

Description of the Importance of Culturing Mathematics Literature in Learning to Develop High- Level Thinking Skills

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ABSTRACT

This research aims to describe the importance of cultivating mathematical literacy in learning to develop higher-order thinking skills. The study is qualitative research with a descriptive approach. The research instrument in this study was a teacher response questionnaire on the importance of learning mathematical literacy and higher-order thinking skills. The results showed that (1) students' ability to understand reading in mathematical texts, pictures/diagrams and data tabulation was still lacking. Students still need to be helped to understand reading whether it is in the form of picture text or data tabulation, (2) in the learning process, the teacher has not fully included mathematical literacy content even though mathematical literacy is one of the learning objectives, this is due to the lack of learning media that supports developing literacy. Students' mathematics, (3) students' potential if they are accustomed to mathematical literacy activities. Students' thinking skills will develop because they will be used to analyzing and reasoning when solving problems. However, maximum effort is needed to familiarize literacy activities in learning, (4) the potential of students towards higher-order thinking skills in learning mathematics is still lacking, even though higher-order thinking skills are the demands of 21st-century learning, (5) 21st-century need to develop skills students' high-level thinking if the learning process is familiarized with mathematical literacy because mathematical literacy will help students to practice their reasoning skills and their ability to analyze. Students can hone their higher-order thinking skills in mathematical literacy learning activities.

Keywords: *Mathematical Literacy, Higher Order Thinking Ability.*

1. INTRODUCTION

The rapid development in the field of information and communication technology is based on the development of mathematics. Therefore, to master and utilize technology in the future requires a strong mastery of mathematics from an early age. Mathematics is a universal science that underlies the development of modern technology and has an essential role in various disciplines and advances the power of human thought.

Realizing the importance of mastery of mathematics, then in the Republic of Indonesia Law no. 20 of 2003 concerning the National Education System (National Education System), Article 37

emphasizes that mathematics is one of the compulsory subjects for students at the primary and secondary education levels. In line with the Act, states that elementary and secondary education mathematics subjects are school mathematics. Therefore, the mathematics subjects given in primary and secondary education are also intended to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to work together. This ability is a competency needed by students to have the ability to obtain, manage, and utilize information to survive in an ever-changing, uncertain, and competitive situation.

Science in the present century has developed in accordance with the demands of life, which are also

evolving. One of the efforts to face the 21st-century needs to develop literacy skills or abilities to meet today's life's challenges. Literacy is an ability or skill in reading, mathematics, and science. In learning, especially learning mathematics, it is hoped that the ability of students not only to count but also to be able to use mathematics in solving problems in everyday life.

The low mathematical literacy ability of students in Indonesia needs attention from all parties. Based on 2018 TIMSS data, students in Indonesia were only able to achieve a score of 397 out of an international average score of 500 [5]. PISA stated that students' mathematical literacy skills in Indonesia were ranked 63 out of 70 countries. In implementing the 2013 curriculum, literacy is very important to be applied from an early age. The Ministry of Education and Culture has activated the National Literacy Movement (GLN) as part of the Minister of Education and Culture Regulation Number 23 of 2015 concerning the Growth of Character. One form of literacy that is integrated into the learning content is mathematical literacy.

Mathematical literacy plays a role in training students to have the ability to analyze, give reasons and be able to communicate creative solutions to problems in various situations and contexts [4]. The problem-solving in question is not limited to solving routine mathematical problems but instead finding solutions to contextual problems faced daily. Good problems can stimulate students' knowledge in finding knowledge, practice perseverance and creativity in finding appropriate problem-solving strategies [8]. Students who have mathematical literacy will formulate, use, and interpret mathematics in various contexts. Therefore, this ability is crucial to be developed from an early age, including at elementary school age.

Students who have good mathematical literacy skills must be sensitive to mathematical concepts relevant to the problems they face [2]. This awareness then develops on how to formulate the problem into its mathematical form and then solve it. This process includes exploring, connecting, formulating, determining, reasoning, and other mathematical thinking. The thinking process in mathematical literacy involves higher-order thinking skills. This thinking process can be categorized into 3 main processes, namely formulating, using, and interpreting.

Students' high mathematical literacy ability will affect their higher-order thinking ability [3]. Higher-order thinking ability is a thinking process of students at a higher cognitive level developed from

various cognitive concepts and methods and taxonomies of learning such as problem-solving methods, Bloom's taxonomy, and taxonomies of learning, teaching, and assessment. These high-order thinking skills include problem-solving abilities, creative thinking skills, critical thinking, argumentation skills, and decision-making abilities [7].

High Order Thinking occurs when students are involved with what they know in such a way as to change it, meaning that students can change or create the knowledge they know and produce something new. Through high order thinking, students will be able to distinguish ideas and clearly, argue well, solve problems, construct explanations, hypothesize and understand complex things more clearly. This ability clearly shows how students reason. Similar to literacy, mathematical literacy skills, and high order thinking skills are limited to numeracy skills and how to apply mathematics in everyday life to solve a problem; how to communicate it, thus it can be seen how the mathematical thinking process of students. Therefore, mathematical literacy can relate to high-order thinking skills [1].

Learning activities and evaluations should be HOTS-oriented; the learning process applied must be a forum for students to develop their thinking skills. In addition, as an evaluation material for the knowledge possessed by students.

However, no research has analyzed the importance of cultivating mathematical literacy in developing students' higher-order thinking skills. Therefore, it is necessary to develop mathematical literacy-oriented learning to facilitate students' mathematics teaching and learning activities in schools and develop students' higher-order thinking skills.

2. RESEARCH METHOD

This study uses a qualitative research method through a descriptive approach. This research emphasizes collecting and analyzing information about the importance of cultivating mathematical literacy in learning to develop higher-order thinking skills. The determination of the subject in this study was purposively carried out at SMPN 2 Barombong in the even semester of the 2019/2020 academic year. The number of subjects in this study was 3 teachers consisting of mathematics subject teachers. The main instrument in this research is the teacher's response questionnaire on the importance of cultivating mathematical literacy in learning to develop higher-order thinking skills. Testing the validity of the data is

done by triangulation, namely technical triangulation. Technical triangulation is done by using several techniques in collecting data.

The analytical technique used in this study is the Analysis Interactive technique, a qualitative data analysis technique consisting of three activity flows, namely data reduction, data presentation, and conclusion drawing/verification that occur simultaneously.

3. RESULTS AND DISCUSSION

This section explains the research results and discusses the importance of cultivating mathematical literacy in learning to develop higher-order thinking skills. The teacher's response questionnaire on the importance of cultivating mathematical literacy in learning to develop higher-order thinking skills was used to verify, obtain, and triangulate research data. The research results are presented as follows:

MN subject

- (1) The ability of students to understand mathematics text reading is still lacking; students are usually lazy to read questions in the form of text.
- (2) Students tend to prefer if the questions given are pictures/diagrams, but students still need to be taught how to read images/graphs.
- (3) Students are sometimes confused with data tabulation; students cannot understand the meaning of the data.
- (4) The subject has not included mathematical literacy content in learning but is already planning to include mathematical literacy content in learning.
- (5) The potential of students, if they are accustomed to mathematical literacy activities, will be good and effective.
- (6) Students' higher-order thinking skills are still lacking due to the lack of students' interest in learning mathematics.
- (7) It is possible that students' high-order thinking skills can be developed in mathematical literacy activities.

HI subject

- (1) The ability of students to understand mathematics text reading is quite understandable if there is an example explanation.
- (2) Students are usually only glued to the picture or diagram but do not understand the meaning of the diagram later, after being explained, they will understand a little

- (3) Data tabulation usually students are confused about the numbers in the table, after being explained they will understand
- (4) The subject has included mathematical literacy content in learning
- (5) The potential of students, if they are accustomed to mathematical literacy activities, is quite good
- (6) Students' high-order thinking skills are still less supportive, usually among 36 students, which can be approximately 5 students
- (7) Allows for the development of high-order thinking skills of students in mathematical literacy activities

NF Subject

- (1) The ability of students to understand mathematics text reading is still lacking.
- (2) Pictures or diagrams, students can present data in a simple and easy to understand form.
- (3) Students do not understand data tabulation.
- (4) Subjects have not included mathematical literacy content in learning
- (5) The potential of students, if they are accustomed to mathematical literacy activities, will make it easier for students to understand mathematics learning
- (6) Students' higher-order thinking skills are still lacking
- (7) It is possible to develop high-level thinking skills of students in mathematical literacy activities because with literacy, students can use many ways to solve problems.

Description of the Importance of Cultivating Mathematical Literacy in Learning to Develop Higher Order Thinking Skills

Based on the information obtained from the MN subject, it can be seen that the ability of students to understand mathematics text readings is still lacking; students are usually lazy to read questions in the form of text. Students tend to prefer if the questions given are pictures/diagrams, but students still need to be taught how to read images/graphs. Students are sometimes confused with data tabulation; students cannot understand the meaning of the data. This is because the MN subject has not included mathematical literacy content in learning even though mathematical literacy is one of the learning objectives. Students are not familiar with questions that require high reasoning so that students' high-order thinking skills are lacking.

In contrast to the subject of IR, which has included mathematical literacy content in learning, so that the ability of students to understand mathematical reading texts, diagrams/pictures, and data tabulations is quite understandable. However, it still requires an explanation from the teacher.

According to the subject of NF, students' higher-order thinking skills are still lacking in agreement with the subject of IR and the subject of MN. One of the factors causing the lack of students' higher-order thinking skills is the lack of students' interest in learning mathematics. And the teacher has not included mathematical literacy content in learning. In addition, the teacher does not familiarize students with solving questions that train students' higher-order thinking skills. Students are only accustomed to solving problems that do not require reasoning.

The subject of MN stated that it is possible to develop students' high-order thinking skills in mathematical literacy activities. This agrees with the NF subject and the HI subject. By cultivating mathematical literacy, students will develop higher-order thinking skills.

Cultivating mathematical literacy in learning will train students to formulate, use, and explain mathematics in various contexts. Students will be accustomed to reasoning so that students' ability in higher-order thinking will grow and develop.

Mathematical literacy is an individual's ability to formulate, use and explain mathematics in various contexts. This includes mathematical reasoning and utilizing concepts, procedures, facts, and mathematical tools to describe, explain and predict events. This guides students to recognize the role of mathematics in life, make good judgments, and make constructive and reflective decisions. The above opinion [6] defines mathematical literacy as knowing and applying basic mathematics in everyday life. The mathematization process begins with a real problem. Students try to identify the problem and its relation to mathematics and form it into a mathematical concept to be solved, and the solution is returned to the real context.

Higher-order thinking skills occur when students can change or create the knowledge they know and produce something new. Through high-order thinking skills, students will be able to distinguish ideas or ideas clearly, argue well, solve problems, construct explanations, hypothesize, and understand complex things more clearly, where this ability clearly shows how students reason. Like literacy, mathematical literacy skills and higher-order thinking skills are limited to numeracy skills and how

to apply mathematics in everyday life to solve a problem and communicate it. Thus, it can be seen how the mathematical thinking process of students.

4. CONCLUSION

Based on the results of the study, it can be concluded that:

1. The ability of students to understand reading in the form of mathematical texts, pictures/diagrams, and data tabulation is still lacking. Students still need to be helped to understand the task, whether it is in the form of picture text or data tabulation,
2. In the learning process, the teacher has not fully included the content of mathematical literacy even though mathematical literacy is one of the learning objectives; this is due to the lack of learning media that supports students' mathematical literacy,
3. If they are accustomed to mathematical literacy activities, potential students' thinking skills will develop because they will be accustomed to analyzing and reasoning when solving problems. However, more efforts are needed to get used to literacy activities in learning,
4. The potential of students towards higher-order thinking skills in learning mathematics is still lacking, even though higher-order thinking skills are the demands of 21st-century learning,
5. It is possible to develop students' higher-order thinking skills if the learning process is familiarized with mathematical literacy because mathematical literacy will help students practice their reasoning skills and ability to analyze. Students can hone their higher-order thinking skills in mathematical literacy learning activities.

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