

CHAPTER I INTRODUCTION

1.1 Background

Education in Indonesian Regulation No. 20 of 2003 is a deliberate and planned endeavor to create a learning environment and learning process. Students actively cultivate their potential and possess the religious-spiritual strength, self-discipline, personality, intelligence, good character, and qualities necessary for society, nation, and state. The national education system is the core component of education that is integrated to fulfill national education objectives. One element of the national education system is the curriculum.

A curriculum, as defined by Indonesian Regulation No. 20 of 2003, is a set of plans and arrangements addressing the objectives, content, and learning resources, as well as the method utilized to perform learning activities to attain certain educational goals. The most recent Indonesian curriculum is the revised version of *Kurikulum 2013 revisi 2017*, often known as *K13*.

There are three essential things in the implementation of K13, namely, strengthening character education, strengthening literacy, and 21st-century education. Of these three essential things, strengthening literacy culture is one of the highlights (Astuti, 2018)

Literacy is defined as competencies or skills in reading and writing. Literacy comes from the Latin "littera" (letters), whose meaning involves mastering writing systems and their conventions. However, literacy is primarily concerned with language and its use, while the written language system is secondary (Haryadi, Arifudin, Purwo, et al., 2018). One part of literacy is mathematical literacy.

Mathematical literacy is the ability to formulate, employ, and interpret mathematics in a variety of circumstances. Mathematical literacy is the use of mathematical concepts, techniques, facts, and instruments to describe, explain, and predict occurrences. Mathematical literacy enables individuals to recognize the role that mathematics plays in

the world and to make the reasoned judgments and decisions required of constructive, active, and reflective citizens (OECD, 2019).

Mathematical literacy is the ability to understand and utilize elementary mathematics in everyday life. Mathematical literacy is more than the execution of procedures; it entails a knowledge base as well as the ability and confidence to apply that information in the real world (Ojose, 2011). Following this, Stacey & Turner (2015) defined mathematical literacy as the capacity to use mathematical material (concepts, facts, methods, and instruments) in daily life.

The seven components of mathematical literacy are (1) communication, (2) mathematizing, (3) representation, (4) reasoning and argument, (5) designing problem-solving techniques, (6) using symbols, formal and technical language, and operations, and (7) employing mathematical tools. To be mathematically literate, individuals must possess all of these skills to vary degrees, as well as confidence in their ability to utilize mathematics and comfort with quantitative concepts (OECD, 2019).

Mathematical literacy starts from realistic problems, categorized into context and content. The process of mathematical literacy begins with the identification of genuine problems and their formulation based on the underlying concept and intrinsic link. After getting a suitable mathematical form of the problem, the following stage is to apply certain mathematical techniques to produce mathematical results and then interpret those results back into the original difficulties (Oktiningrum & Hartono, 2016).

Literacy questions in the PISA study require reasoning and problem-solving skills that emphasize various problems and situations in everyday life. The ability tested in PISA comprises process components: understanding and solving problems, reasoning, and communication (Khikmiyah & Midjan, 2017).

According to PISA results in 2018, Indonesia ranks 72 out of 78 countries in mathematical literacy. It concludes that students' mathematical literacy is still deficient in Indonesia. It indicates that Indonesian students' mathematical literacy needs to be improved.

Based on the interview results with one of the mathematics teachers at SMP Negeri 3 Medan, it was stated that students still lacked understanding of story problems, were less precise in identifying the information contained in the questions, and had difficulty in making mathematical models. Students' abilities in problem-solving and mathematical calculations are not maximal.

In addition, based on observations, it can be seen that learning mathematics in the classroom does not explore students' mathematical literacy skills but only transfers knowledge. The problem given to students is also not much different from the example of the teacher's explanation, so students are less creative in solving high-level problems. Therefore, student learning outcomes, especially mathematical literacy skills, are challenging to achieve optimally

Based on these two things, it is known that there are some students' abilities that are still low. These abilities are the basic abilities of mathematical literacy. In addition, the learning process does not support improving students' mathematical literacy skills. So it can be concluded that the mathematical literacy ability of students at SMP Negeri 3 Medan is still low.

Mathematical literacy is influenced by several factors, such as personal, environmental, and instructional factors. Instructional factors include intensity, quality, and teaching methods. Teachers' teaching methods positively impact the achievement of students' mathematical literacy, so it can be said that teachers play an essential role in student learning outcomes and mathematical literacy (Masdiansyah & Rahmawati, 2014). Therefore, the teacher's teaching method must be able to improve students' mathematical literacy.

One way to improve students' mathematical literacy is to innovate learning models; the learning process has to focus on students' learning process and the stages of problem-solving (Nasrulloh & Nurlia, 2021).

According to Wardono et al. (2018), one effort to improve students' mathematical literacy is to innovate the learning of mathematics and develop the instrument of learning assessment. Innovation in learning mathematics is done by choosing the learning method according to

the material and characteristics of students. One mathematics learning that can positively impact students' literacy is Problem-Based Learning.

In line with Masjaya & Wardono (2018), mathematics learning for students must be designed in such a way as to provide good opportunities for students to train, develop, and improve mathematical literacy skills as an essential part of improving future outcomes. One of the learning models that can improve students' mathematical literacy skills is a problem-based learning model.

Astuti (2018) stated that one of the recommended learning models in the *Kurikulum 2013* is Problem Based Learning. Problem-Based learning trains students to solve real problems that are open and unstructured to develop problem-solving skills and, at the same time, build students' new knowledge.

The Problem-Based Learning (PBL) model is a learning model with student learning methods to authentic and meaningful challenges to students who serve as the basis for students to examine and investigate to grow their knowledge, obtain new abilities, and increase their motivation. High and inquisitive standards might inspire kids' confidence and increase their independence. PBL is a model of student-centered learning. PBL is a form of education that enables students to undertake research, combine theory and practice, and apply knowledge and skills to discover solutions to issues (Wardono et al., 2018).

Problem-based learning is a type of education that employs real-world situations as a context for enhancing students' critical thinking and problem-solving skills and acquiring concepts through studying course materials. Students should produce an immediate response to a challenge demanding logical intelligence, boldness, and an active solution in the real world (Mulyanto et al., 2018).

The problem-based learning model helps students get information already in their minds and devise their basic and complex knowledge (Malmia et al., 2019). Problem-based learning provides students with the knowledge and enhances their problem-solving, critical and creative thinking, lifelong learning, communication skills, teamwork, flexibility, and self-evaluation (Anazifa & Djukri, 2017).

The problem-Based Learning model has been proven to improve several variables of mathematical ability, namely: creative thinking ability, mathematical representation ability, mathematical communication ability, and mathematical understanding ability (Rinaldi & Afriansyah, 2019).

Problem-based learning as a paradigm of education that cultivates problem-solving skills is very conducive to the development of mathematical literacy. Students' capacity to gain mathematical literacy is measured by their ability to solve everyday issues that frequently arise (Fery et al., 2017).

The problem-Based Learning model improves students' mathematical literacy because it enhances the skills used in solving problems. Problem-Based learning also helps students solve problems and improve their thinking skills by constructing actual situations or relating concepts to be learned (Fery et al., 2017).

According to (Junianto & Wijaya, 2019), Problem-Based Learning impacts mathematical learning and improves students' understanding and skills to use concepts in daily life. Understanding and skills to use the concept in daily life are one of the mathematical literacy aspects, namely, mathematizing and formulating situations mathematically.

In line with that, Rattanatumma (2016) also stated that PBL improves students' mathematics learning achievement and problem-solving abilities. Problem-solving abilities contain three of seven components in mathematical literacy: mathematizing, representation, reasoning, and argument devising strategies for problem-solving.

Wardono et al. (2016) also stated that PBL could encourage creative thinking, mathematical competence, and tolerance. Mathematizing, developing problem-solving strategies, reasoning, argumentation, and communicating are key mathematical literacy skills that should be incorporated into creative thinking. The relationship between Problem Based Learning (PBL) and mathematical literacy is because mathematical literacy can improve the mathematical competencies of students and the fundamental capabilities in mathematical literacy.

Based on the background I described above, the researcher was interested in conducting a study entitled "**The Effect of Problem Based Learning Model on Student's Mathematical Literacy Ability at SMP Negeri 3 Medan**".

1.2 Problem Identification

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

1. Students' mathematical literacy at SMP Negeri 3 is still low.
2. The Mathematics Learning process does not support the improvement of students' mathematical literacy.

1.3 Problem Limitation

Based on the background and identification of the problem above, it is necessary to limit the problem so that this research is more centered. This research focuses on the effect of problem-based learning models on mathematical literacy skills at SMP Negeri 3 Medan in class VII students.

1.4 Problem Formulation

Based on the identification of the problem above, the problem is formulated as follows, Is there an increase in students' mathematical literacy after the problem-based learning model is applied?

1.5 Research Objectives

This study aims to determine the level of students' mathematical literacy skills before and after the problem-based learning model is applied to students.

1.6 Research Benefit

1. For students,

Students may improve their mathematical literacy skills by implementing problem-based learning models in this study.

2. For teachers,

Teachers and prospective mathematics teachers may consider using problem-based learning models to improve students' mathematical literacy skills.

3. For researchers,

To increase the researcher's insight into the effect of the problem-based learning model on students' mathematical literacy skills, this study's result may be used as a reference for further research.

4. For the school,

This research may improve the quality of mathematics learning at SMP Negeri 3 Medan by increasing students' mathematical literacy skills and teachers' ability to implement problem-based learning.

5. For the following research,

The results of this study are expected to motivate other researchers to conduct more in-depth research on things that have not been reached in this research, both related to the learning process and effectiveness and evaluation to enrich the repertoire of knowledge.

1.7 Operational Definitions

1. Problem-based Learning

Problem-based learning is a getting-to-know model that uses problems in day-to-day life as a context for college students to improve necessary thinking and problem-solving abilities and acquire concepts from gaining knowledge of materials.

2. Mathematical literacy

Mathematical literacy is the ability to formulate, employ, and interpret mathematics in a variety of circumstances. Mathematical literacy is the use of mathematical concepts, techniques, facts, and instruments to describe, explain, and predict phenomena.

