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STUDENT'S STRATEGY IN ANSWERING MATHEMATICAL PROBLEM-SOLVING QUESTION AT SMA NEGERI 1 INDRALAYA UTARA

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Abstract

The objectives of this research are to determine student's strategy in answering mathematical problem-solving questions. This research is descriptive study. The subject in this research was 5 students of SMA Negeri 1 Indralaya Utara X.C in Academic Year 2013/2014, which was selected by using purposive sampling technique. The data were gathered by using written test, interview and document research. A written test and interview were conducted to obtain information on students' strategy to solve the problem-solving questions. Document research was as supporting data. Based on the result of the study, it was concluded that the strategies were used by student in solving the problem based on the type of the question. The strategies used by student in the linear equation material were guessing and checking, writing open statement, and making a drawing. While the strategies used by student in arithmetic sequences and series materials were finding a pattern, making a drawing, and counting every possibility.

Key words: student's strategy, problem-solving question

Introduction

In daily lives, human can't escape various problems. Problem faced is various from a simple problem to the complex problems. Everyone has own way of dealing with problems. In learning mathematics, problem is connected to problem solving questions. Baroody (1993 in Roebyanto & Yanti, 2009a) defines the problem as a question which there is a routine procedure that can quickly be used to solve it. For example, the characteristics of problem solving questions that is nonroutine question which present a new situation for the students and the question can be resolved in several ways solution (Aisyah, 2007: 4; Beck, 2005: 21).

Problem solving is defined by G. Polya (1973) as attempt to find a way out of a difficulty, achieve a goal which is not immediate achievable. In the process of problem solving by Polya, the steps to solve the problem to get a goal are (1) understanding the problem, (2) planing solution, (3) doing the plan, and (4) correcting back. At this planing step, the student is expected to determine the strategy to be used in solving problems, so it is needed the rules made by the students during the problem solving process.

In other definitions, problem solving is formulated by using the word "strategy, way, step or method" in the literature (Bloom & Broder, 1950; Chisco & Davis, 1986; Mayer, 1982; Polya, 1957; Robertstein, 1481; Schoelield, 1979; Wickelgren 1074), such as:

1. Problem solving is the using of different strategies to get solution, such as make a pattern, make a drawing, use a sheet or chart;
2. Problem solving is the using of strategies or techniques such as pattern, working backwards or by trial and error;

3. Problem solving is thinking with a different way to solve a problem, such as trial and error or working backwards;
4. Problem solving is using various ways to solve probles such as make graphics, images or trial and error;
5. Problem solving is identifying the problem, determining the steps and then solving the problem;

(Mulyati, A., 1997 in Purba, 2010: 4-5)

One interpretation of problem solving by Branca (1980) is a problem solving as process. In this explanation, learning of mathematics emphasize methtods, strategies, or procedures used by students in solving mathematicals problems untill they find the answer.

The opinions above indicate that in solving a mathematical problem that is nonroutine question needs ways, techniques, procedures, or methods used untill the quetion is no problem for a student.

One indicator of the NCTM (2000) states that learning program from childhood untill 12th grade should be enable student to apply and adjust various of suitably strategies to solve problems. This indicates the importance of knowledge of problem solving strategies. Thus, in the classroom, teacher can give problems that have the variety of ways in problem solution. As the suggention from Dodson and Hollander (in Suryawan, 2010: 2-3) which suggest to the teacher to teach students a variety of strategies that can be used in a variety of questions including of stimulating students to solve mathematical problems in orther ways that they discover as much as possible. This allows the studnets the opportunity to try several strategies to get a variety of learning experiences.

In general, strategy can be defined as planning, steps, and sequence to achieve a goal (Yamin, 2013: 1). Shadiq (2004: 13) defines strategy as a way that are often used by people dan often succed in process of peoblem solving. While Aisyah (2007: 11) suggests as a solution technique of practical mathematics problem solving question.

Related strategy to solve the problem, Polya and Pasmep (in Shadiq, 2004: 13) among mention some strategies problem solving, namely (1) trial and error, (2) make a diagram, (3) trying on a simpler problem, (4) make table, (5) find a pattern, (6) dispart purpose, (7) consider every possibility, (8) logical thinking, (9) work backwards, and (10) ignore things that are not possible. While Rey (1978, Aisyah, 2007: 11-16) groups into eleven strategies; (1) act in action, (2) make a picture or diagram, (3) look for pattern, (4) make a table, (5) calculating every possibility systenatically, (6) guess and check, (7) working bacwards, (8) identifies the desired information, given, and necessary, (9) write an open statement, (10) solve the problem simpler or similar, and (11) change the viewpoint.

Result of the study conducted by Shahabiyah (2008) stated that ability of students X SMA Negeri 18 Palembang in using problem solving strategies in math learning, indicated that over all was well categorized. However, one of the indicators that had low percentage was the ability of planning problem solving, 72,9%. This is due the students to still think that in solving mathematical problems can only use one strategy.

The preliminary study of the LKS “Linear Equation” grade X SMA Negeri 1 Indralaya Utara showed that math teacher has given problem solving learning. In line with the result of the study Shahabiyah, students assume that a given problem by teacher can only be done one strategy that is guessing and checking strategy. In fact, a given problem can be solved by a variety of strategies or a combination of several strategies. Such as, a problem solving question of linear equation system can be solved with several strategies such as the use of algebra, guess and check, make diagram, or logical

reasoning (Roebyanto & Yanti, 2009b). The number of strategies that can be used to solve a problem solving equation makes researcher wants to know the strategies that would appear on some problem solving question will be given.

THEORETICAL BACKGROUND

Problem Solving Matters

The term of problem solving has a kind of understanding. Polya (1973) defines problem solving as a effort to find a way out of the difficulty, achieve a goal that is not immediately attainable. More specifically, problem solving is is the use of different strategies to get a solution , for example, make patterns , make a drawing , use a sheet or chart (Mulyati, A. 1997 , in Purba : 2010: 4-5).

The characteristics of mathematical matter which can be used for solving the problem is as follows:

1. Problem solving matter is a nonroutine that present a new situation that has never been encountered by previous students (nonroutine).
2. To solve the problems, there are several strategies that can be used, including make drawings or diagrams, find patterns, create tables, etc (a half-open or open questions).

(Aisyah, 2007: 4; Beck 2005:21).

Student's Strategies

Strategy is planning, steps, and sequence to achieve a goal. In the problem solving learning, strategy related to a method or a technique (Yamin,2013: 1). Sadiq (2004: 13) defines strategy as a way of solving problems that are often used by people and often succeed in solving the problem. More specifically, the strategy is needed to solve mathematical problems. Aisyah (2007: 11) states that the mathematical problem-solving strategies can be interpreted as a completion technique solving problems of practical math problems. It means, we need a strategy or the technique, or a special way to solve the mathematical problem solving.

Based on the definition that has been stated above, it can be concluded that the strategy of problem solving is the way, step, or stage work techniques that used by someone in solving problem-solving matters.

Polya and Pasmep (in Sadiq, 2004: 13) reveals that there are ten general strategies can be introduced to students, namely (1) trial and error, (2) create a diagram, (3) try out the simpler matter, (4) make table, (5) find a pattern, (6) break destination, (7) consider every possibility, (8) logical thinking, (9) working backwards, and (10) ignore impossible. While Reys (1978, Aisyah, 2007: 11-16) explains there are eleven problem-solving strategies, including (1) act in action, (2) create a picture or diagram, (3) find patterns, (4) create table, (5) systematically calculate every possibility, (6) guess and check, (7) working backwards, (8) identify the desired information, is given, and necessary, (9) write an open statement, (10) solve the problem simpler or similar, and (11) change the view.

METHOD

Type of study is descriptive qualitative research. The subject of this study was some students at grade X.C SMA Negeri 1 Indralaya Utara academic year 2013/2014 that were selected by using purposive sampling techinique. The focus of this study is the strategies used by students to solve mathematics problem solving question. Information about strtategies used by students to solve the mathematics problem solving question was obtained by giving a written test and interview research

subjects. The study documents as supporting data obtained from teacher lesson plan, worksheets, and student's exercise books.

Futhermore, this study used the triangulation (Satori and Komariah 2010: 33-36). Triangulation source is data which obtained from more information. Triangulation technique was done through test, interview, and documentation studies. Triangulation of time was interviews that were done twice in a different time.

The analysis of the data was done on the result of the written test and interview results. Conclusions was made to determine the strategies used by students to solve the mathematics problem solving matter. Then, the results are presented narratively.

RESULT AND DISCUSSION

In this study, student's strategy obtained from the written test and interview results. The results of the written test anlysis showed that from the 3 given matters, strategies used by students to solve the 1st matter were the guess and check strategy, write an open statement strategy, and make a picture. For the 2nd matter, the strategies used were to find a pattern, make a picture, and calculate every possibility. For the 3rd matter, the strategies used were just finding a pattern and calculating every possibility. As an example of the student's answer who used the guess and check strategy in solve the 3st matter can be seen in Figure 1 below.

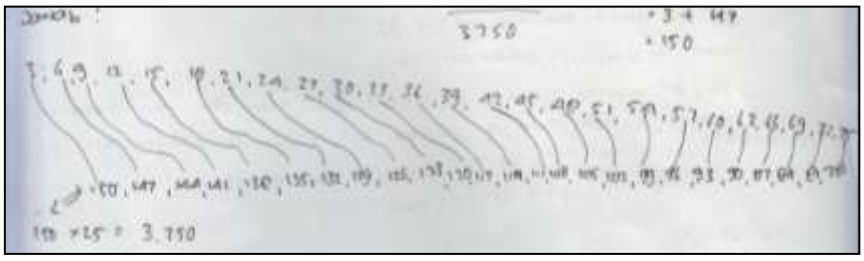
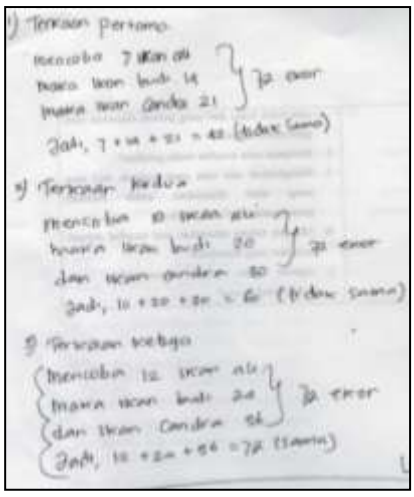


Figure 1. An example Student's Strategy

These are Figure 2. Guess and check in 1st matter and Figure 3. Calculate every possibility strategy in 2nd matter.



Researcher also did the interviews to explore other strategies different from strategies which has been used by students when completing the written test. As the strategies can be seen in the table below.

Table 1. Results Interview: Strategies Used

Research Subject	Matters/Strategies		
	1	2	3
I	Make a drawing	Calculate every possibility	Calculate every possibility
II	Guess and check	Find a pattern	Calculate every possibility, Find a pattern
III	Guess and check	Find a pattern	Calculate every possibility, Find a pattern
IV	Write open statement	Find a pattern	Find a pattern
V	Guess and check	Make a drawing	Find a pattern

CONCLUSION AND REMARK

Based on the results of this study, it is concluded that the strategies used by students to solve the problem depends on the peculiarities of a given problem. Strategies which used by students to solve the problem solving matter for linear equations material were guess and check, write an open statement strategy, and make a picture. While the strtaegies that used to solve problem solving matter for sequence and series arithmetic material were find a pattern, make a picture, and calculate every possibility.

The advice that can be given related to the results of this study are teacher should find out what are the appropriate strategies to solve problems in certain material and teach it to students.

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