ANALYSIS PROBLEM SOLVING ABILITY ON FLAT QUADRILATERAL MATERIAL OF STUDENTS AT JUNIOR HIGH SCHOOL

Indah Dirgantari Ritonga[1], Edy Surya[2], Edi Syahputra[3]

[1]*College student, Post Graduate Program School in Mathematics Education, State University of Medan, Indonesia*
[2]*Lecturer, Post Graduate Program School in Mathematics Education, State University of Medan, Indonesia*
[3]*Lecturer, Post Graduate Program School in Mathematics Education, State University of Medan, Indonesia*

ABSTRACT

This study was conducted to determine the level of problem-solving ability of students of SMP Negeri 1 (Junior High School) Percut Sei Tuan VIII-4 in the academic year 2015/2016. This type of research is qualitative research. Of the 31 students, three people (16.13%) satisfy the indicator to identify the elements that are known, were asked, and the adequacy of the required elements. Furthermore, 8 (25.81%) satisfy the indicator formulate a mathematical problem or to develop a mathematical model, 18 (58.06%) satisfy the indicator implement strategies to solve the problem (and the kind of new problems) inside or outside of mathematics, 7 person (22.58%) satisfy the indicator explain or interpret the results according the problem of origin and 6 (19.35%) satisfy the indicator using mathematics meaningfully.

Keywords: *Mathematical Problem Solving Ability*

Introduction

The development and advancement of technology today is inseparable from the development and advancement of science. In line with the development and progress of science, then mathematics as a science that much role in other sciences in the community need to be progressing. Mathematics is one of the basic science that must be mastered by the student. Mathematics can not be separated from everyday human life. Mathematics has always been progressing directly proportional to the advancement of science and technology.
Talk about the problem of learning is a very interesting issue to be discussed, especially in the learning process and the subject areas of mathematics can not be separated in education. In learning mathematic need techniques or ways to learn. Therefore, learning needs to be improved efficiently.

Mathematics as one of the basic sciences, both aspects of its implementation as well as aspects of reasoning, has an important role in the effort mastery of science and technology. This means that to a certain extent mathematics need to be mastered by all Indonesian citizens, both application and thought patterns.
The problem in mathematics is a question that is not routine, it means that the solution is not known how the method. So solving the problem is to find ways methods through activities to observe, understand, try, suspect, find and review.

A problem usually contains an encouraging someone to finish it but not directly a person can solve them. If a problem is given to a child and the child immediately know how to resolve it correctly, then the problem can not be said to be a problem. So the problem is very relative. Ruseffendi (1988: 169) states that, "Something that is a problem for someone when something is: new, in accordance with the conditions to solve the problem (the stage of mental development) and he has the prerequisite knowledge".

Problem solving is part of the mathematics curriculum is very important because in the learning process and its completion, students gain experience possible using the knowledge and skills already possessed to be applied to solving problems that are not routine. Through these activities, the aspects of mathematical skills such as application of the rules on non-routine issues, pattern discovery, generalizing, mathematical communication and others can be developed better. Mental activity that can be reached in problem solving, among others, is to remember, recognize, explain, distinguish, applying, analyzing, and evaluating.

Method

The research was conducted in State Junior High School 1 of Percut Sei Tuan in 2015/2016 academic year. Which is the subject of this research is class VIII-4, amounting to 31 people. Furthermore, given the initial test to students who aim to know the students' problem-solving skills by referring to each indicator exhaustion problem solving skills, as well as to find out the images difficulties experienced by students in solving problems of rectangular flat wake.

In this case to determine the level of student success in every indicator troubleshooting conducted tests on 31 students of State Junior High School 1 Percut Sei Tuan VIII-4 with scoring guidelines as follows:

$$K = \frac{\text{students who meet the indicators}}{students} \; x \; 100\%$$

Where, K : The percentage of students who meet the indicators.
With the following qualifications:

Table Qualifying Percentage Indicator in the Problem Solving

Persentage	**Qualification**
$85 \leq P_k \geq 100$	Very good
$70 \leq P_k \geq 84{,}99$	Good
$55 \leq P_k \geq 69{,}99$	Good Enough
$40 \leq P_k \geq 54{,}99$	Not Good
$0 \leq P_k \geq 39{,}99$	Very less

(Arikunto, 2006)

Result and Discussion

There are many interpretations about problem solving in mathematics. Among opinion of Polya (1985), which many observers referred math. Polya problem solving interpret as an attempt to find a way out of a difficulty in order to achieve a goal that is not so immediately achievable. While Sujono (1988) describes a mathematical problem as a challenge when a solution requires creativity, understanding and genuine thought or imagination. Based on the explanation Sujono then something that is a problem for someone, may not constitute a problem for others or have become routine only.

Ruseffendi (1991b) suggested that the matter is a matter of solving a problem for a person if he has the knowledge and ability to solve them, but at the time he acquired about that he did not know how to solve it. On another occasion Ruseffendi (1991a) also argues that an issue that is a problem for a person if: first, the problem was not known. Second, students should be able to finish it, both mentally and knowledge readiness readiness; irrespective of the whether finally he arrived or not to answer. Third, something that is solving a problem for him, if he had no intention to solve them.

More specifically Sumarmo (1994) defines as a problem solving activity complete word problems, solve problems that are not routine, apply mathematics in everyday life or other circumstances, and prove or create or test the conjecture.

Based on the understanding that the Sumarmo expressed in mathematical problem solving appears the power development activity math (mathematical power) against students.

Problem solving is one type of intellectual skills by Gagné et al (1992) are higher in rank and more complex than other types of intellectual skills. Gagné, et al (1992) found in completing the necessary problem solving complex rules or rules of high-level and high-level rules can be achieved after mastering the rules and undefined concept. Similarly, rules and undefined concept can be mastered if supported by an understanding of the concept of concrete. Once the concrete is required to understand the concept of the skills of discernment.

The importance of problem solving abilities by students in mathematics is confirmed also by Branca (1980);

1. The ability to solve problems is a common goal of teaching mathematics.
2. Completion of problems that include methods, procedures and strategies are core processes and major in mathematics curriculum.

3. Problem solving is a basic ability to learn mathematics.

The view that the ability to solve problems is a common goal of teaching mathematics, implies that mathematics can help in solving the problems well in other subjects and in everyday life. Therefore, this problem solving capabilities into general purpose math learning.

View of problem solving as the core and main processes in the mathematics curriculum, means learning more priority problem-solving processes and strategies do students finish rather than just results. So the skills and strategies in the process of solving these problems become basic skills in mathematics.

Although the problem solving is a skill that is not easily achieved, but because of the importance and usefulness of this problem-solving abilities should be taught to students at all levels. In this regard, Ruseffendi (1991b) suggested some reason problems solving type given to students, namely:

a. can lead to curiosity and motivation, foster creative properties.
b. besides having the knowledge and skills (numeracy and others), required the ability to skillfully read and make a true statement;
c. can lead to answer the original, new, unique, and diverse, and can add new knowledge;
d. can improve the application of knowledge that has been gained;
e. invites students have problem-solving procedures, capable of making analysis and synthesis, and are required to make an evaluation tehadap solution results;
f. is an important activity for students which involves not just one field of study but may be field or other subjects.

Many teachers ask students to memorize a specific technique to solve different problems, so that students can quickly identify the type of problem and solve it immediately (Dai, 1996; Lee Zhang, & Zheng, 1997; Zheng, 2001 in Jinfai).

How to solve the problem raised by several experts, among them Dewey and Polya. Dewey (in Rothstein and Pamela 1990) gives five key steps to solve the problem,

1) identify / presents a problem: not required if the problem solving strategy is not an issue;
2) define the problem: a problem solving strategy emphasizes the importance of the definition of the problem in order to determine the number Possible Solutions;
3) develop some hypotheses: a hypothesis is an alternative to the settlement of the problem solving;
4) to test several hypotheses: evaluating the advantages and disadvantages of hypothesis;
5) selecting the best hypothesis.

As Dewey, Polya (1985) also describes a process that can be performed on any troubleshooting steps. The process is summarized in the following four steps:

1) understand the problem (understanding the problem).
2) The settlement plan (devising a plan).
3) implement the plan (carrying out the plan).
4) examine the process and results (looking back).

Sumarmo (1994) presented some indicators that should be considered in solving the problem, including the following:

- Identify the elements that are known, were asked, and the adequacy of the required elements.
- Formulate a mathematical problem or to develop a mathematical model.
- Implement strategies to solve problems (a kind and new problems) within or outside mathematics.
- explain or interpret the results as the origin of the problem.
- Using mathematics significantly.

Based on test results obtained from 31 students, 5 people (16.23%) have met the indicator to identify the elements that are known, were asked, and the adequacy of the required elements. Furthermore, 8 (25.81%) have met to formulate indicators mathematical problem or to develop a mathematical model, 18 (58.06%) have met the indicator implement strategies to solve problems (a kind and new problems) within or outside mathematics, 7 people (22.58%) have met the indicator explain or interpret the results as concerns the origin and 6 (19.35%) have met the indicators Using mathematical significantly.

From the research data showed the test results of mathematical problem solving ability of students is presented in the following table:

Tabel Data Results Mathematical Problem Solving Ability Test

Num-ber	**Number of Question**	**Skor of Indicator**				
		1	**2**	**3**	**4**	**5**
1	1	0	0	1	1	0

2	1	0	0	1	0	0
3	1	0	0	1	0	0
4	1	0	0	0	0	0
5	1	0	0	0	0	0
6	1	0	0	0	0	0
7	1	1	1	1	1	1
8	1	1	0	1	1	1
9	1	0	1	1	1	1
10	1	0	0	0	0	0
11	1	0	0	1	0	0
12	1	0	1	1	0	0
13	1	1	1	1	0	0
14	1	1	1	1	0	0
15	1	0	0	0	0	0
16	1	0	0	0	0	0
17	1	0	0	0	0	0
18	1	0	0	0	0	0
19	1	0	0	0	0	0
20	1	0	0	0	0	0
21	1	0	0	0	0	0
22	1	0	0	0	0	0
23	1	0	0	0	0	0
24	1	0	1	1	1	1
25	1	0	1	1	1	1
26	1	1	1	1	0	1
27	1	0	0	1	1	0
28	1	0	0	1	0	0
29	1	0	0	1	0	0
30	1	0	0	1	0	0
31	1	0	0	1	0	0

Here is a table percentage of junior high school students problem solving abilities Percut Sei Tuan VIII-4.

Indicator of problem solving ability	**Percentage (%)**	**Category**
Identify the elements that are known, were asked, and the adequacy of the required elements.	16,23%	Very less
Formulate a mathematical problem or to develop a mathematical model.	25,81%	Very less
Implement strategies to solve problems (a kind and new problems) within or outside mathematics.	58,06%	Good enough
Explain or interpret the results as the origin of the problem.	22,58%	Very less
Using mathematical significantly.	19,35%	Very less

Closing

Based on the description of the discussion of this research, it can take several conclusions, namely:

a. Problem solving is part of the mathematics curriculum is very important because in the learning process and its completion.
b. Sumarmo (1994) presented some indicators that should be considered in solving the problem, including the following:
    - Identify the elements that are known, were asked, and the adequacy of the required elements.
    - Formulate a mathematical problem or to develop a mathematical model.

- Implement strategies to solve problems (a kind and new problems) within or outside mathematics.
- explain or interpret the results as the origin of the problem.
- Using mathematics significantly.

c. Problem solving ability of students SMP Negeri 1 Percut Sei Tuan VIII-4 is still very low.
Based on test results obtained from 31 students, 3 (16.13%) have met the indicator to identify the elements that are known, were asked, and the adequacy of the required elements. Furthermore, 8 (25.81%) have met to formulate indicators mathematical problem or to develop a mathematical model, 18 (58.06%) have met the indicator implement strategies to solve problems (a kind and new problems) within or outside mathematics, 7 people (22.58%) have met the indicator explain or interpret the results as concerns the origin and 6 (19.35%) have met the indicator using mathematics meaningfully.

REFERENCES

1. Arikunto, Suharsimi. 2006. *Dasar-Dasar Evaluasi Pendidikan (Edisi Revisi)*. Jakarta: Bumi Aksara.
2. Branca, N.A. 1980. Problem Solving as a Goal, Process and Basic Skill. Dalam Krulik,S dan Reys,R.E (ed). *Problem Solving in School Mathematics*. NCTM: Reston. Virginia
3. Gagné,R.M, Briggs, L.J dan Wager, W.W. 1992. *Principles of Instructional Design (4nd ed).* Orlando: Holt, Rinehart and Winstone, Inc.
4. Jinfai, Cai and Nie, Bikai. 6 July 2007. *Problem solving in Chinese mathematics education: research and practice*. Vol. 39, pp. 459–473. China: ZDM Mathematics Education.
5. Polya, G. 1985. How to Solve It. *A New Aspect of Mathematical Methods*. New Jersey: Pearson Education, Inc.
6. Rothstein dan Pamela,R. 1990. *Educational Pyschology*. Singapore: McGraw-Hill, Inc.
7. Ruseffendi, E.T. 1988. *Pengajaran Matematika Modern dan Masa Kini Untuk Guru dan SPG*. Bandung: Tarsito.
8. _____,1988. *Pengantar Kepada Membantu Guru MengembangkanKompetensinya dalam Pengajaran Matematika Untuk Meningkatkan CBSA*. Bandung : Tarsito.
9. Sujono. 1988. *Pengajaran Matematika untuk Sekolah Menengah*. Jakarta: Departemen Pendidikan dan Kebudayaan.
10. Sumarmo,U, Dedy, E dan Rahmat. 1994. *Suatu Alternatif Pengajaran untuk MeningkatkanPemecahan Masalah Matematika pada Guru dan Siswa SMA.* Bandung: Laporan Hasil Penelitian FPMIPA IKIP .