

CHAPTER I

INTRODUCTION

1.1. Background

Education is an important part of the development process of a developing country like Indonesia, where education itself is a conscious effort to develop the potential that exists in a person through teaching. Education is also a form of embodiment of a human culture that is dynamic and full of development. As stated by Sastrawijaya (1991), the purpose of education is everything that includes job readiness, problem-solving skills, constructive use of free time, and so on because the expectations of each student are different.

In the implementation of education itself, there is a learning process and learning outcomes. Real education will not be separated from the process of learning and teaching to acquire knowledge. Teaching is no longer an attempt to impart knowledge but also an effort to create an environmental system that teaches students so that teaching objectives can be achieved optimally. This argument is supported in the UU 2003 about National Education System No. 20 Article 3 where national education functions in developing capabilities and forming dignified national character and civilization, to be able to enhance the development of students to create individuals who are faithful, pious, have a noble character, is knowledgeable, capable, creative, physically healthy and spiritually independent, and become citizens who are mobile and responsible. One way to realize the goals of national education is through formal education. In formal education at school, one of the subjects that need more attention in mathematics.

The objectives of learning mathematics in Indonesia, especially at the secondary education level, aim for students to be able to understand mathematical concepts, use patterns as conjectures in solving problems and be able to make generalizations based on existing phenomena or data by using reasoning

properties, communicating ideas, having an attitude of appreciating the usefulness of mathematics in life, having attitudes and behaviors that are in accordance with the values in mathematics (Kemendikbud, 2016). However, if in its development mathematics can go as desired, it will create a quality generation in the future, but business does not always go as expected because it is not uncommon for obstacles to arise from students and the immediate environment or even from mathematics itself. According to the National Council of Teachers of Mathematics (NCTM) (2000: 7), five basic mathematical abilities are standard processes in learning mathematics, namely problem-solving abilities, reasoning abilities, communication skills, connection abilities, and representation capabilities.

The abilities mentioned earlier are abilities in mathematics which are part of the life skills that students must have. One of the mathematical abilities that must be mastered by students is the ability of students to solve mathematical problems as emphasized in the 2013 curriculum. According to Poyla (1973), four important stages must be achieved by students in solving problems, namely understanding the problem, devising a plan, carrying out the plan, and looking back. Through these organized stages, students will obtain optimal results and benefits from problem-solving.

Basically when someone learns mathematics is inseparable from problem-solving, because the success or failure of someone in mathematics stops with the student's ability to solve the problems they face. These problem solvers are not only important when learning mathematics, but also as a companion to other subjects. The importance of problem-solving abilities was also stated by Branca (in Hendriana & Utari, 2017) who said that solving mathematical problems is one of the important goals in learning mathematics and even the process of solving mathematical problems is the heart of mathematics. Therefore, problem-solving is the main focus taught to students at every level of education.

Mathematical problem-solving ability of students in Indonesia is still low. This can be seen from students' learning achievements in mathematics subjects which tend to be lower when compared to other learning materials. This is because some students have the perception that mathematics is difficult to learn,

not fun, and difficult to memorize mathematical formulas (Mustangin et al., 2019; Mustangin et al., 2020; Julaeha et al., 2020).

Several facts state that students' problem-solving skills are still relatively low, among others, research conducted by Musabik et al. (2021) where based on observations made by researchers in class VII in one of the Madrasah Tsanawiyah in Kediri, information was obtained that there were still several problems that occurred in the learning process, such as the lack of students' mathematical problem-solving ability due to the selection of an inappropriate learning model. There is also research conducted by Bernard et al. (2018), on the mathematical problem-solving ability of class IX students at SMPN 1 Cihampelas in understanding the problem, planning a solution, implementing a solution plan, and checking back on all the steps that have been done is considered insufficient with a percentage of 53%.

In line with the results of the several studies above, the low ability of students to solve mathematical problems can also be seen from the results of the Trend In International Mathematics and Science Study (TIMSS) survey. Based on the 2015 TIMSS report, Indonesian students occupy the 45th position out of 50 countries participating in the mathematics test. Out of an average international score of 500, Indonesian students only get an average score of 397 (Mullis et al., 2016). This score shows that the mathematical ability of Indonesian students is at a low level.

The results of the Trend in International Mathematics and Science Study (TIMSS) survey are not much different from those of the Program for International Student Assessment (PISA) survey. Indonesia starting in 2000 has implemented the PISA rating scale. In 2018, Indonesia ranked 72th out of 78 participating countries (OECD, 2019). From the research results, Indonesian students are still not familiar with TIMSS and PISA questions. Students have not been able to solve problems with standardized content if expressed in different ways, so it requires higher abilities. Students are weak in working on problems that require problem-solving, argumentation, and communication skills.

Researcher also found in preliminary investigation in SMP Negeri 35

Medan using observation and diagnostic test that students' problem-solving ability were low. There were students playing games, telling stories with friends, and sleeping while the teacher is teaching. When the initial diagnostic tests (attached) were carried out, students were not able to solve the mathematical problems. Students were not able to identify problems, students were not able to design strategies to solve problems, and transform questions into mathematical language. From 30 students who were given the initial diagnostic test, the students who answered question number 1, mostly answered as done by S8 in Figure 1.1:

$$\begin{array}{l}
 1. \frac{10}{8} = \frac{\cancel{100}}{100} \\
 10 \times 100 = 8x \\
 8x = 10 \times 100 \\
 x = 1000 : 8 \\
 x = 120
 \end{array}$$

Figure 1.1. Answer S8

Based on the indicator of problem-solving ability by Polya (1973) that is used in this research, namely:

1. Understanding the problem
2. Devising a plan
3. Carrying out the plan
4. Looking back

In Figure 1.1, it can be seen that to solve the problem in question number 1, S8 has not been able to understand the elements that are known or asked in the problem (indicator of problem-solving number 1). So, to take the next step of problem-solving such as planning or strategizing a problem (indicator of problem-solving number 2), students are still failed. As a result, the answer given by S8 are not in accordance with the questions (indicator of problem-solving number 3 and 4). Based on the explanation above, S8 has not fulfilled the indicators of problem-solving ability so it can be said that S8's problem-solving ability is low.

Students who answered question number 3, mostly answered as done by S15 in Figure 1.2:

$$3) \begin{array}{l} 24 \text{ orang} \Rightarrow 20 \text{ hari} \\ x \quad \times 15 \text{ hari} \end{array}$$

$$\frac{24}{x} = \frac{20}{15}$$

$$x = \frac{24 \times 20}{15}$$

$$x = 32 \text{ orang}$$
 banyak berencana (bers) 24 orang \rightarrow 24 orang \rightarrow 8 orang

Figure 1.2. Answer S15

In Figure 1.2., it can also be seen that to solve the problem, S15 has not clearly written the problem is in the question (indicator of problem-solving number 1), so that it affects students' ability for planning the mathematical model for the problem (indicator of problem-solving number 2), although S15's answer was correct, but the answer given by S15 are not in accordance with the questions (indicator of problem-solving number 3 and 4). When interviewed, S15 said that he cheated on his friend's answer without asking where he got the result. Based on the explanation above, S15 has not fulfilled the indicators of problem-solving ability so it can be said that S8's problem-solving ability is low.

In addition, many students did not answer at all the problems that is given. When asked why they did not answer, they said that they did not know how to solve it. Based on the results of the diagnostic test, it can be said that the average ability to solve mathematical problems is still relatively low. Where of the 30 students tested, 24 students belong to the low category, 4 students belong to the medium category, and 2 student belongs to the high category. Problem-solving abilities have not been well mastered, there are still many students who have problems working on problem-solving questions, and only a few students have enough problem-solving abilities.

Based on interviews with several seventh-grade students, they said that mathematics is a difficult and dizzying subject. They also said that they find it

difficult to identify and write down what is meant in the problem, especially problems in story form. Furthermore, an interview with Mrs. Sari Cipta Dewi, M.Pd. as the mathematics teacher at SMP Negeri 35 Medan said that to overcome this problem, so far there have been many efforts made by the teacher, but these efforts have not produced maximum results, so the teacher returned to using a conventional teacher-centered model. In line with the observations made by researcher during the lesson, the teacher said that when explaining the topic, many students did not pay attention, such as walking around the class, talking with friends, sleeping, and others.

Therefore, mathematics teachers need to apply learning models that can improve students' mathematical problem-solving abilities. From several learning models, there is an interesting and suitable learning model to be given to students during the teaching and learning process to improve students' mathematical problem-solving abilities, namely the Problem-Based Learning (PBL) model.

The PBL model is one of the learning innovations that involve students in solving a problem through stages that connect the problem with the knowledge or concepts that students already have. According to Sani (2013: 138), problem-based learning will be able to help learners to develop thinking and problem-solving skills, learn adult roles, and become independent learners.

Through problem-based learning, students can not only learn concepts related to the problem but students are also able to learn scientific methods to solve the problem. Thus, the application of the PBL model in learning mathematics is possible to encourage students to have their ideas for independent learning, because this model provides opportunities for students to seek their knowledge so that students will gain experience from learning.

From this description, the researcher will conduct a research entitled “The Effect of Problem-Based Learning Model on Students’ Mathematical Problem-Solving Ability of Class VIII SMP Negeri 35 Medan”.

1.2. Identification of Problem

Based on the description of the background that has been put forward and the result of preliminary investigation in SMP Negeri 35 Medan using observation, interview, and diagnostic test, the following problems can be identified:

1. Students' mathematical problem-solving ability are low, as seen from students who have not been able to plan problem-solving, solve problems and re-check the correctness of results or solutions.
2. Learning conducted by teachers on students' problem-solving abilities is still teacher centered.
3. Students are not active in the learning process and only rely on the knowledge of the teacher.
4. Students think mathematics is a difficult subject.

1.3. Scope of Problem

Based on the background and problem identification above, the researcher limits the subject matter as follows:

1. The learning model to be studied is the Problem-Based Learning (PBL) model.
2. The topic taught using the PBL model is Number Pattern.
3. The variable of this research consists PBL model and mathematical problem-solving ability.

1.4. Formulation of Problem

Based on the limitations of the problem above, it can be formulated that the problem in this research is: Is there an effect from the use of the Problem-Based Learning (PBL) model on the students' mathematical problem-solving abilities of class VIII at SMP Negeri 35 Medan?

1.5. Research Purposes

Based on the formulation of the problem above, the purpose of this research is to find out how the effect of the Problem-Based Learning (PBL) model on students' mathematical problem-solving abilities of class VIII in SMP Negeri 35 Medan.

1.6. Research Benefits

Some of the benefits that researcher expect from this research are as follows:

1.6.1. Theoretical Benefits

Theoretically, this research is expected to contribute to learning mathematics, namely as an addition to existing knowledge or used as additional material in applying mathematics learning models. In this case it can provide extensive knowledge about the use of the Problem-Based Learning (PBL) model in mathematics, and is expected to add insight to teachers regarding the use of the PBL model.

1.6.2. Practical Benefits

1. For schools; as material for consideration in efforts to improve mathematics learning to improve the quality of education.
2. For teachers; as an alternative in the selection of mathematics learning models in improving students' mathematical problem-solving abilities.
3. For student; as a new experience in the learning process and able to have a positive impact on students' mathematical problem-solving abilities.
4. For researcher; in addition to knowledge about writing scientific papers and provision for professional teachers and is useful for completing one of the requirements for obtaining a bachelor of education degree.