

CHAPTER I

INTRODUCTION

1.1. Research Background

According to UU number 20 of 2003, education is a conscious and planned effort to create an educational environment and learning process for students to actively develop their strength for spiritual strength, self-control, personality, intelligence, and noble character, such as his own ability, society, nation, and state are needed. With education, one can gain knowledge, ability, and good attitudes, and produce high human resources so education is very important and cannot be separated from life (Rismen et al., 2020). One of education that cannot be separated from our lives is mathematics (Suryani et al., 2020).

In essence, mathematics is a systematic science and implies that the concepts in it are interrelated with one another (Puspitasari et al., 2019). The objectives of learning mathematics (Ariawan & Nufus, 2017), namely: 1) students are able to understand, explain, and apply mathematical concepts appropriately in solving mathematical problems; 2) students are able to reason and perform mathematical manipulations, as well as prove and explain the idea of a mathematical statement; 3) students are able to solve mathematical problems systematically; and 4) students are able to communicate ideas with formulas/symbols/tables/graphs/diagrams to explain the problems they face. In addition, the characteristics of students who can use mathematics in everyday life are: high curiosity (Afriansyah, 2021), sensitivity/attention to their surroundings (Permatasari & Nuraeni, 2021), and willingness/interest in mathematics (Faqih et al., 2021), as well as good self-confidence (Sulaiman et al., 2021).

According to the National Council of Teachers of Mathematics or NCTM (2000), learning mathematics in schools has 5 standard processes that students need to have in solving problems, namely: problem solving, reasoning and proof, communication, connection, and representation. Therefore, communication was

considered one of the five standard processes of mathematics in this research. Based on the process standards of the mathematics learning process, the communication aspect is one of the competencies that must be developed in mathematics learning. Because through mathematical communication, students can arrange their mathematical thinking both in verbally and writing, which take place in the educational process.

Through learning mathematics students are expected to be able to communicate ideas with symbols, tables, diagrams, or other media to clarify situations or problems because many issues or information are conveyed in the language of mathematics, for example presenting issues or problems into mathematical models which can be in the form of diagrams, mathematical equations, graphs or tables (Dewi et al., 2020).

From the explanation above, it can be concluded that mathematical communication ability is the ability possessed by students to provide mathematical ideas both orally and in writing in the form of models or mathematical symbols. Mathematical communication is very important to support learning mathematics in understanding a process. Through communication students can also develop mathematical ideas in a language students can understand.

In the learning process that important to improve mathematical communication ability because mathematics requires students not only to think but also to communicate (Thorpe, 2018). Mathematical communication ability support student success in almost every study (Tohara, 2021). Therefore, in learning mathematics, there needs to be interactive so students need to have mathematical communication ability. Meanwhile, outside of mathematics lessons, this communication skill is still important for students to have as a tool for interacting with others. Communication between one another can build a better life, and without communication, it will not be possible to exchange mindsets with each individual in society (Schramm, 2021). Therefore, students are expected to be able to communicate well, so they can interact properly, both at school and in society.

Teachers need to develop students' mathematical communication ability (Hanipah & Sumartini, 2021). Students' mathematical communication ability can increase students' positive attitudes toward mathematics (Hwa, 2018; Kelly, 2019). Therefore, students' mathematical communication ability are important for students to have. The reasons for the importance of students' mathematical communication are explained in several statements, namely: 1) the source of students' strength in modeling and deciding on the strategies used; 2) main points in analyzing mathematical problems; (3) means for students to convey ideas to their friends (Sari, 2017; Heryan, 2018).

Mathematical communication ability need to be mastered by students (Chasanah, 2020). Students' mathematical communication ability really need to be improved, because through mathematical communication students can organize their mathematical thinking both orally and in writing (Putri & Sundayana, 2021), students can respond appropriately (Riyanti & Mardiani, 2021), both among students itself and between students and teachers during the learning process takes place. Students who have good communication ability tend to be able to make various representations (Yanti & Novitasari, 2021), making it easier for students to get alternatives for solving various mathematical problems (Rahmi et al., 2017). The conclusion that can be drawn is that when students have good mathematical communication ability, students will be smarter and have various ways of solving math problems.

The explanation above shows that mathematical communication is important and very beneficial for all aspects of life. Learning mathematics needs to be designed in such a way as to improve students' ability to communicate mathematically. However, the importance of mathematical communication ability is not in line with the reality that occurs. Students' mathematical communication ability is still low based on previous research. Sriwahyuni et al. (2019) concluded that the mathematical communication ability of junior high school students were still in the very low category. It was found that 65% of students had not been able to explain mathematical ideas, state and complete events related to everyday life in mathematical symbols. Another study was also conducted by Yanti et al. (2019) which shows that students who meet the indicators of mathematical

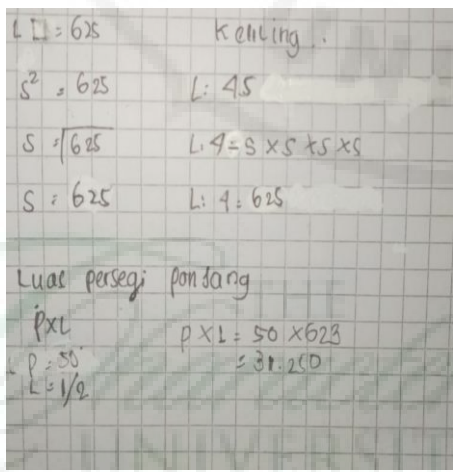
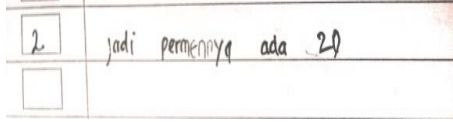
communication ability as many as 47% of students are able to express an image in the form of mathematical symbols. As many as 30% of students are able to explain mathematical ideas orally and in writing. And as many as 34% of students are able to discuss and write conclusions about mathematical problems. Based on these three categories, students' mathematical communication ability are classified as low.

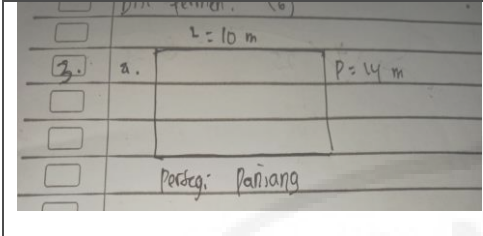
One of the Mathematical problems is low mathematical communication ability also occurs in SMP Negeri 1 Bandar. This information was obtained from the results of observations and interviews with students and a teacher in class VIII SMP Negeri 1 Bandar, Mr. J.P. Marpaung, S.Pd., that students' mathematical communication ability in mathematics are still low which causes students' abilities in mathematics as well. This is due to students' low interest in learning mathematics because students think mathematics is a very difficult subject. And based on information obtained from teachers and students that conventional teacher-centered learning methods are applied in class. learning that is carried out tends to be monotonous, namely delivering material, providing examples of questions, and providing questions for students to work on. So the learning that takes place is one-way because it is dominated by teachers and students who don't play an active role in the learning process. And teachers still rarely give questions in the form of contextual problems in the learning process so that students have difficulty understanding the concepts of the material being studied. So students consider mathematics to be a difficult subject because students are unable to solve the problems given So what happens in mathematics learning activities in class VIII SMP Negeri 1 Bandar is that students experience difficulties in understanding the concepts of the material being studied which results in students still being confused about understanding the questions or data in the questions given, expressing them in a mathematical form. In the end they are unable to determine what concept or formula should be used to solve the problem. Conversely, sometimes students also experience difficulties when faced with questions related to reading and interpreting data presented in the form of diagrams, graphs, symbols, or other mathematical images. Accordingly, it can be seen that the ability of students to communicate mathematics is still low.

This is supported by the results of the diagnostic test given by the researcher during the initial observation at SMP Negeri 1 Bandar to measure students' mathematical communication ability. The diagnostic test was given to class VIII-1 students of SMP Negeri 1 Bandar for the 2022/2023 academic year. The questions and analysis of the diagnostic tests given are

1. Putri has a flower garden planted with various types of flowers in it. The garden is divided into 2 (two) plots. Plot I is in the form of a square which is planted with Jasmine flowers with an area of 625 m². Plot II has a rectangular shape planted with roses, the length of plot II is 50 m and the area is 1/5 the area of plot I. Determine the perimeter of plot I and plot II?
2. Jessica bought 20 candies from a stall near her house. When she was at her sister's house Krystal, Tiffany and Kris asked for the candy so Jessica's candy left 14 pieces. How many candies did Jessica's three sisters ask for?
3. Mr. Harry has a rectangular banana garden. It is 14 m long and 10 m wide. Make a sketch of the picture of the problem above!

Table 1.1 Analysis of Student Errors in Completing Diagnostic Tests

Students' Answer	Aspect	Errors
	Mathematical Expression	Students have not been able to answer question number 1 correctly, where students have answered that the circumference of plot I is 625 cm, it should be 100 cm, this is because students are wrong in substituting the side values of square plot I. And students are unable to answer around plot II because students have not been able to make mathematical model of the known information in the problem.
	Written Text	In question number 2, students have not able to provide conclusions to provide an explanation for the answers obtained.
	Drawing	In question number 3, the

	<p>students did not explain the sketch of Harry's banana garden correctly, the rectangular image was not correct, it can be seen that the 14 meter image is shorter than 10 meters.</p>
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Based on the diagnostic test, it was concluded that the mathematical communication ability of SMP Negeri 1 Bandar students were still low. This can be seen from the 29 students who were given the test, there were 83% of students had not been able to make a mathematical model (mathematics expression) correctly, 69% of students had not been able to provide an explanation of the answers to the problems given (written text) and 76% of students had not been able to enter information correctly in the picture (drawing). And of the 29 class VIII-1 students at SMP Negeri 1 Bandar, only 13.79% or 4 people were able to exceed the minimum completeness criteria, namely 65.

The low students' mathematical communication ability resulted in most students experiencing learning problems, such as: (1) students were less brave in asking questions, (2) students were less courageous in expressing opinions/ideas, (3) students were less able to conclude/summarize the material they had learned, and (4) students lack the courage to present their work. The conclusion that can be drawn is when students are lacking in communication, students will experience difficulties in learning mathematics, because these students do not have the courage, lack in making conclusions, and are embarrassed when showing the results of their work to others, and will result in students having difficulty solving problems, because they don't communicate well (Khairunisa & Basuki, 2021; Nuraeni & Afriansyah, 2021).

According to Sritresna (2017), the cause of students' low mathematical communication ability is due to "lack of student involvement in the teaching and learning process, so learning that tends to be teacher-centered causes low student response to mathematics lessons." To overcome these problems, teachers have an important role in efforts to improve students' mathematical communication ability.

With these problems, teachers are required to use innovative teaching styles so that students experience an increase in mathematical communication ability and problem-solving ability, such as using approaches in learning, such as the Realistic Mathematics Education (RME) approach because realistic mathematics learning has characteristics and principles that allow students can develop optimally, such as the freedom of students to express their opinions, the existence of contextual problems that can relate mathematical concepts to real life, and the creation of models that can facilitate students in solving problems. According to Ruseffendi (2004), the reason for using realistic mathematics in schools is that mathematics can be used in various circumstances, used by every human being in every activity, both mindset and mathematics itself. According to the research results obtained by Lubis and Fibri (2017) stated that Realistic Mathematics Education is an approach that can improve students' mathematical communication ability classically by 87.50%. So that Realistic Mathematics Education can be a solution for teachers to overcome the problems of students who do not achieve mathematical communication ability. Not only that, research conducted by Karmila and Atiqoh (2021) states that the mathematical communication abilities of students who use a realistic mathematics approach are higher than the mathematical communication ability of students who do not use a realistic mathematics approach. The results of the study show that a realistic mathematical approach can improve students' mathematical communication ability. With these two studies, it can be concluded that when students are taught using Realistic Mathematics Education they experience a high increase in mathematical communication ability.

Another approach that can improve students' mathematical communication ability is the problem posing approach. The problem posing approach is learning that focuses on students asking questions based on the information or situation that has been given. Based on the available information, students process it in their minds after understanding, so students can ask questions. By submitting questions like this, it is hoped that a concept will be formed for the material given to each student (Herawati et al., 2010). Problem posing is an approach to learning that focuses attention on students to be able to develop their mathematical abilities

so that they can absorb the learning being carried out (Hidayatuloh, 2017). One of the studies using this approach is the research conducted by Indrawati and Nurmiati (2020) that the use of problem posing has an effect on student mathematics learning outcomes. This is shown in the pretest and posttest scores, namely, there is an increase of 13.69 from the previous 59.54 to 73.23. Another study conducted by Mahmuzah and Aklimawati (2016) obtained satisfactory results, namely, students were able to develop their mathematical communication ability when taught using this approach. In another study, by Harmin et al. (2021) to find out the effectiveness of problem posing on students' mathematical communication abilities, the research results obtained that the average student's mathematical communication ability using problem posing was in the very high category and there was a difference between students' mathematical communication ability who apply problem posing with those who do not apply problem posing.

According to these studies, it was found that the Realistic Mathematics Education (RME) approach and the problem posing approach can improve and develop mathematical communication ability. Because both are able to improve students' mathematical communication ability. In learning using these two approaches, students are not only assessed from the results but also assessed on the process of doing it.

Based on the description above, that the Realistic Mathematics Education (RME) approach and the problem posing approach can improve and develop mathematical communication ability, the researcher chooses to conduct research with the title **"Differences in Students' Mathematical Communication Ability Using Learning Approach RME And Problem Posing at SMP Negeri 1 Bandar"**.

1.2. Problem Identification

Based on the description of the background of the problems stated above, several problem identifications can be identified as follows:

1. Learning is still teacher-centered so students are less actively involved in the learning process, resulting in a lack of interaction between teacher and students.
2. Mathematics learning that is carried out tends to be monotonous, namely delivering material, providing examples of questions, and providing questions for students to work on so students feel bored, have difficulty, and are not interested in carrying out learning.
3. Teachers still rarely give contextual problems in the learning process so students have difficulty understanding the concepts of the material being studied.
4. Students consider mathematics to be a difficult subject because students are unable to solve the problems given.
5. The students' mathematical communication ability are still low at SMP Negeri 1 Bandar.
6. Learning used by teachers has not been able to improve students' mathematical communication ability

1.3. Scope of Study

Based on the identification of the problems described above, the scope needed so that this research is not too broad. The scope of this research is limited to the low mathematical communication ability of students, and learning approaches such as RME and problem posing that can support students to improve mathematical communication ability have not been applied. This research is quasi-experimental that aim to determine students' mathematical communication ability taught using the RME approach and problem posing at SMP Negeri 1 Bandar.

1.4. Problem Limitation

The identified problem is a fairly broad and complex problem, for more precise research targets to be carried out, this research limits the problem as follows:

1. Differences in mathematical communication abilities that are taught using the RME approach with Problem Posing at SMP Negeri 1 Bandar.
2. This research will have applied in statistics matter.
3. This research conduct in classes VIII of SMP Negeri 1 Bandar A.Y 2022/2023.

1.5. Research Question

According to the discussion on problem identification, the research question in this research, as follows: “Are students' mathematical communication ability using the RME approach higher than students' mathematical communication ability using problem posing approach?”

1.6. Research Objective

Based on the formulation of the problem above, the objectives of this study are to analyze whether students' mathematical communication ability using the RME approach higher than students' mathematical communication ability using problem posing at SMP Negeri 1 Bandar.

1.7. Research Benefits

It is expected that this research will be used as an informational material in the world of education to improve the quality of teaching and learning outcomes of mathematics. So, based on the above research objectives, the benefits of this research are as follows.

1.7.1. Theoretical Benefits

- a. Increase scientific views and theories related to the Realistic Mathematics Education learning approach and Problem Posing in mathematics.

- b. Material for consideration is using the Realistic Mathematics Education learning approach and the Problem Posing learning approach to improve students' mathematical communication ability.

1.7.2. Practical Benefits

- a. For teachers: can be used as a reference and guide in applying a learning approach that requires students to be more active in participating in learning.
- b. For students: it can be a learning experience that provides a variety of learning and teaching styles that involve students being more active and creative so that students can foster good communication with teachers and other students.
- c. For researchers: can be used as a guideline for future researchers who want to do more research on improving learning outcomes or mathematical abilities using several learning approaches.