

CHAPTER I

INTRODUCTION

1.1. Background

Mathematics is one of the most important subjects that very close and can be found around us. When we walk away, many things that we look related to mathematics. Something that we look, can be formed into a problem. Then, from the problem we try to solve (called problem solving). As a framework, a problem as a developmentally appropriate challenge for which the participant has a goal but the means for achieving it is not immediately apparent (Polya, 2004; Schoenfeld, 1992). Problem solving requires making sense of the problem situation and the means necessary for making decisions, which direct an individual's understanding (Schoenfeld, 1992)

Education process implemented in order to be able to develop the potential of learning to confront and solve life problem that it face and to support future development. Understanding, knowledge and skills that students need to be held covered in standard process which includes: problem solving, reasoning, communication, connection and representation. In addition the learning objectives of mathematics according to Badan Standar Nasional Pendidikan (BNSP)(2006) are:

(1) Memahami konsep matematika , menjelaskan keterkaitan antarkonsep dan mengaplikasikan konsep atau algoritma, secara luwes, akurat, efisien, dan tepat, dalam pemecahan masalah; (2) Menggunakan penalaran pada pola dan sifat, melakukan manipulasi matematika dalam membuat generalisasi, menyusun bukti, atau menjelaskan gagasan dan pernyataan matematika; (3) Memecahkan masalah yang meliputi kemampuan memahami masalah, merancang model matematika, menyelesaikan model dan menafsirkan solusi yang diperoleh; (4) Mengkomunikasikan gagasan dengan simbol, tabel, diagram atau media lain untuk memperjelas keadaan atau masalah; (5) Memiliki sikap menghargai kegunaan matematika dalam kehidupan, yaitu memiliki rasa ingin tahu, perhatian dan minat dalam mempelajari matematika, serta sikap ulet dan percaya diri dalam pemecahan masalah.

This means that mathematical problem solving ability is a component of process standard that trains high order of thinking ability. Mathematical problem solving ability is an ability made by an individual or group to find the solution of a problem with the knowledge, understanding and skills that people possess. In solving the mathematical problems of students in training to determine what is known, what is asked in the problem and what kind of solution that suits those problems. Because in solving mathematical problems do not just want to get the answer or outcome but rather on how students solve the mathematical problem.

To solve the problem is needed some strategies named problem solving. Mathematical problem solving is a process which involved the method solution is unknown in advance. To find the solution, students should map their knowledge about mathematics. There are four important phases to solve mathematics problem. In this research, problem solving ability according to Polya (2004) will be measured through students' ability to complete a problem by using problem solving steps as follows:

1. Understanding the problem

From this step, students should understand the problem that can be looked from being able to point out what the data, what the condition, and also what the problem showed.

2. Devising a plan

From this step, students make plan how to solve the problem, which solution that corresponds to the problem. Finding the connection between the data and the unknown.

3. Carrying out the plan

From this step, students implement the plan of what they have planned before.

4. Looking back

Students able to derive the result differently and use method for some other problem.

Unachieving goal of learning mathematics, especially mathematical problem solving occurs in SMP Negeri 1 Binjai. Low Mathematical problem solving ability is founded in the eighth grade through diagnostic test. Diagnostic tests conducted by researcher by giving the problem to see students' problem solving ability. The test is contextual problem to know the initial mathematical problem solving ability of students. Actually, all topics in mathematics can be tested to measure students' mathematical problem solving ability. But in this research, researcher choosed one topic of mathematics which still fresh and perhaps students still remind it. The topic was algebra. Giving diagnostic tests carried out on January 6th 2016. There are 20 students answer the diagnostic test in class VIII- 9. The problem tested to students as follow:

Pak Idris mempunyai kebun apel berbentuk persegi dan Pak Halim mempunyai kebun semangka. Ukuran panjang kebun semangka Pak Halim 10 meter lebihnya dari panjang sisi kebun apel Pak Idris. Sedangkan, lebarnya 3 meter lebih dari panjang sisi kebun apel Pak Idris. Jika diketahui luas kebun Pak Halim adalah 450 m^2 , tentukan luas kebun apel Pak Idris.

From the answers given by students obtained:

1. Students could not understand the problem

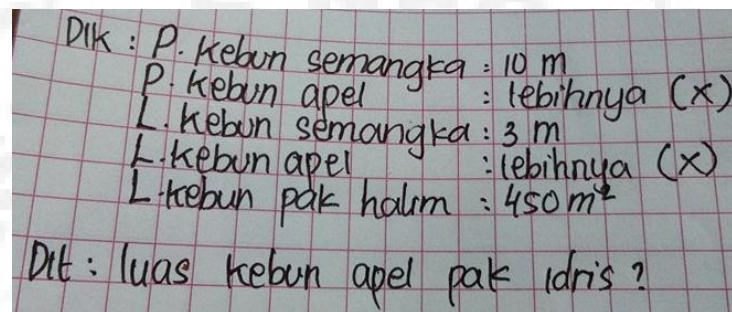


Figure 1.1 Student's sheet in understanding the problem step

From Figure 1.1, Students were able to identify what is asked but they did not able to identify what is known. Student did not know clearly what is known, and did not write what is known in student's sheet. In this step, there are 8 of 20 students could not understand the problem.

2. Students could not devise a plan in problem solving strategies

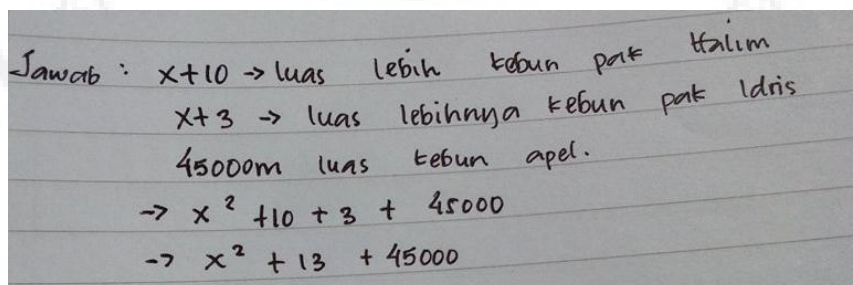


Figure 1.2 Student's sheet in devising a plan

From interviewing some of students about how they devise a plan, researcher got that most of them did not know which formula that suitable to the problem and which formula can be used. It happened because they did not understand the problem clearly, so that they could not make a formula which matched and believed that can solve the problem. Here, Figure 1.2, we can clearly see how student devised the plan. In this step, there are 7 of 20 students which could not able to find the connection between data and unknown.

3. Students could not carry out the plan in problem solving strategies

$L \square = p \times l$
 $L \cdot \text{kebun} = (2x + 10) \times (x + 3)$
 $450 \text{ m}^2 = (2x + 10) \times (x + 3)$
 $45.000 \text{ m} = x^2 + 13x + 30$
 $x \rightarrow (15 + 10) \times (15 + 3)$
 $= 25 \times 25$
 $= 625 \text{ m}^2 \text{ was kebun pak Idris}$

Figure 1.3 Student's sheet in carrying out the plan

Students could not find an appropriate strategy to solve the problem. From Figure 1.3, we can see that the students could not do the completion based on the plan that has been made and also they did not check each step clearly and carefully. In this step, there are 19 of 20 could not implement problem solving strategy.

4. Students did not look back the solution carefully and they could not derive the solution differently

Dik : Panjang Kebun Semangka pak Halim 10 m.
 Lebar Kebun Semangka pak Halim 3 m.
 Luas Kebun pak Halim 450 m².
 Dit : Tentukan Luas Kebun apel pak Idris ?
 Jawab : Persegi : $S \times S$
 : 10×10
 : 100 m

 Persegi panjang : $P \times L$
 : 10×3
 : 30 m

Figure 1.4 Student's sheet in looking back the solution

Most of students did not check back or look back their task carefully. They also could not derive the solution differently. Based on Figure 1.4, students could not derive the solution. Most of them have the same solution, mostly still have same mistakes to solve the solution. In this step, there are 19 of 20 students did not look back the solution carefully and could not derive the result differently.

From the diagnostic test of problem solving ability above, many students still can not understand the problem, make the question into mathematics model and formulate the problem. For this first indicators, namely understanding the problem, 60 % of students have been understood the problem and 40% of students have not been understood the problem. For the second indicators, devising a plan, there are 65 % of students have been devised a plan and 35% of students have not been devised a plan. For the third indicators, namely carrying out the plan, there are 5 % of students have been carried out the plan and 95 % of students have not been carried the plan. And the last indicators, look back, 5 % of students have been looked back carefully, and 95 % of students have not been looked back carefully. The graphic will be shown in Table 1.1:

Table 1.1 Table of Preliminary Diagnostic Test

Aspect	Categorized	Not Categorized
1. Understanding the problem	60%	40%
2. Devising a plan	65%	35%
3. Carrying out the plan	5%	95%
4. Looking back	5%	95%

From Table 1.1, shows that students still have low ability in problem solving. Fourth aspects of problem solving through the diagnostic test, were still not reached yet as well by students. This is happen because students were not able to figure out the problem in their mind and could not make the problem into the mathematics model and also formulated the problem.

Recognizing the reality on the ground that the problem solving ability of students is still low. We need a model of learning that make the students become active. It required a learning approach that can support successful learning. The new paradigm in education today is to create meaningful learning process, the learning process that takes place in schools let students actively involved in learning (students-oriented) and most of activity are not dominated by teacher. As a manager of student learning, teacher are obliged to improve attention and efforts in providing school mathematics learning, so the lesson material can be understood by students. Students are required to be better to use the ability of thinking to be skilled in problem solving in daily life related to mathematics.

Problem solving ability will be improved when the teacher use innovative and contextual learning approach. Through contextual approach, the concept of thinking and understanding of students will be more opened to mathematics, and not only focuss on a specific topic being studied, so it will lead to a positive attitude towards mathematics itself. The need for capabilities and skills to be able to solve the problem and develop thinking that study would be more meaningful if the students directly experience for themselves of what is learned.

Because we expect students actively in learning, the learning students must construct their own knowledge , that knowledge can be gained from their own experience or from other social interaction. One approach of learning that makes students active and interested in learning mathematics is Contextual Teaching and Learning. Contextual Teaching and Learning is a concept of learning that help teacher to connect between what is taught with students' real-world situation and encourage students make connections between knowledge possessed and its application in daily life, that involve seven main components, they are: constructivism, questioning, inquiry, learning community, modeling and authentic assessment (Trianto, 2009). Guiding lesson contextually in students' life in Contextual Teaching and Learning will produce basic knowledge that students will obviously see and understand the problem from their real situation so that they are encouraged to solve its problem. The problem can not be solved

using routine procedure, so that the students perceive the problem as a challenge. Mathematics teacher have a duty to help students to improve student's problem solving ability. Teacher should strive harder encourage students to solve problems that given. One focus of learning mathematics is problem solving, so that basic competencies that should be owned by every student is minimum standard of knowledge, skill, attitude, and value which is reflected in learning of mathematics of thought and action to solve the problem. Then, students not only memorize the concept and less able to use these concept but encourage them to use concept of what they have learned to real life problem. Contextual teaching and learning approach believed can improve students' problem solving ability that require students to seek their own solution problem independently that give a concrete experience, the experience can be used also to solve the similar problem will give meaning itself for the learners. Students solve mathematical problem until students' mathematical problem solving ability increase. So, contextual teaching and learning provides the opportunity for students to solve mathematics problem and improve students' mathematics problem solving ability.

Based on above background, the researcher interested in conducting research entitled: **“Efforts To Improve Students' Mathematical Problem Solving Ability Through Contextual Teaching And Learning at SMP Negeri 1 Binjai”**.

1.2. Problem Identification

Based on the background on the issues that have been mentioned above, some problems can be identified as follows:

1. Students still consider that mathematics is a difficult subject.
2. Most of activities in learning activities are still dominated by teacher.
3. Students' mathematical problem solving ability is low.
4. Students have difficulties to solve mathematical problems.
5. Unsuitable learning approach so that the objective of learning can not be achieved.

1.3. Problem Limitation

Because of extent problem and limited ability, time and costs, so researcher need to make a limitation problem in this research. As for the limitation problem in this research are:

1. Research subject was eighth grade students of SMP Negeri 1 Binjai Academic Year 2015/2016.
2. Learning Approach used is Contextual Teaching and Learning.
3. Problem solving ability in eighth grade students of SMP Negeri 1 Binjai Academic Year 2015/2016.

1.4. Problem Formulation

In accordance with extent problem describe above, the research problem formulation in this study are:

1. How does contextual teaching and learning approach improve students' mathematical problem solving ability in learning and teaching cube and cuboid topic in eighth grade of SMP Negeri 1 Binjai?
2. How does learning management conducted by teacher in implementing contextual teaching and learning approach in learning and teaching cube and cuboid topic in eighth grade of SMP Negeri 1 Binjai?
3. How does learning activity of students by implementing contextual teaching and learning approach in learning and teaching cube and cuboid topic in eighth grade of SMP Negeri 1 Binjai?

1.5. Research Objective

Based on the problem formulation, then objectives of this research are as follows:

1. Improving students' mathematical problem solving ability through contextual teaching and learning approach in learning and teaching cube and cuboid topic in eighth grade of SMP Negeri 1 Binjai.
2. Knowing the learning management conducted by teacher in implementing contextual teaching and learning approach in learning and teaching cube and cuboid topic in eighth grade of SMP Negeri 1 Binjai.
3. Knowing the learning activity of students by implementing contextual teaching and learning approach in learning and teaching cube and cuboid topic in eighth grade of SMP Negeri 1 Binjai.

1.6. Research Benefits

This research is expected will give the benefits as follows:

1. For students, helping them to increase their problem solving ability of mathematics and also encourage them to able to solve real problem around them.
2. For teachers, opening their insight about developing the learning process well.
3. For school, increasing quality of school caused by implementing of students' learning outcomes and teacher activities.
4. For researcher or advanced researcher, improving the insight, ability, information and experience in increasing the competency as teacher student.

1.7. Operational Definition

The operational definition of this study is described as follows:

a. Contextual Teaching and Learning

Contextual Teaching and Learning is a conception of teaching and learning that helps teachers relate subject matter content to real world situations.

Contextual Teaching and Learning approach has 7 main components, they are:

- Constructivism
- Inquiry
- Questioning
- Learning community
- Modeling
- Reflection
- Authentic assessment.

b. Problem Solving Ability

Problem solving ability is the ability which gained by students to understand and complete the problems which are faced by using their skills and abilities to determine the concept they should use to be applied in solving the problem. To measure students' problem solving ability, there are 4 stage that have to be considered, namely:

- Understanding the problem
- Planning problem solving strategy
- Implementing problem solving strategy
- Checking the results of solving the problem.