

CHAPTER I

INTRODUCTION

1.1 Background

The progress of a nation is influenced by the quality of education from the nation itself because high education can produce quality Human Resources (HR). The education in question is not informal but formal, including the teaching and learning process involving teachers and students at school. This fact indirectly demands diverse human resources, such as the ability to solve problems. The ability to solve problems in education needs to be applied as early as possible. In the current era of globalization, qualified human resources are needed overcome various increasingly complex life problems (Sapitri & Febriani, 2017).

In the era of the Industrial Revolution 4.0, the education system is expected to realize students have skills that can think critically and solve problems, creative and innovative as well as communication and collaboration skills (Yamin & Syahrir, 2020). The 2013 curriculum contains the importance of problem-solving skills which can be seen in the basic competencies of science learning which states that students can be expected to understand the concepts and principles of science and their interrelationships and apply them in solving problems in life (Prastiwi & Nurita, 2018).

The concept of "Merdeka Belajar" answers the problems teachers face in educational practice. Nadiem Makarim said that freedom of learning is freedom of thought. The learning context allows students to gain learning experiences that can provide opportunities to solve problems to master science concepts (Runi, 2021). Students can connect and transform the knowledge they already have with issues that have never been taught in solving problems (Rofiah, Aminah & Sunarno, 2018).

Science learning is a means for students to learn about themselves and the surrounding environment and is needed to meet human needs by solving problems that arise in everyday life (Nirwana & Wilujeng, 2021). The formation of students'

cognitive ability requires a process of solving problems they face in the surrounding environment (Insyasiska *et al.*, 2017). Learners' thinking skills can be developed by enriching meaningful experiences through decision-making and problem-solving related to analyzing, evaluating, and creating (Anderson & Krathwohl, 2001).

Problem-solving ability is a step used in finding the right solution to something that is not yet known and becomes an obstacle and can find strategies to solve problems from the information obtained to find solutions to problems and can even evaluate the correctness of problem solutions (Butterworth & Geoff, 2013). Malau (2017) argues that problem-solving ability is the ability to solve problems with the right method or procedure. Problem-solving ability is an important part of learning (Heller *et al.*, 1992; Afriana *et al.*, 2016). The opinion of several experts can be stated that problem-solving ability needs to be improved so that students' ability can develop in solving problems in line with the opinion that problem-solving skills can be improved by problem-solving-oriented learning and inviting students to solve problems according to the stages of problem-solving.

Science subjects are one of the subjects that can develop students' ability to solve problems because science subjects present problems related to the real life of students so that later students can find solutions to solve problems. Several aspects of competence must be owned and mastered by students in science subjects, including aspects of scientific work, aspects of living things and life processes, aspects of matter and its properties, and aspects of life processes (Ministry of National Education, 2003; Wahyuni *et al.*, 2017). Problem-solving skills are very important in science learning, where learning will be more meaningful because problem-solving activities require students to find the concepts in learning themselves. The application of problem-solving skills provides direct experience for students which can increase the ability of students to construct, understand and apply concepts that have been learned (Lampung, 2017; Sumiantari *et al.*, 2019; Napitupulu *et al.*, 2019).

Environmental pollution is one of the materials in science learning. Environmental pollution is a study that is most often encountered in everyday life because human life cannot be separated from the surrounding environment. To

enhance the learning process, environmental pollution issues that affect students will be presented to them in the form of images (Dila* & Suyanto, 2023). This material discusses the causes, impacts, and human efforts in overcoming environmental pollution problems. Students are expected to be able to solve problems in the surrounding environment and environmental management efforts to reduce the impact and pollution of the environment (Dindin, Abdul, Muiz, 2013). Environmental pollution material in the learning aspect can be achieved, requires the ability of students to seek information, process information, make decisions, and solve problems (Rahayu et al., 2021).

Teacher-centered learning causes a lack of student involvement in the learning process so students get the material passively and are less skilled in solving problems (Faqiroh, 2020; Sihalohe et al., 2017). Teachers still position themselves as the subject of learning while students are the object of learning, in other words, learning is still teacher-centered. (Alberida *et al.*, 2018) stated that the learning process should be more focused on student-centered which helps students know their ability, especially in problem-solving.

The results of interviews with science teachers at SMP Negeri 27 Medan found that teachers have never applied the problem-solving learning model during learning because it takes a lot of time during learning. Students have never been faced with problem-solving problems by providing steps to solve the problem. Teachers present problems more dominantly using the lecture method during learning and giving assignments to students. This can be seen from the results of observations of teachers during learning, the teacher conveys material and students only play a role in receiving information without being guided to find their concepts and given assignments so that students' problem-solving skills have not been trained. Learning success is more focused on understanding and completing the material taught by the teacher. The teacher-centered learning process results in less-than-optimal learning. Teachers also said that students' interest in learning is still low so problem-solving skills are also low because only smart students want to take part in learning.

In addition to interviews, researchers also gave tests to students to see students' problem-solving ability. Based on the test given to seventh-grade students

at SMP N 27 Medan, the average score of students is low. The test was given to 32 students in the form of an essay problem-solving test. The test results show that 43% of students' problem-solving ability can define problems, 47% can describe problems, 32% can plan problem-solving, 25% can carry out problem-solving and 38% can evaluate problems. The test results show that students' problem-solving ability is lower when planning and implementing problem-solving. Learners who do not reach the Minimum Completion Criteria (KKM) value are more than those who reach the KKM value, while the KKM value that must be achieved by students is 72.

Interviews were also conducted with students, based on the results of interviews students stated that they did not understand how to answer the questions that had been given and students had never been faced with problems to solve problems. Learners consider science lessons difficult and boring because there are more notes and assignments. Learners also stated that learning is more theory than practice during learning.

One of the effective learning models to train students' problem-solving skills by implementing problem-based learning (PBL). The PBL model is designed to help learners develop the ability to solve problems in a structured way problems in real life. Problem-solving can be done through the stages of identifying existing problems, describing problems, making problem-solving plans, implementing problem-solving solving, and the final stage evaluating the problem so that it can conclude the problems that occur. Student activities will be more active and can foster students' interest in learning science through experiments because the PBL model is student-centered. This opinion is supported by Sihombing & Sinaga, 2018; Khusna et al., 2018 which states that PBL learning introduces students to real-world problems and encourages them to explore them, and find out about these problems so that students can draw their own conclusions about the situation that is happening and finally students can find solutions to these problems.

Problem-based learning is learning that provides real and meaningful learning through problem-solving and can be used to solve problems (Arends, 2008). The PBL model is active learning that can require students to have higher-order thinking skills such as critical thinking, problem-solving skills, and creative

thinking which allows students to become concerned and determine problem-solving skills (Royantoro et al., 2018; Sahyar et al., 2017). The PBL learning model that utilizes real-world (contextual) problems provides opportunities for students to hone, grow, and improve problem-solving skills so that they can be applied in dealing with problems in everyday life. (Simatupang & Ionita, 2020; Sulastrri & Pertiwi, 2020; Suratno et al., 2020). PBL challenges learners to find solutions to real-world problems faced in their lives both at school and in the community.

Problem-based learning teaches learners to think critically in responding to a problem and formulating a solution to the problem. (Gök & Boncukçu, 2023). Menurut Sagala & Simanjuntak, (2017) PBL is designed for students to learn to be independent learners, work together to solve problems, and learn to find out, not to be told.

The application of the PBL model can develop thinking skills, problem-solving skills, self-control, learning motivation, and learning outcomes. In this learning process, students learn to use interactive concepts and processes to evaluate what they know (Insani, 2018). Nirwana & Wilujeng (2021) concluded that there was a significant effect of the problem-based learning model on critical thinking skills with a magnitude of influence of 1.91 or in the high category.

Based on the description of the problem above, the researcher is motivated to raise a research title **"The Effect of Problem-Based Learning Model (PBL) on Problem-Solving Ability in Science Material in Class VII"**.

1.2 Identification of Problem

As explained in the background of the problem above. So what becomes the problem identification in the research is:

- 1) The learning process is still teacher-oriented (teacher-centered)
- 2) The learning model used by the teacher is less varied so students are less interested in learning science
- 3) Students' interest in learning science is still low
- 4) Learners are less actively involved in learning
- 5) The ability of students to solve science problems is still low

1.3 The Problem of Formulation

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

- 1) Is there an effect of using the PBL model on students' problem-solving ability in environment pollution material in class VII?
- 2) How does the problem-solving ability of students increase using the PBL model in environment pollution material in class VII?
- 3) How is the improvement of students' problem-solving ability using conventional learning on environmental pollution material in class VII?

1.4 Problem Limitations

The limitations of the problem that will be examined are:

- 1) The learning used applies problem-based learning models and conventional learning models.
- 2) The research subjects were only limited to seventh-grade students of SMP Negeri 27 Medan.
- 3) Material subject learning about environmental pollution
- 4) Students' problem-solving ability is measured through science questions using a problem-solving ability test with the stages of identifying problems, determining problem objectives, planning problem-solving, carrying out problem-solving, and evaluating again.

1.5 Research Objectives

This research aims to :

- 1) Knowing the effect of the PBL model on students' problem-solving ability taught on science material in grade VII junior high school.
- 2) Knowing the increase in students' problem-solving ability using the PBL model in experimental classes on science material in grade VII junior high school?
- 3) Knowing the increase in students' problem-solving ability using the conventional learning in science material in grade VII junior high school?

1.6 Benefit of Research

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

1) For students

The results of this study are expected to provide a direct experience so that students get used to thinking in solving problems.

2) For teachers

The results of this study can be used as an alternative learning model that can be applied to improve students' problem-solving ability.

3) For school

The research results are expected to improve students' problem-solving ability in schools.

4) For researchers

The research results are expected to describe the learning process based on problems applied in schools and students' higher-order thinking skills.

