

# Analysis Mathematical Problem Solving Skills of Student of the Grade VIII-2 Junior High School Bilah Hulu Labuhan Batu

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**Abstract:** This study aimed to analyze the students' mathematical problem solving ability of class VIII-2 SMP Negeri 3 BilahHuluLabuhanBatu on linear equations and inequalities of one variable's material. The research instrument used a test. This type of research is qualitative descriptive. The subjects were students of class VIII-2 BilahHuluLabuhanBatu2016/2017 academic year which amounted to 31 people. Based on the results of research conducted, shows the percentage of students' ability to understand the problem reached 87.10% and in the excellent category, the percentage of problem-solving ability of students to plan and 40.32% in the unfavorable category, the percentage of the student's ability to solve the problem according to plan 21.19% and classified in very less, the percentage of the student's ability to re-examine the results obtained 48.39% and in the unfavorable category, while the average percentage reached 49.25% and in the unfavorable category.

**Keywords:** Mathematical Problem Solving Ability.

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## I. INTRODUCTION

Education in each discipline helps students to think, also helps students to be responsible for his thoughts. Attitude and way of thinking can be developed through a process of learning math, because math is a means of thinking, logical thinking methods, structure and linkages between the strong and clear concept. Thus educators no longer doubt that mathematics can train our ability to think rationally so that it can be a good problem solver, because mathematics serves as a tool for problem-solving, communication, reasoning patterns of thinking and connectedness with other aspects.

But lately raised various issues concerning the quality of education that has not met expectations, especially mathematics education. Indonesia quality math education on a national scale is still low, although schools in the country for a long time already have experience in applying mathematics courses, the result achieved is far from satisfactory. One cause of low mathematics learning outcomes of students because many students who think math is difficult to learn and characteristics of abstract mathematics that students think math is a frightening specter.

Especially if a given problem is related to a story about the problem solving ability of everyday life. Students difficulties in solving problems in the form of problem solving and students find it difficult to interpret the given problem in the form of word problems into mathematical models. Thus, students are not able to resolve the problem given that students tend to draw conclusions to perform the operation numbers that exist in the matter of the story without understanding what the problem is given in the matter. Where the problem-solving usually involves some combination of concepts, requires the ability to think and skills of students. So if given a different matter with the questions that were previously difficult to work on the problems of the students.

One of the activities in mathematics that are considered important enough by both teachers and students at all levels from elementary through high school is a problem-solving abilities. It is appropriate in Subjects Mathematics Content Standards (SIMPM) for all levels of primary and secondary education stated that the purpose of mathematics courses in schools is that the students are able to:

1. Understand the mathematical concept, the relationship between concepts and apply concepts or algorithms, flexible, accurate, efficient, and precise in troubleshooting.
2. Using the reasoning in the patterns and nature, perform mathematical manipulation in making generalizations, compile evidence, or explain mathematical ideas and statements.
3. Solve problems that include the ability to understand the problem, devised a mathematical model, solve the model, and interpret the obtained solution.
4. Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.
5. Have respect for the usefulness of mathematics in a life, that curious, attentive, and interest in studying mathematics, as well as a tenacious attitude and confidence in solving problems.

(Depdiknas,2006) [1]

Of the points above, it appears that the ability to solve problems becomes a central objective in mathematics. As disclosed Vettleson (2010) [2], "In the discipline of mathematics, the use of problem solving skills has been extremely important and highly influential. Problem solving is the foundation of all mathematical and scientific discoveries ". In the disciplines of mathematics using problem solving skills have a very important influence. Problem solving is the foundation of all mathematics and the process of discovering new knowledge. Then confirmed in a background document attachments Content Standards on Permendiknas 22 of 2006 on the subjects of mathematics stated that the problem-solving approach is the focus in mathematics. According to the theory proposed learning Gagne (Dahar, 2011) [3], that "the ability to solve a problem is basically the main purpose of the educational process". Solving math problems is very important so that a general purpose teaching mathematics, even as the heart of mathematics, more priority than the process and as a result the focus of school mathematics and aims to help develop thinking mathematically.

## II. MATHEMATICAL PROBLEM SOLVING SKILLS

One of doing math is closely related to the characteristics of mathematics is problem solving abilities. In solving the problem of course is no problem to be solved. Jonassen (2004) [4] suggests that the problem is something (entity) that is not yet known, and if found will have more social, cultural or intellectual. In line with the opinion of Jonassen, Suherman, et al. (2003) [5] provides that an issue usually contains a situation that encourages a person to get it done but do not know firsthand what is to be done to solve them. Traits that something is said is the problem requires thinking / reasoning, challenge students to be able to guess / predict the solution, as well as a way to get it is not a single solution, and must be proved that the solution obtained is correct / right.

Problem solving ability is the ability or strategic competence shown students in understanding, selecting approaches and coping strategies as well as a complete model to find the solution of a problem. According to Anderson (2009) [6] states that "problem-solving ability is a very important life skill that involves various processes such as analyzing, interpreting, reasoning, predicting, evaluating, and reflecting. Problem solving is one of the goals or fundamental component of the school curriculum in different countries ". Nakin (2003) [7] suggests that problem-solving is a process that uses certain measures (heuristic) that help in resolving the problem. Furthermore, NCTM (2010) [8] added that the term refers to problem solving mathematical tasks that have the potential to provide intellectual challenge and improve the understanding of students' mathematical development.

Lesh and Zawojewski (in Kuzle, 2013) [9] defines "Mathematical problem solving as the process of interpreting a situation mathematically, the which usually involves Several iterative cycles of expressing, testing, and revising mathematical interpretation and of sorting out, integrating, modifying, revising or refining clusters of mathematical concepts from various topics within and beyond mathematics ". In addition Cooney et al (1975) [10] as follows: "... the action by the which a teacher encourage students to accept a challenging question and guides them in their resolution". Furthermore, Polya (1985) [11] that problem solving is interpreted as an attempt to find a way out of a difficulty to achieve a goal that is not easily achieved. Branca (Krulik and Reys, 1980) [12] suggests that solving the problem has three interpretations, namely: troubleshooting (1) as the main purpose; (2) as a process, and (3) as a basic skill. Thirdly it has implications in mathematics. In addition Polya (Silver, 1997) [13] of mathematical problem solving is a way to solve

mathematical problems using mathematical reasoning (mathematical concepts) that has been previously occupied. When students use the intellectual work in the lesson, it was reasoned that self-directed problem solving to accomplish is an important characteristic.

Maria (2007) [14] states that the method of problem solving is a theory developed by Dewey, Polya, and Wallas, the troubleshooting steps are as follows: (1) understand the problem; (2) the development of a solution by themselves, (3) the advancement of learning through discussion, and (4) conclusion. Furthermore, Schoenfeld (1985) [15] said the problem-solving includes understanding the problem (resources), seeking what to do to resolve the issue (heuristics), to solve the problems (control), draw up problem resolution (belief systems).

By Polya (1973) [16] are four basic steps to solve a problem, namely: (1) Understanding the problem, (2) devising a plan, (3) carrying out the plan, and (4) looking back. Almost the same as Polya, Dominowski (2002) [17] states there are three general steps to solve a problem, namely: interpretation, production, and evaluation. Interpretation refers to how a problem solver understand or mentally present a problem. Production involves selecting answers or possible steps to make the settlement. Evaluation is the process of assessment of the adequacy of the answers may be, or further step has been done for trying or attempting to solve a problem.

Kirkley (2003) [18] states that the general problem-solving model in the '60s, is Bransford's IDEAL models, namely: (1) Identify the problem; (2) Define the problem through thinking about it and sorting out the relevant information; (3) Explore solutions through looking at alternatives, brainstorming, and checking out different points of view, (4) ACT on the strategies, and (5) Look back and Evaluate the effects of your activity. Furthermore, the National Council of Teachers of Mathematics (NCTM, 2000) [19] states that the learning programs from pre-kindergarten to grade 12 should enable all students to be able: (1) Build new mathematical knowledge through problem solving; (2) Solve problems that arise in mathematics and in other contexts; (3) Implement and adapt a variety of appropriate strategies to solve problems; and (4) Monitor and reflect on the process of mathematical problem solving.

From the opinions of the above, it can be concluded that the problem-solving ability matematisadalah ability of the student to solve problems by observing the process of finding answers based on the step-by-step problem-solving, namely: a) understand the problem, b) plan settlement issues, c) solve the problem in accordance plan, d) re-examine the results obtained.

### III. METHODS OF THE RESEARCH

This research is a descriptive qualitative to see the picture of students' mathematical problem solving ability. Subjects in this study conducted at class VIII-2 SMP Negeri 3 BilahHuluLabuhanbatu was totaling 31 people. Problem solving ability test in the form of questions regarding the content of linear equations and inequalities one variable that consists of one question. Problem in the form of contextual questions. Furthermore, for the preparation of a more systematic instruments, so as easily controlled, corrected it before the instrument is organized into items the instruments it needs to be grating test instrument problem solving capabilities are presented in Table 1.

**Table 1. Grid of Problem Solving**

Aspect	Indicator measured	Question's number
Understanding the problem	<ul style="list-style-type: none"> <li>• Writing a known</li> <li>• Writing a logical reason</li> </ul>	1a
Devising a plan	<ul style="list-style-type: none"> <li>• Writing a mathematical equation models and ways that can be used in the settlement of this problem</li> </ul>	1b
Carrying out the plan	<ul style="list-style-type: none"> <li>• Implement the plan that has been created and prove that measures chosen are correct</li> </ul>	1c
Looking back	<ul style="list-style-type: none"> <li>• Checking the completion of the (test or test answers)</li> </ul>	1d

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	<ul style="list-style-type: none"> <li>• Checking work, is there any calculations or analysis is wrong,</li> <li>• Checking work, is there any incomplete or unclear</li> </ul>	
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Furthermore, based on the scoring rubric assessment guidelines for mathematical problem solving abilities are presented in Table 2.

**Table 2. Guidelines Scoring of Problem Solving**

Rated Aspect	Score	Information
Understanding the problem	2	Writing is known, gives a correct and logical reasons
	1	One wrote that note, one gives the right reasons
	0	There is no answer at all
Devising a plan	2	Make a correct mathematical equation models and lead to a true solution
	1	Make a wrong model of a mathematical equation
	0	There is no mathematical equation models or no answer at all
Carrying out the plan	4	Implement procedures and calculations are correct
	3	Implement procedures with results correct but not complete
	2	Implement procedures and calculations with the results wrong, but completely
	1	Implement procedures and calculations with the results of one but not complete
	0	Do not write problem-solving
Re-examine the results obtained	2	Writing checks is correct and complete
	1	An incomplete examination
	0	There is no examination or no information

Source: ModifikasidariSumaryanta (2015) [20]

#### IV. RESULT OF THE RESEARCH

From the research data showed the test results of mathematical problem solving ability of students are presented in Table 3 as follows:

**Table 3. Data of Problem Solving Ability Test Results of Mathematic of Grade VIII-2 SMP Negeri 3 BilahHuluLabuhanbatu**

Number of students	Number	Indicator's Score			
		1	2	3	4
1	1	2	1	1	1
2	1	2	1	1	1
3	1	2	1	1	1
4	1	2	0	1	1
5	1	2	1	1	1
6	1	2	1	1	1
7	1	2	1	1	1
8	1	2	1	1	1
9	1	2	1	1	1
10	1	2	1	1	1
11	1	2	1	1	1
12	1	2	1	1	1
13	1	2	1	1	1
14	1	0	0	1	1
15	1	2	1	1	1

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16	1	2	1	1	1
17	1	2	1	1	1
18	1	0	0	1	1
19	1	2	1	1	1
20	1	2	0	1	1
21	1	0	1	1	1
22	1	2	0	1	1
23	1	2	1	1	1
24	1	2	1	1	1
25	1	2	1	1	1
26	1	2	1	1	1
27	1	2	1	1	1
28	1	2	1	0	0
29	1	2	1	1	1
30	1	2	1	1	1
31	1	0	0	1	1

To calculate the percentage of the total score for each indicator problem-solving skills in a way

$$\%STI_k = \frac{PSTI_k}{MSTI_k} \times 100$$

Where:

$\%SI_k$ : The percentage of the total score on the indicators to  $k = 1, 2, 3, 4$

$PSTI_k$ : Acquisition of the total score on the indicators to  $k = 1, 2, 3, 4$

$MSTI_k$ : The maximum score on the indicators to  $k = 1, 2, 3, 4$

With qualifications such as table 4 below:

Table 4. Qualification Percentage Indicator of Problem solving

Percentage	Qualification
$85 \leq P_k \leq 100$	Very good
$70 \leq P_k \leq 84,99$	Good
$55 \leq P_k \leq 69,99$	Good Enough
$40 \leq P_k \leq 54,99$	Not good
$0 \leq P_k \leq 39,99$	Very less

(Arikunto, 2006) [21]

Table 5. KPM percentage of grade VIII-2 SMP Negeri 3 BilahHuluLabuhanbatu based indicators of problem solving

Number	Indicators of problem solving	Point of question	Score of student	Score Total	Percentage	Category
1	Understanding the problem	1	54	62	87,10%	Very Good
2	Devising a plan	1	25	62	40,32%	Not Good
3	Carrying out the plan	1	30	124	24,19%	Very less
4	Re-examine the results obtained	1	30	62	48,39%	Poorly

## V. DISCUSSION OF RESEARCH

Based on the analysis of the results obtained TKPM description of the student's ability to solve problems. Percentage of students' ability to understand the problem reached 87.10% and classified in the category very good, the percentage of problem solving ability of students to plan 40.32% and classified in the not good category, the percentage of the student's ability to solve the problem according to plan 24.19% and classified into categories very less, the percentage of the student's ability to re-examine the results obtained 48.39% and classified in the poorly category, while the average percentage reached 50% and classified in the not good category. This indicates that the class was not finished in solving problems.

## VI. CONCLUSION

Percentage of students' ability to understand the problem reached 87.10% and classified in the category very good, the percentage of problem solving ability of students to plan 40.32% and classified in the not good category, the percentage of the student's ability to solve the problem according to plan 24.19% and classified into categories very less, the percentage of the student's ability to re-examine the results obtained 48.39% and classified in the poorly category, while the average percentage reached 50% and classified in the not good category. It shows class in solving problems unresolved.

## VII. SUGGESTION

Based on these results, the suggestions can be submitted by researchers is:

1. To the teachers to better train students in working on non-routine matters and questions that aim to improve students' mathematical problem solving ability.
2. To the students to be more active and active in learning mathematics so as to obtain a better learning outcomes.

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