

Analysis of Mathematical Problem Solving Ability Through Application of Think Aloud Pair Problem Solving Learning Model in State Junior High School Al Manar

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Abstract. This research has two purposes. 1) Applying a verbal problem-solving model to Al Manar Middle School students in pairs to determine the students' problem-solving abilities. 2) Determine the student's difficulty in completing the math problem-solving ability test. This test teaches students to apply problem-solving learning by thinking aloud in pairs. The study described here is of a descriptive qualitative nature. Class VII children participated in a study conducted during T.A. 2021/2022. As a result, we found the following: 1) Intermediate and high-achieving students had the highest level of mathematics problem-solving ability, followed by low-ability students' mathematics problem-solving ability. 2) Degree of Difficulty of Tasks Students have no problem with tasks classified as high level. Students who fall into the middle category have difficulty understanding basic concepts and become confused when trying to solve problems. Students fall into the bad category if they struggle on all indicators of their problem-solving skills.

Keywords: Problem Solving, Think Aloud Pair Problem Solving.

1 Introduction

The teaching of mathematics is one component of the overall education system that plays a significant role. Given the significance of mathematics, it is a requirement that students study mathematics as part of the national curriculum. Students are required to study mathematics. After completing mathematics coursework in school, students are not only expected to be able to comprehend the material that was covered, but they are also expected to have the mathematical skills necessary to solve problems that are relevant to real-world situations.

Therefore, during the process of learning, activities designed to foster learning are geared toward the development of these skills and abilities.

The data collected on the ground indicate that overall academic achievement among students, particularly in the area of mathematics, remains dismal. Indonesia received an average score

of 397, placing it 45th out of 50 countries that participated in the international tests TIMSS and PISA in 2015. TIMSS placed Indonesia in this position. In addition, based on the data provided by PISA, in 2012 Indonesia was ranked 64th out of 65 nations, with an average score of 375. This placed Indonesia in the middle of the pack. The most recent PISA statistics from 2015 reveals that Indonesia has a score of 386, placing it 61st out of 69 nations in the rankings. The conclusion that can be drawn from the findings of TIMSS and PISA is that Indonesia performed worse than expected when asked to solve problems with the same characteristics as those found in TIMSS and PISA.

It is stated in the curriculum that one of the abilities that students are expected to have in order to understand mathematics is the capacity to solve issues or often solve problems. This is one of the abilities that is considered essential (Depdiknas, 2013). According to Clark, who is quoted in Minarni 2018:29, "the focus of mathematics learning is the process of mathematical problem solving." It requires the learning of mathematical principles as well as the application of mathematical abilities to a diverse array of issues. indicating that the process of solving mathematical problems lies at the heart of mathematical education. In order to solve these mathematical issues, you will need to acquire the necessary knowledge and use your mathematical talents and concepts in a wide variety of contexts, such as problems that are not routine, problems with open-ended solutions, and questions that are based in the real world. Students are expected to take an active part in the learning process throughout the curriculum for the year 2013. According to Sinambela (2017: 18), "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. Problem-solving abilities are required in order to accomplish the cognitive component. It is expected of students that they will be able to apply the talents discussed here to the solution of mathematical problems, in addition to the students' other abilities. The features of a question are called a problem if the question is closely related to a question that challenges the mind and the problem is not immediately known how to solve it. In other words, a problem is a question that has the characteristics of a question. When we are trying to solve problems, we need to think about how we may solve the problem in stages, so that we can reach conclusions that are reliable and accurate.

The statement "mathematical problem solving is one of the important goals in learning mathematics, even the process of solving mathematical problems is at the center of mathematics" is a quote from Branca (Soemarmo and Hendriana, 2014: 23) that demonstrates the significance of having problem-solving skills. In keeping with this idea, Wandari (2017: 6) asserts that "the ability to solve problems 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" (students will find it helpful to have this ability when solving problems in both the classroom and in real life. According to Sadiq (2014: 105), there are four actions that must be followed in order to fix the problem. These phases are as follows: "(1) Fully grasping the nature of the issue at hand; (2) Formulating a strategy for addressing the issue; (3) Carrying out the strategy; and (4) Analyzing or confirming the findings."

The capacity of students to solve problems is currently at a relatively low level, and the low level of students' ability to solve mathematical problems is backed by the findings of various

earlier scholars. According to Caprioara (2015: 1862), "Studies conducted on students with significant experience in solving mathematical problems have shown that their results are quite low.," and this is the case even if the problem that needs to be solved does not present a particularly high level of difficulty for that level. This indicates that research carried out on students who have had past expertise in the material aspects of solving mathematical problems has revealed fairly low results, despite the fact that the problems to be solved do not provide a particularly high level of difficulty.

According to Saragih (2014:124), "In the problem-solving, it is often seen that students are only concerned with the final result without knowing how the process if the answer is correct or not." [Citation needed] This frequently leads to the kids providing answers that are inaccurate. This means that when it comes to issue solving, it is common to find that pupils are just concerned with the final result, without making an effort to comprehend whether or not the response process is accurate. The conclusion that "the student's answer is erroneous" frequently emerges as the consequence of this situation. In their study conducted at SMPN 3 Bonegunu, Kadir et al. (2018:3) came to the conclusion that "Factors causing low mathematical problem solving skills are the lack of training in matters relating to mathematical problem solving abilities and the fact that teachers have not used strategies and learning models that can improve students' abilities." kids' ability to solve mathematical problems".

Students at Al Manar Private Junior High School have trouble solving problems, which is one indication that the school's students have a low problem-solving skill. This finding was gleaned from the findings of first observations and interviews done at the school. The instructor discovered that the students were not accustomed to working through the stages of problem solving when they solved difficulties. The method of carrying out calculations, as well as checking both the process and the results of computations, has shown to be the source of the majority of the challenges encountered. The following assertion is supported by the outcomes of the questions that were asked and answered during the test that was administered at Al Manar Private Junior High School's class VII-1, which was comprised of 25 students. The test assessed the students' capacity to solve problems.

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Low levels of student problem solving, students who do not understand the problem, and students whose plans for completing the task are not guided, which means that the calculating process has not provided the correct answer. Students also do not check the final responses

that have been received, despite the fact that if this were done, it would be feasible for students to review the answers that have been produced. Students do not verify the final answers.

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One of the many possible educational approaches we could use to help with these two skills is called "Thinking Aloud Pair Problem Solving" (TAPPS). This instructional approach is meant to align with the characteristics of mathematics and the requirements of the current curriculum. The constructivist learning model is another approach to education that aspires to have these characteristics. Various models of learning are available for our use. One of the factors that goes into determining students' learning activities and outcomes is the use of various learning models.

Instructional Use Only Think Aloud Pair Problem Solving (TAPPS) is an abbreviation for a course that aims to improve one's ability to solve mathematical problems by working together with a partner. "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," writes Wartono (2017: 693). One such cooperative learning model that teaches students to work together to find solutions to problems is the Think Aloud Pair Problem Solving (TAPPS) Learning Model. Teaching Strategy Based on Think-Aloud, Problem-Solving (TAPPS) This is made possible by utilizing the TAPPS (Think Aloud Pair Problem Solving) Learning Strategy. There is a paradigm called Think Aloud Pair Problem Solving (TAPPS) that teachers can use to get their students more involved in class and help them learn from their teachers and each other. Teachers can use this paradigm to motivate students and guide students to actively connect using TAPPS. This is a model that teachers can utilize. Learning through the Think Aloud Pair Problem Solving (TAPPS) method. The instructor leads the class through a series

of problem-solving problems, each of which requires the students to make use of the cognitive frameworks that they have acquired up until this point in the lesson.

Enhancing students' problem-solving abilities in mathematics while taking into account the diverse personal circumstances of individuals, as well as the varying circumstances of their educational institutions and learning environments. In addition to this, it can provide training for teachers so that they are better able to instruct students in the art of problem solving. This can be accomplished by presenting students with issues that they need to solve or by employing a number of learning strategies..

"Analysis of Students' Mathematical Problem Solving Ability Through the Application of Think Aloud Pair Problem Solving (TAPPS) Learning Models in Al Manar Private Junior High School Students."

2 Research Method

Types of research

In this study, descriptive qualitative research was used as the research method. According to Denzin and Lincoln quoted in Moleong (2017):5, "Qualitative research is research that makes use of the natural environment for the purpose of interpreting what happens, and is carried out using many existing methods."

Research Subjects and Objects

Twenty students in the seventh grade at Al Manar Private Junior High School participated as the study's subjects. During the even semester of the 2021/2022 school year, these students received a learning treatment known as Think Pair Problem Solving (TAPPS). After that, on the basis of the results of the mathematical problem-solving ability test that was administered to students who had filled in the appropriate sections of the questionnaire, those students were selected as interview subjects.

2.1 Data analysis

The pupils' abilities as study subjects were investigated in greater depth through the use of field observations. The research instrument that was set up was modified according to the capabilities that were derived from the findings of the field observations. Learning tools and mathematical problem-solving ability instruments make up the collection of instruments that have been compiled. Capacity for Analyzing and Solving Mathematical Problems The configuration of the instruments is done so that a comprehensive image of the students' capacity to comprehend mathematical concepts can be obtained. While the learning tools are organized in such a way as to prepare pupils to understand mathematical concepts and learn on their own, the learning tools themselves are independent learners. Validation of the instruments' and learning tools' accuracy is performed in order to make certain that the prepared instruments and learning tools are in accordance with the capabilities that were designed as a consequence of observations made in the field. The purpose of education based on the Think Aloud Pair Problem Solving (TAPPS) model is to accustom students of research fields to the habit of absorbing mathematical ideas and putting those ideas to use in the process of solving mathematical problems. After every single one of the instructional activities based on the Think Aloud Pair Problem Solving (TAPPS) model has been finished, the next

stage is to carry out the execution of this specific activity. The exercises and questionnaire were completed in an open and forthright fashion. The corrected worksheets were analyzed according to the Miles and Huberman model, which included the following steps: data collection, data reduction, data presentation, data presentation, conclusions, and verification (verification). Interviews with students who participated in the study were conducted after analysis of their responses to a test measuring their aptitude for solving mathematical problems provided a starting point for the research. Triangulation and other operations were carried out after the test was finished, and then the data was analyzed. Both quantitative and qualitative descriptions of the data were analyzed to produce the study's findings and draw conclusions. The results of this investigation are presented in the form of a narrative account of how the research questions were answered. The findings of the research will be analyzed, and conclusions will be derived from the discussion and presentation of the data. The following is a chart that is included in this research and is designated as Figure 1.

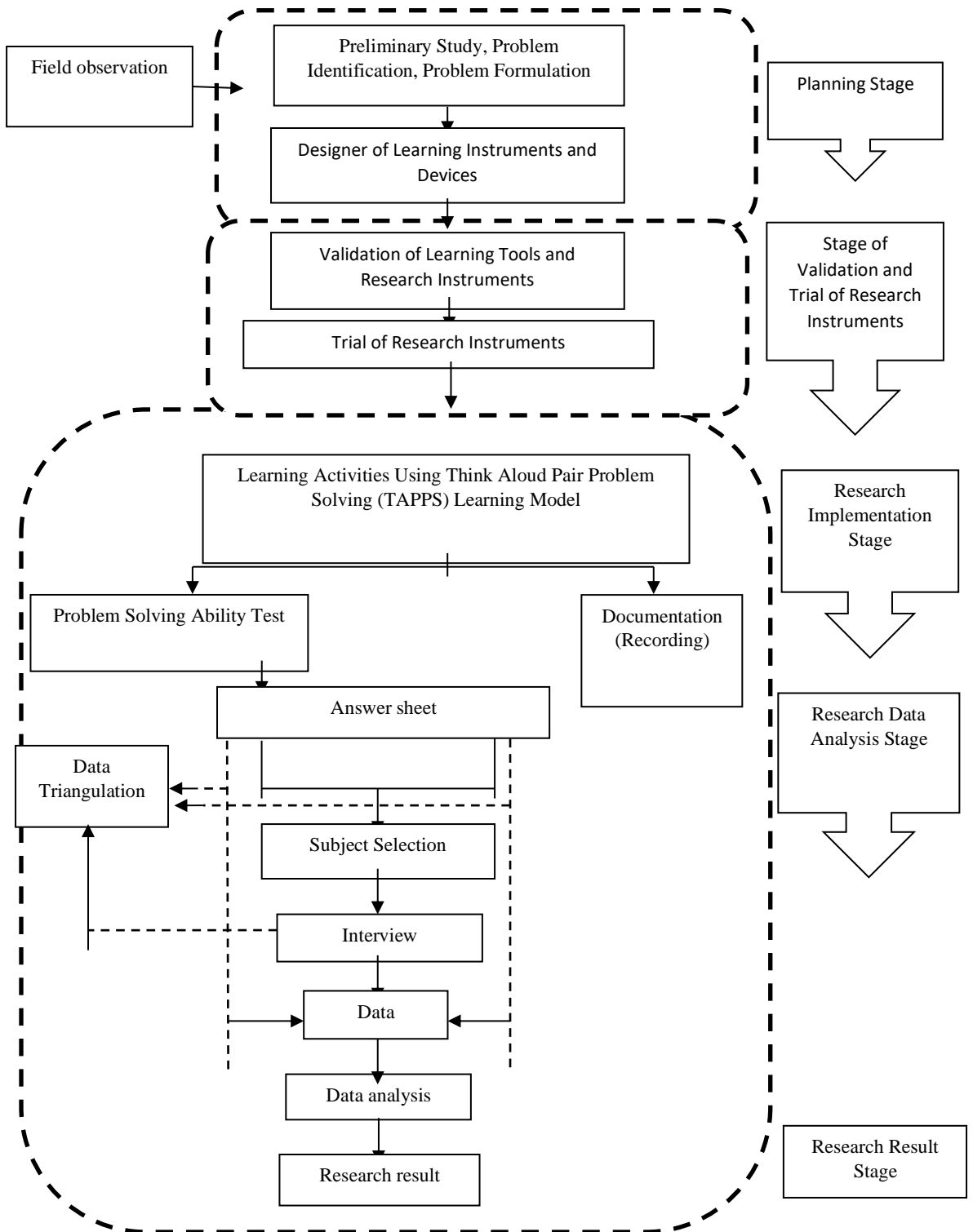


Figure 1. Research design

Research Instruments

A written examination is the instrument that is used to examine one's ability to solve mathematical problems. After the Think Aloud Pair Problem Solving (TAPPS) paradigm has been deployed, students will be required to complete this test. This examination is organized with reference to indicators of a candidate's capacity to solve mathematical problems. The majority of the questions on this assessment are in the form of four-item essays.

3 Results

Description of Students' Mathematical Problem Solving Ability

The value of the students' problem-solving ability test results acquired from 20 individuals was statistically classified as being spread throughout three criteria, namely low, medium, and high. Table 1 displays the mathematical problem-solving abilities of pupils according to their respective distributions.

Table 1. Trial of mathematical problem-solving abilities

No	Value Interval	Total Students	Percentage	Rating Category
1	$0 \leq \text{KPMM} < 65$	3	15%	Low
2	$65 \leq \text{KPMM} < 80$	9	45%	Medium
3	$80 \leq \text{KPMM} < 100$	8	40%	High
The highest score		95,31		
Lowest Value		45,31		
Range		50,00		
Average		75,70		
Standard deviation		11,86		

According to the data shown in Table 1, there are as many as three kids who fall into the low group of student problem solving abilities (15 percent). There were 9 pupils who fell into the middle category, which accounts for 45 percent of the total, and there were 8 kids who fell into the high category (40 percent). It is possible to draw the following conclusion from the description of this distribution: the pupils' ability to solve mathematical problems falls, for the most part, into the medium category.

4 Discussion

After applying the think aloud pair problem solving learning model, the primary objective of this investigation is an investigation of the method by which students' mathematical problem-solving abilities develop.

Many strategies have been established by educators with the goal of enhancing the processes by which students solve mathematical problems. These strategies have been developed both via the use of instructional materials and through the educators' own unique ideas. A cooperative learning model of think aloud pair problem solving is used in this investigation. This model is very helpful for students to prepare solutions in order for them to be able to

tackle problems that are related to mathematical problem solving. All of these focus on the efforts that students are making to master certain learning objectives or competencies.

The Think-Aloud-Pair Problem Solving Learning Model is an Excellent Tool for Assisting Students in Improving Their Capabilities in the Area of Problem Solving. Think-Aloud-Pair is an Acronym for Think-Aloud-Pair Problem Solving Learning Model. Maula (2014: 19) found that students in the TAPPS model had a higher problem-solving ability on average than students in the TAPPS model, despite the fact that the findings of his research indicate that the average problem-solving ability of students in the TAPPS model is higher than the average problem-solving ability of students in the TAPPS model. The study was titled Learning Effectiveness of the Worksheet Assisted TAPPS Model on Problem-Solving Ability in Circle Material. Because of this, the percentage of students who have mastered their learning in accordance with the expository learning standard is lower than the number of students who have completed their learning in accordance with the TAPPS model.

It was found that students' problem-solving abilities were getting better after the Think aloud pair problem solving learning model was applied during the learning process that was carried out for four meetings in class VII of Al Manar Private Junior High School. This was discovered during the learning process that was carried out for four meetings. When compared to earlier learning, which solely consisted of lectures or explanations of various theories, conventional learning, such as the kind described above, was still applied. According to

The problem-solving abilities of the 20 students were ranked as follows: the "high" category had as many as 40 percent of the students, which totaled 8 students; the "medium" category had as many as 45 percent of the students, which totaled 9 students; and the "low" category had as many as 15 percent of the students, which totaled 3 students.

Students who fall into the moderate category aptitude-wise dominate this category, as measured by their level of proficiency in the ability to solve mathematical problems. In addition, there are a total of 8 students who have a high level of ability to solve problems, while there are a total of 3 students who have a low level of capacity to solve problems. In addition, the outcomes of the students' answers related to the answers to the students' mathematical problem solving tests given overall are not very encouraging. This is due to the fact that pupils are not yet accustomed to engaging in activities that involve problem-solving questions.

5 Conclusion

The ability of the students to solve mathematical problems using the think-aloud pair problem solving approach is predominantly held by students with moderate abilities, but the average value of the students falls into the category of students with medium abilities. This indicates that students were successful in completing the mathematical problem-solving abilities test that was given to them..

Difficulty in the ability to solve mathematical problems in problem-based learning, as will be shown in the following: a.Students that fell into the high category did not report experiencing any major challenges.b Students who fall under the medium category have difficulties understanding concepts, which leads to confusion when trying to solve problems.c. Students who fall within this category struggle with all of the many indicators of their capacity to solve

problems. The students are unable to apply the solution approach, which means that they are unable to find a solution to the problem.

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