

Table 5

MANOVA Result Data Before and After Treatment

	F	*Sig.*
Class (Before Treatment)	0.483	0.525
Class (After Treatment)	9.202	0.000

Table 5 has shown us that data F significance value of the class (Before Treatment) has greater than 0.05. It can be inferenced that there is no difference in the initial ability between Problem-posing and Think-pair-shared class (before the treatment) which is viewed from the standard mathematical achievement, mathematical problem-solving skills, and mathematical communication skills. On the other hand, data F significance value of the class (After Treatment) has lower than 0.05. After the treatment, there is a difference in the effectiveness between Problem-posing and Think-pair-shared class (After Treatment) which is viewed from viewed from the standard mathematical achievement, mathematical problem-solving skills, and mathematical communication skills.

The function of t-Benferroni was conducted to evaluate the different effectiveness between class using problem posing method and class using think-pair-share learning model. The results of t-Benferroni test will be presented in Table 5, as follows.

Table 6

The Results of t-Benferroni Test

	t-Benferroni	$t_{\left(\frac{\alpha}{p};n_1+n_2-2\right)}$
Standard Mathematical Achievement	3.75	2.30
Mathematical Problem-solving Skills	3.36	2. 30
Mathematical Communication Skills	3.05	2. 30

Data from table 6 has shown us that t-Benferroni > t_{tab}. This result can be interpreted statistically that Think-pair-share cooperative learning model is more effective than problem posing learning method which is seen from the standard mathematical achievement, mathematical problem-solving skills, and mathematical communication skills. These results are corresponding with the theoretical review which revealed that Think-pair-share cooperative learning is more effective than problem posing learning method which is seen from three different aspects.

Our research reveal that Think-pair-share cooperative learning model has significantly influence students' achievement, mathematical problem-solving skills, and mathematical communication skills. Several research (Khaleel & Hamdan, 2017; Li & Shahrill, 2018; Tint & Nyunt, 2015) has reported that think-pair-share has gradually improve students to be active in the classroom activities. Tint & Nyunt (2015) who said that the think-pair-share cooperative learning has

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promoted their students to be active in the classroom computer-based learning environment. Although, learning with computer, think-pair share cooperative learning has encourage students to communicate with their peers during learning process. This indicated that think-pair-share learning model can be used either in usual learning environment or computer-based learning environment.

IV. CONCLUSION

Students mathematical achievement has significantly improved in two experimental class. Data have shown that the students' mean score in think-pair-share cooperative learning class get higher than the students' mean score in problem posing method class. The think-pair-share cooperative learning model has encouraged students to promote their mathematical problem-solving skills and mathematical communication skills. Problem posing learning method has promoted student's abilities both mathematical problem-solving skills and mathematical communication skills. The statistical results had shown us that Think-pair-share cooperative learning model is more effective than problem posing learning method which is seen from the standard mathematical achievement, mathematical problem-solving skills, and mathematical communication skills

REFERENCES

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