

CHAPTER I

INTRODUCTION

1.1 Background

Mathematics is the science that has the concept of hierarchically, structured, logical and systematic concepts ranging from the simplest to the most complex concepts. In learning mathematics, students are not only required to memorize mathematical formulas, but students also need to understand the concept of a material and can apply their knowledge to solve the existing problems.

It is important for students to get five process standards of mathematics, namely problem solving, mathematical reasoning, mathematical communication, mathematical connections, and representations in mathematics learning. National Council of Teachers of Mathematics (1989) also formulate learning objectives of mathematics, namely: (1) learn to communicate, (2) learn to reason, (3) learn to solve problems, (4) learn to associate the idea, and (5) learn to format a positive attitude towards mathematics.

Obviously that mathematics is applied in field wherever in everyday life. The development of science and technology is the role of mathematics. Therefore, to master and create in the future technology needed a strong mastery of mathematics from an early age by Departemen Pendidikan Nasional (2006).

Basically mathematics of school is function to develop the ability to count, measuring, lowered and using mathematical formulas needed in everyday life. Mathematics is also function to develop ability communicate ideas or ideas with the language and symbols through a mathematical model which can be words and mathematical equations, graph or table meaningful.

Many factors cause the mathematical achievement of students in Indonesia is low, one of which is not yet optimized mathematical communication skills of students. This is according to research conducted which showed that students' mathematical communication skills are still low.

In the curriculum 2006 has been formulated five skill or proficiency expected in the learning of mathematics, namely: (1) learning to communicate, (2) learning to reason, (3) learning to solve the problems, (4) learning to associate the idea, and (5) learning to establish a positive attitude to mathematics. It relates to the opinion about the importance of communication in learning mathematics, communication is not only used in science but also in the overall of mathematics learning activities.

Communication skills should be owned by every student', communication skills can be built up in students' self. This is in accordance with the opinion expressed by Lindquist based on the National Council of Teachers of Mathematics (NCTM) revealed that communication skills in mathematics needs to be built so that students' are able to : (1) express and explain their thinking about mathematical ideas and relationship, (2) formulate a mathematical definition and make generalizations obtained through investigation (discovery), (3) express mathematical ideas orally and in writing, (4) read the discourse of mathematics with understanding, (5) explain and apply well as expanding of math questions that have been learned, and (6) appreciate the beauty and power of mathematical notation, well as its role in developing ideas/mathematical ideas. Communication is one of the purpose in the learning of mathematics. The process of communication is helping students' to build ideas, publicize the idea, and can build a good social network in a classroom environment.

In the view of the experts, mathematical communication ability needs to be developed among students'. Mathematical communication is the ability to include and contain a variety of opportunities for students' to communicate in the form of: reflecting real objects, pictures, or ideas of mathematics, modeling situations or problems using oral, written, concrete, graphs, and algebra, using skills of reading, writing, listening, and study to interpret and evaluate ideas, symbols, terms, and mathematical information.

Baroody (in Ansari, 2009 : 4) mentions at least two important reasons why communication in learning mathematics should be cultivated among the students'. First, mathematics is essentially a language for mathematics itself.

Mathematics is not just a thinking tool that helps us to find patterns, solve the problem and make conclusion, but also a tool to communicate our thoughts about various ideas with clear, precise and concise. In fact, mathematics is considered as a "universal language" with symbols and unique structure.

The discussion group is another way to develop students' mathematical communication skills. Discussion groups making students to practice for to express understanding, verbalize the process of thinking, and clarifying their understanding or misunderstanding. In forming a group discussion to note a few things, for example what kind of tasks which allow students can explore mathematical abilities fine and true. Besides it is also need to design teacher's role in the group of discussions. In the process of group discussion, will happen an exchange of ideas and thinking between of students'. This will provide the opportunity for students to build mathematical of understanding. Student's conversation and teachers will also drive or strengthen a deeper understanding of mathematical concepts.

This results in lower students' mathematical abilities. However mathematical ability must be owned by the students' to achieve the learning objectives of the Mathematics. National council of teacher of mathematics (2000) stated that in learning mathematics the students' should have the mathematical ability, namely communication, problem solving, reasoning, connections, and mathematical representations to achieve the learning objectives of mathematics.

In fact, the students' communication mathematics ability is still far from expectations. This can be seen from the results of preliminary test performed by researcher at the date of February, 6th 2015 at VIII-6 class of SMP Negeri 11 Medan as a sample. The test was given consist of 3 problems with the type is essay test about quadrilateral as:

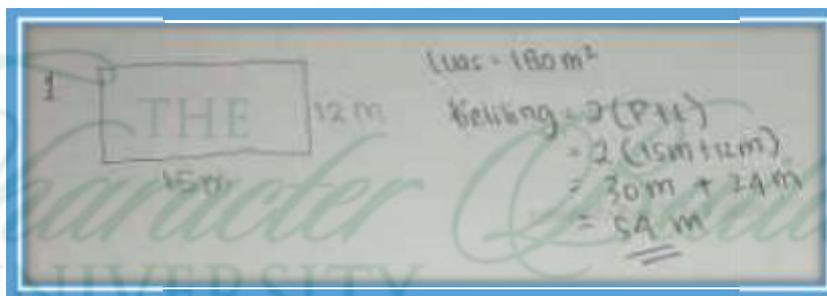
1. The floor area which shaped of a rectangular is 180 m^2 . comparison of the length and width the room flooring is $5 : 4$. stated in drawing and mathematical model! calculated the circumference of the room floor.

2. Mr. Nasir has a square-shaped rice fields with side length is 54 m. Around the rice fields planted orange trees by the distance between orange tree is 3 m.

Questions :

- Data anything obtained from this problem
 - How do know my much the orange trees are planted around the rice fields!
 - Calculate how much orange trees are planted around the rice fields!
 - Check come back the result obtained in question c! Whether much of orange trees are planted around the rice fields is 88 trees? Explain!
3. Mr. Irham will make a fence around the banana garden which shaped rectangular. The length of a banana gardens is 20 m, whereas the width is 10 m.
- Describing the problem
 - Based on the image, how to calculate the length of the fence to be made by Mr.Irham ?
 - Calculating the length of the fence to be made by Mr. Irham!

After the results of the students' answers were analyzed, there were some errors found are made by students. In the first case, from indicators of communication, 90% of the students failed related the image to the mathematical ideas and formulate mathematical ideas into mathematical models. This is one picture of the students' answer was wrong:

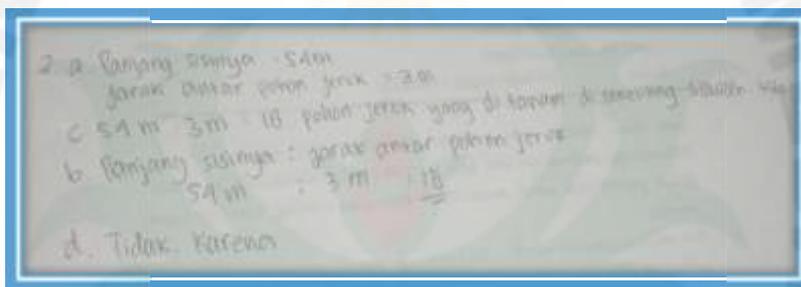


Picture 1.1. The Student's Answer for 1st Question

From the pictures of the student' answers showed that students' are also not able to calculate the length and width of floor space with a ratio of length and width of which has been known that the circumference calculation results

obtained not appropriate. This shows that the ability of students to communicate mathematical ideas is low, so that the students' are not able when making the mathematical models and solution final strategies of the problem.

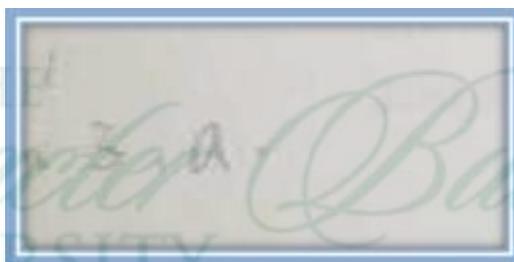
The question number 2 found that 95% students cannot answer the question correctly, from the indicator of communication, students' fail to formulate the mathematical idea into mathematical model and respons a statement in the argument, This is one of the student's wrong answer:



Picture 1.2. The Student's Answer for 2nd Question

From the pictures the students' answers we can see that the students' analyze the wrong side and the distance between trees so that students' can not calculate what is written. This shows the lack of communication skills in terms of making a mathematical model to respond to a problem in the form of arguments.

In question number 3 students' were asked fatherly illustrates a problem that is known the length and width of bananas garden the Mr. Irham, and calculate its length. Of indicators of student' communication fails describe mathematical ideas and so can not calculate the length of a banana garden.



Picture 1.3. The Student's Answer for 3rd Question

From the picture above, we can see that the student' can not answer the question at all. They can not describe about a story that could not answer the next

question. It can also be used as real proof that students' mathematical communication ability is low.

The analysis showed that from 25 students who take the diagnostic test, which is the complete categorize with scored ≥ 75 only 4 people who completed or about 16%, while 84% of students' do not complete. Furthermore viewed from mathematical communication ability category around 4% higher mathematical communication ability, 12% medium, while 8% lower and 76% is very low. It showed that students' mathematical communication ability of students' is still low.

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. Siti Khadijah S.Pd date of January, 27th 2015 known that the student still have many difficult in mathematical Communication. 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 communicate the problem.

Vygotsky learning theory argues that students forming knowledge as a result of the thoughts and activities of the students themselves through language. Vygotsky believed that development depends both on biological and social factors, social factors are very important for the development of higher mental functions for the development of the concept, logical reasoning, and decision making. The learning process will occur if the child work or handle tasks that have not been studied, but these tasks are still within their reach. Learning Vygotsky's theory is a theory of learning that support cooperative learning model Group Investigation.

One type of cooperative learning model that can be applied is Group Investigation (GI). In the Group Investigation (GI) learning model, students' in groups conducting the investigation. This activity gives the possibility for students to interact even more and did not close the possibilities the process of students' answers communication because in the investigation process allows for more than one answer.

Based on the above explanation, the researcher interested in conducting the research reveal whether the learning model group investigation (GI) can increase students' mathematical communication skills which in turning will increase students' mathematics learning outcomes as one of academic human contribution in increasing the quality of education in Indonesia. Therefore, this research title is **“Increasing of Students’ Mathematical Communication Ability by Using Group Investigation (GI) Learning Model in Quadrilateral of Grade VII at SMP Negeri 11 Medan Academic Year 2014/2015”**.

1.2 Problem Identifications

Based on the background described above, we can identify some problems as follows :

1. Mathematical communication ability of students' still low.
2. There are still many students' who are not able to resolve the question of the communication on the subject of the quadrilateral.
3. Students' tend to be passive, just waiting for information from the teacher. Students' are less brave in stating his opinion.
4. The learning approach is still conventional so that so that students' are not trained to find their own knowledge and develop the ability of communication.

1.3 Problem Limitation

Based on identification problem above, so the researches make the limited the problem in: Increasing of students' mathematical communication ability by using Group Investigation (GI) in quadrilateral of grade VII at SMP Negeri 11 Medan Academic Year 2014/2015.

1.4 Problem Formulation

The problems formulation of this research are:

1. How is the increase communication math strategies on learning model group investigation on the topic quadrilateral in SMP N 11 Medan?

2. How is the increase communication of mathematics after use Group Investigation (GI) learning model in quadrilateral of grade VII at SMP N 11 Medan?

1.5 Research Objectives

The objective of this research are:

1. Increasing the students' mathematical communication ability using Group Investigation learning model.
2. Increasing whether of mathematical communication ability of student's after the applied Group Investigation learning model.

1.6 Research Benefits

Benefit that hoped from this research is:

1. For students' can construct the knowledge actively, able to develop the communication ability, understanding in dealing the problems and can improve the social relation and responsible to themselves and their environment.
2. For Teachers can improve the quality of mathematics learning achievement through the create mathematical communication and as one of learning model alternative that can be used in mathematics learning.
3. For Researcher can become the comparative material about mathematical communication rule, positive attitude and achievement motivation to the learning result in mathematics learning, increase the experience and thinking insight for writer about the scientific research.
4. For School expected can become the comparative material to apply the group investigation learning model and expected can improve the education quality in Indonesian.

1.7 Operational Defenition

To avoid the differencies in interpretation of the terms contained in the problem formulation in this research, it should be noted the operational definition as follows :

1. The ability of students' mathematical communication is students' ability to (1) relate the picture, table, diagram and dailiy events into mathematical idea, (2) formulate the mathematical idea to mathematical model, (3) respons a statement or problem in the argument and (4) express the description or mathematical paragraph with own language.
2. 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.