# CHAPTER I
# INTRODUCTION

## 1.1. The Background of The Problems

Education is a very important sector to increase the progress of a country. By using education, then a country can create the qualified human resources and able to compete in the era of globalization. This is in accordance with the Law Number 20 in 2003 about the national education state that the national education serves to develop skills and to form the character and dignity nation's civilization in order to achieve the life of the nation, aims to develop the potential of students to become a faith human and fear of Almighty God, noble, healthy, smart, skilled, creative, independent, and become democratic and responsibility citizens.

Indonesia will always effort to improve the quality of education.It seems had not given the satisfactory results in the eyes of the world. Based on the data in Eduacation For All (EFA) Global Monitoring Report 2011 that out of UNESCO (in http: / / azharmind.olwordpress.com / 2012 / 02 / kualitas-pendidikan-indonesia-rangking. html) : Indonesia is ranked 69$^{th}$ of 127 countries in the world with the acquisition of educational development index or Education Development Index (EDI) is 0.934. Also based on the global league table published by Pearson Education firm (in http : // www.bbc.co.uk/ indonesia/ majalah/ 2012/ 11/ 121127_education_ranks.shtml) Indonesia is in the lowest position with Mexico and Brazil. This rank combines the international test results and data such as graduation rates between 2006 and 2010. Seeing the poor conditions in education, government needs to give special attention and to make the latest breakthrough in order to the education in Indonesia is not underestimated by the world.

Mathematics as one of the subjects taught from primary school to university is the foundation and framework of science and technology development that can be used to achieve the educational goals. In the content standards for elementary and secondary education units (Regulation of National Education Minister Number

22 of 2006 dated 23rd May 2006 about the content standards) stated that math needs to be given to all students start from elementary school to equip students with the ability of think logically, analytical, systematic, critical, and creative, also the cooperate ability. The competencies required so that students have the ability to acquire, manage, analyze, and implement an information for surviving in the competitive situation.

Recently mathematics always considered the scary lessons and tend to memorize formulas so that in the students' soul already entrenched about the assumptions , this cause the students' interest and attrachted to mathematics lesson are low . Whereas the interest of students to mathematics can be a major thing to develop a desire in learning mathematics , and with the interest is expected to expected to be a tendency of positive attitude towards mathematics in order to reach learning achievement in mathematics . The fact of the Trends research in Mathematics and Science Study ( TIMSS , 2012) followed by Indonesian's students of eighth grade in 2011 . The sssessment conducted by the International Association for the Evaluation of Educational Achievement Study Center Boston College, followed by 600,000 students from 63 countries. Indonesia have the ranks 38th with a score of 386 from 42 countries whose students tested for mahematics. Indonesian student learning achievement in mathematics is decreased. Indonesian students still dominant in the low level, or more on the ability of memorian in learning science and mathematics, teachers are authoritarian by his trust in formulas or mathematical knowledge that already exists .Whereas, learning mathematics should develop a logical, reasoning, argue, and can convince the others. However this is still less developed in mathematics education in schools. This shows that there should be a change or improvement innovation for better results .

Many factors that cause the mathematical achievement of students in Indonesia is low, one of the, it has not optimized the students' mathematical communication skills. This is accordance with the research done by setiayadi Esrah

(2007) which showed that the mathematical communication skills of students is 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 establih of 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) reflect and clarify in thinking about mathematical ideas in a variety of situations, (2) model the situation with verbal, written, graphic images and algebraic, (3) develop understanding of mathematical ideas, including the role of defenition in variety of mathematical situations, (4) use the skills of reading, listening and writing, interpreting and evaluating of mathematical ideas, (5) examines the mathematical ideas through conjecture and convincing reasons, (6) understand the value of math notation and mathematical role in the development of mathematical ideas. Communication is one of the important objectives 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 .

According to Harlen (in Sulastri, 2009) state that, the communication includes the ability to get information from written sources and present the information in the form of graphs or tables. So communication is one of the expected ability in learning mathematics where students should be able to communicate the mathematical ideas such as principles, concepts, strategies and

procedures of mathematics. In communicating, students interact with many facililities such as blackboards, textbooks, worksheets, learning communities and learning environments. In this case, the student will not be separated from communication not only communication among students but also students with learning facilities, and students with teachers. If communication goes well, the students will feel comfortable, interested, challenged to learn math and be able to create the achievement in mathematics.

According to Baroody (in Ansari, 2009) there are two reasons why the communication needs to be developed among students, they are: 1. mathematics as language, It means that mathematics is not just a tool to aid thingking to resolve the issue and draw conclusions but also mathematics as a valuable tool to communicate ideas clearly, precisely and carefully. 2. mathematics learning as a social activity means that mathematics as a social activity in learning, interaction vehicle among students, and also the communication between teachers and students. Communication is very needed by students to express themselves, form social interaction network, and form the personality of students. Communication also help educators in this case "the teacher" to understand the students' ability to interpret the understanding of mathematical concepts that they are learning. Mathematics as a discussion so that mathematical communication is the essence of teaching and learning.

The Low of students' mathematical communication ability can be seen from the example in the case of students on $8^{th}$ grade SMP N 4 Pematangsiantar. To measure the students' communication skills, given preliminary tests in the form of three questions about the Pythagorean as follows:

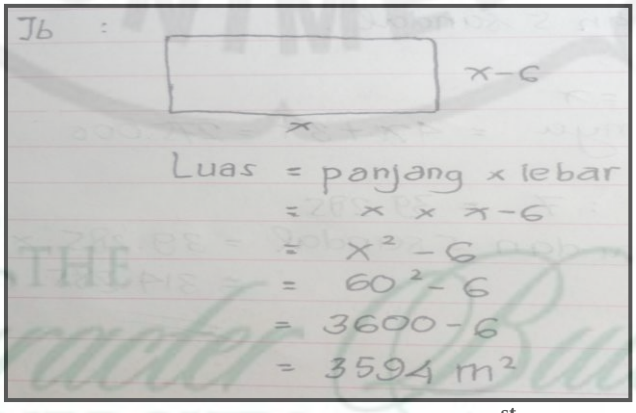
1. A farmer has a rectangular-shaped piece of land as shown below. If the circumference is around 60m, determine the area of the farmer's land.

x - 6

x

2. Known that the price of shoes is twice than the price of slippers. A merchant buy 4 pairs of shoes and 3 pairs of slippers. The merchant must pay Rp275.000,00
   a. Make the mathematical model from the description above.
   b. Solve the mathematical model and find the price of 3 pairs of shoes and 5 pairs of slippers.
3. From the form of the equation, which one is include the linear equation with one variable? Give your reason to choose the equation.
   a. $x + y = 20$
   b. $2x – 5y + 3z = 15$
   c. $2x – 3 = 5$
   d. $x^2 – x = 2$

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, 80% 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:

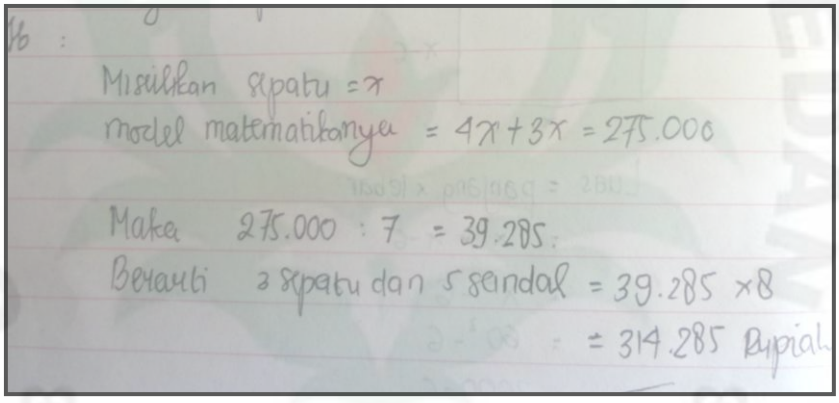



**Picture 1.1. The Student's Answer for 1st Question**

From the picture of student's answer above show that student still confuse to relate the picture of rectangle with the length is x and its wide is x-6 to the mathematical idea, that is the formula of circumference so that students cannot

determine the area of the land. 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.

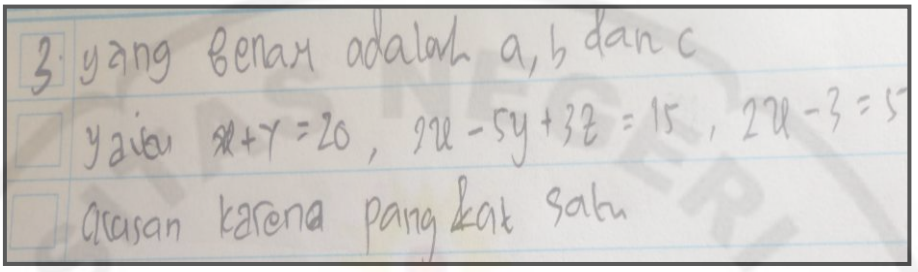
The question number 2 found that 60% students cannot answer the question correctly, from the indicator of communication, students fail to formulate the mathematical idea into mathematical model and respons a statement in the argument, This is one of the student's wrong answer:




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

From the picture of the students' answers we can see that students have the mistake to connect the sentence the price of one pair shoes is equal to the twice price of one pair sandals so that the mathematical model that he made was wrong and the process of resolving the final answer was wrong by dividing 275 thousand to 7, which is 4 plus 3 sandal shoes. 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 asked to choose one variable linear equations and give the reason, from indicators of communication students fail to express a paragraph of mathematics in the form of arguments. Here's one of the mistakes of the students' answers:




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

From the picture above, we can see that the students choose a, b, and c because the choice has degree 1 while the choice d has degree 2, students can not give a reason and correct answer to question number 3. It can also be used as real evidence that the mathematical communication skills of students is low. However, only 45% of students failed to answer Question 3.

The result of analyze show that from 32 students that follow the initial test, the complete categorized who scored ≥ 65, only 6 students that complete or about 18,75%, while 81,25% students were not complete. Next can be seen from the mathematical communication ability category, about 10,48 % have high mathematical communication ability, while 12,35% were low and 77,17% were very low. This show that the communication ability is still low.

The observations result and interviews by the author of one of the junior high school mathematics teacher in SMP N 4 Pematangsiantar namely Mam Marningot, it is known that students have difficulties in solving communication problems. It is characterized by students has not been able to give a true and clear arguments about the questions they answer, and the student has not been able to make the steps of argumentation strategies in answering the problem-solving. The courage to convey the ideas and arguments are correct and clearly still less in the learning process.

Recognizing the importance of mathematical communication skills, and after doing observation that show the mathematical communication skills of students is low, then the teacher should seek to apply the learning model of learning that can provide opportunities and encourage students to practice communication

skills. In fact, the process of learning mathematics is still centered on the teacher as a information sources. Students tend to be passive and they just accept the provided information. The teacher describes a material and student work exercises, sometimes, they are given the opportunity to ask the teacher if students do not understand the material that taught by the teacher. The learning process like that cause two-way communication between teachers and students, while the interaction among students rarely applied in the learning environment.

Furthermore, in the class still focus on the teacher as the primary source of knowledge and discourse become the primary choice of learning methods. In this case, students only receive the information given by the teacher, while the students are less empowered. The process of mathematics learning that teachers done less involve the students' activity. In other words, students obtain the knowledge because "notified" by the teacher, not "find" by students.

Learning that can be used to improve the communication skills of students should pay attention to the conditions necessary to establish the communication . One of the requirements to build communication in the learning process is the interaction between students and students, and students with teachers . Cooperative learning model is very appropriate used in the process of building communication skills . According to Slavin ( in Rusman , 2010:201 ) says : " cooperative learning promotes students interact actively and positively in the group . It is expected by the cooperative learning, teacher can facilitate the students' so that can interact with other students, such as asking the problem until students are encouraged to exchange information and discussion. Some experts say that the cooperative learning model excels not only to help students understand difficult mathematical concepts, but also to grow the collaboration, critical thinking and develop students' social attitudes .

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.

There are three main concepts underlying the group investigation learning model, as expressed by Joyce and Weil (1996:80), namely Inquiry, Knowledge and Dynamics of Learning Group. These three concepts can lead to better interaction between students and students, students and teachers so that can create a positive attitude towards learning and can build the skill of students' mathematical communication.

The Students' attitude to the learning proces is also one of the important thing to analize. Berlin and Hillen (in Yaniawati, 2001 : 107) state that the positive attitude showed by the students will be become the beginning step to go the learning environment effectively. The research that had been done by Ramdan (2008 : 107-108) indicate that the students show the positive attitude in the learning process. Some of students consider learning to use is something new for them so that students' motivation to learn mathematics become larger. The attitude shown by students towards learning is also one of the factors that determine the achievement of learning objectives. This is accordance with the research conducted by Nuraisyah (2006) conclude that creativity and students attitude in teaching and learning mathematics influenced to the mathematics learning achievement.

Based on the above explanation, the researcher interested in conducting the research reveal whether the learning model group investigation (GI) can improve students 'mathematical communication skills which in turning will improve students' mathematics learning outcomes as one of academic human contribution in improving the quality of education in Indonesia. Therefore, this research title is **"The Implementation of Group Investigation Learning Model to Improve the Students's Communication at 8$^{th}$ Grade SMP N 4 Pematangsiantar Academic Year 2014/2015"**

## 1.2. The Identification of The Problems

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

1. The students' mathematical communication ability are generally low.
2. Students difficult to solve the mathematical communication problems.
3. The process of mathematics learning is still centered to the teachers and less involving the students activitity.
4. Communication that occurs in the classroom tends to two way between teachers and students, while the interaction among students rarely applied in the learning process.
5. The interest of students to mathematics is low so that students tend to give less the positive attitude to mathematics.

## 1.3. The Limitation of The Problems

From the problems above, the researcher limits this problem as follows :

1. Effort to improve the ability of students' mathematical written communication by implementing the group investigation learning model.
2. Student's attitde to mathematical learning that using the group investigation learning model.
3. The learning materials that used are linear equation with two variables in $8^{th}$ grade of Junior High School 4 Pematangsiantar.

## 1.4. The Formulation of The Problems

1. How are the group investigation learning model can improve the ability of students' mathematical communication of eighth grade SMP N 4 Pematangsiantar?
2. How is the improvement of the ability of students' mathematical communication after implemented the group investigation learning model of eighth grade SMP N 4 Pematangsiantar?

3. How are the student's attitude to group investigation learning model in mathematics learning?

## 1.5. The Purposes of The Research

1. To know the process the group investigation learning model can improve the ability of students' mathematical communication of eighth grade SMP N 4 Pematangsiantar.
2. To know how the improvement of the ability of students' mathematical communication improve after implemented the group investigation learning model of eighth grade SMP N 4 Pematangsiantar.
3. To know the student's attitude to group investigation learning model in mathematics learning.

## 1.6. The Benefits of The Research

The benefits that expected from this research are :

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 thingking 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. The Defenitions of Operational

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 learning model is the cooperative learning model with students study in small heterogeneous group, do investigation to find or solve the problems and then communicate the result that had found, compare the result and give the respons that consist of 6 syntax, they are choose the topic, plan the cooperative, implementation, analysis and synthesis, present the result, and evaluation.
3. Students' attitude to group investigation learning model is the tendency of students to respons positively or negatively about the learning model that measured through the students' interest to group investigation learning model, the students' perseption to the problems faced, the teacher's rule in group investigation learning model.