CHAPTER I

INTRODUCTION

1.1 Background

Basically, education is a process to help people improve their knowledge, ability, and creativity. It reinforced the Law of National Education System No. 20 of 2003 Chapter II Article 3, has been formulated expressly to the basic function, and national education goals that:.

> Pendidikan nasional berfungsi mengembangkan kemampuan dan membentuk watak serta peradaban bangsa yang bermartabat dalam rangka mencerdaskan kehidupan bangsa, bertujuan untuk berkembangnya potensi peserta didik agar menjadi manusia yang beriman dan bertakwa kepada Tuhan Yang Maha Esa, berakhlak mulia, sehat, berilmu, cakap, kreatif, mandiri, dan menjadi warga negara yang demokratis dan bertanggung jawab.

It advocates four pillars of education : (1) learning to know, that is acquiring the instruments of understanding, (2) learning to do, so as to be able to act creatively, (3) learning to live together, so as to participate in and co-operate with other people in all human activities, and (4) learning to be, so as to better develop one's personality and to act with ever greater autonomy, judgement and personal responsibility.

School as an educational institution that organizes the learning process has an important role in transferring knowledge and skill to students. The role is expected to produce qualified human in science department. In other word, school implements teaching – learning activity as realization of established educational objective.

Education in schools is created through the interaction between educators with students that aims to help the development of all the potential, skills, and characteristics of learners, to the intellectual, social, affective, and physical (Sukmadinata, 2003:10).

Mathematics as a science that underlies the development of modern technology, have an important role in a variety of disciplines and advance the thinking power of humans. To master and create future technologies required

mastery of mathematics from an early age. Therefore, the subjects of mathematics is a subject that is given at every level of education from the start of primary education.

Mathematics is also one of the subjects used scientific thinking. Mathematics is indispensable to develop the ability logically, systematically, and critically thinking in students' self for support learning success. If learning success can be achieved, then it will be affect to produce qualified human for progression of country as the role of school.

Mathematics is a tool to develop a way of thinking. Therefore mathematics is indispensable both for everyday life as well as in dealing with the advancement of science and technology so that mathematics must be procured to every student since elementary classes. however there are essentially mathematical science is a way of thinking deductive formal and abstract (Hudojo, 2001 : 45).

According Tinggih (in Hudojo, 2001 : 46), mathematics not only related to numbers and operations, but also the element of space as a target.

Of the above description is clear that the object of study of mathematics is not just the quantity, but more focused to the relationships, patterns, shapes and structures. Math is very abstract, ie relating to the abstract concepts and deductive reasoning.

We can say that the essence of mathematics and mathematical thinking is relating to idea, structure, and information in symbol form and to build these, we need mathematical communication to facilitate it. So student's ability in communicating is so very important in mathematics learning. Baroody (In Ansari, 2016 : 5) explains there are at least two an important reasons why communication in mathematics need to grow is in students' self. First, mathematics as language, it means that mathematics is not only a tool to aid thingking, to find pattern, to solve problem and to take conclusion but also valuable tool to communicate various ideas clearly and exactly. Second, mathematics learning as social activity, it means mathematics as interaction place inter students and communication between teacher and students.

Based on Regulation of the Minister of National Education No. 22 of 2006 stated that the study of mathematics aims to enable students to have the following capabilities: (1) Understand the concepts of mathematics, explain the relationship between concepts and apply concepts or algorithm, are flexible, accurate, efficient, and precise, in solving the problem. (2) Using the pattern and nature of the reasoning, mathematical manipulation in making generalizations, compile evidence, or explain ideas and mathematical statements. (3) Solve the problem that includes the ability to understand the problem, devised a mathematical model, solve the model and interpret the obtained solution. (4) Communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem. (5) Have respect for the usefulness of mathematics in life, which has a curiousity, attention, and interest in studying mathematics, as well as a tenacious attitude and confidence in solving problems
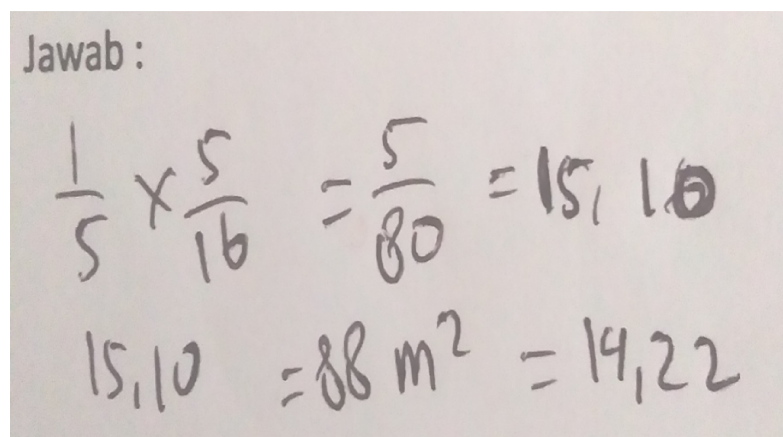
Based on NCTM (2000) describes the communication is a very important part of mathematics and mathematics education. Communication is a way of sharing ideas and clarifying understanding. Through the communication of ideas can be reflected, repaired, discussed, and developed. Communication process also helps build meaning and permanents ideas and communication process can also publish the idea. When students challenged their minds and their ability to think about mathematics and communicate the results of their thoughts orally or in writing, they are learning to explain and convince. Listen to the explanation of the other students, giving students the oppurtunity to develop their understanding. Communication is essential for students because every problem in daily life needs good communication to find its solution. In an effort to develop communication, students have to be able to deliver information to the mathematical language, for example, presents the question or problem into a mathematical model to make it more practical, systematic, efficient, and easy to understand.

Mathematical communication ability can occur when students work in groups, when students describe an algorithm to solve an equation, when students construct and describe a graphical representation of the real-world phenomena, and when students give a conjecture on geometry images. Furthermore, in

learning students need accustom to give arguments of each answer and give responses to the answers given by others, so that what is learned becomes meaningful.

Baroody & Ginsburg (in Yang,etal. 2015 : 157) said that mathematical communication is a fundamental mathematics educational objective that involves cognitive and social activities. Silver & Smith (in Yang, et.al. 2015 : 157) also explain that mathematical communicationis used to engage students in communicative situations for increasing learning interaction with others to obtain mutual mathematical ideas, share mathematical thoughts, develop mathematical concepts and strategies, and reflect on their current mathematical understanding. Mathematical communication abilities also include expressing mathematical thought by using mathematical language clearly, precisely, and succinctly (National Council of Teachers of Mathematics, 2000).

In fact, based on researcher's preliminary study of students in grade VII-E at SMP Budi Murni 2 Medan, the students are not able to make explanation to solve the problem. For example, the problem number one is : A garden planted corn 1/5 part and 5/16 from the rest of the land planted with sweet. If the rest of the land that has not been planted is 88 m^2, so draw it into figure and mathematical model and determine the land area of the corn!

Figure 1.1. Student's answer for The First Problem

Indicators of mathematical communication ability in problem number one are explaining problem in writing into figure and stating problem in writing into mathematical model (Ansari, 2016 : 24). From the above figure 1.1 can be known that they can not change the area into variable form and automatically they can not draw available condition into figure. It means the student's ability in stating problem in writing into mathematical explanation is low.

The problem number two is : City A and City B have distance is 60 km. Determine the distance both of the city at the map with scale 1 : 1.200.000 (make it in cm)!

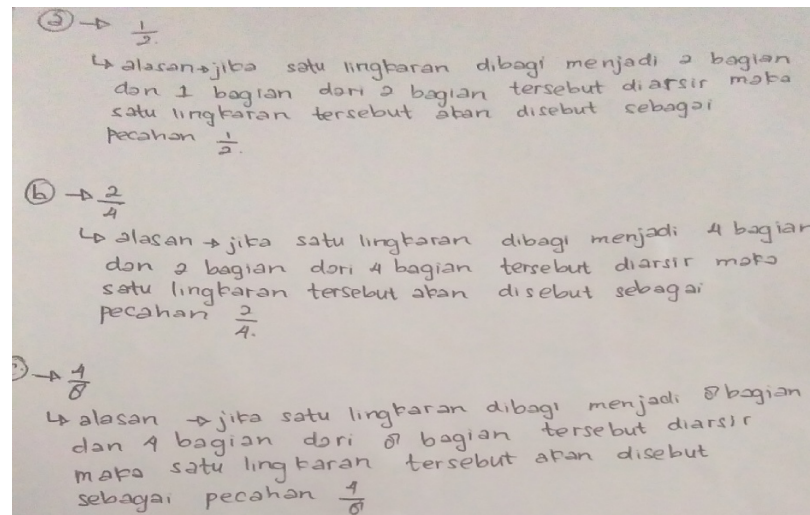**Figure 1.2 Student's answer for The Second Problem**

Indicators of mathematical communication ability in problem number two are explaining problem and representation the problem (Ansari, 2016 : 17). From the figure 1.2 can be known that they can not explain with detail how many the real of distance, scale, and the distance at map. It means the student's ability to explaining problem in representation is also weak.

The third problem is : State this following picture in fractional form and in your own word!
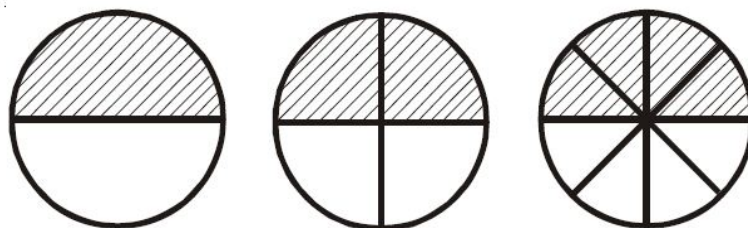
Figure 1.3 The Third Problem of Observation Test

The student's answer is like the picture below.

Figure 1.4 Student's answer for The Third Problem

Indicators of mathematical communication ability in problem number three are explaining problem situations by own words and doing calculation (Ansari, 2016 : 23). From the figure 1.4 can be known that the students can not communicating ideas or situations exactly what the meaning of shaded and non-shaded area in the picture or in mathematical notation, in fractional form, what denumator and numenator is. It means student's ability explaining problem situations by own words and doing calculation is also weak.

In addition to the preliminary observation based on test, the researcher also do the interview the mathematic's teacher in this class about the respones of students in mathematics class. Based on the answers, the researcher can conclude that there are less respons that given by students in mathematics class, then the logic that they have to solve the problems is still low and only 10% students could pass the KKM in a class.

From these preliminary study, it can be concluded that the student's mathematical communication ability is still less and unsatisfactory. This happens due to lack of their understanding to explain and make in mathematics model as well as their lack of mathematical communication skills because they have not

been accustomed to change something abstract becomes real performance form for mathematical models.

Weak communication skills will result in a lack of other mathematical abilities. Students who have good mathematical communication skills will be able to create a diverse representation, it will be easier in finding alternatives to solving problems that resulted in the increased ability to solve mathematical problems.

An activity which expected able to apply for growing up student's mathematical understanding and communication are applying cooperative learning model type Think Pair Share (TPS) and Problem Based Learning.

According to the constructivist learning theory, knowledge can not simply be transfered from the teacher to the mind of students. This means that students must be mentally active build knowledge based student's cognitive structure. An activity which can be applied for making active learning also for developing student's mathematical communication ability is to implement cooperative learning model type Think – Pair – Share (TPS) and Problem Based Learning model. One of the benefits of cooperative learning is the sharing process among students.

Arends (in Ansari, 2016: 92) refers to the virtues taught by using strategy think-pair-share (exchange thoughts in pairs or discussion in pairs) are as follows:

1. Can develop students' thinking and fuses aspects of cognitive and social aspects of learning.
2. To foster the involvement and participation of students by providing opportunities open to the students to speak and express their own ideas and motivate students to get involved in the conversation classes.
3. Can be used to analyze the thinking of students and learn communication skills.
4. If done in groups, discussions can combine multiple opinions and thoughts in determining the steps to resolve the problem.

5. Can enhance critical thinking and be open, meaning to accept the opinions of others and accept the truth on that basis.

The relationship between the indicator of beginning student's ability with TPS model and PBL model are :

Table 1.1 The Relationship between indicator of beginning student's ability with TPS and PBL model

The Indicator of Beginning Student's Ability	TPS	PBL
Quetion 1 : Explaining problem in writing into figure and stating problem in writing into mathematical model.	Factual academic knowledge.	Student collaboration in PBL encourages shared inquiry and dialogue and the development of thinking and social skills
Question 2: Explaining problem and representation the problem	Giving students more time to think and to respond and help each other to solve problem	Organized arounnd real life situations that evade simple answers and invite completing solutions.
Question 3 : Explaining problem situations by own words and doing calculation	Group and social skills.	Inquiry and problem solving skills.

Pierce and Lange (in Novikasari, 2016 : 154) explain that, PBL approach describes learner-centered principle, among others showing the students how to

represent developed knowledge; giving time to students to reflect the learning process; giving choice and control to the students in collaborative context; and appreciating individual perspective with the plan it has. According to Savin (2003 : 197), in problem-based learning, the focus is on organizing the curricular content around problem scenarios rather than subjects or disciplines.

According to Trianto (2009 : 81), cooperative learning type – think - pair share planned to influence the student's interaction. While Oktaviarini (2015 : 78) say that Problem Based Learning is one of an alternative that is increasing the student's mathematical communication ability.

Based on above background, the researcher intends to conduct a research entitled : **"The Difference of Students Mathematical Communication Ability by Using Cooperative Learning *Think Pair Share* (TPS) Type and Problem Based Learning"**

1.2 Problem Identification

Based on analyzing in the background, problem identification in this research are:

1. Student's mathematical communication ability at SMP Budi Murni 2 Medan is still low.
2. Student's activity at SMP Budi Murni 2 Medan is passive during the learning goes on.
3. Teacher still uses learning process in old paradigm.
4. Teachers learning model used is still less variation and the learning process is still conventional.
5. The school has not used cooperative learning model yet.
6. The process to get the answer still less complete.

1.3 Problem Limitation

This research needs to bound the problem to get precise target of expectation. The limitation of this research are :

1. The model used were cooperative learning model Think – Pair – Share type and Problem Based Learning.
2. The student's mathematical communication ability in this research is bounced in student's mathematical communication ability at Quadrilateral matter in grade VII semester II.
3. This research was conducted at SMP Budi Murni 2 Medan.

1.4 Problem Formulation

The problem formula in this research is :

1. Is there any difference student's in mathematical communication ability by cooperative learning *think pair share* type and problem based learning model?
2. How the process to answer the questions by cooperative learning *think pair share* type and problem based learning model?

1.5 Research Objectives

The objectives in this research is:

To know any difference student's mathematical communication ability in cooperative learning *think pair share* typeand problem based learning model.

1.6 Benefits of Research

1. For Teacher, this can be as consideration in selecting one of alternative model or approach in mathematics learning.
2. For Students, this can makes students have enthusiasm to improve mathematical communication skill.
3. For School, this can be consideration and suggestion to improve the quality of teacher and learning system at class.
4. For The Authors, this study is expected to be a positive feedback in preparing themselves as prospective educators

1.7 Operational Definition

Operational Definition emphasize to things which will be standard or indicator of variable. The standard or indicator is not abstract but easy to be measured (Noor, 2011 : 97). So, operational definition in this research are,

1. Mathematical Communication Ability is the ability to express mathematical ideas to others both orally and in writing is called mathematical communication ability. Mathematical ideas in this case can be concepts, formulas, or strategies to solve a problem. In general, mathematical communication skills can be distinguished into oral mathematical communication skills and written mathematical communication abilities. The indicator of student's mathematical communication ability which will be measured are the ability of stating mathematical problem into mathematical model, the ability of explaining mathematical problem into figure, and the ability of explaining problem situation by own words and doing calculation.

2. Cooperative Learning Model *Think – Pair – Share* (TPS) Type is a model of cooperative learning that gives students time to think and respond to each other and help each other. Cooperative learning model *think pair share* is relatively simple because it does not take a long time to arrange seating or group students.

3. Problem Based Learning Model is a teaching model that is characterized by the existence of real problems as a context for the students to learn critical thinking and problem-solving skills as well as gaining knowledge. This definition implies that PBL learning which is directed by an everyday problem.