

CHAPTER I INTRODUCTION

1.1. Problem Background

One of Indonesian main goal is to educate all of each citizen people. According to Prembule UUD 1945 Paragraph 4th “The intellectual life of the nation” is shown that education is the important point for nation improvement. In general, education is seen as essential thing to enhance the dignity of a nation and to promote progress towards a better state than before. Each country proposes to improve the quality of education to promote his country. Therefore, the success and failure of a country's education has a significant influence for the development of the quality of future generations (Djumransjah, 2006). In improving the quality of education is expected to product the human beings generation who can contribute to the society, nation and country so that they can live and compete in the international world with no loss of their national identity.

Basically education is all the effort that is intended to help to develop all the potential that exists in a person. In this case, we need someone who was able to educate so that all potential contained in a person who would be trained can develop and benefit to others, and especially for themselves. In general, the task of educating is done by a trained educator and one who trained was a child. An educator tries to guide, lead, teach children in terms of both physical and spiritual.

The education system helped determine the success or failure of a country, especially in a race to progress to other countries. All societies, without exception, must play an active role to build the formal education system. All intended to provide young people with science and knowledge as widely as possible, which obviously is necessary for a long life. Especially when it comes to entering the workforce, as would require expertise in the field of work. The education system will be increasingly important as increasing the complexity of people's lives. Through the good education we obtained the qualified human being who will bring us into an independent and the qualified nation.

In the Act Number 2 in 1989, about National Education System, in Chapter 1 Article 1 paragraph 2 is written: "The national education is education that is rooted in the culture of Indonesia and that pursuant to - the Constitution of 1945". So in this case, the goal of national education is the ultimate goal of an educational institution either formal or informal according to the culture of Indonesia (Depdiknas, 2010).

National education has the function to develop skills and form the character and civilization of the nation's dignity in the context of the intellectual life of the nation. This means that education is a major institution in shaping the qualified human resource (HR) who able to adapt with the world developing and the changes that occur in a society, nation and state. As contained in the Act - Law of National Education System (UUSPN) No. 20, 2003.

Education is the conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing their potential to have spiritual power, religious, self-control, personality, intelligence, noble character, and necessary skills for themselves, society, nation and state.

Thus, education is a conscious doing by family, society and government through guidance, instruction and training that can be taken place at school and outside school. The education system is intended as a strong, sturdy, and commanding social institution to empowering all citizens of Indonesia. Human resource development course expected to develop into a qualified human being so that they can proactively to respond the time challenges that always change by the time (Sembiring, 2008).

Education will never be separated from teaching and learning. Learning is a complex process that happens to every person throughout his life. The learning process occurs because of interaction between the people with the environment. In this process, there are two aspects are mutually supportive each other namely learning methods and media. These two aspects are interrelated. Application of a particular instructional method required adjustment of media to be used. In addition to the adjustment method of learning media, it is also very

necessary to the purpose of learning, types of tasks, the learning context which includes the characteristics of students and also the expected response from the students when learning takes place (Arsyad, 2007).

Among the major problems of education in Indonesia that much discussed is the low quality of education that is reflected in the low average learning outcomes. Another problem of education in Indonesia is also much discussed is that the learning approach is still too dominated by the teacher or teacher center (Asmani, 2009). Teachers put a lot of students as objects and not as subjects. Our education system were very lack to provide opportunities for students in various subjects to develop the ability to think holistically (whole), the creatively, objectively, and logically. Not to use the creative and innovative learning yet as one of the interesting paradigm of learning.

Teaching and learning are two concepts that cannot be separated from one another. Learn show what should be done as a lesson recipient (student), while teach shows what should be done by a teacher. So learning is a process of interaction between teachers and students during the teaching process. The successful of teaching process will be influenced by the ability of teachers to determine the methods and tools used in teaching and also determined by student interest.

Mathematics education is the basic science of all levels of education and the internal of the national education system which plays an important role in the development of science and technology. That's because mathematics is one of the fundamental knowledge that can foster students' thinking skills and are needed in the development of technology.

As stated by Suprioko (201: 2) that:

"Mastery of mathematics in the successful development of education is very important, because the mastery of mathematics for students, both in primary and in secondary education will become a powerful tool for studying other subjects, both at the same level of education and the higher level of education"

Based on the interview with mathematics teacher in SMP Negeri 1 Medan the low of students' learning outcomes due to teachers' explanation the mathematics material is less obvious and less attracted the students' attention. In general, teachers are too quick in explaining the subject matter. In addition the use of unsuitable teaching methods and media makes the students have difficulty in understanding and mastering the material so that the values obtained by the students tend to be low.

Looked from student outcomes (daily report), student has less score in topic geometry especially 3 dimensions. It is just 35% who get score more than minimum standard. Teacher said that student careless is the main reason why students cannot solve geometrical problem. They won't drawing figure to help student for imagine it. And the end, student get mistake when doing calculate with wrong properties of geometry even though they using right formula.

According information that get from interview too, one of the afraidness subject for student is mathematic. They have difficult to find property of 3D and determine every node (point) to draw figure. They cannot solve problem without figure because they need to know every position of line and point in a 3D figure. Student criticize that their teacher just give them formula without tell them how to use it with many condition of problem. So, they just can solve simple or easy problem and cannot solve for advance problem.

That's effect appear from teaching technique. Knowledge which get instantly cannot dig deep concept in student mind. Learning process must connecting with students' experience. Formula or theorem conclusion should gotten by own student suppose to construct deeply in their mind.

Based on initial observation has given to students consider 3D geometrical problem, it find some difficulty is student facing on, such that;

- a. Student difficult to imagine geometrical

Some student cannot drawing 3D figure if just telling by text. So, student cannot solving problem if not showed by picture. Student

cannot determine every node geometrical exactly. 20 from 25 cannot answer problem that has not figure.

3. A pyramid with base as square with wide of diagonal 10m. the If the high of shade pyramid is 8m, find the volume of pyramid and its surface area.

- Problem Understanding
(Determine what is known and asked from its problem with your own word)

Known: diagonal = 10m
slanting = 8m

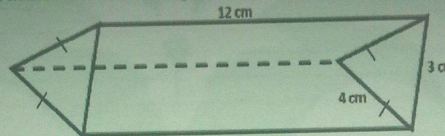
Asked: V = ?

Figure 1.1 : Students' answer for initial observation problem no.3

(Student confuse to draw figure following the text only)

Otherwise most of student (21 from 25 students) answer problem with figure well

A chocolate manufacturer package their products in the form of an upright triangle prism as shown at the picture beside. If a company has the paper supply of packaging area about $20m^2$, specify the maximum number of Chocolate products that can be packed ?



- Problem Understanding
(Determine what is known and asked from its problem with your own word)

Known: $h = 12 \text{ cm}$ edge = 4
 $b = 3 \text{ cm}$ Area of P Supply = $20m^2$

Asked: the maximum number of chocolate products
if the area about $20m^2$?

- Planning For Solving Problem
(Using some variable for easier and connecting information which is asked and known)

Surface area = LA of 2 sides + 2 rectangular
 $20m^2 = \text{Surface area}$

- Do Planning Procedure
(Flows the planning procedure for getting its result or answer)

$LA = a \times t$ $L = p \times l$ $SA = 10,5 \times 4$
 $\frac{1,50}{12}$ $L = 11 \times 12$ $= 1512 \text{ cm}^2$
 $LA = 3,5 \times 3$ $L = 18$ $20m^2 = 15120$
 $\frac{12}{12}$ $L = 10 \times 3$ $200000m^2 \text{ is}$
 $LA = 5,25 \times 2 = 10,5$ $L = 144$

- Correcting the procedure and answer
(Analyze and evaluation, is its procedure and its answer has already corrected)

the answer are look alike in number
two A and B)

Figure 1.2 : Students' answer for initial observation problem no.2

(student answer problem with figure very well)

- b. Student difficult to connected 2D geometry as base of prism or pyramid.

Student confuses to find base area of prism and pyramid especially for trapezium, kite, and rhombus. Some student forgot how to find area and circumference of 2D geometry.

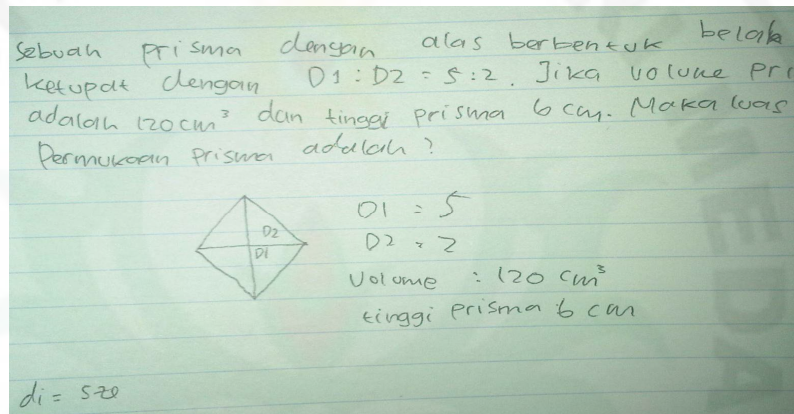


Figure 1.3: Cannot find base of Prism

- c. Less of knowledge with pre-material (Pythagoras theorem)

Some student cannot determine kind of triangle which is just find the length of its side. That's caused is student unknown about triple Pythagoras sets. Looking from the result above

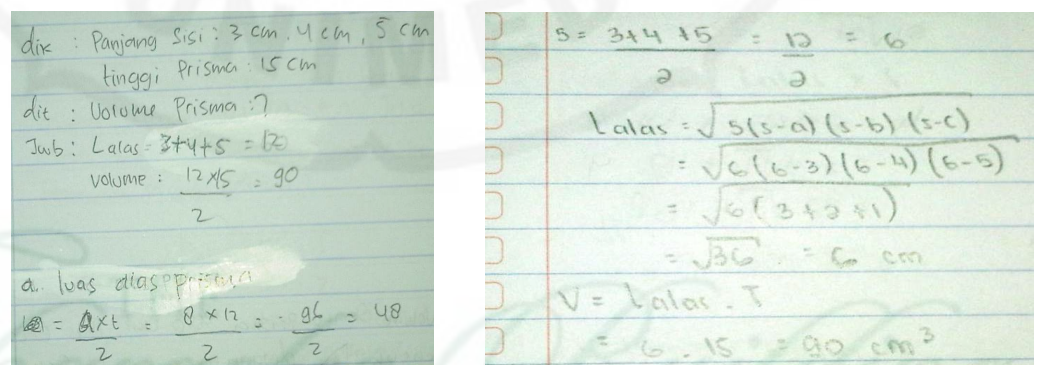


Figure 1.4: Different ways of student to solve math problem. Some student solve it with irregular triangle formula, some of them with regular triangle formula (simple one)

- d. Student cannot provide their deep thinking for advance problem

Caused of minimum concept that student has, so they can provide their knowledge to solve some difficult problem. They are just stuck for using formula only.

1. The following sketch shows a front view of a prism-shaped swimming pool. The high and wide are 2.5 km, 1.0 km. For each high 0.5 km, the deep of pool is added 200m. find...

a. The deepest of pool 1 km

b. Volume of pool $1,5 \text{ km}^3$

Figure

• Problem Understanding
(Determine what is known and asked from its problem with your own word)
Known: $L = 2,5 \text{ km}$, $w = 1 \text{ km}$, $2,5$ divided into 5 groups and added into 200 m the deep 200 m
Asked: the deepest and volume of pool

• Planning For Solving Problem
(Using some variable for easier and connecting information which is asked and known)

Figure 1.5: Students' answer for initial observation problem no.1
(Advance problem that student miss to solve)

From initial diagnostic test had been given to 25 student, one of main problem is less capability of student to solve mathematics problem. Some student difficult to arrange their mind to solve problem steps by steps. They just writing their knowledge, and if they miss or forget, they just stuck and give up to solve it without arranging their mind. Student solve problem without do planning, think its procedure, doing solve as procedure, and correcting their answer. It makes student don't know, how to start it and when their problem has already finish to solve or not, at the end lost in their own problem.

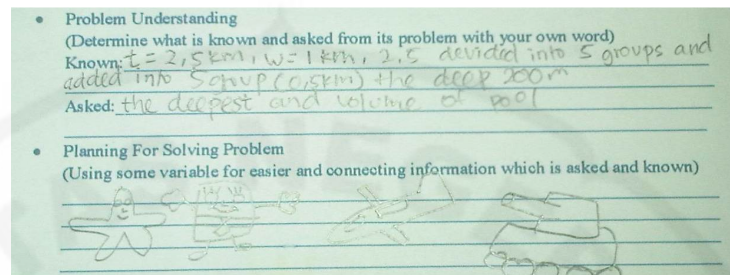


Figure 1.6: Students' lose in their answer without well planning

SMP Negeri 1 Medan is one of the thousands of existing formal educational institutions in Indonesia. SMP Negeri 1 Medan aims to deliver their students get an excellent achievement and become a qualified graduated with ways always to improve their students' performance from year to year. That school conducts a field in order to realize the goal. The goal is to create a conducive learning atmosphere, comfortable, and enjoyable. In all of their efforts to achieve their goal they faced so many problems. The most problem is how to make the students can mastery the subject material given, especially in Mathematics subject. Many students have the difficulty in almost Mathematics' material. In this research the IX grade is used to be a sample research. Based on observations in the classroom, the math learning weaknesses in IX grade, SMP Negeri 1 Medan are:

1. Students have no capability to mastery the relationships between concepts,
2. Students less attention to the material that is explained by the teacher,
3. Student always just memorize the formula without understand it well,
4. Students less interest learn about their matter themselves and just wait for the material presented by the teacher.
5. Student less capability to solve mathematics problem.
6. Student less creativity for mathematics problem solving.

According to the Standards of Education, the implementation of the learning process is the implementation of the lesson plan. Implementation of

learning includes preliminary activities, core activities and closing activities. Implementation in core activities of learning process is to reach the basic competence conducted in an interactive, inspiring, fun, challenging, motivating learner to actively participate, and give as well as enough scope for innovation, creativity, and independence in accordance with their talents, interests, physical and psychological development of students. In implementation of core activities, teachers use a variety of approaches, strategies, methods and models to suit the learning characteristics of students and subjects, which may include a process of exploration, elaboration and confirmation.

In mathematical learning, exploration activities can be done with using simple question which has relation in real life. Then let student to tell us, what is relationship of the question and topic for today. This process will make students mind opened. In this study, learning activities with using some questions for guiding student to open students' discovery of topic is called **Guided Discovery**. Guided discovery construct student's understanding with using some question which has direction to a conclusion. So, student knowledge does not got instantly and construct deeply in student's mind.

Tampubolon (2000: 23) states that the guided discovery approach is very effective to include math and science. Student participation in the investigation and search will help them to valid conclusions, skilled, and understand the concepts. Search activities provide concrete experiences to help students understand and remember the abstract ideas without memorized by rote.

According to Carin (1993: 90), the guided discovery learning is highly recommended. It is based on the following considerations:

- a. Learning with guided discovery to enable students for solving problems, so that students learn from direct experience. Such learning can provide satisfaction for students to fulfill their interest in the world around them.
- b. Many teachers who are familiar with the use of traditional or expository learning, while learning through discovery often fail due to

a lack of guidance. Guided discovery provides an option to avoid the effect of both learning, so that the guided discovery has the possibility to increase the expected results

- c. Many student of junior high school students who have aged 13-15 years old, but still in the concrete operational stage (Director General of Basic Education, 2001). Students who are in the concrete operational stage thinking can only learn knowledge reasoning through guided discussion based on direct learning experiences provided by the teacher.
- d. Learning in groups is recommended as a way of organizing students for guided discovery learning. This can lead all students to participate in the construction process, work together, share opinions, and learn from each other, and Guided discovery can be applied to teaching students with backgrounds, learning styles, and varying levels of development.

Why are the researchers in this research interested in the Polyhedron? The reason is although the Polyhedron has been studied up in the elementary school level, but still many students who do not understand the material. It is also found at students in SMP Negeri 1 Medan. Based on interviews with mathematics teachers, students usually just memorize the surface area and volume's formula of the Polyhedron itself, without ever understanding how that formula can be obtained. The teacher said that he delivered the material with conventional learning. Knowledge of polyhedron geometrically had lost since the study it just tech by tell formula only. Students confuse when they are trying to answer question and solve mathematics problem because they do not understand property of it geometrically. So, It need to understand the geometrical and its property to improve mathematics solve problem capability.

Based on the background above, the researcher is interested in doing research, entitled

"The Use of Guided Discovery to Improve mathematics Students' Problem Solving in Polyhedron at IX grade SMP Negeri 1 Medan " .

1.2. Problems Identification

Based on the background can be identified the problems that occurred as follows:

1. Students consider mathematics is a difficult subject so that the low rate of student learning outcomes.
2. Students' understanding of the material concept is still lack.
3. Less precisely model and learning approaches that used by teacher to deliver teaching materials.
4. Less of students' mathematics problem solving capability for finishing problem.
5. Guided discovery can use for delivery material by teacher to improve student understanding

1.3. Research Scope

The identification of problems found various problems about things that can affect student learning outcomes. Taking into account the ability of the author, cost, time constraints and scope of the problem, it is necessary to place restrictions on the research problem. The authors limit this problem is only on:

1. Guided Discovery in materials Polyhedron
2. Students' mathematics problem solving for improving learning outcomes
3. Understanding material concept of polyhedron Students of SMP N-1 Medan grade IX

1.4. Research Question

Based on the background of the issues, problems identification and restrictions problem that has been stated above, then the problem in this study is formulated as follows:

1. How does the learning process thoroughly using method Guided Discovery that is applied in polyhedron can improve the students' mathematics problem solving for students at IX grade SMP Negeri 1 Medan?
2. What are the constraints that faced in learning process of Polyhedron material for students at IX grade SMP Negeri 1 Medan?
3. How does the effectiveness of learning process thoroughly Guided Discovery that applied in the polyhedron in improving the students' math problem solving for students at IX grade SMP Negeri 1 Medan?

1.5. Research Objectives

Noting the problems that arise in the required learning, it needed the efforts that can improve students' mathematics problem solving. The purposes of this study are:

1. To improve the students' mathematics problem solving in learning process thoroughly using method Guided Discovery in polyhedron for students at IX grade SMP Negeri 1 Medan
2. To solve the constraints that faced in learning process of Polyhedron material for students at IX grade SMP Negeri 1 Medan
3. To apply guided discovery effectively of learning process thoroughly in the polyhedron for improving the students' math problem solving for students at IX grade SMP Negeri 1 Medan

1.6. Significant of Study

As a classroom action research, this study provides the benefits mainly on conceptual learning and also for the increasing of student outcomes in mathematics learning.

1. Student Beneficial

With the implementation of guided discovery, miss-conception and difficulties in the learning process (both strategies, techniques, concepts, etc.) will quickly be analyzed and diagnosed, so the errors and difficulties will not be protracted. If errors occur can be repaired, then the learning will be easy to implement, interesting, and students are expected to rise. It shows the reciprocal relationship between learning and improved student learning outcomes. Both will be realized, if the teacher has the ability and willingness to perform.

In addition, this thesis can improve student learning outcomes PTK, it is performed by the teacher can be a model for students to improve their achievement. Teachers are always doing innovative and creative will have a critical and reflective attitude towards learning outcomes achieved by students. The critical attitude is what will be used as a model for students to continue to reflect on themselves, as was done by his teacher.

2. Teacher Beneficial

Teachers have the ability to improve the learning process through an in-depth review of what happened in class. By doing guided discovery, teachers can develop and improve their performance in a professional manner. It causing the teacher is able to assess, reflection, learning, and is able to improve its management. In this case, the teacher is no longer merely as a practitioner who is satisfied with what was done so far, but also as a researcher in their field who have always wanted to make repairs to the innovative and creative learning.

Guided discovery that is applied in class activities research , teachers will feel more confident. Teachers are always reflection, self-evaluation, and analyze their own performance in the classroom, of course, will always find

their strengths, weaknesses, and challenges of the future of learning and education, and develop alternative solutions to problems / weaknesses in her learning. Such a teacher is a teacher who has a strong self-confidence.

3. School Beneficial

School with teachers have the ability to make changes or improvements in a professional performance, then the school will thrive. There is a close relationship between the development of a school teacher with the development of skills. School will not develop, if the teacher does not have the ability to develop themselves. Relation to class activities research, if the school is the teachers have the skills to implement learning process activities course the school would gain a great benefit, because of the increased quality of teaching reflects the quality of education in these schools.