

CHAPTER 1 INTRODUCTION

1.1 The Background of the Research

The most important thing to increase the progress of a nation is human resources. Indonesia is categorized as a developing country and the quality of National Education has very wide impacts in all aspects of human's life. By education, human will be able to solve various problems and difficulties of life. Therefore, the purposes of education are as a self-builder, shaper, and developer. Globalization requires people to have adequate education in order to compete. Unfortunately, from the following facts below, Indonesia still has some serious educational problems, such as (1)Every minute, four children out of school; (2)54% of teachers do not have sufficient qualifications to teach; (3)34% shortage of school teachers; (4)Uneven distributions of teachers; (5)Education Development Index (EDI) is at 69th position out of 127 countries. (UNESCO, 2011)

The quality of education is the first indicator of Country Development Rate. Therefore, educational development is the main factor for the national development. As a developing country, the quality of education in Indonesia is still low. It is caused by the learning quality that is not optimal yet. It is shown by the low number of students's learning outcomes in senior high school, especially in mathematics. Generally in SMA Panca Budi Medan, there are many students who failed the examinations. Their grade is lower than KKM that required by the school, it is about 65%, while the KKM in this school is 75. It is caused by the teachers's methods and the students's activities. Based on that average grade's percentage, shown that teaching of mathematics has not been maximal yet to get a good result. Which means still needs to be improved in order to minimize the number of students whose grade is lower than KKM required by the school.

Nowadays, the government has been actively encouraging the education in Indonesia. One of the government's efforts is curriculum development becomes curriculum of 2013. This curriculum requires active students. The curriculum is

not knowledge-oriented only, but also on the attitude and psychomotor, it means the education process is success. But when students show bad learning achievements, attitude and psychomotor, it means that the education process has failed. It means that this curriculum requires teachers to measure the students' characters, things that were never done, especially in SMA Panca Budi Medan.

Teaching activities in school is a part of the general educational activities, which automatically will increase the students' achievements. The higher number of students who can reach the level of understanding and mastering the material, the higher success of teaching is. Learning model recommended in the 2013 curriculum is problem-based learning, project-based learning and discovery learning. With these models is expected the increasing grades of student learning outcomes, is it cognitive, affective, or psychomotor?

In the learning process, teachers are required to encourage students to learn actively, so learning becomes meaningful to students. In line with (Slameto, 2003) argues that in the process of teaching and learning, teachers should create a lot of students's activities in thinking and doing. Learning activities that are done by the students themselves, the impressions will not go away, but thoughts, processed and then released again in a different form. Or students will ask, ask opinions, raises discussions with teachers. So students can run the command, carry out a task, make charts, diagrams, and the essences of the lesson presented by the teachers. When the students become active, then they have a knowledge/science well.

Learning mathematics will be meaningful to students if it is done in accordance with the students's initial knowledges. From the beginning of knowledge, teachers provide materials/learning resources that correspond to the basic competencies required. Then conditioned with the guidance of the teachers to make students active in constructing their own knowledge. Learning will be meaningful if teachers relate the new knowledge with some experiences which has contained one of the important factors in learning mathematics.

Description above reinforce the researchers to conclude the learning strategy in this model is one less variable trigger low student's learning outcomes.

In an effort to improve students's learning outcomes, required innovations in learning mathematics. One step that can be done by the teachers as the learners mentor is to choose the right learning model. The use of a less precise model of learning can lead to be bored, lack of understanding the material, and finally may decrease the motivations of participants in the study.

The main problem in formal education (school) is the low absorptive capacity of the learners. This is proven by the result of the students' learning which is very low. Achievement is certainly the result of learning conditions that are conventional and will not make the students aware of participants, how to actually learn it. In other words, the learning process is still dominated by the teachers and not provide access for the students to develop independently through discovery in the process of thinking (Trianto, 2010).

Mathematics is one of those subjects that has a very close concepts related with daily life. This means that the learning is not enough if just to teach mathematics conceptually, but students also need to understand how to use the concept significantly.

In learning mathematics, students must have comprehension, skills, and knowledge which these aspects are known and can be done by teachers and students. NCTM (in Effendi: 2012) states that the expected goals in learning mathematics are to set of five standard process that must be owned by students namely problem solving ability, communication ability, connection ability, reasoning ability, and representation ability. As stated by Fadillah (2011) that beside solving problem ability, reasoning, communication, and connection, entering representation as component of standard process in *Principles and Standards for School Mathematics* is very exact since for mathematical thinking and communicating of mathematical ideas, the students need to represent on various form of mathematical representation. Moreover, it can't be denied that mathematics objects are abstract so that to learn and understand abstract ideas requires representation.

Meanwhile, Jones (in Fadillah: 2011) also explain three reason why representation as a standard process, namely (1) Basic ability must be owned by

students to build a concept and mathematical thinking is doing translation on various representations type smoothly; (2) Teacher should provide mathematical ideas through various representations since the situation can provide enormous influence to students in learning mathematics; and (3) Teachers should provide various exercises to students since the students really need these exercises to build their representations so that having ability and good in understanding the concept and flexible can be used on problem solving.

This is consistent with the opinions expressed by Yuniawatika (2011) which said that students can be encouraged to find and create various representations that could be used as a thinking way in expressing their knowledge from abstract to concrete and the situation can be concluded that mathematical representations ability as a way to increase and express mathematical thinking ability of students.

Rahmi (in Hutagaol: 2013) said that diagram, picture, table, chart, mathematical statement, written text, also combination of all as representations variety can be used by students in expressing mathematical ideas. Variety of representations such as table, picture, graph, and another symbol are part of mathematics that can't be separated since mathematical representations is a part of mathematics.

But based on last situation, students mathematical representations ability in school is still less considered since many students who don't understand the mathematical representations ability.

As stated by Hudiono, (in Fadillah: 2011) in his research on learning mathematics at Junior High School, concluded that the lack of teacher's knowledge and student's learning habits using direct instruction has not been possible to maximally develop representation power of students. Accordingly, NCTM (in Fadillah: 2011) also said that mathematical representation ability of students is very limited. It is shown by the student's ability in solving mathematical problems dominated in symbolic representations, so they pay less attention to the other representations. As'ari (in Fatayati: 2012) also said the students should not only understand the abstract ideas contained in mathematics

but also must express the abstract ideas in different forms of representation which is easy to understand for the students such as in the form of images, symbols, and words since the representation is one of the alternative forms can be used to solve problems in mathematics.

From problem result which is addressed to some students in grade XI at SMA Panca Budi Medan, it was found that the students's mathematical representation ability is still less. Shown by students' answers, many of them have not been able yet to draw a tabular (table frequency).

The following are questions and students' answers which were given in order to know the mathematical representation ability of students;

1. The scores of 45 students on a 20-point Science quiz are as follows:

17 20 15 18 19 16 11 10 15 16 12 12 13 14 11 10 14 13 12 11 13 15 14
10 15 16 17 17 18 20 20 18 19 19 18 17 16 15 12 12 13 14 15 19 20

- a. Draw a frequency table for the grouped data !
- b. How many students will pass the science quiz at the standard score > 15 ?
- c. Determine the value of mean !

2. Graph for the number of students based on their ethnic background in

School Q

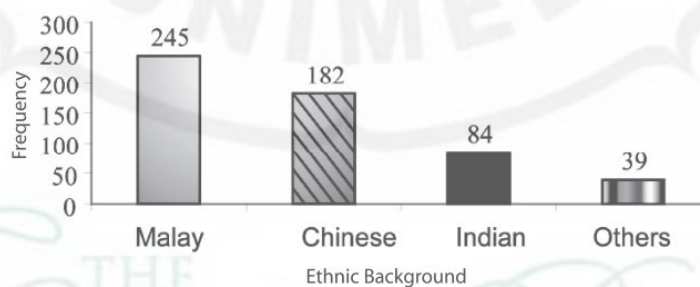


Figure 1.1 The Question of Initila Test no.2

Describe the brief of the overall pattern of the number of students based on their ethnicities background ?

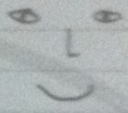
1.	Kelas	Frekuensi	
	10 - 15	15	 Gak tau lagi pk.
	14 - 18	26	
	18 - 20	4	
2.	20		
3.	$\bar{x} = \frac{\sum f_k x_k}{\sum f}$ Gak tau pk, maafkan saya.		

Figure 1.2 The Student Answer of Intial Test no.1

2 Malay memiliki nilai tertinggi dan Cina memiliki nilai tertinggi kedua

Figure 1.3 The Student Answer of Intial Test no.2

From 30 students who answer the question, can be seen that 60,5% of them have not been able yet to build their visual representations in making table exactly, while 75,35% of students also have not been able yet to build their mathematical representations ability in equation or mathematical expression aspects especially in making the equation. Mathematical model from initial representation is also given and 65,49% of students have not been able yet to represent their ideas or knowledge in writing the text form.

The mathematical representation ability of students has not satisfied yet according to the observed results. This situation is caused by the lack of their understanding in statistics and the lack of representing something from abstract to concrete.

Disinterest of student in mathematics subject caused by the student's ignorance of the usefulness of materials studied in mathematics into their daily lives. In addition, teachers only focus on books when teaching.

A wide range of innovative learning strategies that are considered the development of students's cognitive abilities and independence. One model is

Problem Based Learning (PBL). PBL is a learning model that engages students to solve a problem through the stages of the scientific method so that students may learn the knowledge related to the problem and having skills to solve the problem. Objectivities to be achieved in Problem Based Learning is a student's ability to think critically, analysis, systematic and logical to look for an alternative solution through the exploration of the empirical data in order to develop a scientific attitude (Sanjaya, 2008). So, the learning goals expected to be achieved is to improve student's learning outcomes and to develop a scientific attitude of the student.

Problem Based Learning model begins with problem, then students deepen their knowledge about what they have already known and what they need to know to solve the problem. (Duch in Riyanto, 2010) states that: Problem Based Learning is learning model that exposes learners to the challenge of "learning to learn". Students actively work in groups to seek the solutions of problems. The problem is as a reference for students to formulate, analyze, and solve. Problem Based Learning model is intended to develop students's critical thinking, analytical, and to find and to use appropriate resources for learning.

In this study, the role of teachers is asking problems, providing encouragement, motivation, and teaching matherials, as well as providing the necessary facilities for learners in the process of reasoning. In addition, teachers also provide support the finding and intellectual development of students.

In the learning of problem based learning students are required to undertake the process of solving problems presented by digging out as much. This experience is indispensable in everyday of life where the growth of mindset and work patterns of a person depends on how he positioned himself in the study. Problem Based Learning is learning using a real problem (the fact) that is presented at the beginning of learning. First step is understanding of the problem so that the necessary reasoning abilities, and then probed for known solutions to these problems.

Based on problems above, the writer is interested to do research with the title **"The difference of Students's Mathematical Representation Ability by**

using Instruction of Problem Based Learning and Direct Instruction in Grade X ”

1.2 Problem Identification

- a. Mathematical representation ability of student is still low.
- b. Student still have difficulties in solving mathematical representation tests.
- c. Teachers learning model used is still less variation and the learning process is still conventional.

1.3 Problem limitation

Based on the problems identification above, there is a wide scope of issues, so this research is limited to know the following :

1. The subject material that will be taught is statistics
2. Teaching model that will be applied in this research is problem based learning model
3. The ability will be measured is representation ability

1.4. Problem Formulation

Problem formulation in this research is: “Is students’s mathematical representation ability using problem based learning higher than direct instruction in grade X SMA Panca Budi Medan Academic Year 2014/2015?”

1.5. Research Objective

Research objective in this research is: To know is students’s mathematical representation ability using problem based learning higher than direct instruction in grade X SMA Panca Budi Medan Academic Year 2014/2015.

1.6. Research Benefits

The expected benefits of this research are:

1. Mathematics teachers may used the material consideration and input, in order to choose one of mathematics’s alternative learning model in school.
2. Prospective teachers may use the benefits of this research to solve the problems and difficulties which is often raised in the school. So, they can be the professional teachers.

3. Students may use the benefits of this research as references and encouragements to improve the students's mathematical representation of students in order to learn mathematics.
4. Researchers may use the benefits of this research to increase the knowledge about the problems and difficulties which is often arised in the school.

1.7. Operational Definitions

In order to avoid the differences of clarity meaning about important terms contained in this research, the operational definitions will be noted as following :

1. Mathematical representation ability is students's ability to express mathematical ideas (problem, statement, definition, and so on) into form: (1) Picture, diagram, graph, or table; (2) Mathematical notation, numerical/algebra symbol; (3) Written texts/words the interpretation of their mind.
2. Problem Based Learning is a learning method based on the principle which is the issue (problem) may be used as a starting point to obtain or to integrate the new science (knowledge). Thus, there is a problem which is used as a meaning for students to learn something which can contribute their knowledge.