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Increasing Skills of Student in Junior High School to Problem Solving in Geometry with Guided

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Abstract

Problem-solving skills are the ability of students to solve problems. One problem-solving model is solving the problem of Polya: (1) understand the problem, (2) create a troubleshooting plan, (3) implement plans troubleshooting, and (4) step checks the answers. During this time problem-solving skills possessed by students are not satisfactory because the student in solving problems not yet using the steps systematically. So, we need a way to improve students' ability to solve problems, such as by way of providing guidance in solving a problem.

Keywords: *problem solving, Polya and geometry*

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Introduction

The problem is become inseparable in human life. The problem is can be viewed as the only thing burden human being, but in fact must be seen as a means of to bring up findings new. The birth of findings of experts who are now enjoyed man because of a problem.

Bondan Djamilah Widjajanti (2009) states that a question is a problem if the issue of the challenge to be answered and procedures to answer it cannot be done routinely. Under these conditions, any student cannot avoid the problems of mathematics. It must be realized that in general, students have difficulty learning mathematics with different levels of difficulty in solving these problems. Avoiding the problem for pragmatic purposes, seek easy course, as well as plunged in ignorance, and will face another difficulty is greater.

Most of students today think that math is a subject very difficult and complicated, making them reluctant to learn it. Such attitudes are caused by the experience of students such as students' perception of mathematics and math teacher. In addition, low student achievement can also be due to the ability of student in solving mathematical problems as insufficient. It can be shown that the student to solve mathematical problems of irregular and inconsistent.

Sri Adi Widodo (2015) states that low of the ability to solve the problem due teacher evaluation using multiple choice and evaluation questions used are mostly not solving the problem. This is why the average score of students Indonesia is below the average score Trends in International Mathematics and Science Study (TIMSS). As expressed by Awaludin Tjala (tt) which states that the low quality of human resources at this time due to the low quality of education that can be seen in the indicator results of the study TIMSS, where the results of TIMSS showed that the mean score Indonesian students score below the international average.

Problem solving is a basic ability that must be mastered by the student. In fact reflected in the goals of mathematics learning. One goal of learning mathematics according to the BSNP (2006) is to foster critical thinking skills, logical, systematic, thorough, effective, and efficient in problem solvings. Bondan Djamilah Widjajanti (2009) adds that the ability to solve problems became the focus of mathematics at all levels.

Whether or not the purpose of learning mathematics one of which can be seen from the success of student in understanding mathematics and utilize this understanding to resolve the problems of mathematics and other sciences. With problem solving, mathematics becomes not lose meaning. For a concept or principle be meaningful if it can be applied in problem solving. Fimatesa Windari, Fitrani Dwina, and Suherman (2014) states that the study of mathematics, students will be able to solve problems that include the ability to understand the problem, devised a mathematical model, solve the model, and interpret the obtained solution.

Looking for the importance of problem solving skills, the learning of mathematics already should be used the way for student to improve their ability solving in mathematical problems. This article will discuss how junior high school students in solving geometry problems.

Discussion

Problem Solving

Problems can occur if a person has certain rules that can be used to address gaps in the current situation with the objectives to be achieved. To achieve these objectives, one needs efforts to solve problems involving thought processes optimally. This is due to resolve the issue someone needs to find rules to overcome these problems. If someone has been able to override the gap current situation with the objective to be achieved (through self-created rules) then this person can be said to solve the problem.

Polya (1973), stated that the problems in mathematics are two types: problem to find and (2) problems to Prove. It is means by the problem to find is to define or get a certain value that is unknown in the matter and meet certain conditions or requirements. As for proving a procedure for determining whether a statement is true or not true.

In mathematic problems usually use exercise, but not all math exercise is the problem. According to Herman Hudojo (1988), a question referred to the issue if the issue requires a knowledge organization that has owned not routine and people are challenged to solve it. The same is expressed by the Didi Suryadi (2011) which states that a matter of problem solving usually contain a situation that can encourage someone to finish but did not directly know how, if the students immediately know how to resolve the problems facing correctly, then the given problem given could not be classified in the category of problem solving.

In mathematics education, problem solving also be important to invest in self-student. By solving mathematical problems, make the math does not lose its meaning, as a concept or principle be meaningful if it can be applied in problem solving. As expressed by E. Mulyasa in Aries Yuwono (2010: 13), which states that any solution plays an important role especially in order to run a flexible learning.

Bondan Djamilah Widjajanti (2009) states that solving the problem is the process used to resolve problems. The same thing also expressed by Polya (1973) which states that solving the problem is an attempt to find a way out of a goal that is not so easy. Meanwhile, Tatag Yuli Eko Siswono (2008), explains that solving the problem is a process or an individual effort to respond or overcome barriers or obstacles when an answer or answers yet apparent method. Based on the understanding that the problem solving demands a way out or a solution of the problems faced.

Desti Haryani (2011) states problem solving is a mental process and requires a high level thinking processes more complex. According with the opinion of Gagne (Bell, 1978) that problem solving is a stage of thinking that is at the highest level among the eight (8) types of learning. Eighth type of learning is learning the signal, stimulus response learning, learning sequence, learning verbal associations, discrimination learning, learning concepts, learn the rules, and learn problem solving.

The problem solving steps described by Bransford and Stein (1993) that identify the problem, define the Goal, Explore solution, Act strategy, Look back and Evaluate the effect. Dominowski in Bondan Djamilah Widjajanti (2009) states there are three stages common to solve a problem, namely: interpretation, production, and evaluation. Steps to resolve the problem, the same estuary step by step solves the problem of Polya (1973), namely Understand the problem, Make a Plan, Carry out our plan, and Look back at the completed solution.

In step understand the problem, at this stage the problem must be believed. To believe a problem can be done in several ways, such as by reading over and over again, ask yourself about what you know, what is not known, how the conditions of the problems facing it possible the conditions expressed in the form of equations or other relationship, whether the conditions given enough to figure in question, whether the condition is not sufficient or the condition is excessive or conditions that contradict each other, and ask the purpose of mathematical problems. If deemed necessary to make images and text appropriate notation for ease in understanding the problems faced.

In step plan, at this stage to make a plan to resolve the problems to do with the search for the relationship between the data (information) which are known to the unknown. To obtain the relationship between the information known to the unknown possible student recalls if ever solve the same problem. If the matter were received in the category of new faces, try to think the problems are similar. It is possible at this stage perform calculations on the unknown variable. So that it will acquire the question of how the information is already known to be interconnected to obtain things that are unknown.

In step implementing a plan, at this stage student will examine each step outlined in the plan and write about it in detail to ensure that every step is correct. While on the move to re-examine the answer, in this last stage, student will see again the answer to ensure that the answers of these problems are correct.

Problem-Solving Skill

Problem solving ability is related with the student's ability to read and understand language about the story, present in the mathematical model, plan calculation of the mathematical model, and complete the calculation of the questions that are not routine. Achievement of solving mathematical ability requires obedience student in using the steps to solve the problem. If student are not coherently in problem solvings can be ascertained that the ability of student has been unsatisfactory, so that student achievement is low. As expressed by Witri Nur Anisa (2014) is business problem-solving abilities or the way students in problem solving by using systematic measures.

Sri Adi Widodo (2013a) reveals that indicators of each step in solving the problem, namely (1) a step to understand the problem with the indicator that student can determine the things that are known in the matter, determine the matters in question in the matter, and can recounted about the problem with its own language, (2) a step to make plans troubleshooting with indicator student know sufficient conditions and terms need to be a problem and student to use all the information that has been collected, (3) measures implementing plans troubleshooting with indicator student using the steps to solve the problem correctly, and student skilled in the algorithm and precision answer the question, and (4) a step to re-examine the answers to the indicators of student inspection results to the answers to the questions.

The same thing also expressed by Erman Suherman in Fimatesa Windari, Fitrani Dwina, and Suherman (2014), stated that the indicators of each step to solve the problem is (1) Understanding the problem, students can identify the elements that are known, are question, and the adequacy of the

elements required. (2) Planning problems, students can formulate a mathematical problem or to develop a mathematical model, or can implement strategies to solve various problems. (3) Resolve the problem; students are expected to perform well to complete the planning. (4) Checking back and get the conclusions.

The Examples Geometry Problems and Its Implementation on Students

As an illustration of this problem solving Polya models can be seen on the issue of "triangular shaped plot of land with a size of 4 meters, 5 meters and 7 meters. The land will be built a fence around it with a height of 2 meters. If the fence is Rp. 85.000,00 prices per m2, how much it cost to build the fence? ". As for the settlement of the problem based on Polya steps are as follows.

Understanding the problem:

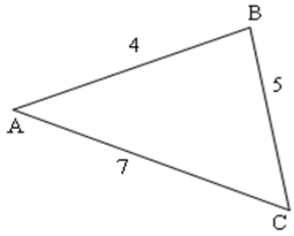

Figure 1. Triangle

At issue is known that the land size of the triangle is 4 meters, 5 meters and 7 meters. When drawn geometrically as in Figure 1. In addition, the fence around it will be made at a price per square meter fence is Rp. 85.000,00. While on the issue of costs incurred asked to build a fence with a height of 2 meters.

Make a plan:

At issue is the key is around the triangle so as to determine the circumference of the triangle is by adding three sides. Using the assumption that the circumference is K and the side is an S then or K = S1 + S2 + S3. At the word "fence", is a wake-up context rectangular (rather wake rectangle). So geometrically, the fence that will be found the land is rectangular.

To find out how much it will cost to build the fence, it is necessary to know area of the rectangle. This is because the cost is beyond the rectangle x price per square meter fence. As for the area of a rectangle is L = length x width. So that the circumference length of the triangle is a wake rectangle and height of the fence is a rectangle the width of the wake.

Implement the planning:

1. Determine the circumference triangle

   K = $S_1 + S_2 + S_3$ = 4 meter + 5 meter + 7 meter = 16 meter

2. Determine the area of a rectangle

   Because the triangular circumference is 16 meters, the length of bagun is rectangular, and the height of the fence is the width of the rectangle. So that the area of the rectangle is

   L = multiplication length and Width

   = circumference triangle x high of fence

   = 16 m x 2 m = 32 m^2

3. Determining the costs incurred

   Since the area of a rectangle wake is 32 m2, the costs for building the fence is 32 m^2 x Rp. 85.000,00/m^2 = Rp. 2.720.000,00

   So the costs for building the fence for Rp. 2.720.000,00

Looking a back the answers:

Costs incurred for building the fence is Rp. 2.720.000,00, so the area of rectangle is $\frac{Rp.2.720.000,00}{Rp.85.000,00/m^2} = \mathbf{32\ m^2}$. From the area of rectangle, it has been known that the high fence (2 m) is the width of the rectangle so that the long wake of the rectangle is $\frac{32m^2}{2m} = \mathbf{16\ m}$.The length of rectangle is 16m which is the circumference of a triangle measuring 4 meters, 5 meters and 7 meters.

In resolving these problems, sometimes students just write down what is known, what is answered, and how to respond or how to resolve the problem. In fact, sometimes students do not write coherently to solve their problems.

The students do not write what is known and asked of the problems encountered, so that a teacher is difficult to guess whether students have understood the problems encountered or not. When teachers have indicated that student do not understand the problem, it turns out that student are able to solve the problem correctly. But if teachers have indicated that students understand the problem, such students have not written what is known and what is being asked. It is as expressed by Sri Adi Widodo (2013b) states that there are some students in problem solving, which are not write what is known and what is being asked. The same thing also expressed by Sri Adi Widodo and AA Sujadi (2015) who found that a small percentage of student in solving the problem, do not write what is known and what is asked, but student are able to resolve the problems faced by correct.

Sometimes the students are not able to tell what steps should be done to resolve the problem. Student do not understand the steps necessary to plan to resolve the problem. Terms of necessary and sufficient to resolve the already can describe plans are sometimes not performed by student. This is in line Sri Adi Widodo (2013b) states that student are not able to deliver a sufficient condition and a necessary condition so that students have not been able to plan your to solve their problems.

In the phase or step to re-examine the answers, students are almost entirely not the process. Student consider that this step makes time to solve the problem is not short (time-wasting). As expressed by Sri Adi Widodo (2013b) student did not do anything at this stage of checking back. In fact, if the students are able to use the stage of checking back with good, small mistakes made by student can be avoided.

Practically, the students are only able to solve the problem in the third step that is only a step to implement a plan to solve the problem. This is why the ability to resolve the problems of student is still not satisfaction.

To improve problem-solving skills, students need guidance in solving a problem. Form of guidance in question, not a problem-solving assistance to each student. This is because the time used in a Learning process can be wasted just to give assistance to one or two students, so that the learning is done by teachers ineffective. But the guidance is done teachers can be either (1) gives an example about problem solvings and their solution by using the steps Polya, (2) create a textbook such as student worksheets sheet student activity, the content of the material reflects the steps in problem solvings, or (3) develop additional book like a comic with storyline reflects Polya problem solving. With the guidance conducted by teachers to students in solving the problem, at least the students can solve problems systematically. So the ability of students to solve problems can be increased.

Conclusions

The problem in math is or questions that are not routine and require the organization of knowledge in the finish. The problem faced by a student in problem solving is used in ways that have not been systematically or serial. So that the students' ability in solving mathematical problems is not maximized. One alternative to improve the ability of solving mathematical problems is to provide guidance to students in solving mathematical problems

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