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Analysis of Students' Mathematical Problem-Solving Ability and Self-Efficacy Through Application of The Think Aloud Pair Problem Solving (TAPPS) Learning Model for Al Manar Private Junior High School Students

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Abstract
This study aims to: 1) determine students' mathematical problem solving abilities and self efficacy after being taught by applying the think aloud pair problem solving (tapps) learning model to students of Al Manar Private Junior High School; 2) Knowing the students' mathematical problem solving ability is assessed from students' self efficacy after being taught by applying the think aloud pair problem solving (tapps) learning model to Al Manar Private Junior High School students; 3) Knowing the difficulties experienced by Al Manar Private Junior High School students in completing the mathematical problem solving ability test which is taught by applying the think aloud pair problem solving learning model (tapps). The type of research used in this research is descriptive qualitative research. This research was carried out in March 2022 in the even semester of the 2021/2022 academic year class VII Al Manar Private Junior High School. The results showed that: 1) The level of mathematical problem solving ability of students with medium and high abilities had the highest proportion, followed by students with low abilities; 2) Students who have high mathematical self-efficacy have high category problem solving abilities as well. Students who have moderate self-efficacy have moderate category problem solving abilities as well. And students who have low self-efficacy have low category problem solving abilities; 3) Difficulty In the high category, students do not experience significant difficulties. In the medium category, students have difficulty understanding concepts so that students experience confusion when solving problems. And in the low category, students have difficulty in all indicators of problem solving ability.
Keywords: Mathematical Problem Solving Ability, Self-Efficacy, Think Aloud Pair Problem Solving.
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1. Introduction

Mathematics education is one part of national education which has an important role. Considering the importance of mathematics, in the national education curriculum, mathematics is one of the subjects that must be given to students. After studying mathematics at school, students are not only expected to understand the mathematics taught, but students are expected to have mathematical abilities that are useful for facing global challenges. This is in line with what was stated by Ariawan and Nufus (2017: 83), where "mathematical learning in schools is not only aimed at making students understand the mathematics material being taught, but other main goals, namely so that students have mathematical reasoning abilities, mathematical communication , mathematical connections, mathematical representation and mathematical problem solving, as well as certain behaviors that students must acquire after he learns mathematics.

In the learning process it should be remembered that at the end of a series of teaching and learning activities, the competences of problem solving, reasoning, connection, communication, representation must already appear as student learning outcomes. Therefore, in the learning process, learning activities should be directed to the emergence of these competencies.

The reality in the field shows that student achievement, especially mathematics, is still low. Based on the results of the international TIMSS and PISA assessments, the 2015 TIMSS, Indonesia was ranked 45th out of 50 participants with an average score of 397. In addition, according to PISA data, in 2012 Indonesia was ranked 64th out of 65 countries, with an average score of 375. The latest 2015 PISA data shows that Indonesia is ranked 61st out of 69 countries with a score of 386. The reflection of the TIMSS and PISA results is Indonesia's lack of training in solving questions with the same characteristics as the questions in TIMSS and PISA.

The characteristics of the TIMSS and PISA questions are questions that are developed referring to mathematical abilities as explained by the Directorate General of GTK Kemdikbud (in Purba 2017:2) explaining that “things that need to be developed in learning mathematics are 1) mastery of mathematical concepts; 2) problem solving ability; 3) the ability to reason and communicate; 4) the ability to think creatively and innovatively”. In line with that, according to the National Council of Teachers of Mathematics (NCTM) (2000: 4) reveals that "the abilities that must be achieved in learning mathematics include: (1) problem solving abilities, (2)

reasoning abilities, (3) communication skills, (4) connection ability and (5) representation ability".

In the 2013 curriculum, it is stated that one of the abilities that students are expected to have in learning mathematics is the ability to solve problems or what is often called problem solving (Depdiknas, 2013). Clark (in Minarni 2018:29), said "mathematical problem solving is central to mathematics learning. It involves the acquisition and application of mathematics concepts and skills in a wide problems". Which means that solving mathematical problems is the center of learning mathematics. This mathematical problem solving involves the acquisition of knowledge and the application of mathematical concepts and abilities in a variety of situations, including non-routine problems, open-ended problems, and real-world problems.

The importance of problem solving skills is reflected in the quote by Branca (Soemarmo and Hendriana, 2014: 23) which states that "mathematical problem solving is one of the important goals in learning mathematics, even the process of solving mathematical problems is the heart of mathematics". In line with this, Wandari (2017: 6) states that "problem solving ability is one of the abilities that must be possessed by students, because this ability is very useful for students when studying mathematics and in everyday life". According to Sadiq (2014: 105) to solve the problem, there are four steps that must be taken: "(1) Understanding the problem, (2) Planning the solution, (3) Implementing the plan, and (4) Interpreting or checking the results".

The problem solving ability of students is currently still relatively low, the low mathematical problem solving ability of students is supported by several previous researchers, Caprioara (2015: 1862) states "The study conducted on students with a significant experience in solving math problems has shown that their results are quite low, even if the problem to be solved doesn't present a high degree of difficulty for that level". This means that research conducted on students who have had previous material experience in solving mathematical problems has shown quite low results, even though the problems to be solved do not present a high level of difficulty.

Saragih (2014:124) states, "In the problem-solving is often found that students are only concerned with the final answer without understanding how the process if the answer is correct or not. This often results in the students' incorrect answers". This means that in problem solving, it is often found that students only focus on the final answer without understanding how the answer process is correct or not. The result that often appears is that "the student's answer is wrong".

Kadir, et al (2018:3), in their research at SMPN 3 Bonegunu stated that "Factors causing low mathematical problem solving skills are the lack of training in matters related to mathematical problem solving abilities and teachers have not used strategies and learning models that can improve students' abilities. students' mathematical problem solving".

The low problem solving ability can also be seen from the results of initial observations and interviews conducted at Al Manar Private Junior High School, that students have difficulty solving problems. The teacher revealed that the students were not used to solving problems with the stages of problem solving. The most difficulties experienced are in the strategy of carrying out calculations, checking the process and results of calculations. The following statement is reinforced by the results of the answers at the time of giving the test at Al Manar Private Junior High School in class VII-1 by giving problem solving ability test questions to 25 students.

The results of preliminary observations of research in class VII of Al Manar Private Junior High School where problem-solving skills in mathematics are based on 4 indicator aspects, namely understanding the problem, planning problem solving, implementing problem solving, and re-examining the results of the settlement.

From the students' answers above, it can be seen in the student's answer process in Figure (a) that students understand the problem given by writing what is known and asked according to the first indicator of problem solving, namely understanding the problem, but at the stage of carrying out the calculation of the problem students are still wrong and students do not check the final answer.

The problem solving of students is low, students do not understand the problem, the settlement plans carried out by students are not directed so that the calculation process has not shown the correct answer. Students also do not check the final answers that have been obtained, even though if this is done it is possible for students to review the answers that have been made.

In the 2013 curriculum, students play an active role in the learning process. Sinambela (2017: 18) argues that "the curriculum is not just a concept, but how a teacher can create good learning strategies that are in accordance with educational standards and can cover three aspects, namely affective aspects, cognitive aspects, and psychomotor aspects". To achieve the cognitive aspect, problem solving skills are needed. As well as other abilities possessed by students, it is intended that students can use these abilities to solve problems in mathematics. The characteristics of a question are called a problem if the question is very closely related to a question that challenges the mind and the problem is not automatically known how to solve it. In solving problems, we must think about how we can solve the problem gradually, so that we can get good and correct conclusions. This ability can be mastered by students well if students master affective abilities, one of which is self-efficacy.

Minarni (2018:132) explains that "Self efficacy is people's beliefs about their abilities to produce a designated level of performance that exerts influence on events that affect their lives". In this case, self-efficacy is the attitude of students' beliefs about their own abilities, so they are able to solve problems or questions given by the teacher.

In relation to mathematical problem solving abilities, Somakin (2010:24) defines "Self efficacy, namely self-confidence in the ability to present and solve mathematical problems, how to learn/work understanding concepts and complete tasks, and the ability to communicate mathematics with peers and students during learning". In addition, according to Simanungkalit (2015: 34) says that: "Self-efficacy is a psychological aspect that has a significant influence on student success in completing assignments and solving problems well". The ability to assess themselves accurately is very important in carrying out tasks and questions asked by the teacher, with self-efficacy it can make it easier for students to do assignments, even more so that it can improve their performance.

In line with Rachmawati (2012: 87) revealed that "individuals with high self-efficacy when faced with unresponsive environmental situations, they will intensify their efforts to change the environment, whereas individuals with low self-efficacy face unresponsive environmental situations, these individuals tend to feeling apathetic, resigned, and helpless". The importance of self-efficacy during learning also applies to mathematics. Students need self-efficacy so that they do not hesitate in maximizing their abilities, so that learning success is achieved and students' mathematics learning outcomes are good. Therefore, self-efficacy needs to be instilled in students from an early age, as a provision for the future in the wider environment, namely the work environment and society.

However, the facts on the ground show that the self-efficacy of Al Manar Private Junior High School students is very low. Based on the results of interviews with seventh grade mathematics teachers at Al Manar Private Junior High School, it can be concluded that there are still many students who complain when working on difficult questions and they do not want to try to solve these problems. There are also some students who do not want to actively participate during learning, for example asking questions to the teacher or answering questions given by the teacher. This unwillingness is motivated by the students' distrust of their mathematical abilities, this can be seen from the students' efforts in solving problems, it appears that in addition to low problem solving abilities, the level of self efficacy is also still low. This aspect can be seen when students get obstacles in understanding the problem, then the student will not do anything to solve it. Students with low self-efficacy tend to avoid difficult and challenging tasks, so that this continues in the behavior of seeing their friends' work rather than students completing them on their own.

This low self-efficacy is also supported by several previous researchers. Azwar (2017:80) stated in his research that "based on interviews with teachers of SMA Negeri 1 Peureulak, it was shown that high school mathematics teachers rarely gave proportional attention to increasing students' self-confidence. When the researcher directly asked some students of class XI SMA Negeri 1 Peureulak, when the learning took place, the students still felt less confident in expressing their opinions and generally only answered questions when appointed by the teacher. When given a problem, students are generally still passive by waiting for answers from friends or from the teacher. In line with Sukoco (2016:12) stating "most of the students of class XI science at SMAN 1 Jetis Bantul are still afraid of making mistakes when asked by the teacher to write and explain their work in front of the class, students are afraid of making mistakes because they are not sure they are able to explain well. The conclusion is the result of direct interviews of researchers to students.

Based on some of the facts above, it can be concluded that students' self-efficacy is still low. Therefore, it is necessary to strive so that students' self-efficacy is high, this is related to the demands for developing student beliefs written in the mathematics curriculum, among others, mentioning that mathematics lessons must instill an attitude of appreciating mathematics in life, namely having curiosity, attention, interest in learning mathematics, independent attitude, tenacity, and confidence in problem solving.

There are many learning models that we can use in an effort to develop these two abilities, one of the learning models that is expected to be in line with the characteristics of mathematics and the expectations of the current curriculum is the Thinking Aloud Pair Problem Solving (TAPPS) learning model. The application of varied learning models is one of the factors that influence student learning activities and outcomes.

Think Aloud Pair Problem Solving Learning Model (TAPPS) is a renewal to improve mathematical problem solving skills. Through the Think Aloud Pair Problem Solving (TAPPS) Learning Method, Wartono (2017: 693) states that the "Think Aloud Pair Problem Solving (TAPPS) learning model is one type of cooperative learning model that trains students to learn actively in solving problems. Think Aloud Pair Problem Solving (TAPPS) learning is a model that can be applied by teachers to encourage students and guide students to actively interact with teachers and fellow students. Students are directed by the teacher through problem-solving questions that require students to use their cognitive structures. optimally, so that students can ask themselves what is related to the material and questions, and understand where their strengths and weaknesses are in solving these questions.

To improve students' mathematical problem solving abilities and self efficacy by considering heterogeneous student circumstances, school conditions, and learning environments. In addition, it can also provide training to teachers to be able to train students' problem solving skills by providing problem solving questions or by applying various learning models. Likewise, self-efficacy can be increased by teacher training to be able to increase student self-efficacy through learning.

Based on the problems above, the researcher is interested in conducting research on "Analysis of Mathematical Problem Solving Ability and Student Self Efficacy Through the Application of Think Aloud Pair Problem Solving (TAPPS) Learning Model in Al Manar Private Junior High School Students".

2. Research Method

Types of research

The type of research used in this research is descriptive qualitative research. Denzin and Lincoln (in Moleong, 2017: 5) state that "qualitative research is research that uses a natural setting that uses a natural setting, with the intention of interpreting phenomena that occur and is carried out by involving various existing methods".

Research Subjects and Objects

The subjects in this study involved seventh grade students of Al Manar Private Junior High School who were given the Think Pair Problem Solving (TAPPS) learning treatment in the even semester of the 2021/2022 academic year with 20 students. Then based on the results of the mathematical problem solving ability test that was tested on students and based on the self-efficacy questionnaire filled in by the students, they were appointed as subjects to be interviewed.

Data analysis

Field observations were carried out to deepen students' ability problems as research subjects. The research instrument that was arranged was adjusted to the formulation of abilities obtained from the conclusions of field observations. The instruments compiled consist of Mathematical Problem Solving Ability Instruments and learning tools. Mathematical Problem Solving Ability Instruments are arranged to get a complete picture of students' ability to understand mathematical concepts. Meanwhile, learning tools are arranged in relation to conditioning students to understand mathematical concepts and learn independently. To ensure that the instruments and learning tools that are prepared are in accordance with the abilities designed as a result of field observations, the accuracy of the instruments and learning tools is validated. Learning using the Think Aloud Pair Problem Solving (TAPPS) model is intended to condition research subject students to get used to understanding mathematical concepts and using them in solving mathematical problems. The implementation of this activity is carried out after the entire series of learning activities using the Think Aloud Pair Problem Solving (TAPPS) model has been completed. The test activities and filling out the questionnaire were carried out honestly and transparently, the answer sheets were corrected, and analyzed using the Miles and Huberman model including: data collection (data collection), data reduction (data reduction) the results of the concept understanding ability test and learning independence questionnaire, data presentation (data display), and conclusions (conclusion) and verification (verification). Interviews were conducted on the research subject students based on the results of the assessment of students' answers to the problem-solving ability test and mathematical self-efficacy. Interviews with teachers were conducted to obtain comparative data on the assessment descriptions of students' answer sheets and the results of the descriptions of interviews with students (data triangulation). Data analysis was carried out after the test and triangulation activities were completed. Data analysis was carried out in the form of quantitative descriptions and qualitative descriptions to produce research findings and draw conclusions. Research results in the form of a description of the answers to the formulation of the problem posed in this study. From the results of this description, a discussion is carried out by comparing it to the theory and the results of other similar studies to get a broader picture of problem solving and its relation to mathematical self-efficacy. This description of the results and discussion will produce conclusions from the research conducted. The following is a chart in this study depicted as Figure 1.

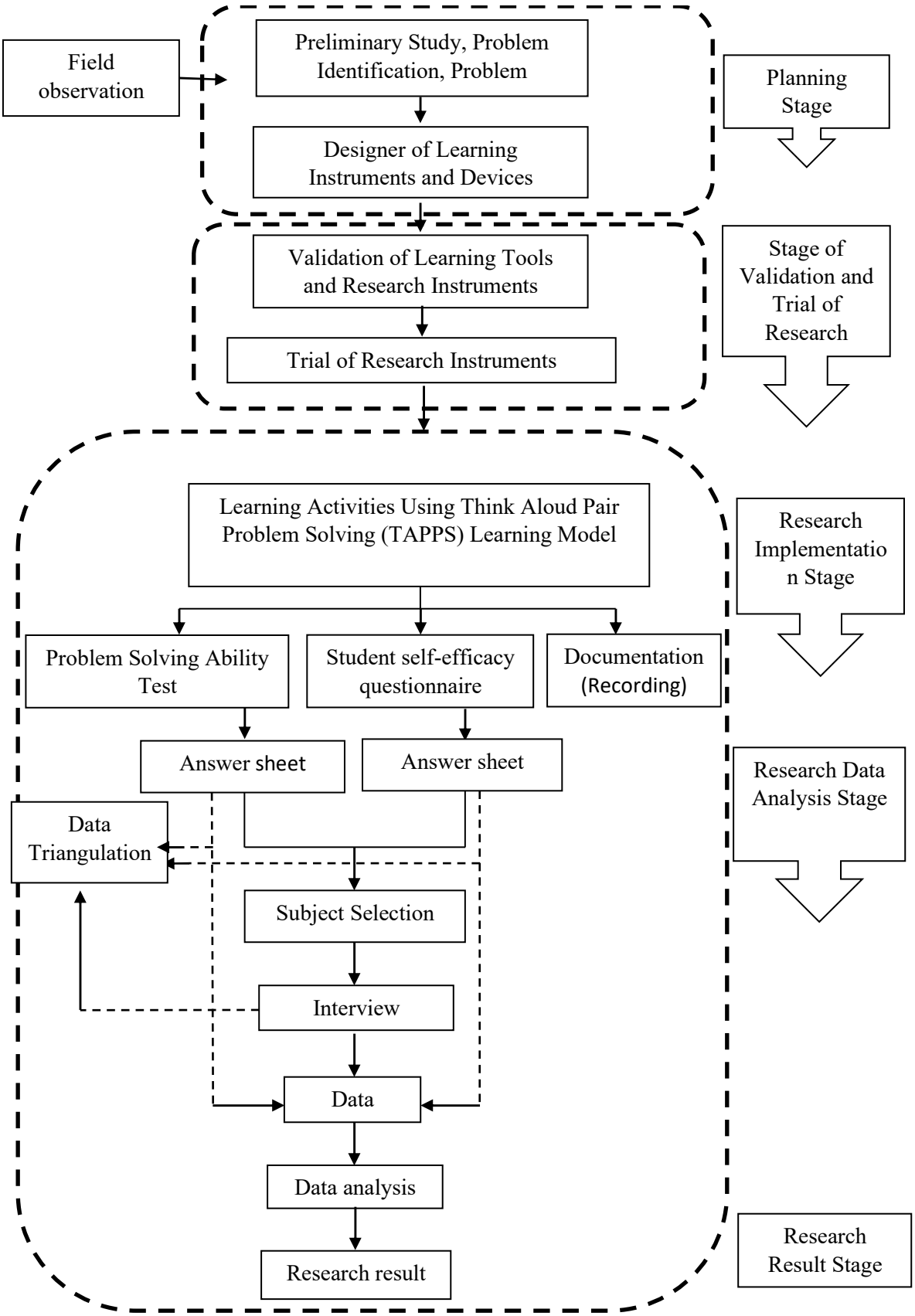

Figure 3.1. Research Design

Research Instruments

The instrument used to measure problem solving ability and mathematical self-efficacy is in the form of a written test. This test is given after the Think Aloud Pair Problem Solving (TAPPS) model is implemented. This test is structured referring to the indicators of the ability to understand mathematical concepts. Many of the questions used in this instrument are 4 items in essay form.

3. Research Results

Description of Students' Mathematical Problem Solving Ability

The value of the students' problem-solving ability test results obtained from 20 people was described statistically spread over 3 criteria, namely low, medium, high. The distribution of students' mathematical problem solving abilities is presented in Table 1.

Table 1. Test of Students' Mathematical Problem Solving Ability Levels

No	Value Interval	The Number of Student	Percentage	Rating Category
1	0 ≤ MPSA < 65	3	15%	Low
2	65 ≤ MPSA < 80	9	45%	Medium
3	80 ≤ MPSA < 100	8	40%	High
The highest score		95,31		
Lowest Value		45,31		
Range		50,00		
Average		75,70		
Standard deviation		11,86		

Description: *MPSA = Mathematical Problem Solving Ability*

Based on Table 1 shows that there are students with low category student problem solving abilities as many as 3 people (15%). There were 9 students in the medium category (55%), and 8 students in the high category (40%). From the description of this distribution, it can be concluded that the level of students' mathematical problem solving ability is mostly in the medium category.

Description of Student Self-Efficacy

The students' self-efficacy scores obtained from 20 people were described statistically spread across 3 criteria, namely low, medium, high. The distribution of students' mathematical self-efficacy is presented in Table 4.7. In Table 4.7 below, the percentage of students' self-efficacy level test results based on high, medium, and low categories can be seen in Table 2.

Student Self-Efficacy Level

No	Value Interval	The Number of Student	Percentage	Rating Category
1	score SE ≥ $\bar{X} + SD$	8	40%	High
2	$\bar{X} - SD \leq score\ SE \leq \bar{X} + SD$	6	30%	Medium
3	score SE ≤ $\bar{X} - SD$	6	30%	Low
The highest score		3,83		
Lowest Value		2,42		
Average		66		
Standard deviation		10,68		

Description: SE score = Average self-efficacy score of each student
($\bar{X}$) = Average self-efficacy scores of all students
SD = Standard deviation of each student

Based on Table 2, it can be seen the level of student self-efficacy with the Think Aloud Pair Problem Solving Learning model. There are 8 students with high self-efficacy (40%), 6 students with moderate self-efficacy (30%), and 6 students with low self-efficacy (30%).

4. Research Discussion

This study focuses on the analysis of the problem-solving ability and mathematical self-efficacy of students after using the think aloud pair problem solving learning model.

In improving the problem-solving process and students' mathematical self-efficacy, many methods have been developed by teachers, both through teaching materials approaches, as well as original innovations found by themselves. In this study, learning uses a cooperative learning model of think aloud pair problem solving which is very helpful for students in planning solutions so that they are able to solve problems related to problem solving and mathematical self-efficacy. All are directed at the efforts of students to master competence or learning objectives.

Think aloud pair problem solving learning model really helps students in improving their problem solving

abilities and self-efficacy. Maula (2014: 19) in a study entitled Learning Effectiveness of the Worksheet Assisted TAPPS Model on Problem-Solving Ability in Circle Material, while the results of his research showed that the average problem-solving ability of students in the TAPPS model was higher than the average problem-solving ability of students in the TAPPS model. expository learning, the percentage of students' learning completeness in the TAPPS model is higher than the percentage of students' learning mastery in expository learning.

In the learning process which was carried out for four meetings in class VII of Al Manar Private Junior High School that the problem-solving abilities and self-efficacy of students were getting better after the Think aloud pair problem solving learning model was applied compared to previous learning which still used conventional learning in the form of lectures or explaining theories. just. Nurastiyani's research (2014:165) entitled Comparison of Problem Solving Ability of Students Using TTW and TAPPS Learning Strategies, while the results of her research show that class VIII students on circle material use cooperative learning with TTW strategy and class VIII students' problem solving abilities on circle material which uses cooperative learning with the TAPPS strategy, the following conclusions are obtained: (1) the problem-solving abilities of class VIII students in the circle material using cooperative learning with the TTW strategy can achieve complete learning; (2) the problem solving ability of class VIII students on the circular material using cooperative learning with the TAPPS strategy cannot achieve complete learning; and (3) the problem-solving ability of class VIII students on the circle material using cooperative learning with the TTW strategy was better than the problem solving abilities of class VIII students on the circle material using cooperative learning with the TAPPS strategy.

Of the 20 students for problem-solving abilities in the "high" category as many as 40% totaled 8 students, the "medium" category as many as 45% amounted to 9 students, and the "low" category as many as 15% amounted to 3 students. On the indicators of students' mathematical problem solving abilities, namely (1) indicators of understanding the problem of the "high" assessment category as many as 15 students are able to understand the problem well, (2) indicators of planning problems in the "Medium" assessment category as many as 2 students are able to analyze and make problem solving with correct, (3) the indicator of solving the "Medium" assessment category problem as many as 5 students were able to solve the problem correctly, (4) the indicator re-examined the "Medium" assessment category as many as 5 students were able to show that the answers given were rechecked correctly.

Then for self-efficacy abilities with "low" abilities as many as 30% totaling 6 students, 30% "medium" abilities totaling 6 students, and "high" abilities as many as 40% totaling 8 students. On the indicators of students' mathematical self-efficacy abilities, namely (1) the level indicator of the "High" assessment category as many as 7 students have good confidence in their abilities to the level of difficulty of the task or activity, (2) the generality indicator of the "Medium" assessment category as many as 12 students. have good confidence in carrying out a certain task or activity, (3) the strength indicator for the "Medium" assessment category as many as 8 students have confidence in carrying out tasks from various activities. Subaidi's research (2016:64) entitled Student Self Efficacy in Solving Mathematical Problems, while the results of Self efficacy research affect how individuals think, feel, motivate themselves, and act. Self-efficacy is an individual's belief about his ability to organize and complete a task needed to achieve certain results. The dimensions of Self-Efficacy used as the basis for measuring individual Self-Efficacy are magnitude, strength, and generality. Strong or high Self-Efficacy is needed by students in solving these mathematical problems so that they can achieve success in learning. Students with high Self-Efficacy will be better able to survive facing these math problems, easily solve math tasks and problems, and failure to solve math problems is considered to be due to a lack of effort or learning. On the other hand, students with weak or low Self-Efficacy tend to be vulnerable and give up easily in facing these math problems, have difficulty solving math tasks and problems, and the failure to solve math problems is considered to be due to their lack of mathematical ability.

Based on the level of students' mathematical problem solving ability, it is dominated by students with moderate category abilities. In addition, there are 8 students who have a high level of problem solving ability and 3 students who have a low level of problem solving ability. In addition, the results of students' answers related to the answers to the students' mathematical problem solving tests given overall have not been good. This is because students are still not used to working on questions that lead to problem solving.

Students' mathematical problem-solving abilities in terms of self-efficacy are 20 students with self-efficacy on each indicator, namely (1) high level indicators as many as 7 people, medium as many as 7 people and low as 6 people; (2) high strength indicator as many as 7 people, medium as many as 8 people and low as many as 5 people; (3) high generality indicators as many as 5 people, medium as many as 12 people and low as many as 3 people.

5. Conclusion

1. The students' mathematical problem solving ability with the think aloud pair problem solving model is mostly by students with moderate abilities but the average value of students is in the medium category. This means that students have been able to complete the mathematical problem solving ability test well. Then on

the mathematical self-efficacy of students with the think aloud pair problem solving model, the most students with high abilities are in the high category on average. This means that students have been able to complete students' mathematical self-efficacy well.

2. Students who have high mathematical self-efficacy have high category problem solving abilities as well. Students who have moderate self-efficacy have moderate category problem solving abilities as well. And students who have low self-efficacy have low category problem solving abilities as well.
3. Difficulty in mathematical problem solving skills in problem-based learning, as follows:
   a. In the high category, students did not experience significant difficulties.
   b. In the medium category, students have difficulty understanding concepts so that students experience confusion when solving problems.
   c. In the low category, students have difficulty in all indicators of problem solving ability. Students are not able to use the solution method so they are not able to solve the problem.

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