

CHAPTER I

INTRODUCTION

1.1 Background

Education is an effort that plays an important role in improving human resources in Indonesia. Through education, humans gain experiences that can develop all the potential of human personality and abilities that are useful for themselves and society. Indonesia has high hopes for education in the future development of this nation because it is from education that the nation's young shoots of hope as the successor of generations are formed. This is same with (Ahmadi, 2014:2), which states that: "Education is a process of bringing about cool changes in human behavior. Education can also be defined as the process of processing knowledge and habitual habits through learning or study. If education is to be effective it should produce changes in all components of behavior (knowledge and ideas; norms and skills; values and attitudes; and understanding and embodiment). Behavior change is the result of an educational process that is directed at the goals to be achieved by each individual or society."

Meanwhile, the functions and objectives of education in Law of the Republic of Indonesia Number 20 of 2003, Chapter II Article 3 are stated as follows: "National education develops the ability and shapes the character and civilization of a nation that is steadfast to educate the nation's life, which aims to develop the potential of students to become human beings who are sincere and fearful of God The Almighty, has a noble character, is healthy, knowledgeable, capable, creative, and becomes a democratic and responsible citizen" (Ahmadi, 2014: 14).

Given the importance of the role of education, the quality of education should continue to be developed. Chomaidi & Salamah, (2018: 1) stated that: "Improving the quality of education can be done by improving the quality of teachers in the teaching process that has been implemented by the government and

other educational institutions through various activities, including conducting teacher upgrades, providing opportunities to improve learning, curriculum renewal, pre-service program training, providing educational facilities and infrastructure, literature, laboratories. However, the education achieved is sometimes satisfying. Therefore, the role of teachers in efforts to improve the quality of students in the teaching and learning process is improved through education".

One of the subjects in the learning process which has an important role in mathematics. Mathematics is a universal science that is useful for human life and also underlies the development of modern technology, and has an important role in various disciplines and advances human thinking. In the 2013 curriculum, it is stated that mathematics subjects need to be given to all students from elementary to high school to equip students with logical, analytical, systematic, critical, innovative, and creative thinking skills, as well as the ability to work together (Apriza, 2019: 56).

Learning mathematics has several objectives. The purpose of learning mathematics based on the regulation of the Minister of National Education Number 22 of 2006 regarding graduation competency standards is so that students have the ability, namely: (a) understand mathematical concepts, explain interrelation between concepts and applying concepts or algorithms, flexibly, accurately, efficiently and precisely in problem solving, (b) using reasoning in patterns and nature, performing mathematical manipulations in making generalizations, compiling evidences, or explaining mathematical ideas and statements, (c) solving problems which include the ability to understand problems, designing models mathematics, solving models and interpreting solutions obtained, (d) communicating ideas with symbols, tables, diagrams, or other media to clarify circumstances or problems, (e) having an attitude of appreciating the usefulness of mathematics in life, namely having curiosity, attention and interest in learning mathematics , as well as a tenacious attitude and confident in problem solving (Depdiknas, 2006). Of the four learning objectives based on Permendikbud Number 22 of 2016, one of them is to communicate arguments or

ideas with diagrams, tables, and symbols. This shows that mathematical communication ability are very much needed by students to have.

According to the results of research conducted by the *National Council Teachers of Mathematics* (NCTM, 2000) states that mathematical communication ability are the ability to deal with problems both in mathematics and life every day in mathematical language or symbols and model situations through writing, concrete objects, pictures, graphs, and algebraic methods. The indicators of mathematical communication ability according to T Haris Multazam (Sahrul et al., 2020) are:

1. *Drawing* is an indicator that reflects real objects, drawings, and diagrams in mathematical ideas.
2. *Mathematical Expression* is an indicator that expresses everyday life in terms of Bahasa or mathematical symbols.
3. *Written Text* is an indicator that provides answers using its language, makes problems using mathematical models in the form of oral, written, concrete, graphic, and algebra, explains and makes questions about previously learned mathematical problems, listens, discusses, and writes about mathematical problems, makes conjectures, arranges arguments, and generalizations

The importance of communication ability in mathematics learning was also stated by Susanti, et al (2018: 91) who stated that "Mathematical communication is a conveyance of mathematical ideas itself, Thus, through communication, students are expected to understand mathematics which has an important role in learning mathematics, to support and understand students to learn properly active".

The mathematical communication ability of each individual will affect the learning process and outcomes that are related. According to Baroody (Asikin, 2013: 204), there are two important reasons why communication in mathematics needs to be developed among students. First, mathematics is language, meaning that mathematics is not just a tool to aid thinking, a tool for finding patterns, solving problems, or drawing conclusions, but mathematics is also a valuable tool for communicating ideas, precisely, and carefully. Second, mathematics learning

is a social activity, meaning as a social activity in mathematics learning, mathematics is also a vehicle for interaction between students and also communication between teachers and students.

From the explanation above, it can be concluded that mathematical communication ability are very important in the learning process. Students are not only required to convey their mathematical ideas orally, but also in writing using diagrams, tables, and symbols. If students have been able to communicate ideas clearly and can solve various problems, it is very helpful in the learning process. Students who have good mathematical communication ability will have success capital in learning mathematics. Conversely, if students do not have good mathematical communication ability, it is very difficult for students to understand mathematical material or concepts so the success of mathematics learning objectives has been set.

But the reality in the field shows that the results of mathematics learning in Indonesia are still far from what was expected. The mathematics skills of students in Indonesia are at a low level. This is supported by the results of the 2016 Trends in International Mathematics and Science Study (TIMSS) report, showing that Indonesia is ranked 46 out of 51 participating countries. The highest score was obtained by Singapore with a score of 618 (50% higher than Indonesia) (GLN Team, 2017). In addition, based on data from the Program for International Student Assessment (PISA) in 2018, Indonesia was ranked 72nd out of 78 with an average score of 379 and the average world score for mathematics was 489. This shows that the mathematics learning achievement of Indonesian students is still very low (Septiani et al., 2020: 66). In the Program for International Student Assessment (PISA) test, there are 4 mathematical abilities assessed, namely comprehension, problem-solving, reasoning skills, and communication ability at a low level, where one of the aspects measured is student's mathematical communication ability.

This issame with the results of an analytical study conducted by Wardhani & Rumiati, the cause of the low mathematics achievement of Indonesian students in the TIMSS results are caused by Indonesia's weakness in working on problems

that require several abilities, one of which is mathematical communication ability (Salam, 2017: 109).

In addition, several factors cause low student learning outcomes, namely learning materials that are considered difficult, teacher reception in teaching that is not good, and teaching strategies or methods that are still conventional. Mahmuzah (2016: 69) states that: "The low mathematical communication ability of students in mathematics learning need serious attention from all circles, especially mathematics teachers. Many factors cause low communication ability of students in the learning process. One is (conventional) teacher-centered learning that does not provide opportunities for students to develop ideas and express their opinions."

The 2016 Ministry of Education and Culture publication shows the fact that Medan State Middle School is not included as a national-level outstanding school. One of the schools that caught the attention of researchers was SMP Negeri 35 Medan. Puspendik Kemendikbud points out the fact that the National Middle School 35 Medan National Examination results in 2018 are in the low category, namely ranking 40 out of 45 schools with an average score of 47,97.

In line with that, the author made observations on grade VIII-6 students of SMP Negeri 35 Medan T.A 2022/2023 in the form of diagnostic tests to 30 students as many as 2 questions whose completion applies the following stages of mathematical communication:

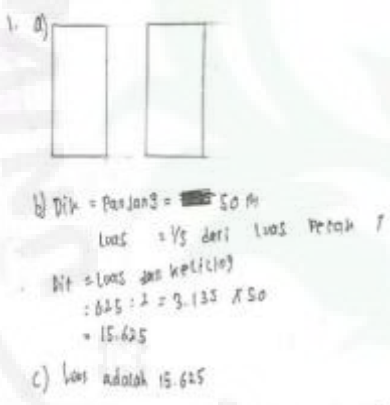
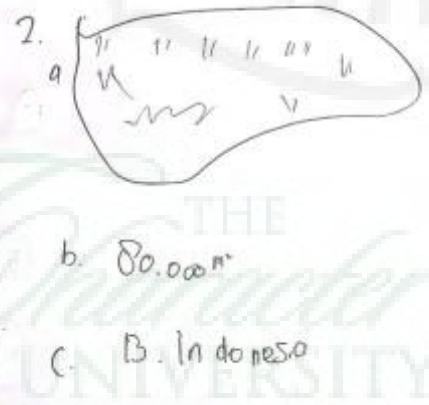
The initial ability test given by the researcher is:

1. Siti has a flower garden planted with various types of flowers in it. The garden is divided into 2 plots. Plot I is in the form of a square planted with white flowers as wide as $625 m^2$. Plot II is in the form of a rectangle planted with red flowers with a length of 50 m in plot II and an area of $\frac{1}{5}$ of the area of plot I.
 - a) Draw an illustration of the flower garden!
 - b) Decide the area and circumference plot II!
 - c) Make the conclusions you come up with using your own language!

2. Aminah is a businesswoman who is going to buy a rectangular plot of land in the Medan area. The length of the land is 50 m and the width is 30 m.
- Draw an illustration of the aminah land!
 - Determine the area of Aminah's land in m^2 !
 - Make the conclusions you come up with using your own language!

The results of working on some student errors in solving the above description questions can be seen in the following table:

Table 1.1 Student Work Results

No.	Student Work Results	Error Analysis
1.		<p>Students cannot draw a square shape correctly and draw 2 rectangle shapes. In addition, the student already understands the intent of the questions so he makes the arrangement known and asked in the questions. However, the process of student answers is not clear. That is, the ideas that students have cannot be poured into written form. Finally, students have not written the conclusions of the answers in full.</p>
2.		<p>Students have not been able to understand the problem seen from not being able to write down what is known and asked in the problem. So that students are unable to draw the form that is informed in the problem, unable to describe the process of answering questions, and unable to write conclusions from answers in their own language.</p>

The results of the initial observation test given to 31 students in class VIII-6 of SMP Negeri 35 Medan showed that student's mathematical communication abilities were in the very low category with an average class score of 44.5 where students who had achieved completeness were 7 out of 30 students or as much as 23.33%. Based on student answer sheets, it was found that there were still many

student errors in answering the questions given, even though the material had been studied before. These errors are measured based on evaluation standards to measure mathematical communication ability, including (1) reflecting real objects, pictures, and diagrams in mathematical ideas, (2) expressing everyday life in language or mathematical symbols, (3) providing answers using their language, create problems using mathematical models in the form of spoken, written, concrete, graphic, and algebraic. Therefore, it can be concluded that the average mathematical communication ability of class VIII-6 students at SMP Negeri 35 Medan is still relatively low. When making observations, researchers conducted interviews with teachers who teach mathematics at the school. The teacher said that in general the learning process that took place was still teacher-centered so student's active participation was still low in terms of asking questions, answering questions, expressing opinions or ideas, discussing with other students, and learning models were still lacking varied during the learning process.

To overcome this problem, an interesting learning model is needed and can generate student's knowledge and mathematical communication ability in the teaching and learning process. The learning model that should be applied is a learning model that provides opportunities for students to communicate and interact socially with their friends to achieve predetermined learning objectives. The learning model that supports this is the cooperative learning model. Huda (2014:17-18) shows that: "The cooperative learning model is an effective teaching strategy in improving student achievement and socialization and also contributes to improving their attitudes and perceptions regarding the importance of learning and working together, as well as the understanding of their friends who have different backgrounds."

Cooperative learning has several types, but in this study, researchers are interested in using *Jigsaw* cooperative learning. According to Arends (Wui, 2021: 23), The *Jigsaw* type cooperative learning model is a learning model in which learning is carried out in small groups consisting of 4 or 6 random people who work together, with positive interdependence and are responsible for completing part of the the material being studied and conveying it to other group members.

This of course will lead to interaction between students in groups to improve student's mathematical communication ability.

The benefits of applying the *Jigsaw* cooperative learning type can be seen from the learning steps, namely: (a) Students are grouped with about 4 members, (b) Each person in the group is given different material and assignments (c) Members of different groups different from the same assignment forming a new group (expert group) (d) After the expert group has a discussion, each member returns to the original group and explains to the group members about the sub-matter they master (e) Each expert group presents the results of the discussion (Rusman, 2018: 220). In this case, students learn to work together to the maximum learning experience, both individually and in a group experience.

Based on research conducted by Tiara & Yuhasriati (2020) that there is a significant difference between students who take part in learning by applying the *Jigsaw* cooperative learning model and students who take part in learning by applying the direct learning model. In the *Jigsaw* cooperative learning model, each student is allowed to work with members of their group to manage information and interact as a whole, while the teacher's position is sufficient to be a facilitator when students experience difficulties. Therefore, the results of this experimental study stated that mathematical communication ability through the application of the *Jigsaw* cooperative learning model were better than students through the application of the direct learning model. Furthermore, research conducted by Eliviarni (2018), descriptively stated that the process of completing student answers using the *Jigsaw* type of cooperative learning is better than the STAD type of cooperative learning. Strengthened by the results of Wui's research (2021: 28), which states that after implementing the *Jigsaw* cooperative learning model, student's mathematical communication ability show an increase in ability, where as many as 6 students or 20%, namely 20 people or 66.67% in the cycle I become 26 people or 86.67%.

Based on the problem regarding the low level of student's mathematical communication, the researcher was interested in conducting a study entitled, "Analysis of Student's Mathematical Communication Ability in the

Implementation of the *Jigsaw* Type Cooperative Learning Model in SMP Negeri 35 Medan".

1.2 Problem Identification

Based on this background, several problems can be identified, namely:

1. Student's mathematical communication skills are in the very low category with an average class score of 44.5 where students who have achieved completeness are 7 out of 30 students or as much as 23.33%.
2. In carrying out learning, the teacher always functions as a source of knowledge.
3. The learning model used by the teacher has not been able to improve Student's mathematical communication skills
4. Students have difficulty applying the stages of mathematical communication in solving mathematical problems

1.3 Scope of Problem

Based on the background of the problem and problem identification above, it appears that the problem is quite broad and complex. In order for the research conducted to be more focused, the authors limit the problem, namely:

1. Student's mathematical communication ability in learning are still relatively low.
2. Student's difficulties in applying the stages of mathematical communication in solving mathematical problems.

1.4 Formulation of the Problem

Based on the background of the problem and the problem definition above, the formulation of the problem in this study is:

1. How is the level of student's mathematical communication ability with the implementation of the *Jigsaw* Cooperative learning model?
2. What difficulties do students experience in solving mathematical communication problems after applying the *Jigsaw* Cooperative learning model?

1.5 Research Purpose

Based on the formulation of the problem stated above, the objectives of this study are:

1. Describe the level of student's mathematical communication abilities in the implementation of the *Jigsaw* Type Cooperative learning model
2. Analyze student's difficulties in solving mathematical communication problems after applying the *Jigsaw* Cooperative learning model

1.6 Research Benefits

The benefits of this research are:

1) For Schools

As input material for educational institutions in improving the quality of education and improving learning models.

2) For Teachers

As input and consideration in applying a better and more appropriate learning model in learning mathematics.

3) For Students

It is hoped that this will encourage students to be more concerned and active in developing mathematical communication ability in learning mathematics considering how important these abilities.

4) For other researchers

As material for consideration by researchers and readers who are interested in studying more deeply the same problem in the future.