

CHAPTER I

INTRODUCTION

1.1 Background

The development of modernization and globalization of the 21st century brings tremendous impact. One of the worrisome impacts is the inability of children (students) independently to know, understand, and overcome problems around them. For the Indonesian people, another impact that is felt due to the challenges of modernization and globalization is the low thinking skills of students (Panggabean, et al., 2021). Advances in science and technology require someone to be able to master information and knowledge. Thus we need an ability to obtain, select and process information. These abilities require critical, systematic, logical, and creative thinking. One of the educational programs that can develop critical, systematic, logical, and creative thinking skills is mathematics (Hasratuddin, 2014).

Mathematics as queen of sciences has a very important role in the development of science and technology. Mathematics was born based on several concepts including the concepts of numbers, quantities, and shapes. Mathematics is widely found in the processes of everyday life, even the basic mathematics of the development of science and technology, so that every human being must realize that mathematics is the queen of knowledge (Siregar, et al., 2020)

Mathematics is a way of finding answers to problems that humans face; a way of using information, using knowledge of shapes and sizes, using knowledge of counting, and most importantly thinking in humans themselves in seeing and using relationships (Hasratuddin, 2015). Mathematics is abstract ideas that are given symbols that are hierarchically arranged and the reasoning is deductive, so learning mathematics is a high activity (Hasratuddin, 2014). Mathematics is one of the fields of study that occupies an important role in education. This can be seen from the time when school hours are more than other subjects (Jumaisyaroh, et al., 2014).

Mathematics learning is very important given to students from an early age so that these students have basic mathematical abilities that help students solve mathematical problems in their daily lives. Therefore, it is natural that mathematics is the main and important subject that is included in various levels of education, from elementary school to university. The target of learning mathematics at every level of education is to develop students' ability to think mathematically. The development of this ability is needed so that students better understand the concepts being studied, and can apply them in various situations.

However, in reality, the ranking of students' mathematical abilities in Indonesia is still very low. This low mathematical ability is due to the fact that there are still many students who have difficulty in learning mathematics, are less interested, and always regard mathematics as a difficult science, thus creating a fear of learning mathematics, as stated by Abdurrahman (2012), that "from various fields of study taught in schools, mathematics is a field of study that is considered the most difficult by students, both those who do not have learning difficulties, and more so for students who have learning difficulties". In teaching mathematics teachers tend to transfer the knowledge they have into the minds of students. Students are often positioned as people who 'know nothing' who just wait for what the teacher gives (Susilowati, 2018)

The results of the International Programme for International Student Assessment (PISA) study showed the achievements of reading literacy, mathematical literacy, and scientific literacy achieved by Indonesian students are very low and can only occupy the bottom 10 from 65 countries. Trends in International Mathematics and Science Study (TIMSS) shows Indonesian students are ranked very low in the ability: (1) to understand complex information, (2) theory, analysis and problem solving, (3) the use of tools, procedures and problem solving, and (4) conduct investigations (Purba, et al., 2021).

PISA is not only focused on numeracy ability but also focuses on students' ability to analyze, reason, and convey ideas effectively, formulate,

solve, and interpret mathematical problems in various forms and situations. PISA requires students to use relevant skills in a less structured context, so instructions are not very clear to students. One indicator that causes poor Indonesian PISA results is that Indonesian students are weak in modeling real situations into mathematical problems and interpreting mathematical solutions to real situations (Ariyanti, 2016).

This means that students are still not able to achieve all the standards of mathematical ability which according to the National Council of Teachers of Mathematics (NCTM) there are 5 (five) basic abilities that are used as standards in the mathematics learning process, namely problem solving, reasoning and proof, communication, connections and representation (Armadan, et al., 2017). Communication skills are one of the skills that students need to have in learning mathematics because in mathematics, receiving and conveying information is not an easy thing.

Mathematics is a language. Mathematics as a language is of course very necessary to be communicated both orally and in writing, so that the information conveyed can be known and understood by others. Communication is an essential part of mathematics and mathematics education. It can be understood that without good communication, it is very difficult to develop mathematics as the learning objectives have been set. This is because the communication process will help students build meaning, convey ideas correctly, and make it easier to explain these ideas to others so that the information is easy to understand and understand (Aminah, et al., 2018).

Mathematical communication ability is the ability of students to use mathematics as a tool of communication (language of mathematics), and the student's ability to communicate mathematics is learned as the content of the message should be delivered (Tiffany, et al., 2017). Mathematical communication is a way of conveying mathematical ideas both in writing and orally. Through communication students can explain ideas and express their understanding of a concept. The mathematical communication process helps students construct a series of meanings as part of the mathematical process to

be applied in solving mathematical problems (Aprillia, et al., 2020).

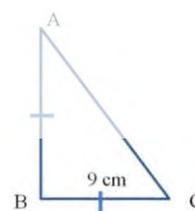
Alexander & Woods (in Dorisno, 2019) argues that "gender differences are regulated by hormones and behaviors such as aggression, play patterns, and attitudes." In physical characteristics, boys differ from girls. Boys are stronger and more active than girls who are feminine, soulful and gentle. However, gender differences are not the most important differences in schools, as each student is assigned the same amount of time and responsibility. After conducting interviews with Mr. Bati Susanto S.Pd as a mathematics teacher at SMPN 3 Silangkitang, it is known that in learning mathematics, female students are more diligent and active in doing assignments compared to boys, but in the learning process boys are more responsive than girls.

The low mathematical communication skills are also experienced by students at SMPN 3 Satu Atap Silangkitang. Based on the results of the initial observations that is conducted on January 2, 2022, it is known that the mathematical communication skills of class VIII students of SMPN 3 Satu Atap Silangkitang are still relatively low. This can be seen from the initial communication ability test questions on the Pythagorean material given by the researcher to 30 students of class VIII-C at SMPN 3 Satu Atap Silangkitang. The test given consists of three questions where the three questions contain indicators of mathematical communication skills, namely writing mathematically, drawing mathematically and mathematical expression The following questions that given is :

1. The following of the measurement of the sides of a triangle .
 - a. 5 cm, 12 cm, 13 cm
 - b. 6 cm, 12 cm, 13 cm
 - c. 6 cm, 12 cm, 14 cm

Determine the type of triangle based on the size of the sides of the triangle above! Give the reason!

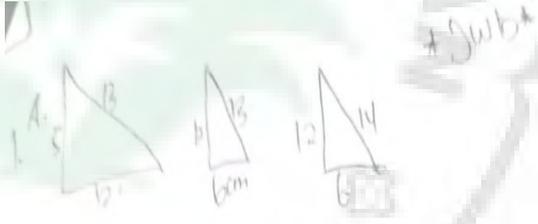
2. Determine the length of the side AC in an isosceles right triangle, as shown in the figure below!

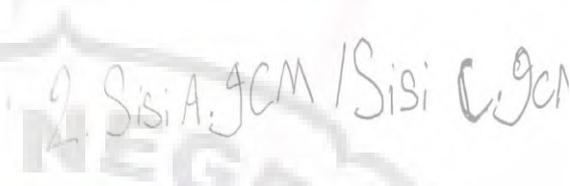
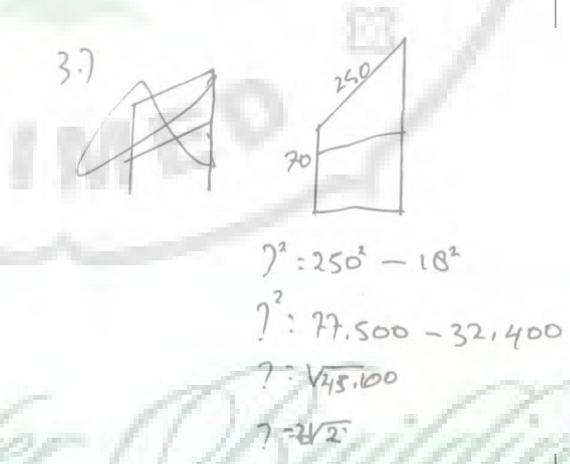


3. A child raises a kite with a string that is 250 meters long. The distance between the child on the ground and the point under the kite is 70 meters. Calculate the height of the kite! Draw an illustration of the problem!

The following is an analysis of the answers of several students related to questions based on indicators:

Table 1.1 Analysis of Student Errors in Completing the initial communication ability test

Indicators of mathematical communication ability	Analysis of Student's Answer Sheet
<p>Written Text</p>	<p>Question no. 1</p>  <p>Figure 1.1 Student Answers Sheet 1</p> <p>Based on students' answers in the picture above, we can see that students are only able to describe the sides of a triangle based on the length of the given in the following question side but have not been able to explain and conclude the solution to the problem presented in the situation, namely explaining the type of triangle based on its sides.</p> <p>Student explanations are incomplete.</p>

Mathematical expression	<p>Question no 2</p>  <p>Figure 1.2 Student Answers Sheet 2</p> <p>Based on students' answers to question number two above, we can see that students do not know the intent and how to do the questions. Students only rewrite the existing questions without solving the problem.</p>
Mathematical expressions	<p>Question no 3.</p>  <p>Figure 1.3 Student's Answer Sheet 3</p> <p>In the students' answers above, we can see that students have begun to understand describing a mathematical problem given in the form of pictures but the images given are still unclear and the</p>

	<p>student's answers are still wrong and incomplete.</p> <p>The student does not explain in detail and clearly the mathematical problems given in mathematical language.</p>
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Based on the results of the initial communication ability test given to class VIII-C students as a whole, it was found that the average score obtained was based on indicators of mathematical communication ability, namely: mathematical writing (average score is 56,7), mathematical drawing (percentage score is 58,3) and mathematical expressions (percentage score is 38,3) and the average overall score is 42,5 . Based on this, we can say that the mathematical communication skills of class VIII-C students at SMPN 3 Satu Atap Silangkitang are still relatively low, especially on mathematical expressions indicator. It can be seen from the answers given by students that students have not been able to model the questions into pictures and mathematical language correctly, calculation errors and errors in describing a solution to the given problem.

The cause of the low mathematical communication ability is due to the learning methods/models that do not involve students actively in learning. The lack of active student involvement in learning results in the low ability of students to construct new knowledge and ability. In addition, it also has an impact on students' ability to build relationships between concepts, materials and real life so that students are less motivated and feel the importance of learning for the future (Aprillia, et al., 2020).

The results of the researchers' initial observations in class VIII of SMPN 3 Satu Atap Silangkitang, it was found that in learning mathematics the teacher had tried to involve students actively in learning mathematics through group discussions and assignments given by the teacher, but the learning process that occurred was still dominated by the teacher, the learning process also tend to be book centered (text book). During the learning process, the teacher explains the material followed by giving some examples of questions on the blackboard,

then giving assignments for students to discuss in their respective groups. Even before all students were able to solve the problems, the teacher had finished them on the blackboard and did not give students the opportunity to explore their knowledge and abilities in solving problems, so that most of the students seemed less motivated and had difficulties in learning mathematical concepts. Students also tend to feel satisfied just by accepting what is conveyed by the teacher during the learning process.

The learning process is essentially a communication process, delivering messages through communication symbols. Lack of ability and skills in mathematical communication will result in a decrease in students' disposition towards mathematics (Aprillia, et al., 2020). The success of a student in learning mathematics depends on his thinking ability and ability to communicate mathematically. Likewise with teachers, a teacher must be able to choose a learning approach that is in accordance with the subject matter and the context of the students' real world.

The principle of 21st century learning uses a student-centered learning approach where the teacher acts as a facilitator who guides students towards the formation of students' own knowledge. Therefore, teachers need to understand and determine learning approaches that can encourage and generate student activity in the learning process which in turn can improve students' mathematical communication skills. One approach that can be applied in learning mathematics is a realistic mathematics learning approach.

Realistic mathematics education approaches is a learning approach that uses real world problems. Mathematic realistic education is a learning theory that starts from 'real' matters for students, emphasizes 'process of doing mathematics' skills, discussing and collaborating, arguing with classmates so that they can find themselves ('student inventing' as opposed to 'teacher telling') and ultimately use that math to solve both individual and group problems. Through abstraction and formalization students will develop a more complete concept. Then students can apply mathematical concepts to new fields of the real world (applied mathematization). Therefore, to bridge mathematical concepts with children's daily experiences, it is necessary to

pay attention to mathematics of everyday experience (mathematization of everyday experience) and the application of mathematics in everyday life (Simanjuntak, et al., 2020).

The approach of Realistic Mathematics Education (RME) comes from contextual problems, where in this situation students must be active in learning and teacher acts as a facilitator Concept of RME is in line with the need to improve mathematics education in Indonesia which is dominated by the problem of how to increase students' understanding of mathematics and develop reasoning power". This is an advantage so every math teacher in Indonesia must know that PMR is very feasible to use in the learning process (Putri, et al., 2019).

Realistic mathematic education (RME) approach come from contextual issues, in this situation student a should has the active role in learning activities, while teacher plays as facilitator. Teacher and student has a different role. Students can express and communicate the ideas to each other and teacher will help and support to compare the idea and also to make a decision. Which idea are the best among other. With those kind of characteristics, Indonesian realistic mathematic approach has a good prospect to applied. It is good among structuralism, empiric, or mechanical approach. Expectation and optimism that RME is the answer to the problem of mathematic approach in Indonesia (Safitri, et al., 2017).

The advantages of the RME approach include: (1) providing understanding to students about the relevance of mathematics to everyday life, and (2) providing understanding to students that mathematics is a field of study that is constructed and developed by students themselves, not only by those who are called experts. In that field. While the weaknesses of the RME approach, including: (1) it is not easy for teachers to encourage students to find various ways to solve problems or solve problems, and (2) it is not easy for teachers to provide assistance to students in order to rediscover concepts, mathematics being studied (Susilowati, 2018).

Based on the phenomena and background described above, the researchers felt the need to conduct more in-depth research related to

students' mathematical communication skills with the title “Analysis of Students’ Mathematical Communication Ability through a Realistic Learning Approach Based on Gender in SMPN 3 Satu Atap Silangkitang”.

1.2. Problem Identification

Based on the above background, several problems can be identified, including:

1. There are still many students who have difficulty in learning mathematics and always consider mathematics as a difficult science.
2. In teaching mathematics, teachers tend only to transfer their knowledge into students' minds.
3. Students also tend to be positioned as people who 'know nothing', who just wait for what the teacher gives.
4. Most students seem less motivated in learning mathematical concepts.
5. The low mathematical ability of students is shown from the results of the PISA and TIMSS studies.
6. There are differences in the abilities of male and female students when learning mathematics
7. Mathematical communication is one of the ability that need to be mastered by students. However, the reality shows that students' mathematical communication ability are still relatively low
8. Basically the teacher has tried to actively involve students in learning mathematics, but the learning process that occurs is still dominated by the teacher and tends to be book-centered (text book).
9. Students also tend to feel satisfied only by accepting what is conveyed by the teacher during the learning process.
10. The material taught by the teacher tends to be less related to the students' daily real life.

1.3. Problem Limitation

Based on the background and problem identification above, it is necessary to limit the problem so that the problems studied are more focused

and focused. The problem in this study is limited to the analysis of students' mathematical communication skills using a realistic mathematics learning approach in terms of students' gender. The students' mathematical communication ability is limited to the students' writing communication ability on the flat-sided building material in grade VIII of SMPN 3 Satu Atap Silangkitang.

1.4. Problem Formulation

Based on the background, identification and limitation of the problem above, the problem in this study is formulated as follows:

1. Is the mathematical communication ability of students who are given the RME learning approach better than students who are given ordinary learning approach?
2. Is there is an interaction between learning and gender on students' mathematical communication ability?

1.5. Research Objective

In line with the formulation of the problem above, the objectives of this research are, among others:

1. Knowing the mathematical communication ability of students who were given the RME learning approach were higher than those given ordinary learning approach
2. Knowing the interaction between learning approach and gender on students' mathematical communication ability.

1.6. Research Benefit

The results of this study are expected to provide benefits for various parties, including:

1. For students, the results of this study are expected to provide stimulus and motivation to students in learning mathematics, as well as provide information related to the level of students' mathematical communication ability.

2. For teachers, the results of this study are expected to be used as information and input for teachers about the importance of students' mathematical communication ability in forming mathematical understanding and as consideration in planning and designing learning in an effort to train and improve students' mathematical communication ability.
3. For further researchers, the results of this study are expected to be used as reference and comparison materials to conduct research on the same topic in the future.

1.7. Operational definition

To avoid confusion in interpreting the study variables, it is considered necessary to provide the following operational definition:

1. The mathematical communication ability that want to measure in this study is the writing aspect.
2. The gender referred to in this study is only limited to gender identity, namely the difference in gender between male and female.
3. The RME learning approach is a learning theory that starts from 'real' things for students, emphasizes the skills of 'processing mathematics', discussing and collaborating, debating with classmates so that they can find out for themselves and ultimately using that math to solve individual and group problems.
4. Ordinary learning learning approach referred to in this study, is a teacher-centered learning process using the lecture method, assignment, and discussion.