

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

Mathematics is a study that be the basic of science and technology that is very important in every aspect of human life. Therefore, mathematics is very important to teach in every level of education such as SD, SMP, SMA and university. Beside of that mathematics is mother of all science, so mathematics is very important to teach. Cokrof (in Abdurrahman in Nasution, 2014:1) said that:

Matematika perlu di ajarkan kepada siswa karena (1) selalu digunakan dalam segi kehidupan; (2) semua bidang studi memerlukan keterampilan matematika yang sesuai; (3) merupakan sarana komunikasi yang kuat, singkat dan jelas; (4) dapat digunakan untuk menyajikan informasi dalam berbagai cara; (5) meningkatkan kemampuan berpikir logis, ketelitian, dan kesadaran keuangan; dan (6) memberikan kepuasan terhadap usaha memecahkan masalah yang menantang.

Beside that statement above, Cornelius (in Abdurrahman in Nasution, 2014:1) also said that:

Lima alasan perlunya belajar matematika karena matematika merupakan (1) sarana berpikir yang jelas dan logis; (2) sarana untuk memecahkan masalah kehidupan sehari-hari; (3) sarana mengenal pola-pola hubungan dan generalisasi pengalaman; (4) sarana untuk mengembangkan kreativitas; dan (5) sarana untuk meningkatkan kesadaran terhadap perkembangan budaya.

Because mathematics is very important to learn, so mathematics is considered as the main lesson in education, so time lesson for mathematics is much than the other lesson. Even though mathematics lesson is very important to teach in school but many students have many problems in study mathematics in school. This problem is because of student assumed that mathematics is a lesson that very difficult to be studied and mathematics is not interested to be studied.

There some factors that caused the students have assume that mathematics is difficult and not interested to be studied, one of the problem is students have less problem solving ability in mathematics. There some competences that hoped

be able to reach by students in study mathematics in every level of education such as SD, SMP until SMA. Depdiknas (in Wahyuni, 2013: 3), he said that the competence that be hoped can be reached by students are:

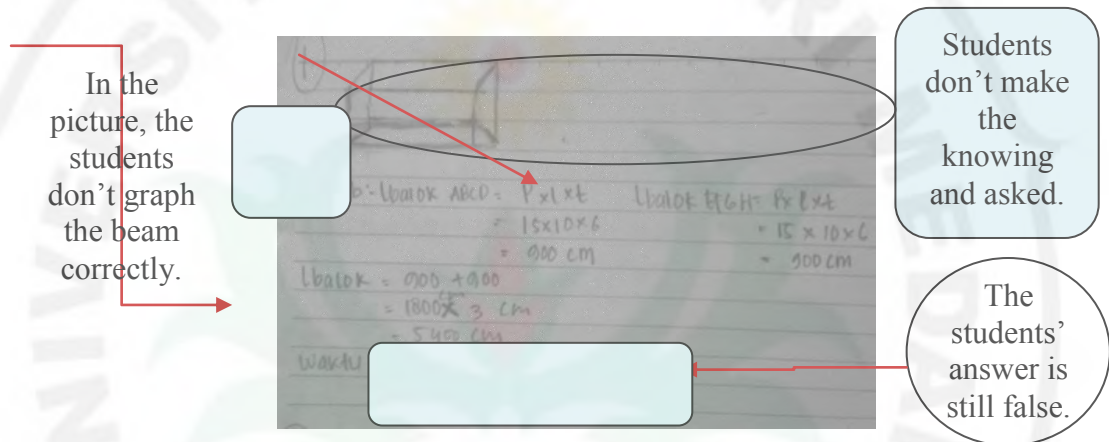
1. Showed the understanding mathematical concept that be studied, explained the relation between concept widely, accurately, efficiency, and right in problem solving.
2. Have the ability to communicate the idea using symbols, tables, graphs or diagrams in explaining the problem.
3. Using reasoning in pattern, characteristics or do manipulate mathematics in make generalization, arranging the fact or explaining idea and mathematics statement.
4. Showing the strategy ability in making (formulating) the model of mathematics in problem solving.
5. Having the respect in used mathematics in daily life.

Based on the competences that be hoped by Depdiknas, problem solving ability must be have by students in study mathematics in school. Because of problem solving ability was very important to have by students. The importance of mathematical problem solving also be said by Barca (in Sumarno in Wahyuni, 2013: 4) are: (1) problem solving ability is the main purpose in study mathematics; (2) problem solving consist of method, procedure, and strategy was a main process in curriculum of mathematics; and (3) problem solving is a basic ability in study mathematics.

Problem solving has the main function in the activity of teach and learn mathematics. By mathematical problem solving, students can try to interpret the concepts, theorems and skills that be studied (Hudojo in Wahyuni, 2014:3).

Based on initial observation that be done by the observer that have the purpose to know the mathematical problem solving of students in class IX-9 by giving four question of four problems about cubes and beams. The observation has the purpose to know the mathematic problem solving ability of the students. In observation, students do the exercise by individually to know their ability to solve the problems. The observation shows that the mathematical problem solving

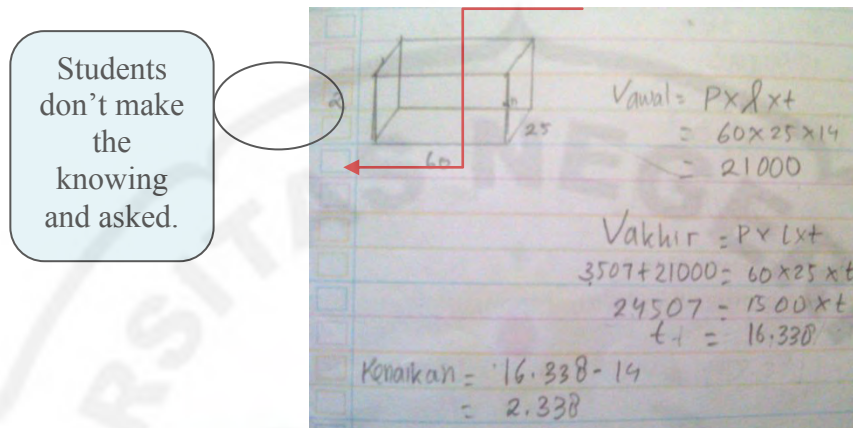
of the students still low. First question that given to the students is: “A *solid beam ABCD.EFGH* that have size  $15\text{ cm} \times 10\text{ cm} \times 6\text{ cm}$ . The point  $P$  was in the side of  $AB$ , so  $AP=3\text{ cm}$ . A lizard wan be in the corner of  $G$  will catch a mosque that wan be in point  $P$  by creep in the surface of beam. If the velocity of lizard moved  $2.5\text{ cm/second}$ , how many the fastest time that need by lizard to catch mosque”.



**Figure 1.1 Sample of Student's Sheet Answer Number 1**

Based on picture 1.1, we can know that the students can't understand what the asked in that question. Student doesn't make the known and the asked from the problem above. Beside of that, in the process of solution the student doesn't know the way to solve the problem, he also can't make the graph of the beam correctly because he doesn't know to put the point coordinate in that beam. Then, the student also doesn't answer the question correctly because the student answer that the velocity of lizard to catch a mosquito is 13,500 second, and the true answer is 8 second.

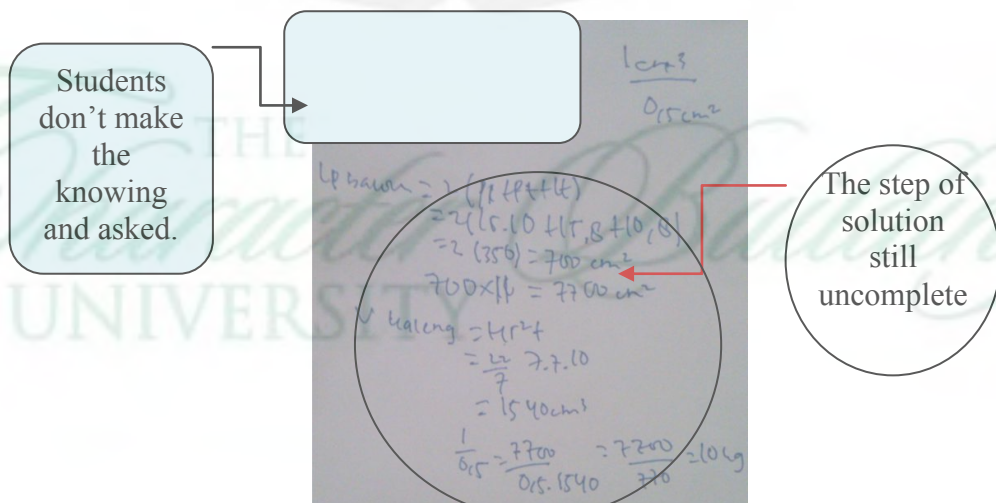
In the next question, student also has the mistake in doing the problem solving process to answer the question. The second question that be given to the student in observation time is: “a tank that have a size like a beam have the size in based area is  $60\text{ cm} \times 25\text{ cm}$  was filled by water that high  $14\text{ cm}$ . If  $3,507\text{ liter}$  of water was added to the tank, so the increase of the water in the tank is?”



**Figure 1.2 Sample of Student's Sheet Answer Number 2**

Based on picture 1.2, the students still can't understand what was asked in the problem above. The student still doesn't make the known and the asked in the process of problem solving. And in the process of answering the question for the problem above, the process still not appropriate with the step of problem solving of mathematics.

In the third question, student also makes the mistake in process of problem solving in that question. The question in the third of observation is: "There are 11 beams that have the same sizes with the length 15 cm, wide 10 cm, and high 8 cm will be paint using the paint in tin that have the sized radius 7 cm and high 10 cm. If every  $1 \text{ cm}^3$  can be used to paint  $\frac{1}{2} \text{ cm}^2$ , how many tins that need to paint 11 beams?"



**Figure 1.3 Sample of Student's Sheet Answer Number 3**

Based on pictured 1.3, the student still can't understand what that asked in the problem above, the student still not make the known and the asked from the problem above. And in the process of answering the question for the problem above, the process still not appropriate with the step of problem solving of mathematics.

In the fourth question in observation, the students still have many mistakes in process of problem solving to answer the question. The question of the fourth question is: "There is a beam that has the comparison size of length, wide, and high of a beam is 4:3:2. If the beam has the area of the base of beam is  $192 \text{ cm}^2$ . How is the surface area of that beam?"

The image shows a student's handwritten work on a grid background. At the top, the ratio  $4:3:2$  is written. Below it, the student has written  $p = 4 \times 8 = 32$  and  $l = 2 \times 92 = 184$ . Then,  $l = 3 \times 92 = 276$  is written. The student then calculates the surface area using the formula  $Lp = 2(pl + pt + lt)$ . The calculation is  $= 2(64 \times 18 + 64 \times 32 + 48 \times 32)$ , which simplifies to  $= 2(1152 + 2048 + 1536)$ , then  $= 2(4736)$ , and finally  $= 9472 \text{ cm}^2$ . There are three annotations with red arrows: one pointing to the ratio  $4:3:2$  with the text "Students don't make the knowing and asked.", one pointing to the surface area formula with the text "The step of solution still incomplete", and one pointing to the final answer  $9472 \text{ cm}^2$ .

**Figure 1.4 Sample of Student's Sheet Answer Number 4**

Based on picture 1.4, the students still not understand what is asked in the problem above. The student still doesn't make the known and asked from the problem above. In the process of problem solving, the student doesn't understand the way to solve that problem, student still has the mistake in calculating the problem solving. So, the result of solution still doesn't have the right answer.

The student almost be understand the problem from the question above and the way to get the solution from the question above although they don't use the right of mathematics model to solve the problem. However, the student can't

be interpreted correctly to get the answer correctly because they don't know the position of P, so they don't use the Pythagorean theorem to find the distance of lizard and mosquito. So in the last problem, the student can't know to find the correct comparison to solve the problem above because they don't understand the problem or they don't have many time to answering the problem above.

Based on the explanation above, that problem showed that the problem solving ability have some indicators, they are: (1) understanding the problem with written the known and the asked in that problem, (2) finding the plan by written the formula that used to solve the problem, (3) solving the problem based on the formula that has been planned, (4) correcting back the result that get from that solution. Based on that analyzed about the average of problem solving ability students' are still low. No one of the student get score 80 in the test, but some student that get score of 60-75 is 6 students from 42 students, and they almost completed in process of problem solving, and the approximation of 6 students are 14.29% because 85.71% from the students uncompleted in answering the problem

Based on the result of observation and interview that be done by researcher to the one of the mathematics teacher in SMP Negeri 11 Medan, she is Mrs. Adelina Hartati S.Pd, known that the student still have many difficult in solving the problem in mathematical problem. That is caused of the student still have difficulties to understand the problem that was be asked in the problem especially to know what they asked and they known in that problem, so the students still were very difficult to solve the problem.

Based on the facts above, so one of the method that can be used to solve that problem is cooperative learning method type Group Investigation (GI). Group investigation is a cooperative learning method in which students from groups based on their interest in a particular topic for in-depth study and investigation (Ellis and Stuen 1998:84).

Group Investigation is learning model group by make the planning, finding and solving the problem in discussing group so they get the purpose of

learning that had formulated (Yumisnaini, 2012:3). Beside of that Trianto (in Yumisnaini, 2012:4) also give the opinion about group investigation, group investigation is the method of learning that involved the student from the planning, finding the topic or ways to learn in investigation. This learning model uses the student to have the good ability in communication or in group process skills.

In implementing the Group Investigation learning model, the teacher divided the students be some groups that consists 5-6 students that heterogeneous in every group. The implementation of group investigation learning model, have four steps, they are: (1) identifying commonly the topics and organizing the student in group; (2) planning the learning tasks; (3) doing investigation; (4) preparing the last report; (5) presenting the last report; (6) evaluation (Rusman, 2010: 221-222).

Group Investigation learning model has some assumption as the reference in developed of learning, they are: (1) to improve the creativity ability of student based on developing creativity process to awareness and developing tools that support creativity; (2) emotional component more important that intellectual, that irrational more important than rational; (3) to improving the change of success in solving a problem must be understand the emotional component and irrational (Rusman, 2010:223)

Based on the opinion above, Group Investigation learning model is one of the learning models that suitable to improve problem solving ability of students in learning process. It is because of in learning process that used group investigation learning model, have some steps of learning that suitable to improve the problem solving ability in class, they are: (1) dividing the students into a small group that consists  $\pm 5$  students; (2) giving the open question that analytically; (3) inviting every students to participate in answering the question by group alternately clockwise in time that agreed (Rusman, 2010:223).

Based on the explanation above, the researcher has the focus in group investigation learning model to improve the problem solving ability. So, this research have the title is: **“Implementation of Group Investigation Learning Model to Improve Problem Solving Ability in Class VIII in SMP Negeri 11 Medan Academic Year 2014/2015”** can answer the problem above.

### **1.2 Problem Identification**

Based on the background above, there are some problem that identified, they are:

1. Mathematical problem solving ability of students still low.
2. Students have difficult in solving the problem.
3. The learning process still teacher centered.
4. In learning process, teacher more emphasis on learning outcomes than in the learning process
5. Teacher often gives the example to the students about how the way to answer that question.

### **1.3 Problem Limitation**

Based on identification problem above, so the researches make the limited the problem in: Implementation of Group Investigation Learning Model to Improve Problem Solving Ability in Class VIII in SMP Negeri 11 Medan Academic Year 2014/2015.

### **1.4 Problem Formulation**

Based on problem limitation above, so the problem of this research be formulated such as:

1. How is the learning process of group investigation learning model can improve the problem solving ability in topic cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015?



2. How is the improvement of students' problem solving ability using Group Investigation learning model on the matter cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015?
3. How is the process of students' answer in improving the problem solving ability in topic cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015?

### **1.5 Research Objectives**

The purposes of this research are:

1. Repairing the learning process by using the group investigation learning model to improve the problem solving ability in topic cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015
2. Knowing the big of the improvement of students' problem solving ability using Group Investigation learning model on the matter cubes and beams in SMP Negeri 11 Medan in Academic Year 2014/2015?
3. Knowing the process of students' answer in improving the problem solving ability in topic cubes and beams in SMP Negeri 11 Medan Academic Year 2014/2015.

### **1.6 Research Benefits**

Benefit that hoped from this research is:

1. Improving the mathematics problem solving ability of students especially in topic cube and beam.
2. As consideration and input for the teacher to implementing group investigation learning model in learning activity.
3. Improving the interesting filling for the student to learn mathematics.
4. As grip for researcher in mathematics lesson that will be a teacher.
5. Be motivated for the school in improving quality of education.
6. As input for the other researcher that will do the research with the same problem.

### 1.7 Operational Definition

This research has the title, “Implementation of Group Investigation Learning Model to Improve Problem Solving Ability in Class VIII in SMP Negeri 11 Medan A.Y 2014/2015”. Terms that require some explanations are as follows:

- Problem solving ability is students' ability in solving mathematical problems through several aspects: understanding the problem, making a plan completion, perform calculations and check back.
- Group Investigation is a teaching method that engages students in groups of 5-6 people from the planning, both in determining the topic as well as a way to learn through investigation.

